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FINAL RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT FOR THE CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR SOILD WASTE MANAGEMENT UNIT 16 (SWMU 16) NSA CRANE IN
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TETRA TECH NUS INC

Final
Resource Conservation and Recovery Act Facility Investigation Report
for the
Cast High Explosives Fill/B146 Incinerator (SWMU 16)

Naval Support Activity Crane
Crane, Indiana

Naval Facilities Engineering Command
Mid-Atlantic

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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT FOR CAST HIGH EXPLOSIVES FILL/ B146 INCINERATOR (SWMU 16)

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CRANE, INDIANA

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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LIST OF ACRONYMS

°F	degrees Fahrenheit
2ADNT	2-amino-4,6-dinitrotoluene
4ADNT	4-amino-2,6-dinitrotoluene
ACE	Army Corp of Engineers
ACH	Air changes per hour
AET	Apparent Effects Threshold
Ah	aryl hydrocarbon
ALM	Adult Lead Model
amsl	above mean sea level
APE	Ammunition Peculiar Equipment
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	area use factor
AVS	acid volatile sulfide
AWQC	Ambient Water Quality Criteria
B&R Environmental	Brown and Root Environmental
BAF	Bioaccumulation Factor
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
brp	below reference point
CA EPA	California Environmental Protection Agency
CDI	Chronic Daily Intake
CEC	cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
Cm/s	centimeters per second
CMS	Corrective Measures Study
COC	Chemicals of Concern
COPC	Chemicals of Potential Concern
CSFs	Cancer Slope Factors
CSM	Conceptual Site Model
CTE	Central Tendency Exposure
CTO	Contract Task Order
DCA	dichloroethane

DCE	dichloroethene
DI	deionized
DO	dissolved oxygen
DPT	Direct push technology
EcoSSL	Ecological Soil Screening Level
EDQL	Environmental Data Quality Level
EEQ	Ecological Effect Quotient
EMR	Environmental Monitoring Reports
EP	Extraction Procedure
EPC	Exposure Point Concentration
EPD	Environmental Protection Department
ERA	Ecological Risk Assessment
ESL	Ecological Screening Level
EU	Exposure Unit
FOL	Field Operations Leader
FTMR	Field Task Modification Report
gpm	gallons per minute
ha	hectares
HASP	Health and Safety Plan
HBX	high blast explosive
HEAST	Health Effects Assessment Summary Tables
Hg	mercury
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HQ	Hazard Quotient
HSA	Hollow Stem Auger
IA	Installation Assessment
IAC	Indiana Administrative Code
ICR	Incremental Cancer Risk
ID	Inside diameter
IDEM	Indiana Department of Environmental Management
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	Incremental lifetime cancer risk
IRIS	Integrated Risk Information System

Kd	soil water partition coefficient
Kh	horizontal hydraulic conductivity
Koc	organic matter water partition coefficient
LEL	lower exposure limit
LOAEL	Lowest Observed Adverse Effects Level
LOEC	Lowest Observed Effects Concentration
MATC	Maximum Acceptable Toxicant Concentration
MCL	Maximum Contaminant Level
MEQ	milliequivalent
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliter
MRL	minimum risk level
MS	matrix spike
MSD	matrix spike duplicate
NAD27	1927 North American Datum
NAD83	1983 North American Vertical Datum
NAVD88	1988 North American Vertical Datum
NAVFACEFDSOUTH	Naval Facilities Engineering Field Division South
NCEA	National Center for Environmental Assessment
NECC	nutrient and energy cycling check value
NEESA	Naval Energy and Environmental Support Agency
ng/kg	nanogram per kilogram
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Observable Adverse Effects Level
NOEC	No Observed Effects Concentration
NSWC	Naval Surface Warfare Center
NTU	nephelometric turbidity unit
NSWC	Naval Surface Warfare Center
OD	outside diameter
OPPTS	Office of Prevention, Pesticides, and Toxic Substances
ORD	Office of Research and Development
ORNL	Oak Ridge National Laboratory
ORP	oxidation-reduction potential
OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon

PAHs	Polycyclic Aromatic Hydrocarbons
PCA	tetrachloroethane
PCB	polychlorinated biphenyl
PEC	Probable Effects Concentration
PEF	Particulate Emission Factor
PID	photoionization detector
Plz	Lower Pennsylvanian water-bearing zone
Pmz	Pennsylvanian middle water-bearing zone
PPE	personal protective equipment
Ppm	parts per million
PPRTV	Provisional Peer Reviewed Toxicity Value
PRG	Preliminary Remediation Goal
Puz	Upper Pennsylvanian water-bearing zone
PVC	polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAGS	Risk Assessment Guidance for Superfund
RBCs	Risk-Based Concentrations
RBTL	Risk-Based Target Level
RCRA	Resource Conservation and Recovery Act
RD	reductive chlorination
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RfDs	Reference Doses
RFI	RCRA Facility Investigation
RISC	Risk Integrated System of Closure
RME	Reasonable Maximum Exposure
RPD	relative percent difference
RQD	Rock Quality Designation
SCV	secondary chronic value
SDWA	Safe Drinking Water Act
SEL	Severe Effects Level
SEM	simultaneously extracted metal
SERA	Screening Ecological Risk Assessment
SIM	selected ion monitoring
SMDP	scientific management decision point
SOP	standard operating procedure

SQG	Soil Quality Guideline
SRA	screening risk assessment
SSLs	Soil Screening Levels
S.U.	standard Units
SV	screening value
SVOCs	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
TBC	To be considered
TCA	trichloroethane
TCDD	tetrachlorodibenzo-p-dioxin
TCE	trichloroethylene
TCMS	Turkey Creek mainstream
TEC	Threshold Effects Concentration
TEL	Threshold Effects Level
TEQs	Toxic Equivalency Concentrations
TNT	2,4,6-trinitrotoluene
TOC	Total organic carbon
TOM	Task Order Manager
TRV	Toxicity Reference Value
TRW	Technical Review Workgroup
TtNUS	Tetra Tech NUS, Inc.
µm	micrometer
U.S. EPA	U.S. Environmental Protection Agency
UCL	Upper 95 Percent Confidence Limit
µg/dL	microgram per deciliter
µg/kg	microgram per kilogram
µg/L	microgram per liter
µmo/g	micromoles per gram
USACE	United States Army Corp of Engineers
USCS	Unified Soil Classification System
UTL	upper tolerance limit
VDEQ	Virginia Department of Environmental Quality
VF	volatilization factor
VOC	volatile organic compound
VOCs	Volatile Organic Compounds
WES	Waterways Experiment Station

WQC	Water Quality Criteria
WQS	Water Quality Standards

EXECUTIVE SUMMARY

This report documents the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) for Solid Waste Management Unit (SWMU) 16, Cast High Explosives Fill/B146 Incinerator, located at the Naval Surface Warfare Center (NSWC), Crane, Indiana. Tetra Tech NUS, Inc. (TtNUS) prepared this report for the Department of the Navy (Navy) Naval Facilities Engineering Field Division South (NAVFACEFD South). This RFI was initiated under Contract Task Order (CTO) 0343, Comprehensive Long-Term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888 and was completed under CTO F277.

PURPOSE OF RFI REPORT

The report summarizes RFI fieldwork (Rounds 1, 2, and 3) conducted from February 2003 through January 2004, describes the nature and extent of contamination, presents a conceptual site model (CSM) of contamination transport and attenuation, and the results of baseline human health and ecological risk assessments. Recommendations for future actions are provided. The initial SWMU 16 RFI fieldwork (Round 1) was conducted in accordance with the Approved Quality Assurance Project Plan (QAPP) for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19) RFI (TtNUS, 2003a).

SWMU 16 Round 1 fieldwork was conducted from February through May 2003. The results of the Round 1 sampling indicated that further sampling would be required to delineate contamination; therefore, an addendum to the approved QAPP (TtNUS, 2003a) was developed to conduct a second round of sampling at SWMU 16 (QAPP Addendum No. 1) (TtNUS, 2003b).

The second round of SWMU 16 RFI fieldwork was conducted from October 2003 through January 2004 (Round 2). The results of the Round 2 sampling indicated that still further sampling would be required to delineate contamination. As a result, a second addendum to the QAPP [QAPP Addendum No. 2, (TtNUS, 2004)] was developed to conduct a third round of sampling, which was completed in the period July through November 2004. The third round of sampling was conducted July through November, 2004.

Rounds 1, 2, and 3 RFI fieldwork and the development of the baseline human health and ecological risk assessments were conducted in accordance with the approved QAPP (TtNUS, 2003a) and the approved QAPP Addenda Nos. 1 and 2 (TtNUS, 2003b and 2004).

SWMU 16 DESCRIPTION

SWMU 16, which is approximately 16 acres in size, is located in the north-central portion of NSWC Crane within the Boggs and Turkey Creek Drainage Basin, which is one of the five drainage basins that carry surface water off the installation and eventually drain into the East Fork of the White River and then to the Wabash River to the southwest.

Most of SWMU 16 is covered with buildings and gravel parking lots, and most grassy areas are located southeast of Building 146. Building 146, which has an area of approximately two-thirds acre, was an explosives fill and pressure washout facility and included three oil-fired, rotary kiln incinerators with fuel storage tanks. SMWU 16 is intermittently active and is used for renovation and rework and breakdown of munitions and is sometimes used for ammunition demilitarization operations. Although current operations are known, it is likely that unknown operations once occurred at this site because of its age. Prior to 1978, outfalls from sumps located north, east, and west of Building 146 discharged to swales that ultimately transported explosives to Boggs Creek via Turkey Creek. These sumps are now welded shut.

The Cast High Explosives Fill/B146 Incinerator consisted of the existing Building 146, an explosive fill and pressure washout facility, and the former oil-fired, rotary kiln incinerators system, which included three incinerators and fuel oil storage tanks. During incinerator operation, incinerator ash and slag residue were stored in waste piles adjacent to the incinerator. The incinerators were closed in the early 1990s, and the waste ash piles were removed along with some obviously contaminated soil.

Site operations also included cast loading [melt pouring of 2,4,6-trinitrotoluene (TNT), hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), and high blast explosive (HBX)] explosives into projectiles, demilitarization and incineration of ammunitions (small caliber ammunition, shotgun shells, fuses, detonators, boosters, tracers, flare candles, and smoke flares), and high-pressure washout. Steamout of Army ammunition and rockets containing TNT and Composition B was reportedly conducted between 1954 and 1956 (Halliburton NUS, 1992).

In 1995, a voluntary interim measure (VIM) was conducted at SWMU 16. The objectives of the interim measure were to sample, remove, and dispose of sludge contaminated with lead and trichloroethylene (TCE) from the east and west sumps, respectively; remove three aboveground storage tanks and associated fuel oil-contaminated soils; clean the sumps; excavate and remove the slag/ash piles; sample the remaining soils; backfill the excavations; and restore the site. During the 1995 interim measure, it was discovered that high levels of TCE were entering the east and west sumps through the inlet piping.

From 1996 to 1998, additional VIMs were conducted at SWMU 16. The objective of the 1996 to 1998 interim measures were to sample and treat the water that had drained into the east and west sumps because this water had elevated levels of TCE; conduct additional soil sampling; repair broken sewer lines; reroute Building 146 roof drains away from the sumps; grout Building 146 floor drains; install sump pumps and new piping from the sumps to the sanitary sewers; and dispose of polychlorinated biphenyl (PCB)-contaminated soil. PCB contamination was discovered during rerouting of some drain lines when trenches were dug through the asphalt cover. The soil/asphalt mixture sample results showed low concentrations of PCBs. The PCB-contaminated soil (approximately 43 tons) was disposed at an off-site facility (MK, 1999) in April 1998.

PHASE III RFI PROGRAM

The most recent investigation (conducted in 2003 and 2004), which is the subject of this report, was a Phase III RFI. RFI fieldwork was conducted from February through May 2003 (Round 1), October 2003 through January 2004 (Round 2), and July through November 2004 (Round 3). The environmental media sampled included groundwater, surface and subsurface soil, surface water, seeps, and sediment. The objectives of this investigation were to:

- Establish the nature and extent of contamination.
- Develop information necessary to evaluate human health risks through a baseline risk assessment.
- Develop information necessary to estimate risks to the environment through a screening level ecological risk assessment (SERA).

FIELD AND ANALYTICAL PROGRAM

During Round 1, the analytical program included explosives, herbicides, metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and polycyclic aromatic hydrocarbons (PAHs). The surface water samples were analyzed for various combinations of energetic compounds, total and dissolved metals, miscellaneous parameters, VOCs, water quality parameters (e.g., temperature and pH), and miscellaneous inorganic parameters. After Round 1 sampling, the analyte list was limited to metals and VOCs because, for chemicals in other analytical fractions, few detections were observed. The subsequent sampling rounds (Rounds 2 and 3) were designed to delineate the extent of VOCs underlying Building 146 and along the drain line to the sump and the extent of metals contamination in soil and in the area where the ash piles existed.

Six new monitoring wells were installed and sampled as part of the Round 1 fieldwork. Results from Round 1 groundwater sampling indicated that additional monitoring wells were required to fully delineate

groundwater contamination; therefore, Round 2 included the addition of 12 new monitoring wells. Upon completion of the Round 2 sampling, it was concluded that further delineation of groundwater contamination was required; therefore, three new monitoring wells were installed and sampled as part of the Round 3 fieldwork.

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

CONCEPTUAL SITE MODEL

Past operations at SWMU 16 have resulted in the release of explosives residue (primarily RDX and HMX) and chlorinated VOCs to surface and subsurface soils surrounding Building 146 and the three sumps located north, east, and west of Building 146. Current releases of contaminants are limited or nonexistent at SWMU 16 because operations have changed and/or control measures have been instituted to eliminate releases.

The upper zone of groundwater has been contaminated with explosives (primarily RDX, and to a lesser extent HMX and TNT degradation products) and chlorinated VOCs [primarily TCE and 1,1,2-trichloroethane (1,1,2-TCA), and their degradation products). Nearly all of the groundwater in the uppermost bedrock is flowing laterally toward the upper slopes of the ridge. Some of this groundwater seeps into the gullies on the side of the ridge, and some of the contaminated groundwater may be taken up by trees and other vegetation and transpired. Thus, natural phytoremediation may be playing a part in controlling and reducing the rate of contaminants reaching the base of the ridge and entering the tributary stream. Chlorinated solvents (TCE) in groundwater are degrading as evidenced by the presence of degradation products. Some of the explosives contaminants (mainly RDX and HMX), TCE, and cis-1,2-dicchlorothene (cis-1,2-DCE) are reaching the gullies on the northwestern side of the site, which is a tributary of Turkey Creek. Low to moderate concentrations of RDX, HMX, and TCE have reached the middle aquifer groundwater monitoring wells. The siltstone and shale layers between the upper and middle water-bearing zones are a partially effective aquitard and prevent much of the shallow groundwater and contaminants from reaching the intermediate groundwater system in the ridge. No explosive compounds and minor concentrations of VOCs have been detected in the lower Pennsylvanian water-bearing zone and the valley bottom wells. The siltstone and shale layers between the middle and

lower water-bearing zones are an effective aquitard and prevent most shallow groundwater and contaminants from reaching the deeper groundwater system beneath the ridge.

Contaminants continue to leach from surface and near-surface soils and migrate downhill in steep gullies on the northwestern and southeastern sides of the ridge. Low to moderate concentrations of explosives and VOCs were detected primarily in the gullies leading down the northwestern side of the ridge. Turkey Creek is the recipient of all waters (surface or subsurface) that flow away from SWMU 16 and the ridge containing SWMU 16. Metals and HMX contained in runoff water from SWMU 16 are causing minor impacts to Turkey Creek.

HUMAN HEALTH RISK ASSESSMENT

The human receptors evaluated for SWMU 16 were the construction worker, maintenance worker, occupational worker, adolescent trespasser, adult recreational user, and future adult and child residents. Human exposure pathways evaluated for SWMU 16 were surface soil, subsurface soil, groundwater, surface water, and sediment. The human health risk assessment was developed in accordance with the protocol described in the approved QAPP (TtNUS, 2003a).

ECOLOGICAL RISK

A screening ecological risk assessment (SERA) was performed for SWMU 16. The SERA was conducted in accordance with the protocol discussed in the original QAPP with modifications made to reflect discussion with the United States Environmental Protection Agency (U.S. EPA) (September 2004) regarding comments on other ecological risk assessments for NSWC Crane SWMUs. The ecological receptors evaluated in the screening assessment included:

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

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

The list of chemicals initially selected as ecological chemicals of potential concern (COPCs) were further evaluated in Step 3a, the first step of the baseline environmental risk assessment (BERA). After a review of alternate toxicity information (based on soil invertebrates and plants) for the initial COPCs was conducted, maximum and average concentrations were compared to the alternate toxicity information, as appropriate.

CONCLUSIONS

The soils, groundwater, surface water, and sediment data collected during the RFI were adequate to support the development of baseline human health and screening level ecological risk assessments for SWMU 16. Upon evaluation of the data obtained during this investigation, the operational history, and the development of the baseline human health and screening level ecological risk assessments for SWMU 16, the following conclusions were reached:

Human Health Risk Assessment

- For surface soil, subsurface soil, sediment, and surface water, the SWMU 16 incremental lifetime cancer risks (ILCRs) for all human receptor exposure pathways were estimated to be within, or less than, the range of 10^{-6} to 10^{-4} established by the U.S. EPA as acceptable; therefore, the human health risk for surface soil, subsurface soil, sediment, and surface water is acceptable for all human receptor exposure pathways.

- For groundwater:

  - For the current/future occupational worker, the ILCRs from ingestion of groundwater were estimated to exceed the range of 10^{-6} to 10^{-4} established by the U.S. EPA for TCE and vinyl chloride; therefore, the risk is unacceptable for the current/future occupational worker.

  - For the future child recreational user, the ILCRs from ingestion of groundwater were estimated to exceed the range of 10^{-6} to 10^{-4} established by the U.S. EPA for TCE; therefore, the risk is unacceptable for the future child recreational user.

  - For the future lifelong recreational user, the ILCRs from ingestion of groundwater were estimated to exceed the range of 10^{-6} to 10^{-4} established by the U.S. EPA for TCE; therefore, the risk is unacceptable for the future lifelong recreational user.

  - For the future child resident receptor and potable use of groundwater, the ILCRs were estimated to exceed the range of 10^{-6} to 10^{-4} established by the U.S. EPA and/or the HIs were estimated to exceeded unity (1.0) for carbon tetrachloride, tetrachloroethene, TCE, vinyl chloride, iron, vanadium, 2-amino-4,6-dinitrotoluene, and 4-amino-2,6-dinitrotoluene; therefore, the risk is unacceptable for the future child resident.

- Based on the results of the human health risk assessment, cis-1,2-DCE, carbon tetrachloride, tetrachloroethene, TCE, vinyl chloride, iron, vanadium, 2-amino-4,6-dinitrotoluene, and 4-amino-2,6-dinitrotoluene in groundwater will be retained for further evaluation during a Corrective Measures Study (CMS).

Ecological Risk Assessment

- For plants and invertebrates, ecological risk was determined to be unacceptable for direct contact by terrestrial vegetation and ingestion of surface soil and food by soil invertebrates from exposure to antimony, copper, lead, and zinc.

- Additionally, for mammals and birds, ecological risk was determined to be unacceptable for incidental surface soil ingestion and ingestion of food by insectivorous birds from exposure to lead and zinc.

- Based on the results of the SERA, antimony, copper, lead, and zinc in surface soil are retained for further evaluation during a CMS.

Table ES-1 contains a summary of SWMU 16 receptor-specific human risks and hazards, ecological risks, critical pathways and chemicals of concern (COCs), and, where necessary, recommendations for further actions.

OTHER RECOMMENDATIONS

Based on the results of this RFI and review by U.S.EPA Region V, the following additional recommendations are presented for the CMS process:

- The RFI indicated that TCE concentrations are not less than human health screening values for surface and subsurface soil at the westernmost RFI sampling locations; therefore TCE contamination is not completely bounded toward the west. In all other directions TCE contamination in soil is reasonably well bounded laterally and vertically, with the exception of a few locations in the deepest interval that were not less than the human health screening value. Because bedrock was encountered in some of the deepest sampling depths, which prevented sample collection at those depths, there is little doubt that the soil VOC contamination has migrated into the bedrock. As a result, U.S.EPA Region V has requested that the Navy conduct further evaluation to delineate TCE contamination of soils and determine the presence of accumulated DNAPL in bedrock. The Navy will address further delineation of TCE contamination of soils and the presence of accumulated DNAPL in the CMS stage.

- RFI sampling determined that the North Sump is releasing RDX. At the present time, the source of the RDX contamination is unknown. The Navy will conduct smoke tests in the CMS phase to determine the source of RDX at the North Sump.

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS, HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor Population	Environmental Media	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure[1]	Overall Risk (Ecological)	Critical Pathways & Chemicals of Concern	Recommendations
Current/Future Maintenance Worker	Surface Soil	2E-06	0.02	No unacceptable exposures to lead.	N/A	N/A	NFA
	Surface Water - Gullies	2E-08	0.004			N/A	NFA
	Surface Water - Turkey Creek	1E-09	0.003			N/A	NFA
	Sediment - Gullies	8E-07	0.05			N/A	NFA
	Sediment - Turkey Creek	2E-06	0.06			N/A	NFA
Current/Future Occupational Worker	Surface Soil	2E-05	0.2	No unacceptable exposures to lead.	N/A	N/A	NFA
	Groundwater	1E-03	5			Ingestion of groundwater Trichloroethene, Vinyl Chloride, Tetrachloroethene, and 1,1,2-Trichloroethane	Proceed to CMS
Current/Future Adolescent Trespasser	Surface Soil	2E-06	0.03	No unacceptable exposures to lead.	N/A	N/A	NFA
	Surface Water - Gullies	3E-07	0.04			N/A	NFA
	Surface Water - Turkey Creek	3E-08	0.02			N/A	NFA
	Sediment - Gullies	6E-07	0.10			N/A	NFA
	Sediment - Turkey Creek	1E-06	0.1			N/A	NFA
Future Construction Worker	Surface/Subsurface Soil	1E-06	3	No unacceptable exposures to lead.	N/A	N/A	NFA
	Groundwater	5E-06	0.5			N/A	NFA
Future Child Recreational User	Surface Soil	5E-06	0.2	No unacceptable exposures to lead.	N/A	N/A	NFA
	Groundwater	3E-04	5			Ingestion of groundwater Trichloroethene, Tetrachloroethene, and Vinyl Chloride	Proceed to CMS
	Surface Water - Gullies	9E-07	0.2			N/A	NFA
	Surface Water - Turkey Creek	1E-07	0.1			N/A	NFA
	Sediment - Gullies	2E-06	0.6			N/A	NFA
	Sediment - Turkey Creek	5E-06	0.6			N/A	NFA
Future Adult Recreational User	Surface Soil	3E-06	0.02	No unacceptable exposures to lead.	N/A	N/A	NFA
	Groundwater	3E-04	1			Ingestion of groundwater Trichloroethene, Tetrachloroethene, and Vinyl Chloride	Proceed to CMS
	Surface Water - Gullies	3E-07	0.06			N/A	NFA
	Surface Water - Turkey Creek	3E-08	0.04			N/A	NFA
	Sediment - Gullies	1E-06	0.06			N/A	NFA
	Sediment - Turkey Creek	2E-06	0.06			N/A	NFA

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS, HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor Population	Environmental Media	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure[1]	Overall Risk (Ecological)	Critical Pathways & Chemicals of Concern	Recommendations
Future Lifelong Recreational User	Surface Soil	8E-06	N/A	No unacceptable exposures to lead.	N/A	N/A	NFA
	Groundwater	5E-04	N/A			Ingestion of groundwater Trichloroethene, Tetrachloroethene, Vinyl Chloride, and 1,1,2-Trichloroethane	Proceed to CMS
	Surface Water - Gullies	1E-06	N/A			N/A	NFA
	Surface Water - Turkey Creek	1E-07	N/A			N/A	NFA
	Sediment - Gullies	3E-06	N/A			N/A	NFA
	Sediment - Turkey Creek	7E-06	N/A			N/A	NFA
Future Child Resident	Surface Soil	5E-05	2	Unacceptable risks if child resident is exposed to lead in sediment from the gullies more than one day a week.	N/A	N/A	NFA
	Groundwater	3E-03	57			Potable use of groundwater cis-1,2-Dichloroethene, 1,1,2-Trichloroethane, Carbon Tetrachloride, Tetrachloroethene, Trichloroethene, Vinyl Chloride, Iron, Vanadium, 2-Amino-4,6-Dinitrotoluene, 4-Amino-2,6-Dinitrotoluene	Proceed to CMS
	Surface Water - Gullies	9E-07	0.2			N/A	NFA
	Surface Water - Turkey Creek	1E-07	0.1			N/A	NFA
	Sediment - Gullies	2E-06	0.5			N/A	NFA
	Sediment - Turkey Creek	4E-06	0.6			N/A	NFA
Future Adult Resident	Surface Soil	2E-05	0.2	No unacceptable exposures to lead.	N/A	N/A	NFA
	Groundwater	4E-03	16			Potable use of groundwater Carbon Tetrachloride, 1,1,2-Trichloroethane, Trichloroethene, Tetrachloroethene, Vinyl Chloride, Iron	Proceed to CMS
	Surface Water - Gullies	3E-07	0.06			N/A	NFA
	Surface Water - Turkey Creek	3E-08	0.04			N/A	NFA
	Sediment - Gullies	9E-07	0.06			N/A	NFA
	Sediment - Turkey Creek	2E-06	0.06			N/A	NFA

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS, HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor Population	Environmental Media	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure[1]	Overall Risk (Ecological)	Critical Pathways & Chemicals of Concern	Recommendations
Future Lifelong Resident	Surface Soil	7E-05	N/A	No unacceptable exposures to lead.	N/A	N/A	NFA
	Groundwater	7E-03	N/A			Potable use of groundwater Trichloroethene, Carbon Tetrachloride, 1,1,2-Trichloroethane, Tetrachloroethene, Vinyl Chloride	Proceed to CMS
	Surface Water - Gullies	1E-06	N/A			N/A	NFA
	Surface Water - Turkey Creek	1E-07	N/A			N/A	NFA
	Sediment - Gullies	3E-06	N/A			N/A	NFA
	Sediment - Turkey Creek	6E-06	N/A			N/A	NFA
Terrestrial Plants and Invertebrates	Surface Soil	N/A	N/A	N/A	Unacceptable	Direct contact by terrestrial vegetation, and ingestion of soil and food by soil invertebrates from exposure to some metals (Antimony, Copper, Lead, and Zinc).	Proceed to CMS
Mammals and Birds	Surface Soil/Surface Water	N/A	N/A	N/A	Unacceptable	Incidental soil ingestion and ingestion of food by insectivorous birds from exposure to Lead and Zinc	Proceed to CMS
Aquatic Organisms	Sediment	N/A	N/A	N/A	Acceptable	N/A	NFA
	Surface Water - Turkey Creek	N/A	N/A	N/A	Acceptable	N/A	NFA

1 - The IEUBK model was used for evaluating child exposures and the Adult Lead Model was used for evaluating adult exposures. Refer to Section 7.0.

N/A = Not applicable
NFA = No further action
CMS = Corrective Measures Study

1.0 INTRODUCTION

This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for the Cast High Explosives Fill/B146 Incinerator was prepared for the Naval Surface Warfare Center (NSWC) Crane facility, located in Crane, Indiana, through the Naval Facilities Engineering Field Division South (NAVFAC EFD SOUTH). This RFI was initiated under Contract Task Order (CTO) 0343 for the Comprehensive Long-Term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888 and was completed under CTO F277. The Cast High Explosives Fill/B146 Incinerator is also known as Solid Waste Management Unit (SWMU) 16.

The Cast High Explosives Fill/B146 Incinerator consisted of Building 146 and three oil-fired, rotary kiln incinerators with fuel storage tanks. B146 is still in existence; it was previously used as an explosive fill and pressure washout facility. The incinerators and fuel storage tanks have been removed. During operation, incinerator ash was stored in waste piles adjacent to the incinerator. These ash piles have also been removed. In previous investigations, exterior sumps receiving roof drain waters and process waters were found to contain trichloroethene (TCE). These sumps discharged into ditches. After this discovery, a remedial action was conducted in which an air stripper was used to remove volatile organic compounds (VOCs) from liquids within the sumps and the roof drain waters were rerouted to a separate line discharging into a ditch. After TCE concentrations in the sump were reduced to acceptable levels, the sump drains were rerouted to the sanitary sewer system.

A historical engineering drawing (entitled Industrial Waste Treatment Facilities Building 146 Settling Tank and Sewer Connection, NAVFAC Drawing No. 2009992 approved in 1974) depicts the location of a 'buried fuel tank hatch' off the northeast corner of Building 146. Whether the hatch and/or a related UST are present was not known, and prompted this geophysical survey.

1.1 PURPOSE

The purpose of this RFI Report is to describe the site investigation activities conducted at SWMU 16 and to present the results and interpretation thereof for the Cast High Explosives Fill/B146 Incinerator. This investigation provides information regarding concentrations of organic and inorganic chemicals measured in surface soils, subsurface soils, sediment, surface water, and groundwater at SWMU 16. In addition, human health and ecological risks associated with SWMU 16 were evaluated by way of a baseline human health risk assessment (HHRA) and a screening-level ecological risk assessment (SERA). The risk assessments were performed using the data collected during the most recent investigations in 2003 and

2004. However, previous investigation results are presented, as appropriate, to provide perspective on current data.

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

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

SWMU 16 is located in the north-central portion of NSWC Crane within the Boggs and Turkey Creek Drainage Basin, which is one of the five drainage basins that carry surface water off the installation and eventually drain into the East Fork of the White River and then to the Wabash River to the southwest. The location of SWMU 16 within the drainage basins of NSWC Crane is shown in Figure 1-2.

1.2.2 Site History

SWMU 16 is approximately 16 acres in size. Building 146 (Figure 1-3) is the largest building at SWMU 16, approximately 2/3 acre in size. It was an explosives fill and pressure washout facility. Most of SWMU 16 is covered with buildings and gravel parking lots, and most grassy areas are located southeast of Building 146. Although current operations are known, it is likely that unknown operations once occurred at this site because the site is so old. Outfalls from sumps once discharged to swales within the area. The outfalls have since been welded shut. Sewer lines to sumps have been rerouted to industrial sources. Down spouts have also been rerouted. There is only one sewer system at Crane and it is a sanitary sewer system.

Building 146 was an explosives fill and pressure washout facility with two large and one prototype, oil-fed rotary kiln incinerators. Three nearby aboveground storage tanks supplied No. 2 fuel oil for the kilns. The storage tanks in the eastern and western bays each had an approximate capacity of 2,000 gallons, and the central storage tank feeding the prototype kiln had a 300- to 500-gallon capacity. Munitions entered the kilns at one end and were exposed to flame combustion, which resulted in the destruction of the energetics (propellants, explosives, pyrotechnics) contained within the munitions to demilitarize them through burning or detonation. Ash and slag residues from the incinerators were piled on the ground.

The incinerators were closed in the early 1990s. A decision was made to remove the waste ash piles, and the piles were removed along with some obviously contaminated soil.

Site operations also included cast loading [melt pouring of 2,4,6-trinitrotoluene (TNT), hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), and high blast explosive (HBX) explosives into projectiles]; demilitarization and incineration of ammunitions (small caliber ammunition, shotgun shells, fuses, detonators, boosters, tracers, flare candles, and smoke flares); and demilitarization and high-pressure washout. Steamout of army ammunition and rockets containing TNT and Composition B was reportedly conducted between 1954 and 1956 (Halliburton NUS, 1992). Prior to 1978, the generated wastewater was discharged through a storm drain to a ditch, with ultimate transport to Boggs Creek via Turkey Creek. After 1978, wastewaters generated at Building 146 were transported to the Rockeye Treatment Facility for treatment.

Two sumps located on the eastern and western sides of B146 received discharges from floor drains in B146. These sumps were designed to drain through clay (terra cotta) tile pipes into ditches in the woods. Terra cotta drains are known for leakage potential and may have resulted in the release of contaminants to the subsurface soil. Both sumps were expected to contain explosive-contaminated sludge. However, it was found that the sumps contained significant quantities of TCE, with the west sump having the maximum concentrations. The east sump was piped to the west sump and an air stripper was installed to remediate TCE contamination during 1995 and 1996. The clay tile discharge lines were plugged when the stripper was installed. Shortly after the air stripper was installed, it was found that stormwater draining from the roof of B146 was flowing into the sumps and causing them to overflow. The roof drains were rerouted to separate discharge lines that discharged into ditches. The air stripper was operated until TCE levels were low enough to allow direct discharge of the sumps into the sanitary sewer system. The discharge from the sumps was rerouted to the sanitary sewer system. After the TCE concentrations were low enough to be transferred to the sanitary sewer without treatment by the air stripper, permanent pumps were installed. The TCE source was never found.

Major contaminants from Building 146 loading and washout activities were TNT, RDX, HBX, Composition A, Composition B, and ammonium picrate. HBX is a mixture of RDX, TNT, aluminum, and wax. Composition A contains RDX and beeswax. Composition B is composed of RDX, TNT, and wax. The primary metals of concern associated with the incinerator operations are the heavy metals lead, barium, cadmium, chromium, and mercury. Potential combustion of fuels containing polychlorinated biphenyls (PCBs) and contamination from PCB oxidation products has also been reported (Halliburton NUS, 1992). Polycyclic aromatic hydrocarbons (PAHs) and undetonated explosives have also been detected in ash from the Ammunition Peculiar Equipment (APE-1236) incinerators. The incinerator emissions testing data provide additional information concerning the potential particulate and gaseous

releases, particularly those occurring prior to baghouse installation (Halliburton NUS, 1992). Initially, incinerator ash was piled near Building 146; later, ash and residue from burning and baghouse dust were collected and transferred to Building 2993, the Hazardous Waste Storage facility, prior to disposal offsite. Ash from Building 146 operations has been reported to be RCRA hazardous waste (Halliburton NUS, 1992). TCE has been detected at high concentrations at the sumps.

SMWU 16 is intermittently active and is used for renovation and rework and breakdown of munitions. It is sometimes used for ammunition demilitarization operations. Nearby facilities include case filling, case preparation, lunch and locker, and sewage pumping station buildings to the north and fuse and detonator magazines to the south. Magazine and storage buildings are situated east of Building 146, and magazines for fuses, detonators, and high explosives lie east of the SWMU. Both Building 145 (the case filling plant) and Building 148 (the small arms repacking building) housed significant quantities of explosives and smokeless powder.

Potential historical contaminant migration pathways at Building 146 include air, surface water, and groundwater. Air should no longer be a migration pathway of significance because the furnaces and ash piles have been removed. Release of contaminants from surface soil or sediments to surface water and groundwater is still a possibility. Groundwater may be contaminated, especially because of the high concentrations of TCE found near the sumps. Contaminants likely to be present at this SWMU are explosives, SVOCs, VOCs, PCBs, dioxins, and metals.

1.3 PREVIOUS INVESTIGATIONS

A 1972 water sample from Building 146 was reported (Halliburton NUS, 1992) to contain detectable levels of HMX and RDX, but the concentrations were not provided. In 1979, water samples were collected (from the same areas as the sediment samples) near sumps where Building 146 floor drains discharge. None of the water samples contained detectable levels of HMX. The TNT concentration was 0.11 mg/L and RDX was 0.03 mg/L. No measurable concentrations or related detrimental effects were found in Turkey Creek, the ultimate receptor of the Building 146 discharge. Sediment samples collected from drainage ways in the north ditch where the Building 146 drains discharge (Department of the Army, 1980) contained TNT [109 to 383 milligram per kilogram (mg/kg)], RDX (31 to 44 mg/kg), and HMX (1.0 to 10.2 mg/kg).

Quantities of chemicals potentially released at SWMU 16 are unknown. Analytical data for two ash pile samples collected in 1982 shows that the ash from the rotary kiln furnaces was a RCRA hazardous waste. Barium, cadmium, and lead exceeded the Extraction Procedure (EP) Toxicity limits (Halliburton

NUS, 1992). Four monitoring wells were installed near Building 146 in July 1983. Soil and groundwater samples were collected and analyzed for metals and selected organic constituents. Based on a comparison of concentrations with average United States soil metal concentrations, the soils around Building 146 contained elevated concentrations of lead (9.3 to 58 mg/kg) and zinc (19 to 280 mg/kg). Groundwater samples around Building 146 exceeded drinking water regulations for lead [0.5 to 0.2 milligram per liter (mg/L)], chromium (0.038 to 0.16 mg/L), nickel (0.16 to 0.55 mg/L), cadmium (0.006 mg/L), mercury (0.0007 to 0.0036 mg/L), and TCE, the only organic chemical detected (2.7 to 27 mg/L). TCE was not detected in soil borings collected from 0 to 5 feet at the same locations.

Surface soil and sediment samples were collected around Building 146 in 1982 and 1985. The 1982 samples exceeded EP Toxicity Limits for cadmium (1.0 mg/L) and lead (5.0 mg/L). These samples contained trace levels of explosives (RDX = 0.013 mg/kg and HMX = 0.022 mg/kg) and high oil and grease content. One of the 1985 samples exceeded the EP Toxicity Limit for lead. None of the 1985 samples contained detectable levels of explosives. However, the detection limits were relatively high (TNT = 3.6 mg/kg, RDX = 5 mg/kg, and HMX = 7.2 mg/kg).

Soil samples were collected from the Building 146 incinerator bays as part of closure activities. Between October and December 1989, 133 soil samples were collected from 34 locations from depths between 0 and 2 feet below ground surface (bgs). The samples were analyzed for metals and PCBs. In March 1990, an additional 16 samples were collected from four locations to represent background conditions. The Indiana Department of Environmental Management (IDEM) determined that quality assurance/quality control (QA/QC) data for the PCB parameters were inadequate, and six locations were resampled from 0 to 2 feet bgs (IDEM, 1990). The analytical results for samples collected from below the incinerator bays indicated that concentrations of arsenic, cadmium, chromium, selenium, and silver exceeded background levels. Only the concentrations of selenium and silver were considered significant (Halliburton NUS, 1993), but concentrations were not provided. The PCB analytical data indicated that detectable levels of PCBs were not present in Building 146 sampling locations.

Voluntary interim measures were conducted at SWMU 16 in 1995. The objectives of the interim measures were to sample, remove and dispose of sludge contaminated with lead and TCE, respectively, from the east and west sumps; remove three aboveground storage tanks and associated diesel contaminated soils; clean the sumps; excavate and remove the slag/ash piles; sample the remaining soils; backfill; and restore the site. During the interim measures in 1995, it was discovered that high levels of TCE were entering the east and west sumps through the inlet piping.

Additional voluntary interim measures were conducted at SWMU 16 from 1996 to 1998. It was determined that the effluent required treatment prior to discharge. The objective of the 1996 to 1998 interim measures was to sample and treat water that had drained into the east and west sumps containing elevated levels of TCE; conduct additional soil sampling; repair broken sewer piping sections; reroute roof drains on Building 146 away from the sumps and grout floor drains; install sump pumps and new piping from the sumps to the sanitary sewers; and dispose of PCB contaminated soil. During some rerouting of drain lines, trenches were dug through the asphalt cover and into the soil. Samples were collected from the soil/asphalt mixture, and low concentrations of PCBs were detected in the samples.

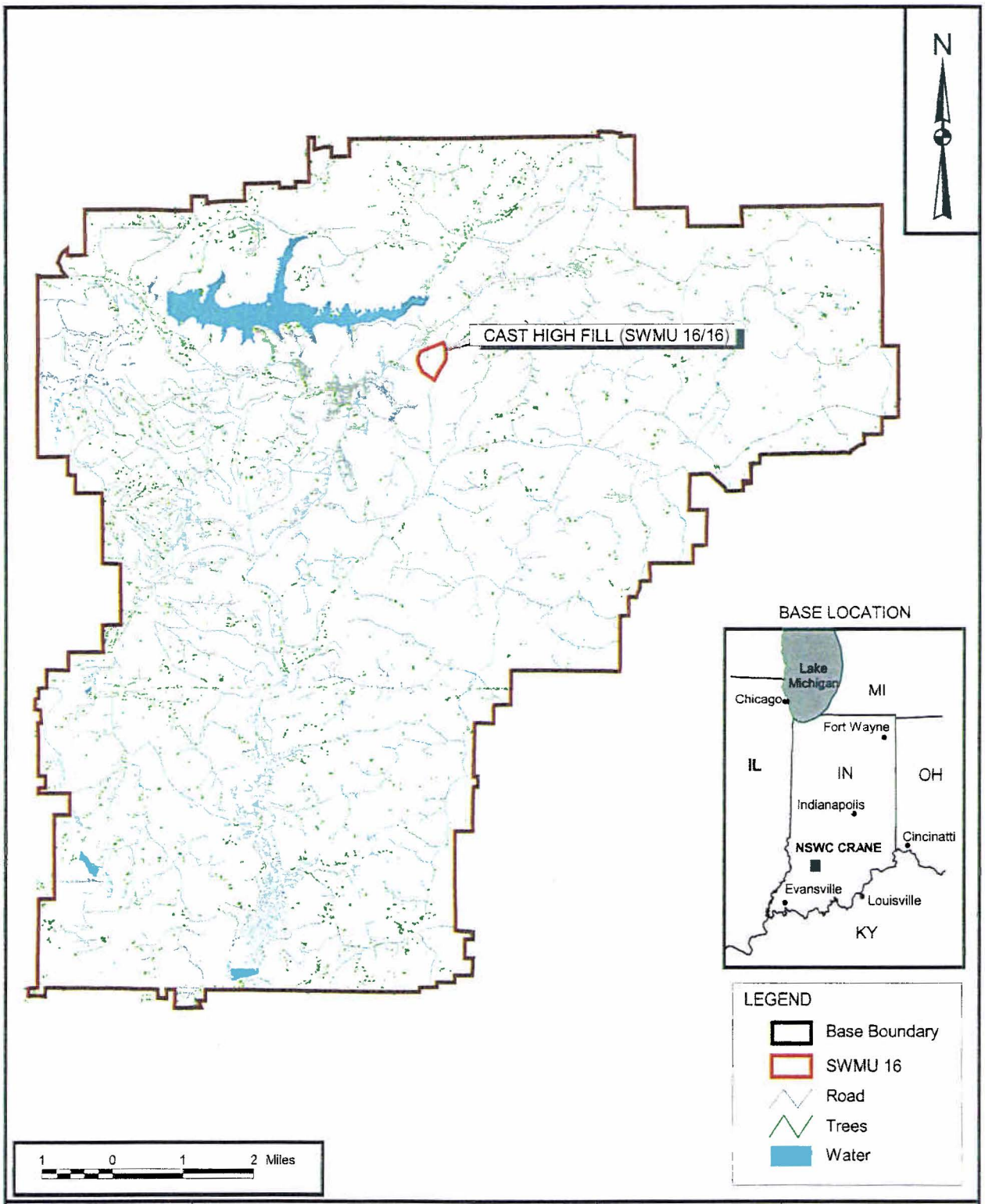
It is important to note that a historical engineering drawing (entitled "Industrial Waste Treatment Facilities Building 146 Settling Tank and Sewer Connection", NAVFAC Drawing No. 2009992 approved in 1974) was found depicting the location of a 'buried fuel tank hatch' off the northeast corner of Building 146. Whether the hatch and/or a related UST are present was not known, and prompted a geophysical survey in 2009 (Tetra Tech NUS [TtNUS], 2009). The survey was conducted to search for, and if detected, locate a possible UST in the area of the buried fuel tank hatch shown on a historical engineering drawing. The survey was performed with a Geonics EM61 and Sensors and Software Noggin Smart Cart ground penetrating radar (GPR) unit equipped with a 250 MHz antenna.

One EM61 anomaly was detected at the location of the possible UST fill port with a size and amplitude consistent with that expected for a small capacity UST (i.e. 1000 gallon UST) and was interpreted as a possible UST. Given that the location of the discovered buried fuel tank hatch and the accompanying EM61 anomaly attributed to a possible UST match well with the historical engineer's drawing depicting the buried fuel tank hatch, it appears the two may be related.

1.4 REPORT ORGANIZATION

This report was prepared in the following format, standard for an RFI Report. Section 1.0 of the report is the introduction, including the purpose, site background, site description, site history, previous investigations, and report organization. Section 2.0 describes the study area field sampling activities and procedures associated with the data collection. Section 3.0 discusses data presentation and data quality review. Section 4.0 describes the physical characteristics of SWMU 16. Section 5.0 presents an evaluation of the nature and extent of contamination detected at SWMU 16 in this field investigation. Section 6.0 presents a discussion on the fate and transport of the contaminants and the conceptual site model. Sections 7.0 identifies the chemicals of concern (COCs) and presents the results of the HHRA. 8.0 presents the results of the SERA. The information included in each appendix is summarized below:

- Appendix A - Field Investigation Photos and/or Survey Locations
- Appendix B - Boring Logs, Well Construction Logs, etc
- Appendix C - Field Log Sheets
- Appendix D - Field Documentation (log books)
- Appendix E - Slug Tests
- Appendix F - Health and Safety Forms
- Appendix G - Laboratory Data
- Appendix H - Data Quality Review
- Appendix I - HHRA Calculations
- Appendix J - Supporting Materials for the SERA



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COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 1-1	REV 0

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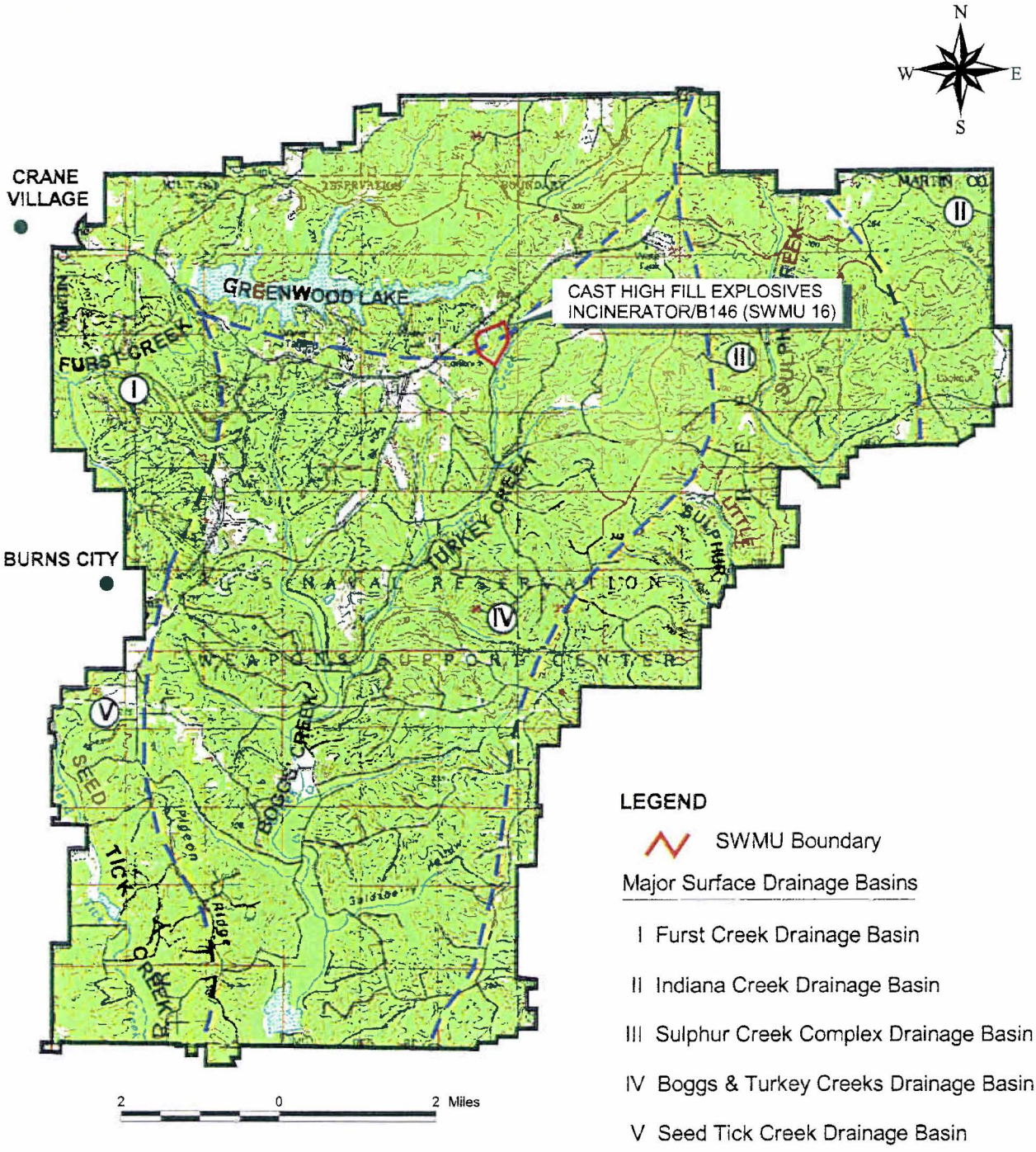

LEGEND

SWMU Boundary

Major Surface Drainage Basins

I Furst Creek Drainage Basin

II Indiana Creek Drainage Basin

III Sulphur Creek Complex Drainage Basin

IV Boggs & Turkey Creeks Drainage Basin

V Seed Tick Creek Drainage Basin

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

DRAWN BY J. LAMEY	DATE 8/27/01	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7448	OWNER NO. —
CHECKED BY B. BALKOVEC	DATE 3/17/04	SWMU 16 CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR LOCATION AND DRAINAGE BASINS NSWC CRANE CRANE, INDIANA	APPROVED BY —	DATE —
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 - 2	REV 0

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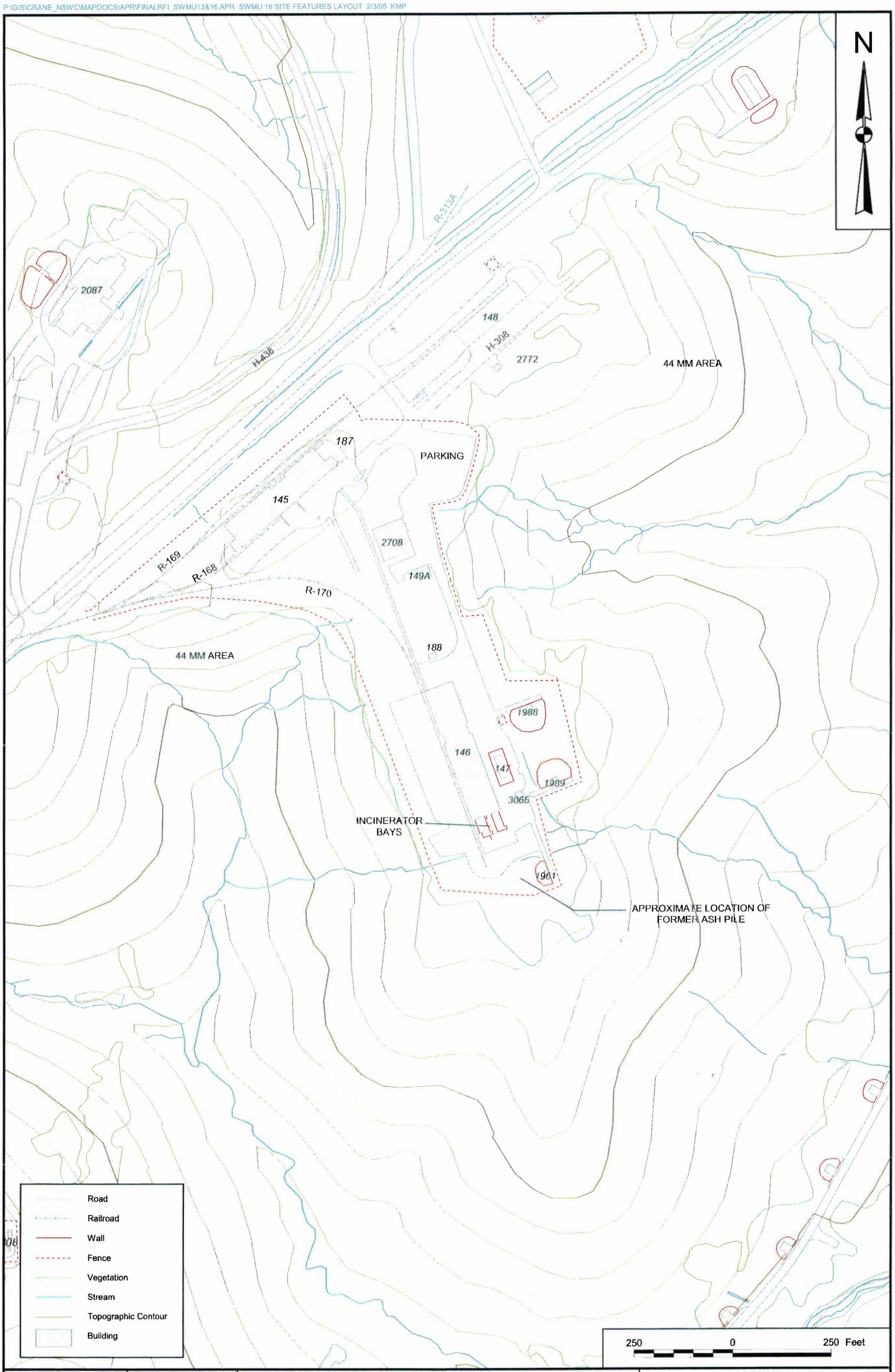

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SITE FEATURES

SWMU 16 CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

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FIGURE 1-3	0

2.0 FIELD INVESTIGATION

This section presents sampling activities, procedures, and documentation utilized during Rounds 1, 2, and 3 field operations performed in 2003 and 2004 for NSWC Crane SWMU 16.

2.1 OVERVIEW

RFI field activities were conducted from February through May 2003 (Round 1), October 2003 through January 2004 (Round 2), and July through November 2004 (Round 3). All work performed for Round 1 was conducted in accordance with the procedures and methodologies described in the U.S. EPA-approved Quality Assurance Project Plan (QAPP) (TtNUS, 2003a). All work performed for Round 2 was done in accordance with the procedures and methodologies described in the Addendum No. 1 to the approved QAPP (TtNUS, 2003c). All work performed for Round 3 was conducted in accordance with the procedures and methodologies described in the Addendum No. 2 to the approved QAPP (TtNUS, 2004). Standard Operating Procedures (SOPs) that governed the field work are included in Appendix H of the approved QAPP (TtNUS, 2003a), Appendix E of the Addendum No. 1 to the approved QAPP (TtNUS, 2003c), and Appendix C of the Addendum No. 2 to the approved QAPP (TtNUS, 2004). Photographs and surveyed sample locations of SWMU 16, copies of all field forms, records, field logbooks, and health and safety documentation associated with Rounds 1, 2, and 3 field investigations are provided in Appendices A through F of this document (Volumes II through IV).

2.2 MOBILIZATION / DEMOBILIZATION

Following approval of the QAPP (TtNUS, 2003a), the Addendum No. 1 to the approved QAPP (TtNUS, 2003c), and the Addendum No. 2 to the approved QAPP (TtNUS, 2004), TtNUS began mobilization activities for Rounds 1, 2, and 3, respectively. All field team members reviewed the approved QAPP (Round 1) and the Addendums No. 1 and No. 2 to the approved QAPP (Rounds 2 and 3, respectively), associated appendices, and the Health and Safety Plans (HASPs) prior to the start of project activities. In addition, the Field Operations Leader (FOL) held field team orientation meetings prior to the start of each shift to ensure that personnel were familiar with the scope of the field activities. Health and Safety documentation is contained in Appendix F.

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

activities was shipped to the site. At the conclusion of each round of field activities, the FOL oversaw the decontamination and demobilization of all equipment.

2.3 SUBSURFACE INVESTIGATION METHODOLOGIES AND PROCEDURES

2.3.1 Drilling

All borings were installed in accordance with SOP CTO166-04 and logged in accordance with SOPs CTO166-07 and CTO166-11. Boring logs can be found in Appendix B.1 Drilling methods used during each Round, along with boring date, boring depth, and depth intervals for soil sampling can be seen in Table 2-1

Round 1

Forty-one (41) borings for soil sampling and six borings for monitoring well installation were drilled using direct-push technology (DPT), hand auger, Rotosonic, and hollow-stem auger (HSA) methods (see Table 2-1).

Round 2

Nine (9) borings for soil sampling and 12 borings for monitoring well installation were drilled using hand auger, Rotosonic, and HSA methods (see Table 2-1).

Round 3

Thirty-eight (38) borings for soil sampling and three borings for monitoring well installation were drilled using DPT and HSA/Air Rotary methods (see Table 2-1).

2.3.1.1 Direct-Push Technology Borings

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

DPT was used to complete 36 soil borings at SWMU 16 during Round 1 and 38 borings during Round 3. Figure 2-1 shows the locations of all soil borings completed as part of the RFI at SWMU 16. DPT soil borings at SWMU 16 were advanced to a total depth of 10 feet, to the water table, or to refusal. Actual sample depths for SWMU 16 soil samples are listed in Table 2-1. DPT was not used during Round 2 field activities at SWMU 16.

2.3.1.2 Rock Drilling

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

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

Controlled amounts of water were added where necessary to remove cuttings from the borehole. Any excess water generated during this process was collected in a container and transported to and disposed at an NSWC Crane-approved sanitary sewer. The Rotosonic drilling rig was also used for collection of soil samples as listed in Table 2-1 for both Rounds 1 and 2. Soil sample collection information is provided in Section 2.5.1.

A conventional drilling rig with diamond coring capabilities was used during Round 3 to drill monitoring well 16MWT21. Once the 2-inch diameter core was collected from the boring, the entire length of the boring was reamed to 5.5-inches in diameter, the hole was cleaned out with pressurized air, and a 2-inch diameter monitoring well was installed.

Continuous rock cores were collected from three (Round 1), five (Round 2), and one (Round 3) bedrock well borings at SMWU 16 for lithologic description purposes. Select cores that were retained were placed into labeled core boxes, photographed, and turned over to the NSWC Crane Environmental Protection Department (EPD) for storage. Appendix B contains rock drilling logs. All boring depths at SWMU 16 are listed in Table 2-1 for Rounds 1, 2, and 3.

2.3.1.3 Hollow-Stem Augering

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

Nine monitoring well borings were drilled at SWMU 16 using the HSA method during Round 2. All three monitoring wells were installed utilizing the HSA method during Round 3.

2.3.1.4 Hand Augering

The hand augering system consisted of a stainless steel bucket auger (6-½ inches long and 3-¼ inches in diameter) and a 4-foot-long stainless steel extension rod with a cross handle. Hand augering was typically used at locations not accessible by other drilling methods or at isolated locations where its use was more practical such as locations requiring boring to depths not exceeding 5 feet bgs. The borings were augered to the desired depth or until refusal was encountered. Soil sample collection information is provided in Section 2.5.1. All samples obtained from the boreholes were screened with a PID immediately upon retrieval from the borehole. All PID readings were recorded on the boring logs.

Hand augering was used to collect nine soil borings during Round 2 and five soil borings during Round 3. No hand augering was required at SWMU 16 during Round 1.

2.3.2 Borehole and Sample Logging

A TtNUS geologist maintained a log for each boring in accordance with SOP CTO166-07 (Borehole and Soil Sample Logging) and SOP CTO166-11 (Drilling and Geologic Logging of Boreholes in Rock). The boring logs for each Round can be found in Appendix B.1, and at a minimum, contain the following information:

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

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

2.3.3 Borehole Abandonment

All DPT soil borings at SWMU 16 were backfilled with bentonite chips and hydrated in accordance with the manufacturer's specifications. The ground surface at all boring locations was restored to its original condition.

2.4 MONITORING WELL INSTALLATION AND DEVELOPMENT

2.4.1 Well Installation

Monitoring wells were installed during Rounds 1, 2, and 3 of the RFI field operations at SWMU 16 in accordance with SOP CTO166-12. Table 2-2 provides monitoring well construction details.

After each boring was drilled to the desired depth, a 2-inch-diameter polyvinyl chloride (PVC) Schedule 40 well screen and riser pipe was lowered into the boring through the steel isolation casing. Well screens ranged in length from 5 to 20 feet depending on well depth. Screens had a slot size of 0.20 inch. After the screen and the riser pipe were in place, the annulus of the boring was backfilled with clean silica sand from the bottom of the boring to 1 to 2 feet above the top of the well screen. A 2-foot bentonite seal was then installed either in pellet (shallow wells) or slurry form (deep wells), and the pellets allowed to hydrate in accordance with the manufacturer's recommendations. The remainder of the annulus of the borehole (from the bentonite seal to the ground surface) was filled with cement-bentonite grout to approximately 1 foot bgs.

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

Indiana State Well Installation Requirements in 310 Indiana Administrative Code (IAC) 16 were followed for all well installation activities. Well construction logs for Rounds 1, 2, and 3 were completed for each well and are presented in Appendix B.1. Refer to Section 2.3.1 for the drilling methods. Monitoring well construction information and water-level measurements are presented in Table 2-2 for each Round. Figures presented in Appendix B-1 show well construction details. Figure 2-2 presents all well locations.

2.4.2 Monitoring Well Protection

After each monitoring well was installed and the annulus grouted to the land surface, a 4-inch-square, steel protective casing with a locking cap was cemented in place over the riser pipe. All caps were keyed alike and keys turned over to the NSWC Crane EPD. This stick-up-type protective casing extended approximately 3 feet above ground surface and 2 feet bgs. A drain hole was drilled into the protective casing approximately 6 inches above the ground surface. Pea gravel was used to fill the space between the outer protective casing and the riser pipe. A 4-foot-square and 6-inch-thick concrete apron was constructed around the protective casing, and two to four yellow painted, safety barrier posts (nominal

4-inch-diameter, 5-foot-long steel pipes buried 2 feet deep and filled with concrete) were cemented around the outside of the concrete apron. Stainless steel well plates indicating well ID, depth, date, etc. were installed on the outside of each protective well casing. To maintain well security, a locking cap was placed on each well.

2.4.3 Monitoring Well Repair and Development

Five existing wells installed by United States Army Corps of Engineers (USACE), Waterways Experiment Station (ACE WES) were sampled during this RFI investigation at SWMU 16. Prior to the initiation of groundwater sampling during Round 1, these wells were inspected and any noted deficiencies were corrected. Inspection reports are included in Appendix C.6 of this document.

Well Development

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

Wells were developed by up to three surging and purging techniques (a surge block with Whale® pump, a bailer, or a check valve method). The surge block/Whale® pump method consisted of inserting a 2-inch surge block into the well and surging over the length of the saturated screen for a minimum of 5 minutes. Immediately after surging, the Whale® pump was lowered into the well and was pumped in accordance with SOP CTO166-10. The bailer method consisted of purging the well over the length of the saturated screen and removing water and fines. The check valve method involved attaching a decontaminated foot valve to new dedicated ¾-inch polyethylene tubing, extending the tubing to the bottom of the well, and both surging and purging by moving the tubing in an up and down motion. On the downward stroke, the ball in the foot valve lifts and the tubing fills with water, and on the upward stroke, the ball is set and surged groundwater is forced out of the tubing and into a purge bucket. Section 2.14 describes the disposal of all IDW including development fluids.

Water-quality parameters [pH, specific conductivity, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity], pumping rates, volumes of groundwater removed, recharge rates, and water levels were recorded on monitoring well development records. Monitoring well development records for Rounds 1, 2 and 3 can be found in Appendix C.7 of this document.

2.5 SAMPLING OPERATIONS

This section discusses the methodology for all soil, surface water, sediment, and groundwater sampling activities and aquifer testing performed at SWMU 16. Table 2-3 provides a summary of all proposed vs. actual samples collected during each Round, as well as a list of the analyses. Table 2-4 provides the reasoning why a proposed sample was not collected or why additional samples were collected.

2.5.1 Soil Sampling

During Round 1 of the RFI, 66 soil samples were collected from 41 soil borings. During Round 2, 18 soil samples were collected from 9 soil borings. During Round 3, 106 soil samples were collected from 43 soil borings. Twenty-one (21) of the soil samples collected during Round 3 were located within Building 146 after coring out a 6-inch concrete plug from the building floor. Soil samples were collected in accordance with SOP CTO166-08. See Figure 2-1 for all soil boring locations. Soil sample log sheets for Rounds 1, 2, and 3 are included in Appendix C.1 of this document.

2.5.1.1 Surface Soil Sampling

The surface soil samples were collected from the ground surface to a maximum depth of 2 feet bgs or until refusal was reached using DPT or Rotosonic methods and/or hand augering. Upon retrieval, all samples were monitored for the presence of VOCs using a PID. The results of this screening were recorded on the boring logs and/or soil sample log sheets (found in Appendix B and Appendix C, respectively, of this document). Samples for VOC analyses were collected first from the 0.5- to 1.0- or 2.0-foot bgs interval that had the highest PID reading. Samples to be analyzed for VOCs were collected using 5-gram EnCore™ samplers. Sample aliquots for the other analyses were collected from the remaining soil core within the 0- to 2-foot depth interval and placed in the appropriate containers following homogenization.

Round 1

All 39 proposed surface soil samples were collected at SWMU 16. Thirty-four (34) of the surface soil samples were collected from the ground surface to a depth of 2 feet bgs using the DPT method, and five samples were collected using Rotosonic drilling.

Round 2

Nine surface soil samples were collected at SWMU 16 during Round 2. One surface soil sample was collected from each of the nine soil borings from the ground surface to a depth of 1 foot bgs by hand auger.

Round 3

Thirty-five surface soil samples were collected at SWMU 16 utilizing DPT and hand augering during Round 3. All samples were collected at a depth of 0 to 2 feet bgs. Sample locations 16SB79 through 16SB84 were labeled as discretionary samples and were not collected.

2.5.1.2 Subsurface Soil Sampling

Upon retrieval, all subsurface samples were monitored for the presence of VOCs using a PID. The results of this screening were recorded on the boring logs and/or soil sample log sheets. Samples for VOC analyses were collected first from the interval that had the highest PID reading using 5-gram EnCore™ samplers. The remaining soil core material was then homogenized, and soil to be analyzed for other parameters was placed into the required containers. Subsurface sample intervals for SWMU 16 are listed in Table 2-1 for Rounds 1, 2, and 3.

Round 1

Twenty-seven (27) of the proposed 43 subsurface soil samples were collected at SWMU 16. Subsurface soil samples were collected at various depths between 2 to 8 feet bgs using DPT or Rotosonic drilling.

Round 2

All four proposed subsurface samples were collected at SWMU 16 during Round 2. Samples were collected between 1 to 5 feet bgs using hand augering.

Round 3

Seventy-one (71) subsurface soil samples were collected at SWMU 16 during Round 3, including 19 samples collected inside Building 146. Subsurface samples were collected between 2 to 10 feet bgs using DPT and hand augering.

2.5.2 Surface Water/Seep Sampling

Surface water samples were collected from intermittent streams, drainage ditches, surface runoff locations, and sumps throughout SWMU 16. Seep samples were also proposed for Round 2. Sample locations were marked with a labeled, wooden survey stake. Fluorescent flagging was tied to the stake and to a nearby tree (if available) to facilitate relocation of the sample location for surveying purposes. All Round 1 surface water samples that could be collected were collected in accordance with the approved QAPP (TtNUS, 2003a). All Round 2 surface water samples were collected in accordance with Addendum No. 1 to the approved QAPP (TtNUS, 2003c). All Round 3 surface water samples were collected in accordance with Addendum No. 2 to the approved QAPP (TtNUS, 2004). All pertinent field data, including water quality parameters, sampling method, and location were recorded on a surface water sample log sheet (see Appendix C.3). See Figure 2-3 for all surface water and seep sampling locations.

Round 1

Only three of the proposed seven surface water samples were collected at SWMU 16 during Round 1. Each sample was collected from a sump. Locations 16SW03, 04, 05, and 06 were not collected due to lack of water.

Round 2

Eleven (11) surface water samples were collected at SWMU 16 during Round 2. This included sampling the three locations previously sampled during Round 1 (16SW01, 02, and 07). Three locations (16SW16, 19, and 22) were not collected due to lack of water. Five seep samples were also proposed for collection during Round 2; however, due to dry conditions none of the five were collected.

Round 3

All 20 proposed surface water sample locations at SWMU 16 were collected during Round 3. Eighteen (18) of the 20 locations were initially found to be dry during the sampling period in early October 2004.

However, after significant rainfalls over a two week period, the locations were revisited in November 2004 and all proposed samples were collected.

2.5.3 Sediment Sampling

Sediment samples were collected from intermittent streams, drainage ditches, and surface runoff locations at SWMU 16 during the three rounds of sampling. The samples were collected in depositional areas that contained predominantly fine (clay and silt) particles present in the streambeds or drainageways. All sediment samples were collected at a depth of 0 to 4 inches bgs. All Round 1 sediment samples were collected in accordance with the approved QAPP (TtNUS, 2003a). All Round 2 sediment samples were collected in accordance with Addendum No. 1 to the approved QAPP (TtNUS, 2003c). All Round 3 sediment samples were collected in accordance with Addendum No. 2 to the approved QAPP (TtNUS, 2004). All locations were marked with a labeled, wooden survey stake. Fluorescent flagging was tied to the stake and to a nearby tree (if available) to facilitate relocation of the sample location for surveying purposes. All pertinent field data, including sampling method, depth, description, and location were recorded on sediment sample log sheets (see Appendix C.2). See Figure 2-3 for all sediment sampling locations.

Round 1

Nine (9) of the 11 proposed sediment samples were collected at SWMU 16 during Round 1. Samples were not collected from sediment locations 16SD01 and 16SD07 because no sediment was present.

Round 2

During Round 2, all 11 new proposed sediment sampling locations at SWMU 16 were sampled.

Round 3

Twenty (20) sediment samples were collected during Round 3 at SWMU 16. Twelve (12) of these locations had been previously sampled during either Round 1 or Round 2. Many of the sample locations were dry; however, the sediment samples were collected at an area where the finest particles were found.

2.5.4 Groundwater Purging and Sampling

Purging and stabilization of wells prior to sampling was accomplished using low-flow techniques in accordance with SOP CTO166-16 and SOP CTO166-15. Sampling was accomplished in accordance with SOP CTO166-05.

Wells were purged prior to sampling using a peristaltic pump or bladder pump, depending on the static water level, well depth, and recharge information obtained during well development. In general, bladder pumps were used to sample wells with a static water level greater than 28 feet bgs, and peristaltic pumps were used to sample wells having a static water level less than 28 feet bgs. Based on historical data and the proposal of future quarterly monitoring, 12 monitoring wells were outfitted with dedicated bladder pumps and tubing during Round 3.

Groundwater quality parameters including pH, specific conductance, temperature, DO, and ORP were measured during purging at 5- to 10-minute intervals using a YSI Model 600 series multi-parameter water-quality meter and flow-through cell. Longer intervals were used for slower pumping wells. Turbidity readings were measured using a LaMotte 2020 turbidity meter. Water levels and pumping rates were also measured during purging at 5- to 10-minute intervals. Purging continued until a minimum of one well volume was removed and the above parameters stabilized or after 4 hours of purge time, in accordance with SOP CTO166-16, and SOP CTO166-15. Copies of the monitoring well low-flow purge data sheets and groundwater sample log sheets for Rounds 1, 2, and 3 are provided in Appendix C.4 of this document.

To the extent possible, the pumping rates were adjusted to prevent drawdown from exceeding 0.3 foot below static level during purging. Well purging continued until all parameters stabilized and the minimum purge volume (stabilized well volume plus the extraction tubing volume) was removed. If the water quality parameters did not stabilize within 4 hours of purging, sampling was initiated and this information was recorded on the low-flow purge data sheet.

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

Sample containers were filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. These samples were immediately sealed in 40-milliliter (mL) vials so

that no headspace existed. Samples for semivolatile organic compounds (SVOCs), explosives, explosive picrates, total metals, total mercury, ammonia, nitrate, dissolved metals, and dissolved mercury were collected next and in the order given (when applicable). Samples with turbidity values greater than 10 nephelometric turbidity units (NTUs) were field filtered for dissolved metals analyses prior to sample preservation using a 0.45 micrometer (µm) in-line filter. All pertinent field data, including sampling method, purge information, pump intake depth, and well location were recorded on the low-flow purge data sheet and the groundwater sample log sheets (See Appendix C.4). See Figure 2-2 for all groundwater sampling locations.

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

In 1983, ACE WES had installed monitoring wells at SWMU 16, and five of those wells (16GW01 through 16GW05), have been incorporated into the TtNUS monitoring activities for Rounds 1, 2, and 3.

Round 1

Eleven (11) monitoring wells were sampled during Round 1 at SWMU 16, which includes the five existing ACE WES wells and six newly installed wells (16MWT01 – 16MWT06). Well location 16GW02 was initially sampled for a wide range of parameters, and then re-sampled during the same round for SVOCs and mercury due to low surrogate recovery and holding time. Well location 16GWT06 was not proposed for installation in the original QAPP (TtNUS, 2003a), but was installed during Round 1 to compensate for low-yielding monitoring well 16MWT01. This location was also initially sampled for a wide range of parameters, and then re-sampled during the same round for SVOCs due to low surrogate recovery.

Round 2

During Round 2, 12 new monitoring wells (16MWT07 – 16MWT18) were installed at SWMU 16, and a total of 21 groundwater samples were collected. Well location 16MWT07 was not sampled due to being dry, and well 16MWT14 was abandoned.

Round 3

Three new monitoring wells (16MWT19 – 16MWT21) were installed at SWMU 16 during Round 3. A total of 23 samples were collected. Well location 16MWT07 was not sampled due to being dry, and wells 16MWT08 and 16MWT16 were both low yielding wells. Dedicated bladder pumps and associated tubing

were installed in monitoring wells WES-14-02-83, WES-14-03-83, WES-14-04-83, 16MWT04, 06, 09, 10, 11, 12, 13, 15, and 17.

2.6 FIELD SAMPLE DOCUMENTATION

Sample documentation consisted of the completion of boring logs, matrix-specific sample log sheets, sample bottle tags, chain-of-custody records, field task modification request (FTMR) forms, equipment calibration log sheets, field logbooks, and health and safety documentation. Field documentation was completed as per SOP CTO 166-03. The sample log sheets contain information such as sample location and sample ID, container requirements and analyses to be performed, sample type, time, date, and method of sample collection. Any unusual circumstances encountered during sample collection were noted on the form. Sample log sheets can be found in Appendix C of this document. Chain-of-custody records (see Appendix C.4) were used to track each sample from collection to receipt and analysis at the laboratory. FTMRs (see Appendix C.8) were used to document deviations from the approved QAPP and the Addendum No. 1 and the Addendum No. 2 to the approved QAPP. Equipment calibration log sheets are discussed in Section 2.9.1 and can be found in Appendix C.9 of this document. Upon completion of sample analyses, sample bottle tags were forwarded by laboratory personnel to the NSWC Crane EPD for storage.

2.7 SAMPLE HANDLING, PACKAGING, AND SHIPPING

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

overnight delivery and were received within sample holding times. Sample bottle tags were removed from each sample bottle by laboratory personnel and forwarded to the NSWC EPD.

2.8 QUALITY CONTROL SAMPLES

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

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

- Equipment Rinsate Blanks - Equipment rinsate blanks were obtained under representative field conditions by collecting the rinse water generated by running analyte-free water through or over sample collection equipment after decontamination and before use. However, when pre-cleaned, dedicated, or disposable sampling equipment was used (no decontamination was required), one equipment rinsate blank was collected as a batch blank. Additionally, bladder pump equipment rinsate blanks were collected at a rate of one equipment rinsate blank for every five samples (See the FTMR form in Appendix C.8). Equipment rinsate blanks were analyzed for the same chemical constituents as the associated environmental samples.

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

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

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

2.9 FIELD INSTRUMENT MEASUREMENTS

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

- PID
- YSI Model 6 series, multi-parameter water-quality meter
- LaMotte 2020 turbidity meter
- M-scope water-level indicator

2.9.1 Equipment Calibration

Instruments used in the field were calibrated daily prior to use according to manufacturers' requirements and in accordance with applicable SOPs. Equipment calibration logs can be found in Appendix C.9.

2.9.2 Field Investigation Preventive Maintenance Procedures/Schedule

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

An appropriate maintenance check was performed daily on each piece of equipment. If damaged or defective parts were identified during the maintenance check, and it was determined that the damage could have an impact on the instrument's performance, the instrument was removed from service until the defective parts were repaired or replaced. Critical spare parts were kept on site to reduce downtime. Spare parts included batteries, a DO-probe membrane kit (membranes and a bottle of solution), and air

particle filters for the PID. Back-up instruments and equipment were available on site or were shipped within 1 day via overnight courier to avoid delays in the field schedule.

2.10 SURVEYING

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

2.11 DECONTAMINATION

The nondedicated, nondisposable equipment involved in field sampling activities was decontaminated before beginning work, during drilling and sampling activities, and at the completion of the RFI activities in accordance with SOP CTO166-16. This equipment included drilling rigs, down-hole tools, augers, and soil and water sampling equipment.

2.11.1 Major Equipment

All down-hole equipment, including down-hole drilling tools, were steam cleaned with high-pressure hot water prior to beginning work, between borings, and at the conclusion of each shift of drilling.

Well riser pipe and screens were supplied at the site in certified clean packaging. All decontamination activities took place at a predetermined area within NSWC Crane.

2.11.2 Sampling Equipment

All nondedicated (reusable) equipment used for collecting samples was decontaminated both before field sampling, between sample collections, and at the end of each sampling event. This equipment included

stainless-steel trowels, stainless-steel mixing bowls, bladder pumps, etc. The following decontamination steps were taken:

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

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

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

2.12 WATER- LEVEL MEASUREMENTS AND AQUIFER TESTING

2.12.1 Groundwater Level Measurements

Water-level measurements were obtained from each monitoring well prior to development and purging. In addition, complete synoptic rounds of water levels were taken including all the wells at the end of each round of field activities. Each round of synoptic water-level measurements was obtained within a 4-hour time period. Measurements were taken with an electrical water-level indicator (M-scope), using the top of the riser pipe as the reference point to determine water depth for monitoring wells and using a surveyed mark for staff gauge measurements. All measurements were taken in accordance with the specific SOP contained in the Appendix of each respective QAPP. A mark was placed at the top of the riser pipe to ensure that measurements were taken from a consistent reference point. Water-level measurements and staff gauge measurements were recorded to the nearest 0.01 foot on groundwater level measurement forms, which are provided in Appendix C of this document. Table 2-2 contains water level/elevation data for each round.

2.12.2 Staff Gauge Installation and Estimation of Stream Flow

Staff gauges were installed at the culverts of drainage ditches and intermittent streams where flowing water was observed. Marks were placed on these permanent structures denoting the point where

measurements would be taken and the staff gauge number. Refer to Figure 2-3 for staff gauge locations at SWMU 16.

Stream flow estimates were made based on visual observations and can be found in Appendix C. Due to shallow depths, dense grassy cover, and/or natural features interfering with adequate unrestricted stream/drainage ditch runs, stream flow measurement SOP CTO166-20 could not be followed at all sampling locations.

2.12.3 Aquifer Testing

Slug tests were performed at SWMU 16 to determine the hydraulic characteristics of the formation in the immediate vicinity of the wells. During slug testing, the change in water level in the wells was induced by withdrawing (rising head) or introducing (falling head) a solid PVC slug with a volume equivalent to approximately 2 to 3 feet of displacement in a 2-inch well. In some instances, one or two bailers (one bailer induces approximately 1.5 feet of displacement in a 2-inch well) were used to withdraw water to initiate the water level change. Monitoring wells with a water level below the top of the well screen were tested only using the rising head method and in most cases using a bailer to induce the water level change. Monitoring wells with 3 feet or less of standing water were not slug tested.

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

Slug tests were performed in monitoring wells 16MWT02, 16MWT04, 16MWT05, 16MWT09, 16MWT10, 16MWT15, 16MWT17, and 16MWT21 at SWMU 16 during the three rounds of investigation. Slug test data evaluation results are discussed in Section 4.6.

2.13 FIELD CORRECTIVE ACTION

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

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

No nonconformances or suspected deficiencies occurred during any of the 3 Rounds of field investigations; however, 14 deviations from the approved QAPP occurred during the Round 1 RFI activities, and 1 deviation occurred from the Addendum No. 1 to the approved QAPP during Round 2. These deviations were addressed using FTMR forms, copies of which are included in Appendix C.9. No deviations occurred during Round 3.

2.14 INVESTIGATION-DERIVED WASTE HANDLING

The field investigations generated several types of potentially contaminated wastes including personal protective equipment (PPE), decontamination fluids from the drill rig, backhoe, and bulldozer, sampling equipment decontamination fluids, DPT plastic sleeves, development and purge water, and soil cuttings. Management of each residue was performed as follows:

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

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

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

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

2.15 SITE MANAGEMENT AND FACILITY SUPPORT

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

All site preparation, mobilization/demobilization, and sampling activities were coordinated through NSWC Crane personnel.

2.16 RECORDKEEPING

Various hardcover, bound record books were maintained for each field activity in accordance with SOP CTO166-03. The Master Site Logbook served as the overall record of field activities. Information recorded daily in the Master Site Logbook included daily field activities, weather conditions, identity of and arrival and departure times of personnel, management issues, etc. Various field notebooks were also maintained. For example, the site geologist supervising monitoring well installation operations maintained a field notebook. Copies of field log books are included in Appendix D.

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

2.17 RESTORATION AND REVEGETATION

At the conclusion of Rounds 1 and 3 field activities, TtNUS performed site restoration and revegetation on all areas impacted by drilling activities and/or heavy equipment (i.e. backhoe and bulldozer) operations at

SWMU 16. At the conclusion of Round 2 field activities, it was determined that the ground surface was too hard to perform site restoration and revegetation. Restoration was subsequently completed on April 15 and 16, 2004.

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method[1]	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
SWMU 16 - Round 1				
16MWT01	24	RS	8-Apr-03	NS
16MWT02	18	RS	11-Apr-03	NS
16MWT03	35	RS	10-Apr-03	NS
16MWT04	25	RS	9-Apr-03	NS
16MWT05	40	RS	9-Apr-03	NS
16MWT06	25	RS	24-Apr-03	NS
16SB01	6	DPT	27-Mar-03	0 - 2, 4 - 6
16SB02	6	DPT	27-Mar-03	0 - 2, 4 - 6
16SB03	2	DPT	27-Mar-03	0 - 2
16SB04	2	DPT	27-Mar-03	0 - 2
16SB05	2	DPT	27-Mar-03	0 - 2
16SB06	2	DPT	27-Mar-03	0 - 2
16SB07	2	DPT	27-Mar-03	0 - 2
16SB08	2	DPT	27-Mar-03	0 - 2
16SB09	2	DPT	27-Mar-03	0 - 2
16SB10	2	DPT	27-Mar-03	0 - 2
16SB11	4	DPT	27-Mar-03	0 - 2, 2 - 4
16SB12	4	DPT	28-Mar-03	0 - 2, 2 - 4
16SB13	4	DPT	28-Mar-03	0 - 2, 2 - 4
16SB14	2	DPT	27-Mar-03	0 - 2
16SB15	2	DPT	27-Mar-03	0 - 2
16SB16	2	DPT	27-Mar-03	0 - 2
16SB17	4	DPT	27-Mar-03	0 - 2, 2 - 4
16SB18	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB19	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB20	2	DPT	28-Mar-03	0 - 2
16SB21	2	DPT	28-Mar-03	0 - 2
16SB22	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB23	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB24	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB25	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB26	4	RS	9-Apr-03	0 - 2, 2 - 4
16SB27	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB28	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB29	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB30	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB31	2	DPT	28-Mar-03	0 - 2

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method[1]	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
SWMU 16 - Round 1 (cont'd)				
16SB32	4	RS	9-Apr-03	0 - 2, 2 - 4
16SB33	4	RS	9-Apr-03	0 - 2, 2 - 4
16SB34	3	RS	9-Apr-03	0 - 2, 2 - 3
16SB35	2	DPT	28-Mar-03	0 - 2
16SB36	3	RS	9-Apr-03	0 - 2, 2 - 3
16SB37	2	DPT	28-Mar-03	0 - 2
16SB38	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB39	3	DPT	28-Mar-03	0 - 2, 2 - 3
16SB40	8	DPT	28-Mar-03	5 - 6, 6 - 8
16SB41	7	DPT	27-Mar-03	3 - 5, 5 - 7
SWMU 16 - Round 2				
16MWT07	25.5	HSA	11-Nov-03	NS
16MWT08	99	RS	9-Nov-03	NS
16MWT09	25	HSA	8-Nov-03	NS
16MWT10	25	HSA	9-Nov-03	NS
16MWT11	98	HSA	11-Nov-03	NS
16MWT12	26.5	HSA	7-Nov-03	NS
16MWT13	19	HSA	11-Nov-03	NS
16MWT14	25	HSA	7-Nov-03	NS
16MWT15	92	RS	9-Nov-03	NS
16MWT16	40	HSA	9-Nov-03	NS
16MWT17	24	HSA	8-Nov-03	NS
16MWT18	105	RS	18-Jan-04	NS
16SS42	2	HA	5-Dec-03	0 - 1, 1 - 2
16SS43	2	HA	5-Dec-03	0 - 1, 1 - 2
16SS44	2	HA	5-Dec-03	0 - 1, 1 - 2
16SS45	2	HA	5-Dec-03	0 - 1, 1 - 2
16SS46	2	HA	5-Dec-03	0 - 1, 1 - 2
16SB47	5	HA	5-Dec-03	0 - 1, 1 - 5
16SB48	3	HA	5-Dec-03	0 - 1, 1 - 3
16SB49	5	HA	5-Dec-03	0 - 1, 1 - 5
16SB50	3	HA	5-Dec-03	0 - 1, 1 - 3
SWMU 16 - Round 3				
16MWT19	15.5	HSA	28-Jul-04	NS
16MWT20	16	HSA	28-Jul-04	NS
16MWT21	96	HSA	9-Sep-04	NS
16SB51	4	DPT	13-Aug-04	1 - 2, 2 - 4

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method[1]	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
16SB52	5	DPT	12-Aug-04	1 - 2, 2 - 5
16SB53	5	DPT	12-Aug-04	1 - 2, 2 - 5
16SB54	5	DPT	13-Aug-04	1 - 2, 2 - 5
16SB55	7	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB56	8	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 8
16SB57	6	DPT	13-Aug-04	1 - 2, 2 - 6
16SB58	7	DPT	13-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB59	8	DPT	13-Aug-04	1 - 2, 2 - 6, 6 - 8
16SB60	9	DPT	11-Aug-04	1 - 2, 2 - 6, 6 - 9
16SB61	7	DPT	11-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB62	7	DPT	13-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB63	8	DPT	11-Aug-04	1 - 2, 2 - 6, 6 - 8
16SB64	10	DPT	11-Aug-04	1 - 2, 2 - 6, 6 - 8
16SB65	8	DPT	11-Aug-04	1 - 2, 2 - 6, 6 - 8
16SB66	8	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 8
16SB67	9	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 9
16SB68	9	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 9
16SB69	7	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB70	7	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB71	6	DPT	12-Aug-04	1 - 2, 2 - 6
16SB72	7	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB73	4	DPT	12-Aug-04	1 - 2, 2 - 4
16SB74	6	DPT	17-Aug-04	1 - 2, 2 - 6
16SB75	3	DPT	12-Aug-04	1 - 2, 2 - 3
16SB76	7	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB77	14	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 10
16SB78	9	DPT	12-Aug-04	1 - 2, 2 - 6, 6 - 9
16SB79	**Discretionary Samples (Not Collected)**			
16SB80				
16SB81				
16SB82				
16SB83				
16SB84				
16SB85	4	HA	14-Aug-04	0 - 2, 2 - 4
16SB86	4	HA	14-Aug-04	0 - 2, 2 - 4
16SB87	4	HA	14-Aug-04	0 - 2, 2 - 4
16SB88	4	HA	14-Aug-04	0 - 2, 2 - 4
16SB89	4	HA	14-Aug-04	0 - 2, 2 - 4

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method(1)	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
16SB90	8	DPT	16-Aug-04	4 - 6, 6 - 8
16SB91	9	DPT	16-Aug-04	4 - 6, 6 - 9
16SB92	8	DPT	16-Aug-04	4 - 6, 6 - 8
16SB93	8	DPT	16-Aug-04	4 - 6, 6 - 8
16SB94	8	DPT	16-Aug-04	7 - 8
16SB95	7	DPT	16-Aug-04	4 - 6, 6 - 7
16SB96	8	DPT	16-Aug-04	4 - 6, 6 - 8
16SB97	7	DPT	16-Aug-04	4 - 6, 6 - 7
16SB98	6	DPT	16-Aug-04	1 - 2, 2 - 6, 6 - 7
16SB99	8	DPT	16-Aug-04	1 - 2, 2 - 6, 6 - 8

Notes:
(1) HA = Hand Auger, DPT = Direct Push Technology, RS = Rotosonic, HSA = Hollow Stem Auger.

NA = Not applicable
NS = No sample
bgs = below ground surface

TABLE 2-2

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Well Number	Installation Date	Northing (NAD83)	Easting (NAD83)	Ground Elevation	Top of Riser Elevation	Total Depth[1]	Screened Interval				Water-Bearing Zone	May 5, 2003		May 30, 2003		January 24, 2004		February 4, 2005	
							Top	Bottom	Top	Bottom		Depth to Water	Water Elevaton	Depth to Water	Water Elevaton	Depth to Water	Water Elevaton	Depth to Water	Water Elevaton
		(feet)	(feet)	(feet amsl)	(feet amsl)	(feet bgs)	(feet brp)	(feet brp)	(feet amsl)	(feet amsl)		(feet brp)	(feet amsl)	(feet brp)	(feet amsl)	(feet brp)	(feet amsl)	(feet brp)	(feet amsl)
16MWT01	4/8/2003	1321193.49	3032881.29	762.02	764.50	24.00	14.00	24.00	748.02	738.02	Puz	25.19	739.31	22.70	741.80	19.12	745.38	15.88	748.62
16MWT02	4/11/2003	1321146.42	3032559.16	757.60	760.36	18.00	8.00	18.00	749.60	739.60	Puz	6.55	753.81	12.18	748.18	10.94	749.42	12.61	747.75
16MWT03	4/10/2003	1320946.97	3032644.29	761.95	764.41	35.00	25.00	35.00	736.95	726.95	Pmz	27.20	737.21	28.07	736.34	28.34	736.07	28.88	735.53
16MWT04	4/9/2003	1321003.28	3032946.47	763.88	766.14	25.00	15.00	25.00	748.88	738.88	Puz	8.05	758.09	13.14	753.00	13.11	753.03	14.29	751.85
16MWT05	4/9/2003	1320741.79	3032812.77	764.50	766.88	40.00	29.00	39.00	735.50	725.50	Pmz	29.77	737.11	30.39	736.49	31.44	735.44	32.11	734.77
16MWT06	4/24/2003	1321199.52	3032883.37	761.77	764.44	25.00	15.00	25.00	746.77	736.77	Puz	22.33	742.11	15.92	748.52	17.41	747.03	17.79	746.65
16MWT07	11/11/2003	1321176.93	3033001.57	760.54	762.87	25.50	15.00	25.00	745.54	735.54	Puz	NA	NA	NA	NA	Dry	< 735.54	Dry	< 735.54
16MWT08	11/9/2003	1321179.45	3033009.24	759.57	761.56	99.00	85.00	95.00	674.57	664.57	Plz	NA	NA	NA	NA	97.03	664.53	96.60	664.96
16MWT09	11/8/2003	1321068.49	3033041.44	762.43	764.28	25.00	15.00	25.00	747.43	737.43	Puz	NA	NA	NA	NA	13.88	750.40	15.25	749.03
16MWT10	11/9/2003	1320936.05	3033074.74	761.93	764.43	25.00	14.00	24.00	747.93	737.93	Puz	NA	NA	NA	NA	22.05	742.38	22.30	742.13
16MWT11	11/11/2003	1320934.64	3033062.79	763.23	765.24	98.00	86.00	96.00	677.23	667.23	Plz	NA	NA	NA	NA	96.30	668.94	96.41	668.83
16MWT12	11/7/2003	1320729.14	3033074.92	753.23	755.45	26.50	16.00	26.00	737.23	727.23	Pmz	NA	NA	NA	NA	20.13	735.32	20.94	734.51
16MWT13	11/11/2003	1321125.78	3032562.41	757.62	759.57	19.00	8.00	18.00	749.62	739.62	Puz	NA	NA	NA	NA	10.25	749.32	11.36	748.21
16MWT14	11/7/2003	abd.	abd.	764.98	abd.	25.00	15.00	25.00	749.98	739.98	Puz	NA	NA	NA	NA	Dry, abd.	< 739.98	abd.	abd.
16MWT15	11/9/2003	1321120.81	3032563.53	757.73	759.69	92.00	81.00	91.00	676.73	666.73	Plz	NA	NA	NA	NA	53.23	706.46	54.99	704.70
16MWT16	11/9/2003	1321059.41	3032814.52	764.98	764.74	40.00	26.00	36.00	738.98	728.98	Pmz	NA	NA	NA	NA	32.93	731.81	34.40	730.34
16MWT17	11/8/2003	1321235.88	3032675.07	764.79	766.53	24.00	14.00	24.00	750.79	740.79	Puz	NA	NA	NA	NA	15.35	751.18	15.78	750.75
16MWT18	1/18/2004	1321068.96	3032807.84	764.99	764.44	105.00	94.00	104.00	670.99	660.99	Plz	NA	NA	NA	NA	96.65	667.79	95.75	668.69
16MWT19	7/28/2004	1320172.28	3033846.62	606.73	609.31	16.00	5.00	15.00	601.73	591.73	Valley deposits	NA	NA	NA	NA	NA	NA	3.25	606.06
16MWT20	7/28/2004	1320532.68	3034030.68	607.43	609.93	16.00	5.00	15.00	602.43	592.43	Valley deposits	NA	NA	NA	NA	NA	NA	3.66	606.27
16MWT21	9/9/2004	1320581.35	3032960.08	760.78	763.05	96.00	80.00	95.00	680.78	665.78	Plz	NA	NA	NA	NA	NA	NA	65.46	697.59
WES-14-01-83	1983	1320638.35	3032713.38	763.87	766.67	50.70	35.80	45.30	728.07	718.57	Pmz	31.00	735.67	31.00	735.67	31.94	734.73	32.33	734.34
WES-14-02-83	1983	1321319.90	3032647.27	763.69	766.54	25.80	11.35	20.39	752.34	743.30	Puz	14.23	752.31	14.56	751.98	15.36	751.18	15.94	750.60
WES-14-03-83	1983	1320816.00	3033018.50	761.51	763.93	35.40	20.88	29.99	740.63	731.52	Puz	18.80	745.13	19.83	744.10	20.00	743.93	20.45	743.48
WES-14-04-83	1983	1320572.35	3032960.96	760.42	762.99	46.00	31.38	40.47	729.04	719.95	Pmz	26.80	736.19	27.27	735.72	28.39	734.60	28.70	734.29
WES-14-05-83	1983	1320584.05	3032850.32	766.60	769.40	50.70	35.80	45.25	730.80	721.35	Pmz	32.59	736.81	33.05	736.35	34.18	735.22	34.88	734.52

TABLE 2-2

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Well Number	Installation Date	Northing (NAD83)	Easting (NAD83)	Ground Elevation	Top of Riser Elevation	Total Depth[1]	Screened Interval				Water-Bearing Zone	May 5, 2003		May 30, 2003		January 24, 2004		February 4, 2005	
							Top	Bottom	Top	Bottom		Depth to Water	Water Elevaton	Depth to Water	Water Elevaton	Depth to Water	Water Elevaton	Depth to Water	Water Elevaton
		(feet)	(feet)	(feet amsl)	(feet amsl)	(feet bgs)	(feet brp)	(feet brp)	(feet amsl)	(feet amsl)		(feet brp)	(feet amsl)	(feet brp)	(feet amsl)	(feet brp)	(feet amsl)	(feet brp)	(feet amsl)
STAFF GAUGES																			
16SG01	10/16/04	1321342.91	3032498.83	750.58	NA	NA	NA	NA	NA	NA	Puz	NA	NA	NA	NA	NM	NM	dry	NA
16SG02	10/16/04	1321121.91	3032465.01	734.32	NA	NA	NA	NA	NA	NA	Puz	NA	NA	NA	NA	NM	NM	5.29	729.03
16SG03	10/16/04	1320712.52	3032705.12	761.79	NA	NA	NA	NA	NA	NA	Puz	NA	NA	NA	NA	NM	NM	5.03	756.76
16SG04	10/16/04	1320748.57	3033005.16	762.44	NA	NA	NA	NA	NA	NA	Puz	NA	NA	NA	NA	NM	NM	2.15	760.29
16SG05	10/16/04	1320889.16	3032979.28	763.21	NA	NA	NA	NA	NA	NA	Puz	NA	NA	NA	NA	NM	NM	dry	NA
16SG06	10/16/04	1320930.80	3034364.52	603.53	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NM	NM	3.51	600.02
16SG07	10/16/04	1320765.76	3034582.61	601.53	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NM	NM	5.99	595.54
16SG08	10/16/04	1318992.38	3033277.47	590.00	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NM	NM	4.16	585.84
16SG09	10/16/04	1318679.54	3033368.61	583.26	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NM	NM	6.34	576.92

Notes:

1 = Total depth of boring; total depth of well may be less.

amsl = Above mean sea level (NAVD88).
abd. = well was grouted shut and abandoned
bgs = Below ground surface.
brp = Below reference point (top of riser for monitoring wells).
NA = not applicable
NM = not measured
NAD83 = North American Datum of 1983
NAVD88 = North American Vertical Datum of 1988
Puz = Upper Pennsylvanian water-bearing zone
Pmz = Middle Pennsylvanian water-bearing zone
Plz = Lower Pennsylvanian water-bearing zone

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
SWMU 16 Ground Water (Round 1)																						
16GW0101	X				X	X	X	X	X	X	X	X	X			X						
16GW0201	X				X	X	X	X	X	X	X	X	X			X						
16GW0202							U	U			U											
16GW0301	X				X	X	X	X	X	X	X	X	X			X						
16GW0401	X				X	X	X	X	X	X	X	X	X			X						
16GW0501	X				X	X	X	X	X	X	X	X	X			X						
16GWT0101	X											X										
16GWT0201	X				X	X	X	X	X	X	X	X	X			X						
16GWT0301	X				X	X	X	X	X	X	X	X	X			X						
16GWT0401	X				X	X	X	X	X	X	X	X	X			X						
16GWT0501	X				X	X	X	X	X	X	X	X	X			X						
16GWT0601	U				U	U	U	U	U	U	U	U	U			U						
16GWT0602											U											
X	10	0	0	0	9	9	9	9	9	9	9	10	9	0	0	9	0	0	0	0	0	0
U	1	0	0	0	1	1	2	2	1	1	3	1	1	0	0	1	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GW TOTALS	**11**	**0**	**0**	**0**	**10**	**10**	**11**	**11**	**10**	**10**	**12**	**11**	**10**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**
SWMU 16 Ground Water (Round 2)																						
16GW0102					X		X	X		X		X						X				
16GW0203					X		X	X		X		X						X	X	X	X	
16GW0302					X		X	X		X		X						X	X		X	
16GW0402					X		X	X		X		X						X				
16GW0502					X		X	X		X		X						X	X		X	
16GWT0102					O		O	O		O		X						O				
16GWT0202					X		X	X		X		X						X				
16GWT0302					X		X	X		X		X						X				
16GWT0302-F							X	X														
16GWT0402					X		X	X		X		X						X	X	X	X	
16GWT0502					X		X	X		X		X						X				
16GWT0603					X		X	X		X		X						X	X		X	
16GWT0701					O		O	O		O		O						O	O		O	
16GWT0801					X		X	X		O		X						O	O		O	
16GWT0901					X		X	X		X		X						X				
16GWT1001					X		X	X		X		X						X	X		X	
16GWT1101					X		X	X		O		X						O				
16GWT1101-F							X	X														
16GWT1201					X		X	X		X		X						X	U		U	
16GWT1301					X		X	X		X		X						X	X		X	
16GWT1301-F							X	X														
16GWT1401					O		O	O		O		O						O	O		O	
16GWT1501					X		X	X		X		X						X	O	X	X	
16GWT1501-F							X	X														
16GWT1601					X		X	X		O		X						O	O		O	
16GWT1601-F							X	X														
16GWT1701					X		X	X		X		X						X				
16GWT1801					X		X	X		X		X						X	X		X	
16GWT1801-F							X	X														
X	0	0	0	0	19	0	24	24	0	16	0	20	0	0	0	0	0	16	7	3	8	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
O	0	0	0	0	3	0	3	3	0	6	0	2	0	0	0	0	0	6	5	0	4	0
GW TOTALS	**0**	**0**	**0**	**0**	**19**	**0**	**24**	**24**	**0**	**16**	**0**	**20**	**0**	**0**	**0**	**0**	**0**	**16**	**8**	**3**	**9**	**0**

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
SWMU 16 Ground Water (Round 3)																						
16GW0103					X							X										
16GW0204					X							X										
16GW0303					X							X										
16GW0403					X							X										
16GW0503					X							X										
16GWT0103					X							X										
16GWT0203					X							X										
16GWT0303					X							X										
16GWT0403					X							X										
16GWT0503					X							X										
16GWT0604					X							X										
16GWT0702					O							O										
16GWT0802					X		O	O				O										
16GWT0902					X							X										
16GWT1002					X							X										
16GWT1102					X		X	X				X										
16GWT1202					X							X										
16GWT1302					X							X										
16GWT1502					X							X										
16GWT1602					X		O	O				X										
16GWT1702					X							X										
16GWT1802					X							X										
16GWT1901					X		X	X				X										
16GWT2001					X		X	X				X										
16GWT2101					X		X	X				X										
X	0	0	0	0	24	0	4	4	0	0	0	23	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	1	0	2	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0
GW TOTALS	**0**	**0**	**0**	**0**	**24**	**0**	**4**	**4**	**0**	**0**	**0**	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SWMU 16 Surface Soil (Round 1)																						
16SS010002	X				X	X	X	X			X	X	X	X		X						
16SS020002	X		X		X	X	X	X			X	X	X	X	X	X	X					
16SS030002	X				X	X	X	X			X	X	X	X		X						
16SS040002	X				X	X	X	X			X	X	X	X		X						
16SS050002	X				X	X	X	X			X	X	X	X		X						
16SS060002	X			X	X	X	X	X			X	X	X	X		X						
16SS070002	X		X	X	X	X	X	X			X	X	X	X	X	X	X					
16SS080002	X			X	X	X	X	X			X	X	X	X		X						
16SS090002	X			X	X	X	X	X			X	X	X	X		X						
16SS100002	X			X	X	X	X	X			X	X	X	X		X						
16SS110002	X			X	X	X	X	X			X	X	X	X		X						
16SS120002	X		X	X	X	X	X	X			X	X	X	X	X	X	X					
16SS130002	X			X	X	X	X	X			X	X	X	X		X						
16SS140002	X			X	X	X	X	X			X	X	X	X		X						
16SS150002	X			X	X	X	X	X			X	X	X	X		X						
16SS160002	X			X	X	X	X	X			X	X	X	X		X						
16SS170002	X			X	X	X	X	X			X	X	X	X		X						
16SS180002	X		X	X	X	X	X	X			X	X	X	X	X	X	X					
16SS190002	X			X	X	X	X	X			X	X	X	X		X						
16SS200002	X			X	X	X	X	X			X	X	X			X						

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
16SS210002	X			X	X	X	X	X			X	X	X			X						
16SS220002	X			X	X	X	X	X			X	X	X			X						
16SS230002	X			X	X	X	X	X			X	X	X			X						
16SS240002	X		X	X	X	X	X	X			X	X	X		X	X	X					
16SS250002	X			X	X	X	X	X			X	X	X			X						
16SS260002	X			X	X	X	X	X			X	X	X	X		X						
16SS270002	X			X	X	X	X	X			X	X	X	X		X						
16SS280002	X			X	X	X	X	X			X	X	X	X		X						
16SS290002	X			X	X	X	X	X			X	X	X	X		X						
16SS300002	X			X	X	X	X	X			X	X	X	X		X						
16SS310002	X		X	X	X	X	X	X			X	X	X	X	X	X	X					
16SS320002	X			X	X	X	X	X			X	X	X	X		X						
16SS330002	X			X	X	X	X	X			X	X	X	X		X						
16SS340002	X				X	X	X	X			X	X	X			X						
16SS350002	X				X	X	X	X			X	X	X			X						
16SS360002	X				X	X	X	X			X	X	X			X						
16SS370002	X		X		X	X	X	X			X	X	X	X	X	X	X					
16SS380002	X				X	X	X	X			X	X	X	X		X						
16SS390002	X				X	X	X	X			X	X	X	X		X						
X	39	0	7	28	39	39	39	39	0	0	39	39	39	30	7	39	7	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SS TOTALS	**39**	**0**	**7**	**28**	**39**	**39**	**39**	**39**	**0**	**0**	**39**	**39**	**39**	**30**	**7**	**39**	**7**	**0**	**0**	**0**	**0**	**0**

SWMU 16 Surface Soil (Round 2)

16SS420002							X	X														
16SS430002							X	X														
16SS440002							X	X														
16SS450002							X	X														
16SS460002							X	X														
X	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SS TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SWMU 16 Surface Soil (Round 3)

16SS510102												X										
16SS520102												X										
16SS530102												X										
16SS540102												X										
16SS550102												X										
16SS560102												X										
16SS570102												X										
16SS580102												X										
16SS590102												X										
16SS600102												X										
16SS610102												X										
16SS620102												X										
16SS630102												X										
16SS640102												X										
16SS650102												X										
16SS660102												X										
16SS670102												X										

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
16SS680102												X										
16SS690102												X										
16SS700102												X										
16SS710102												X										
16SS720102												X										
16SS730102												X										
16SS740102												X										
16SS750102												X										
16SS760102												X										
16SS770102												X										
16SS780102												X										
16SS790102												O										
16SS800102												O										
16SS810102												O										
16SS820102							O	O														
16SS830102							O	O														
16SS840102							O	O														
16SS850102							X	X														
16SS860102							X	X														
16SS870102							X	X														
16SS880102							X	X														
16SS890102							X	X														
16SS980102												X										
16SS990102												X										
X	0	0	0	0	0	0	5	5	0	0	0	28	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	3	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0
SS TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**0**	**28**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SWMU 16 Subsurface Soil (Round 1)

16SB010406					X	X	X	X			X	X	X	X		X						
16SB020406			X		X	X	X	X			X	X	X	X	X	X	X					
16SB03XXXX					O	O	O	O			O	O	O	O		O						
16SB04XXXX					O	O	O	O			O	O	O	O		O						
16SB05XXXX					O	O	O	O			O		O			O						
16SB06XXXX					O	O	O	O			O		O			O						
16SB07XXXX			O		O	O	O	O			O		O		O	O	O					
16SB08XXXX					O	O	O	O			O		O			O						
16SB09XXXX					O	O	O	O			O		O			O						
16SB10XXXX					O	O	O	O			O		O			O						
16SB110204					X	X	X	X			X	X	X	X		X						
16SB120204			X		X	X	X	X			X	X	X	X	X	X	X					
16SB130204					X	X	X	X			X	X	X	X		X						
16SB14XXXX					O	O	O	O			O		O			O						
16SB15XXXX					O	O	O	O			O		O			O						
16SB16XXXX					O	O	O	O			O		O			O						
16SB170204					X	X	X	X			X	X	X	X		X						
16SB180203			X		X	X	X	X			X	X	X	X	X	X	X					
16SB190203					X	X	X	X			X	X	X	X		X						
16SB20XXXX					O	O	O	O			O		O			O						
16SB21XXXX					O	O	O	O			O		O			O						
16SB220203					X	X	X	X			X	X	X	X		X						
16SB230203					X	X	X	X			X		X			X						

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
16SB240203			X		X	X	X	X			X		X		X	X	X					
16SB250203					X	X	X	X			X		X			X						
16SB260204					X	X	X	X			X		X			X						
16SB270203					X	X	X	X			X		X			X						
16SB280203					X	X	X	X			X		X			X						
16SB290203					X	X	X	X			X		X			X						
16SB300203					X	X	X	X			X		X			X						
16SB31XXXX			O		O	O	O	O			O		O		O	O	O					
16SB320204					X	X	X	X			X		X			X						
16SB330204					X	X	X	X			X		X			X						
16SB340203					X	X	X	X			X		X			X						
16SB35XXXX					O	O	O	O			O	O	O			O						
16SB360203					X	X	X	X			X	X	X			X						
16SB37XXXX			O		O	O	O	O			O	O	O		O	O	O					
16SB380203					X	X	X	X			X	X	X	X		X						
16SB390203					X	X	X	X			X	X	X	X		X						
16SB400506	X				X	X	X	X			X	X	X			X						
16SB400608	X				X	X	X	X			X	X	X			X						
16SB410305	X		X		X	X	X	X			X	X	X		X	X	X					
16SB410507	X		X		X	X	X	X			X	X	X		X	X	X					
X	4	0	6	0	27	27	27	27	0	0	27	16	27	11	6	27	6	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	3	0	16	16	16	16	0	0	16	4	16	2	3	16	3	0	0	0	0	0
SB TOTALS	**4**	**0**	**6**	**0**	**27**	**27**	**27**	**27**	**0**	**0**	**27**	**16**	**27**	**11**	**6**	**27**	**6**	**0**	**0**	**0**	**0**	**0**

SWMU 16 Subsurface Soil (Round 2)

16SB470405												X										
16SB480203												X										
16SB490405												X										
16SB500103												X										
X	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SWMU 16 Subsurface Soil (Round 3)

16SB510206												X										
16SB5106XX												O										
16SB520206												X										
16SB5206XX												O										
16SB530206												X										
16SB5306XX												O										
16SB540205												X										
16SB5406XX												O										
16SB550206												X										
16SB550607												X										
16SB560206												X										
16SB560608												X										
16SB570206												X										
16SB5706XX												O										
16SB580206												X										
16SB580607												X										
16SB590206												X										

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
16SB590608												X										
16SB600206												X										
16SB600609												X										
16SB610206												X										
16SB610607												X										
16SB620206												X										
16SB620607												X										
16SB630206												X										
16SB630608												X										
16SB640206												X										
16SB640608												X										
16SB650206												X										
16SB650608												X										
16SB660206												X										
16SB660608												X										
16SB670206												X										
16SB670609												X										
16SB680206												X										
16SB680609												X										
16SB690206												X										
16SB690607												X										
16SB700206												X										
16SB700607												X										
16SB710206												X										
16SB7106XX												O										
16SB720206												X										
16SB720607												X										
16SB730205												X										
16SB7306XX												O										
16SB740206												X										
16SB7406XX												O										
16SB750203												X										
16SB7506XX												O										
16SB760206												X										
16SB760607												X										
16SB770206												X										
16SB770610												X										
16SB780206												X										
16SB780609												X										
16SB790206												O										
16SB7906XX												O										
16SB800206												O										
16SB8006XX												O										
16SB810206												O										
16SB8106XX												O										
16SB820204							O	O														
16SB830204							O	O														
16SB840204							O	O														
16SB850204							X	X														
16SB860204							X	X														
16SB870204							X	X														
16SB880204							X	X														
16SB890204							X	X														

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
16SB900406(1)												X										
16SB900608(1)												X										
16SB910406(1)												X										
16SB910609(1)												X										
16SB920406(1)												X										
16SB920608(1)												X										
16SB930406(1)												X										
16SB930608(1)												X										
16SB940708(1)												X										
16SB950406(1)												X										
16SB950607(1)												X										
16SB960406(1)												X										
16SB960608(1)												X										
16SB970406(1)												X										
16SB970607(1)												X										
16SB980206(1)												X										
16SB980607(1)												X										
16SB990206(1)												X										
16SB990608(1)												X										
X	0	0	0	0	0	0	5	5	0	0	0	66	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	3	3	0	0	0	15	0	0	0	0	0	0	0	0	0	0
SB TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**0**	**66**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SWMU 16 Surface Water (Round 1)																						
16SW0101					X	U	X	X	U	X	X		X			X						X
16SW0101-F							X	X														
16SW0201					X	U	X	X	U	X	X		X			X						X
16SW0201-F							X	X														
16SW03					O		O	O		O	O		O			O						O
16SW04					O		O	O		O	O		O			O						O
16SW05					O		O	O		O	O		O			O						O
16SW06					O		O	O		O	O		O			O						O
16SW0701					X	U	X	X	U	X	X		X			X						X
16SW0701-F							X	X														
X	0	0	0	0	3	0	6	6	0	3	3	0	3	0	0	3	0	0	0	0	0	3
U	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	4	0	4	4	0	4	4	0	4	0	0	4	0	0	0	0	0	4
SW TOTALS	**0**	**0**	**0**	**0**	**3**	**3**	**6**	**6**	**3**	**3**	**3**	**0**	**3**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**3**
SWMU 16 Surface Water (Round 2)																						
16SW0102												U										
16SW0202												U										
16SW0702												U										
16SW1201					X		X	X		X		X										
16SW1201-F							X	X														
16SW1301					X		X	X		X		X										
16SW1301-F							X	X														
16SW1401					X		X	X		X		X										
16SW1401-F							X	X														
16SW1501					X		X	X		X		X										

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
16SW1501-F							X	X														
16SW1601					O		O	O		O		O										
16SW1701					X		X	X		X		X										
16SW1701-F							X	X														
16SW1801					X		X	X		X		X										
16SW1801-F							X	X														
16SW1901					O		O	O		O		O										
16SW2001					X		X	X		X		X										
16SW2001-F							X	X														
16SW2101					X		X	X		X		X										
16SW2101-F							X	X														
16SW2201												O										O
X	0	0	0	0	8	0	16	16	0	8	0	8	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	2	0	2	2	0	2	0	3	0	0	0	0	0	0	0	0	0	1
SW TOTALS	**0**	**0**	**0**	**0**	**8**	**0**	**16**	**16**	**0**	**8**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SWMU 16 Surface Water (Round 3)

16SW0301							X	X														
16SW0301-F							X	X														
16SW0401							X	X														
16SW0401-F							X	X														
16SW0501							X	X														
16SW0501-F							X	X														
16SW0601							X	X														
16SW0601-F							X	X														
16SW0801							X	X														
16SW0801-F							X	X														
16SW0901							X	X														
16SW0901-F							X	X														
16SW1001							X	X														
16SW1001-F							X	X														
16SW1101							X	X														
16SW1101-F							X	X														
16SW1202					X		X	X		X		X										
16SW1202-F							X	X														
16SW1302					X		X	X		X		X										
16SW1302-F							X	X														
16SW1601							X	X														
16SW1601-F							X	X														
16SW1901							X	X														
16SW1901-F							X	X														
16SW2301							X	X														
16SW2301-F							X	X														
16SW2401					X		X	X		X		X										
16SW2401-F							X	X														
16SW2501							X	X														
16SW2501-F							X	X														
16SW2601							X	X		X		X										
16SW2601-F							X	X														
16SW2701							X	X				X										
16SW2701-F							X	X														
16SW2801							X	X				X										

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
16SW2801-F							X	X														
16SW2901							X	X				X										
16SW2901-F							X	X														
16SW3001					X		X	X				X										
16SW3001-F							X	X														
X	0	0	0	0	4	0	40	40	0	4	0	8	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW TOTALS	**0**	**0**	**0**	**0**	**4**	**0**	**40**	**40**	**0**	**4**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SWMU 16 Sediment (Round 1)

16SD010004					O		O	O			O											
16SD020004		X	X		X	X	X	X			X		X		X	X	X					
16SD030004					X	X	X	X			X		X			X						
16SD040004					X	X	X	X			X		X			X						
16SD050004					X	X	X	X			X		X			X						
16SD060004		X	X		X	X	X	X			X		X		X	X	X					
16SD070004					O		O	O			O											
16SD080004					X	X	X	X			X		X			X						
16SD090004		X	X		X	X	X	X			X		X		X	X	X					
16SD100004					X	X	X	X			X		X			X						
16SD110004					X	X	X	X			X		X			X						
X	0	3	3	0	9	9	9	9	0	0	9	0	9	0	3	9	3	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	2	0	2	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
SD TOTALS	**0**	**3**	**3**	**0**	**9**	**9**	**9**	**9**	**0**	**0**	**9**	**0**	**9**	**0**	**3**	**9**	**3**	**0**	**0**	**0**	**0**	**0**

SWMU 16 Sediment (Round 2)

16SD120004					X		X	X				X										
16SD130004					X		X	X				X										
16SD140004					X		X	X				X										
16SD150004					X		X	X				X										
16SD160004					X		X	X				X										
16SD170004					X		X	X				X										
16SD180004					X		X	X				X										
16SD190004					X		X	X				X										
16SD200004					X		X	X				X										
16SD210004					X		X	X				X										
16SD220004												X										X
X	0	0	0	0	10	0	10	10	0	0	0	11	0	0	0	0	0	0	0	0	0	1
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SD TOTALS	**0**	**0**	**0**	**0**	**10**	**0**	**10**	**10**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**

SWMU 16 Sediment (Round 3)

16SD0302							X	X														
16SD0402							X	X														
16SD0502							X	X														
16SD0602							X	X														
16SD0802							X	X														
16SD0902							X	X														
16SD1002							X	X														
16SD1102							X	X														

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	Sulfide/ Chloride	MEE	TOC	MNA	SIM
16SD1202							X	X														
16SD1302							X	X														
16SD1602							X	X														
16SD1902							X	X														
16SD2302							X	X														
16SD2401							X	X														
16SD2501							X	X														
16SD2601							X	X														
16SD2701							X	X				X										
16SD2801							X	X				X										
16SD2901							X	X				X										
16SD3001							X	X				X										
X	0	0	0	0	0	0	20	20	0	0	0	4	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SD TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**20**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SWMU 16 Seep (Round 2)																						
16SP0101					O		O	O		O		O										
16SP0201					O		O	O		O		O										
16SP0301					O		O	O		O		O										
16SP0401					O		O	O		O		O										
16SP0501					O		O	O		O		O										
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	5	0	5	5	0	5	0	5	0	0	0	0	0	0	0	0	0	0
SP TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

(1) Samples collected inside Building 146

X = Analyzed.
U = Unscheduled.
O = Omitted (See Table 2-4 for reason).
TOC - Total organic carbon.
AVS - Acid volatile sulfide.
CEC - Cation exchange capacity.
DIOX - Dioxins.
EXP - Explosives.
HERB - Herbicides.
HG - Mercury.
NH3 - Ammonia.
NTIA - Nitrite/nitrate.
SVOC - Semivolatile organic comounds.
VOC - Volatile organic compounds.
PAH - Polynuclear aromatic hydrocarbon.
PCB - Polychlorinated biphenyl.
PIC - Picrates, (picric acid, picrimic acid).
SEM - Simultaneously extracted metals.
AVS/SEM - Acid volatile/simultaneously extracted metals.
ALC - 1,4-dioxane, acetonitrile, isobutyl alcohol, propionitrile as determined by Method 8015B
Metals - U.S. EPA Contract Laboratory Program Target Analyte List Metals
Water samples with a -F designation were filtered in the field prior to preparation

TABLE 2-4

REASONING BEHIND OMITTED AND UNSCHEDULED SAMPLING
SWMU 16 -CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																			REASON
	ALC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PIC	Sulfide/ Chloride	MEE	CEC	pH	TOC	SIM	
SWMU 16 Ground Water (Round 1)																				
16GW0202					U	U			U											Re-sample due to holding time exceedence
16GWT0601	U		U	U	U	U	U	U	U	U	U		U							Well installed to replace 16MWT01
16GWT0602									U											Re-sample due to holding time exceedence
SWMU 16 Ground Water (Round 2)																				
16GWT0102			O		O	O		O						O						Well dried out
16GWT0701			O		O	O		O		O				O	O					Well dried out
16GWT0801								O						O	O					Well dried out
16GWT1101								O						O						Well dried out
16GWT1201															U					Substitute
16GWT1401			O		O	O		O		O				O	O					Well adandoned
16GWT1501															O					Missed sample
16GWT1601								O						O	O					Well dried out
SWMU 16 Ground Water (Round 3)																				
16GWT0702			O							O										Dry well
16GWT0802					O	O				O										Well dried out
16GWT1602					O	O														Well dried out
SWMU 16 Surface Soil (Round 3)																				
16SS790102										O										Discretionary sample
16SS800102										O										Discretionary sample
16SS810102										O										Discretionary sample
16SS820102					O	O														Discretionary sample
16SS830102					O	O														Discretionary sample
16SS840102					O	O														Discretionary sample

TABLE 2-4

REASONING BEHIND OMITTED AND UNSCHEDULED SAMPLING
SWMU 16 -CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																			REASON
	ALC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PIC	Sulfide/ Chloride	MEE	CEC	pH	TOC	SIM	
SWMU 16 Subsurface Soil (Round 1)																				
16SB03XXXX			O	O	O	O			O	O	O	O	O							Refusal
16SB04XXXX			O	O	O	O			O	O	O	O	O							Refusal
16SB05XXXX			O	O	O	O			O		O		O							Refusal
16SB06XXXX			O	O	O	O			O		O		O							Refusal
16SB07XXXX			O	O	O	O			O		O		O			O	O	O		Refusal
16SB08XXXX			O	O	O	O			O		O		O							Refusal
16SB09XXXX			O	O	O	O			O		O		O							Refusal
16SB10XXXX			O	O	O	O			O		O		O							Refusal
16SB14XXXX			O	O	O	O			O		O		O							Refusal
16SB15XXXX			O	O	O	O			O		O		O							Refusal
16SB16XXXX			O	O	O	O			O		O		O							Refusal
16SB20XXXX			O	O	O	O			O		O		O							Refusal
16SB21XXXX			O	O	O	O			O		O		O							Refusal
16SB31XXXX			O	O	O	O			O		O		O			O	O	O		Refusal
16SB35XXXX			O	O	O	O			O		O		O							Refusal
16SB37XXXX			O	O	O	O			O		O		O			O	O	O		Refusal
SWMU 16 Subsurface Soil (Round 3)																				
16SB5106XX										O										Refusal
16SB5206XX										O										Refusal
16SB5306XX										O										Refusal
16SB5406XX										O										Refusal
16SB5706XX										O										Refusal
16SB7106XX										O										Refusal
16SB7306XX										O										Refusal

TABLE 2-4

REASONING BEHIND OMITTED AND UNSCHEDULED SAMPLING
SWMU 16 -CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																			REASON
	ALC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PIC	Sulfide/ Chloride	MEE	CEC	pH	TOC	SIM	
16SB7406XX										O										Refusal
16SB7506XX										O										Refusal
16SB790206										O										Discretionary Location (Not Sampled)
16SB7906XX										O										Discretionary Location (Not Sampled)
16SB800206										O										Discretionary Location (Not Sampled)
16SB8006XX										O										Discretionary Location (Not Sampled)
16SB810206										O										Discretionary Location (Not Sampled)
16SB8106XX										O										Discretionary Location (Not Sampled)
16SB820204					O	O														Discretionary Location (Not Sampled)
16SB830204					O	O														Discretionary Location (Not Sampled)
16SB840204					O	O														Discretionary Location (Not Sampled)
SWMU 16 Surface Water (Round 1)																				
16SW0101				U			U													More information requested
16SW0201				U			U													More information requested
16SW03				O	O	O		O	O		O		O						O	Dry
16SW04				O	O	O		O	O		O		O						O	Dry
16SW05				O	O	O		O	O		O		O						O	Dry
16SW06				O	O	O		O	O		O		O						O	Dry
16SW0701				U			U													More information requested
SWMU 16 Surface Water (Round 2)																				
16SW0102										U										Resample
16SW0202										U										Resample
16SW0702										U										Resample
16SW1601			O		O	O		O		O										Dry
16SW1901			O		O	O		O		O										Dry
16SW2201										O									O	Dry

TABLE 2-4

REASONING BEHIND OMITTED AND UNSCHEDULED SAMPLING
SWMU 16 -CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																			REASON
	ALC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PIC	Sulfide/ Chloride	MEE	CEC	pH	TOC	SIM	
SWMU 16 Sediment (Round 1)																				
16SD010004			O		O	O			O											No sediment.
16SD070004			O		O	O			O											No sediment.
SWMU 16 Seep (Round 2)																				
16SP0101			O		O	O		O		O										Not located.
16SP0201			O		O	O		O		O										Not located.
16SP0301			O		O	O		O		O										Not located.
16SP0401			O		O	O		O		O										Not located.
16SP0501			O		O	O		O		O										Not located.

ALC = Alcohols
CEC = Cation exchange capacity
DIOX = Dioxin
EXP = Explosives
HERB = Herbicides
HG = Mercury
HN3 = Ammonia
MEE = Methane, ethane, ethene
NTIA = Nitrates/nitrites
O = Omitted (sample not collected)
PAH = Polycyclic aromatic hydrocarbons
PCB = Polychlorinated biphenyl
pH = Acidity or alkalinity of an aqueous solution
PIC = Picrates
SIM = Selected ion monitoring
SVOC = Semi-voltile organic compound
TOC = Total organic carbon
VOC = Voltile orgnaic compound
U = Unscheduled (sample collected)

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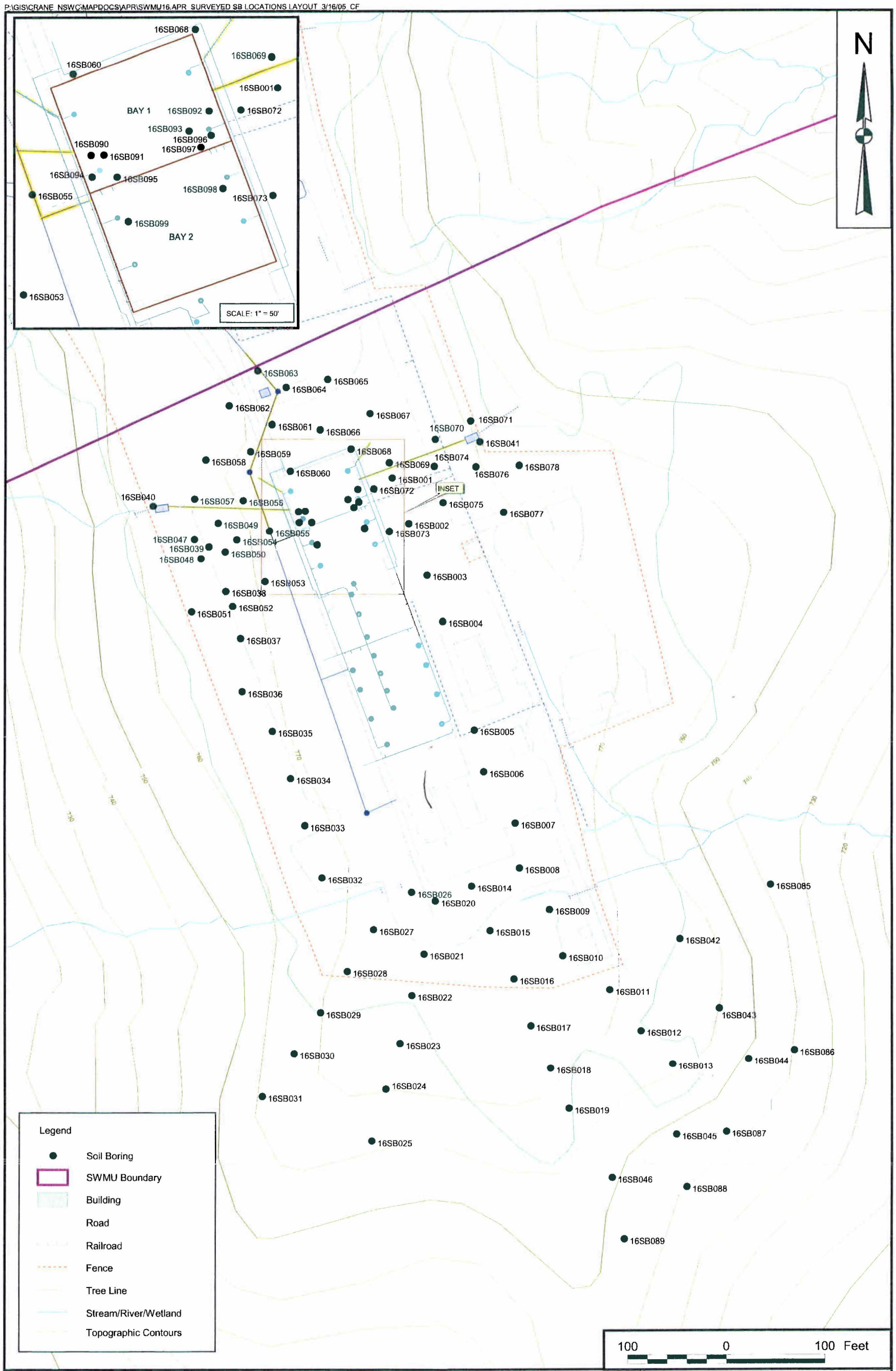

DRAWN BY C. FOSTER — DATE 12/29/04	NAVFAC	SURVEYED SOIL BORING LOCATIONS SWMU 16 CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. SCHUBERT — DATE 12/29/04			APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2 - 1 — REV 0

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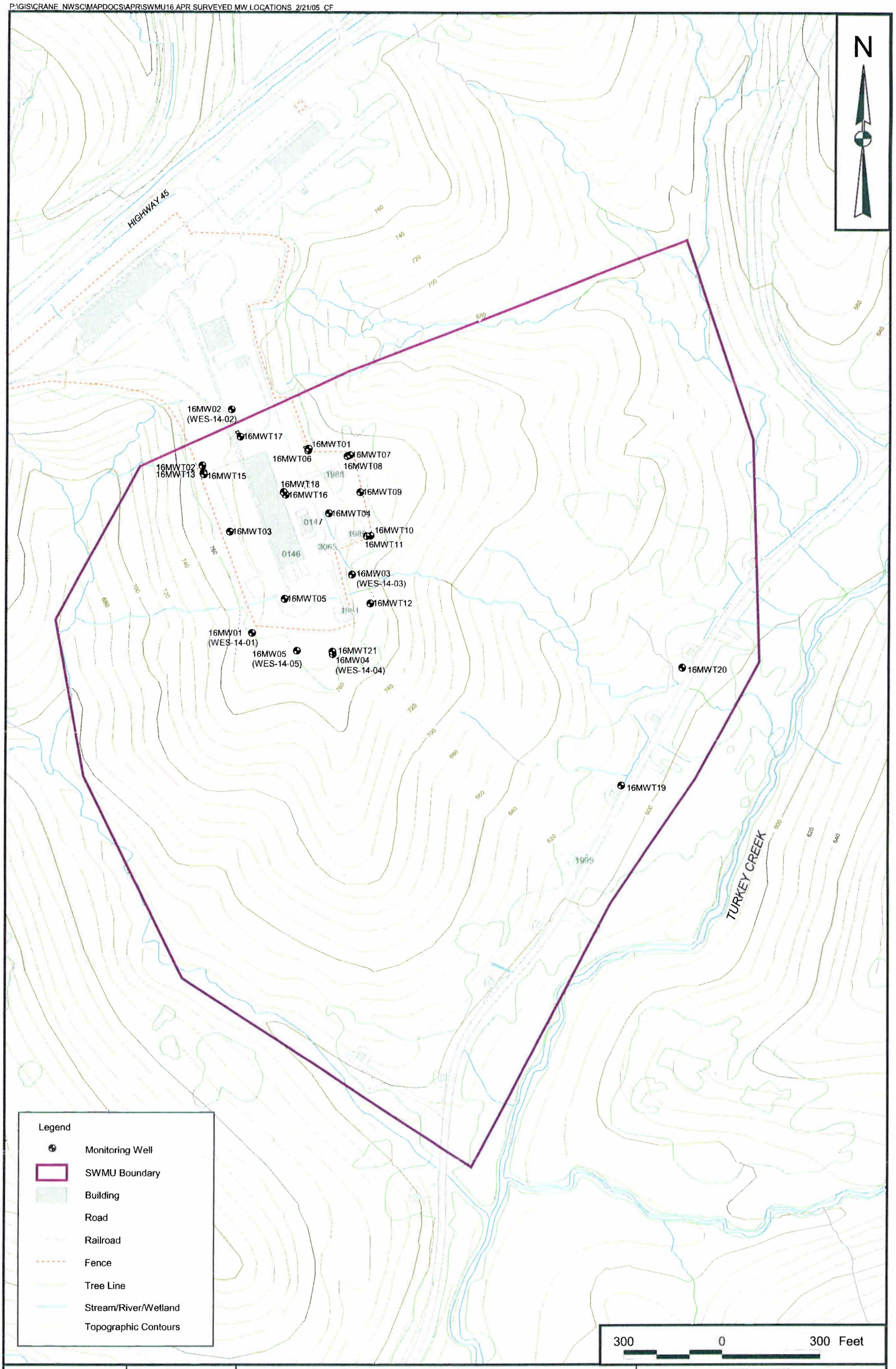
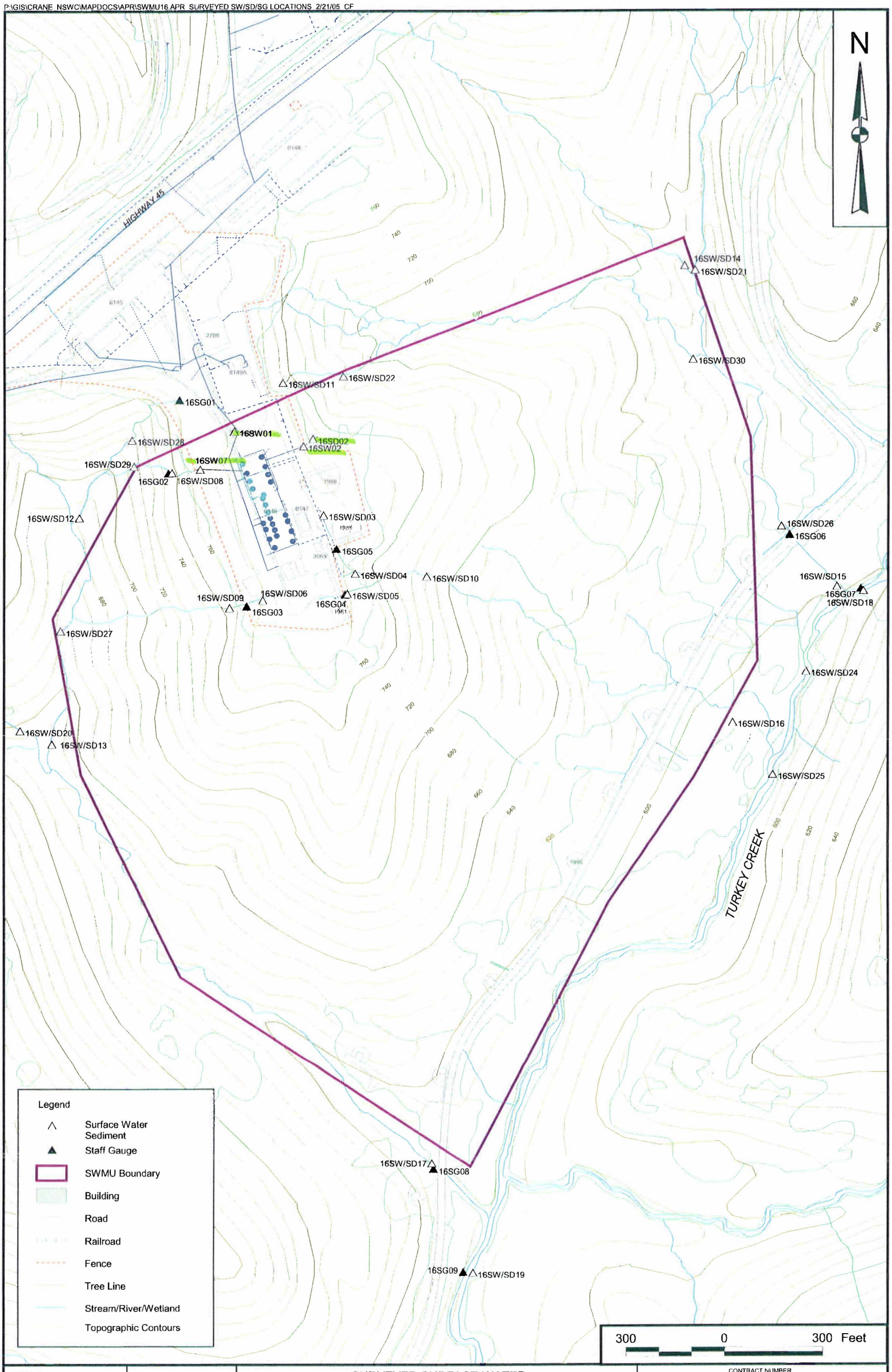


DRAWN BY C. FOSTER	DATE 12/13/04	MONITORING WELL LOCATIONS SWMU 16 CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. SCHUBERT	DATE 12/13/04		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 2-2 REV 0

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU16.APR SURVEYED SW/SD/SG LOCATIONS 2/21/05 CF



DRAWN BY C. FOSTER	DATE 12/29/04	SURVEYED SURFACE WATER, SEDIMENT, AND STAFF GAUGE LOCATIONS SWMU 16 CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. SCHUBERT	DATE 12/29/04		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO FIGURE 2 - 3 / REV 0

3.0 DATA PRESENTATION AND QUALITY

This section describes the data and summarizes the data quality for three separate data sets collected over three sampling rounds. Data presentation is provided in Section 3.1; data quality is described in Section 3.2.

3.1 DATA PRESENTATION

RFI data were collected in three rounds as described in Section 2.0. Laucks Testing Laboratory conducted the analyses, which are summarized for each sample in Table 2-3. Validation and quality review of the data were conducted by TtNUS as described in Section 3.2. The subsections below present descriptions of available background data and SWMU 16 site data.

3.1.1 Background Data Set Descriptions

In addition to the RFI data collections described above, soil samples were previously collected and analyzed in an effort to establish the concentrations of metals representative of the entire NSWC Crane complex (TtNUS, 2001). All metals likely to be included in NSWC Crane environmental investigations were analyzed in that effort. The intent was to provide background soil data sets that could be used to gain perspective on whether observed metal concentrations in SWMU soils are indicative of background concentrations or not.

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

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

The details of sample collection and data generation are provided in TtNUS, 2001. For SWMU 16 there is one Depositional Environment (Pennsylvanian), and two depths (surface and subsurface). In the subsurface there are three distinct grain sizes.

3.1.1.1 SWMU 16 Surface Soil Background Concentrations

After chemical analyses and extensive statistical testing, one distinct soil emerged as representing SWMU 16 surface soils:

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

Tables 3-1 and 3-2 of this RFI report present summaries of the NSWC Crane background data. These tables were taken from TtNUS, 2001. Table 3-1 shows concentration ranges and related statistics for all of NSWC Crane soils, regardless of Depositional Environment, depth, or grain size. This table helps the data user understand how individual a SWMU-specific background data set compares to all of NSWC Crane. Table 3-2 presents surface soil background data summaries specific to SWMU 16 (Alluvial, Mississippian, and Pennsylvanian surface soil)

The tables indicate the metals that were analyzed, the frequencies of detection, the measured concentration ranges, simple summary statistics, the location of maximum observed concentrations, an estimate of the statistical distribution shape, and an estimate of the concentration [95 percent upper tolerance limit (UTL)] that encompasses 95 percent of the data, on average.

3.1.1.2 SWMU 16 Subsurface Soil Background Concentrations

Similar to surface soils, the NSWC Crane basewide background soil collection effort yielded distinct soil groups that represent SWMU 16 subsurface soil metal concentrations for background soils:

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

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

3.1.1.3 SWMU 16 Surface Water, Sediment, and Groundwater Upgradient Concentrations

For mobile environmental media such as surface water, sediment, and groundwater, “background” concentrations are represented by upgradient locations and data. These locations represent concentrations of chemicals that are unaffected by SWMU operations. The upgradient locations are not necessarily free from contamination, but they do represent locations that are free from site-related contamination for the site of interest (in this case, SWMU 16).

Four upgradient locations were sampled for surface water and sediments. Three of these (16WW/SD14, 16WW/SD20, and 16WW/SD21) represent upgradient conditions for gullies; one (16SW/SD18) represents upgradient conditions for Turkey Creek main stream. The concentrations of metals representing the two different classes of drainage channel (gullies and Turkey Creek Main Stream), appear to be significantly different. Comparisons of site data to these upgradient values are discussed in the surface water and sediment section, as applicable (Sections 5.3). There was a single upgradient well, 16MWT01. This well, located in the Pennsylvanian Upper Zone (Piz), is used to represent upgradient groundwater conditions for all other SWMU 16 wells.

The maximum observed chemical concentrations are almost certain to be contained in the site (i.e., SWMU 16) surface water and sediment data (rather than the upgradient data) even if the SWMU 16 data represent the same material as the upgradient conditions. This is a result of having far fewer upgradient samples than downgradient samples. Nevertheless, the available upgradient data do provide some insight into conditions that are upgradient of SMWU 16, when one takes into account the relative sizes of the site and upgradient data sets. The significance of this is case-specific and is addressed where appropriate throughout this report.

3.1.2 SWMU 16 Data Set Descriptions

3.1.2.1 SWMU 16 Surface Soil Site Data

In RFI Rounds 1 through 3, select surface soil samples were collected for a wide array of analyses as described in Section 2.0. After Round 1 the analyte list was limited to metals and VOCs because few detections were observed for chemicals in the other analytical fractions. The subsequent sampling rounds were designed to delineate the extent of VOC and metals contamination in soil and to obtain a refined understanding of the extent of contamination.

Some surface soil samples were not collected as scheduled. Explanations for why certain samples were not collected or were collected in addition to the scheduled sample collections are provided in Section 2.0 and Table 2-4. The Round 1 through Round 3 data for SMWU 16 surface soils are summarized in Tables 3-5 and 3-6. Appendix Table G-1 is a list of all surface and subsurface soil data generated during Rounds 1, 2, and 3. Table 3-5 indicates how often each chemical was detected, the location of the maximum and minimum, etc. Table 3-6 is similar to Table G-1 but displays results only for chemicals that were detected at least once in surface or subsurface soil. For each chemical that falls into this category, all results, including non-detects and rejected values, are shown in Table 3-6.

3.1.2.2 SWMU 16 Subsurface Soil Site Data

In RFI Rounds 1 through 3, select subsurface soil samples were collected for a wide array of analyses as described in Section 2.0. After Round 1 the analyte list was limited to metals and VOCs because enough data had been collected to adequately characterize the other chemical concentrations. The subsequent sampling rounds were designed to bound the extent of metal and VOC contamination and to obtain a refined understanding of the extent of contamination.

Some subsurface soil samples were not collected as scheduled. Explanations for why certain samples were not be collected or were collected in addition to the scheduled sample collections are provided in Section 2.0 and Table 2-4. The Round 1 through Round 3 data for SMWU 16 subsurface soils are summarized in Tables 3-7 and 3-8. Table G-1 is a list of all surface and subsurface soil data generated during Rounds 1, 2, and 3. Table 3-7 indicates how often each chemical was detected, the location of the maximum and minimum, etc. Table 3-8 is similar to Table G-1 but displays results only for chemicals that were detected at least once in surface or subsurface soil. For each chemical that falls into this category, all results, including non-detects and rejected values, are shown in Table 3-8.

3.1.2.3 SWMU 16 Surface Water Data

Data collected for surface water in Rounds 1 through 3 are summarized in Tables 3-9 through 3-15. The surface water samples were analyzed for various combinations of energetic compounds, total and dissolved metals, miscellaneous parameters, VOCs, and water quality parameters (e.g., temperature and pH), and miscellaneous inorganic parameters. Details of the analytical scheme are presented in Table 2-3.

After data collection, drainage channel surface water sample data were divided into two data sets. One data set (Gullies) represents samples that were collected on the steeper hillsides and generally represents drainage channels that are perennially dry, except during storm events. Frequencies of detection and other statistics for these data are presented in Table 3-9 through 3-12. The second subdivision comprises data from samples collected in streams that are more likely to contain water (i.e., Mainstream channels). Similar statistics for these data are presented in Table 3-13. Tables 3-14 and 3-15 present the results for all parameters detected at least once in surface water and sediment, respectively. Table G-2 is a list of all results for surface water samples at SWMU 16.

Upgradient samples are labeled as “upgradient” in these tables. Although not part of the drainage channel system, data for sump samples are included in Tables 3-9 through 3-12 and Table 3-14. The sump data appears in a subsection of each of Tables 3-9 through 3-12. Sump sample locations are identifiable by the word "sump" that is included in the column headers of Table 3-14. Sump samples were analyzed with other aqueous samples; therefore, the data quality evaluation is common to all aqueous samples. No seep samples were collected, so seep samples are not included in the data tables.

3.1.2.4 SWMU 16 Sediment Data

Data collected for sediment in Rounds 1 through 3 are summarized in Tables 3-16 through 3-19. Depending on the sampling round, sediment samples were analyzed for various parameters of interest for this SWMU (See Table 2-3).

Similar to the surface water samples, sediment sample data were divided into two data sets: Gullies and Mainstream. The Gully sediment summary statistics are presented in Table 3-16; similar statistics are provided in Table 3-17 for Turkey Creek Mainstream (TCMS) sediment data. Data for all chemicals detected at least once in Gully sediments are provided in Tables 3-18 and 3-19 for gullies and TCMS samples, respectively. The summary formats are similar to those described for surface and subsurface soils (See Sections 3.1.2.1 and 3.1.2.2). Appendix Table G-3 presents all sediment data generated during Rounds 1 through 3. Upgradient samples are appropriately labeled as “upgradient” in those printouts.

3.1.2.5 SWMU 16 Groundwater Site Data

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

The groundwater wells are identified as Puz (Pennsylvanian, Upper Zone), Pmz (Pennsylvanian Middle Zone), Plz (Pennsylvanian, Lower Zone) or Valley on Table 2-2. The Puz wells represent shallow groundwater on or near to the ridge top and down the side slopes of the ridge toward the valley. Pmz wells are of intermediate depth underneath the ridge top. The Plz wells represent deeper groundwater underneath the Upper Zone and Middle Zone wells. The Valley wells represent shallow groundwater

immediately beneath the "valley" floor near the Mainstream surface water channels. The significance of these classifications becomes evident later in this report.

Summary statistics for groundwater data collected in Rounds 1 through 3 are presented in Tables 3-20 through 3-30. Data for all chemicals detected at least once in groundwater are presented in Tables 3-31 through 3-33. Appendix Table G-4 presents all groundwater data generated during Rounds 1 through 3. These data are arranged so that each round of data within a well location is side by side to facilitate an understanding of temporal concentration trends within each well.

3.2 DATA QUALITY

This section summarizes the data quality for three separate data sets acquired during this RFI. TtNUS collected data concurrently at NSWC Crane SWMUs 13 and 16 at various times during this RFI. Consequently, samples from more than one SWMU but of a similar matrix may have arrived at the analytical laboratory in a similar time frame. Samples from the different SWMUs may have been combined into the same sample preparation or analysis groups. The number of QC results obtained under such circumstances is greater than if only SWMU 16 QC data were available. This provides more robust estimates of analytical performance, especially for quantitative measures such as accuracy and precision, than could be obtained from SMWU 16 QC data alone. A tabulation of data quality characteristics and detailed QC data review for the three rounds of data generation at SWMU 16 are presented in Appendix H of this report. The titles of the data tables (Table H-1 through H-13) identify which SWMUs are represented by the data.

Based on the reviews in Appendix H the following can be summarized about SWMU 16 data quality. Sample collection and analysis completeness was generally satisfactory with a few, insignificant exceptions (See Appendix H, Section H.3.1). The Round 1 through 3 data were also generally of sufficient quality to support this RFI. Some analytes exhibited detection limits that exceeded the target levels. The exceedances are considered to be typical of environmental investigations and did not have any significant adverse effect on data use because they did not affect chemical of primary interest or occurred infrequently, etc. The general data quality is summarized below. Significant deficiencies and limiting data quality characteristics to be considered when using the data are noted below.

<u>Round 1</u>

Dioxins and Furans – The dioxin and furan appear to be satisfactory in all respects. There was no significant bias or imprecision exhibited in soil; aqueous samples were not analyzed for these analytes.

Explosives – Picramic acid results for samples 16SS150002 and 16SS210002 were the only results rejected for the explosive analyses. The picramic acid results were non-detected and were rejected because of low matrix spike (MS) recoveries. The low MS recoveries are likely due to a difficult sample matrix and they indicate that picramic acid results are generally biased low. A slight to moderate low bias [average percent recovery = 59.2 for MS and matrix spike duplicate (MSD), and 88.4 for LCS] was detected in aqueous RDX concentrations. The low bias indicates that reported RDX concentrations are, on average, less than actual site concentrations. Results for other explosive compounds in aqueous and solid sample matrices were not biased significantly low and may be biased slightly high in some cases, though not significantly. Some uncertainty beyond the usual level of uncertainty has been indicated for the nine explosives chemicals identified in Tables H-10 and H-11.

Herbicides – Hexachlorophene and pentachlorophenol are not herbicides but they were analyzed by a herbicide method to achieve low detection limits. The hexachlorophene results exhibit a severe low bias (approximately 20 percent mean recoveries in MS and MSD) and the pentachlorophenol results exhibit a moderately low to severe low bias (approximately 37 percent mean recoveries in MS/MSD) in solid samples. The results for these compounds exhibit a moderately low bias (recoveries ranging from 32 to 58 percent) in aqueous samples. Herbicides were not analyzed in Rounds 2 and 3.

Metals - The metals, overall, exhibit no bias to a slightly high bias, with an apparent but probably false indication of moderate high bias for calcium, chromium, titanium, and zinc (See Table H-8). The probable false indication is due to spike amounts being significantly less than the native metal concentration in the spiked samples. The relative percent difference (RPD) of several soil and sediment results exceeded the reference point of 50 percent, however, the laboratory precision was equal to or better than field duplicate precision, as expected. This indicates that the greater proportion of uncertainty is associated with natural sample heterogeneity. Nevertheless, several metals exhibited some high RPD values (e.g., greater than 100 percent) that indicate a relatively large degree of heterogeneity in the solid samples.

Miscellaneous Parameters (ammonia, AVS, SEM, Cation Exchange Capacity, Nitrite/Nitrate and TOC) – The data are generally of acceptable quality although the ammonia nitrogen results exhibit a slight low bias and occasionally exhibit an uncertainty that is greater than expected.

PCBs – No significant biases or other data quality deficiencies were detected.

SVOCs – There were two sets of data collected in Round 1 for SVOCs and a few other parameters (See Tables G-4) in well WES-14-02-083. The SVOC data was of slightly higher quality in the second data set

of Round 1 because there were fewer rejections of results (there were no groundwater SVOC analyses conducted in Rounds 2 or 3). The compounds 1,4-phenylenediamine, 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, 2,4-dichlorophenol, 2,6-dichlorophenol, 2-chlorophenol, 2-methylphenol, 2-nitrophenol, 3&4-methylphenol, 3,3'-dichlorobenzidine, 4,6-dinitro-2-methylphenol, 4-nitrophenol, 4-nitroquinoline-1-oxide, aramite, hexachlorocyclopentadiene, kepone, phenol, and benzyl alcohol constitute all of the results rejected for the semivolatile analyses for Round 1 soil and groundwater. The majority of the results were rejected because several compounds (4-nitroquinoline-1-oxide, aramite, kepone, and 1,4-phenylenediamine) yield poor analytical responses. The remaining semivolatile results were rejected due to one of the following reasons: low acid surrogate recovery representative of phenolic compound recoveries, low MS recovery, gross holding time exceedance, and low laboratory control sample recovery. The gross holding time exceedance and low laboratory control sample recovery are attributed to laboratory performance and the remaining reasons for data rejection can be attributed to a difficult sample matrix. In summary, the semivolatile compounds, including PAHs, generally show a slightly low bias, with 3,3'-dichlorobenzidene and 4-chloroaniline exhibiting a moderate low bias and hexachlorocyclopentadiene exhibiting a severe low bias. The low phenol compound recoveries indicate that site concentrations for phenolic compounds are higher than the reported concentrations. This may be significant for the locations at which phenols were detected. Detection limits were acceptable, so it does not appear that the ability to detect these compounds was compromised. A moderate degree of uncertainty is evident due to sample heterogeneity.

VOCs – The compounds acrolein, 2-butanone, acetone, acrylonitrile, and methacrylonitrile constitute all of the results rejected for the volatile analyses for Round 1. The data were rejected because these compounds yield poor analytical responses. This is a systematic problem that occurs for one or more of these compounds in the majority of the samples.

Round 2

Explosives - Some uncertainty beyond the usual level of uncertainty has been indicated for the nine chemicals identified in Tables H-10 and H-11.

Dissolved Organic Gases - The results for ethane and ethene, and possibly other dissolved organic gases, should be viewed as having a relatively high degree of uncertainty, (e.g., an RPD of at least 50).

Metals - The metals, overall, exhibit no bias to a slightly high bias, with an apparent but probably false moderate high bias for titanium, and zinc (See Table H-8) on solid matrices. The probable false indication is due to spike amounts being significantly less than the native metal concentration in the

spiked samples. Based on the two MS results for dissolved metals, dissolved metal results appear to be biased slightly low (approximately 30 to 40 percent) and outside the reference range of 75 to 125 percent. Several soil and sediment RPD results exceeded the reference point of 50 percent, however, the laboratory precision was equal to or better than field duplicate precision, as expected. This indicates that the greater proportion of uncertainty is associated with natural sample heterogeneity. Nevertheless, several metals exhibited some high RPD values (e.g., greater than 100 percent) that indicate a relatively large degree of heterogeneity in the solid samples.

Miscellaneous Parameters (Ammonia, Chloride, Nitrite/Nitrate, Sulfate, and TOC) – The data are generally of acceptable quality.

VOCs – The compounds 2-butanone, acetone, acrolein, acrylonitrile, methacrylonitrile, and acetonitrile constitute all of the results rejected for the volatile analyses. The rejections were because these compounds yield poor analytical responses. This is a systematic problem that occurs for one or more of these compounds in the majority of the samples analyzed from the Mine Fill B and Cast High Explosives Fill/B146. These chemicals are reported along with the other VOC results even though they are not expected to be site-related contaminants. The primary site-related contaminants are expected to be chlorinated VOCs.

Round 3

Explosives – Data quality was generally acceptable but 2,2',6,6'-tetranitro-4,4'-azoxytoluene (4,4'-TN-AZOXY) exhibited a low bias (approximately 30 to 40 percent recovery) in some QC samples and some uncertainty beyond the usual level of uncertainty was indicated for RDX in one groundwater duplicate pair (See Table H-10). These do not represent significant data quality deficiencies.

Metals - The metals, overall, exhibit no bias to a slightly high bias, with a moderate high bias for calcium, chromium, titanium, and zinc (See Table H-8). Additionally, several metals exhibited some high RPD values (e.g., greater than 100 percent) that indicate a relatively large degree of heterogeneity in the solid samples (See Appendix H).

Miscellaneous Parameters (Nitrite/Nitrate) – No results were rejected and data quality was acceptable.

VOCs – All VOC compounds were rejected in sample 16SB560206 due to poor internal standard recovery. No other samples were similarly affected. The compounds acrolein, acrylonitrile, methacrylonitrile, and methyl iodide constitute all of the remaining results rejected for the volatile

analyses. The rejections were because these compounds yield poor analytical responses. Because the primary site-related contaminants are chlorinated VOCs, these rejections are not viewed to represent significant data deficiencies.

Completeness

Sample collection deviated somewhat from the proposed sampling strategy in Rounds 1 and 2 for solid and aqueous samples but samples that could be collected were generally collected. Uncollected samples resulted in some cases from no surface water being present at or near to the sampling location or refusal was encountered during soil boring advancement. Accordingly, the percent completeness for samples collected is less than 90 percent in several cases (compare sample collection ratios in Table H-1).

Comparability

Sample collection deviated from the proposed sampling strategy in Rounds 1 and 2 for solid and aqueous samples. Uncollected samples were generally not collected because surface water was not available at all planned locations or refusal was encountered during soil boring advancement. Accordingly, the percent completeness for samples collected is less than 90 percent in several cases (compare sample collection ratios in Table H-1). There were no data rejections in these cases but the lack of data from the planned locations as well as locations where data have been rejected for quality reasons should be considered when interpreting the results of the investigation. Use of consistent and appropriate sampling and analysis methods and collecting samples from the intended locations ensured that comparability was maintained among sampling rounds. Inability to achieve target detection limits or risk-based target levels (RBTLs) in several cases should also be considered (See Section H.3.2).

Representativeness

All samples appear to be representative of the intended environmental matrix. Lack of data where samples could not be collected or where data have been rejected, however, should be considered when evaluating representativeness of the areas or volumes of environmental media that were characterized.

Sensitivity

Sensitivity was typical of environmental investigations conducted at NSWC Crane. Some risk-based screening levels were less than the achievable detection limits and these are identified in detail in Appendix H (Tables H-4 through H-7). The inability to achieve certain screening values (SVs) with the selected analytical methods was recognized at the outset of the investigation and concluded not to be

detrimental to the attainment of project objectives. When it was feasible to achieve lower detection limits, it was done. For example, the herbicide analytical method was used to measure hexachlorophene and pentachlorophenol concentrations instead of the usual SVOC method. In addition, selected ion monitoring (SIM) was used to achieve lower than normal detection limits for PAHs. Where detection limits were not low enough to achieve risk-based screening levels, the data user should take this into account when interpreting the data.

TABLE 3-1

SUMMARY OF DESCRIPTIVE STATISTICS
COMPLETE BACKGROUND SOIL SAMPLE DATA SET
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR(1)
NSWC CRANE
CRANE, INDIANA

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

Notes:
NA - Not available

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

TABLE 3-2

SUMMARY OF DESCRIPTIVE STATISTICS
SOIL GROUP 3 - ALLUVIAL, MISSISSIPPIAN, AND PENNSYLVANIAN SURFACE SOIL
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR(1)
NSWC CRANE
CRANE, INDIANA

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

Notes:
NA - Not available
mg/kg - milligram per kilogram

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

TABLE 3-3

SUMMARY OF DESCRIPTIVE STATISTICS
SOIL GROUP 8 - PENNSYLVANIAN SUBSURFACE CLAY AND SILT
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR(1)
NSWC CRANE
CRANE, INDIANA

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

Notes:
NA - Not available
mg/kg - milligram per kilogram

(1) - Taken from Table 4-9 (TtNUS, 2001) of the Final Basewide Background Soil Investigation Report, Naval Surface Warfare Center Crane, Crane, Indiana, January, 2001.
(2) - This value is the average of all detected and non-detected values. Non-detected values were represented by using one half the detection limit.

TABLE 3-4

SUMMARY OF DESCRIPTIVE STATISTICS
SOIL GROUP 9 - PENNSYLVANIAN SUBSURFACE SAND
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR(1)
NSWC CRANE
CRANE, INDIANA

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

Notes:
NA - Not available
mg/kg - milligram per kilogram

(1) - Taken from Table 4-10 of the Final Basewide Background Soil Investigation Report, Naval Surface Warfare Center Crane, Crane, Indiana, January, 2001.
(2) - This value is the average of all detected and non-detected values. Non-detected values were represented by using one half the detection limit.

TABLE 3-5

SUMMARY OF DESCRIPTIVE STATISTICS
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect
Dioxins (ng/kg)							
1,2,3,4,6,7,8,9-OCDD	27/28	79.1	11500	49.4	2341	2427	16SS0330002
1,2,3,4,6,7,8,9-OCDF	9/28	0.62 J	20.1	0.2 - 2.6	2.83	7.58	16SS0130002
1,2,3,4,6,7,8-HPCDD	27/28	1.1 J	151	1.5	27.7	28.7	16SS0060002
1,2,3,4,6,7,8-HPCDF	10/28	0.33 J	8	0.07 - 6.2	0.957	2.00	16SS0130002
1,2,3,4,7,8,9-HPCDF	1/28	1.8 J	1.8 J	0.08 - 1.2	0.268	1.80	16SS0130002
1,2,3,4,7,8-HXCDD	6/28	0.2 J	1.5 J	0.1 - 0.82	0.319	0.718	16SS0270002
1,2,3,4,7,8-HXCDF	9/28	0.17 J	0.98 J	0.05 - 0.44	0.248	0.511	16SS0130002
1,2,3,6,7,8-HXCDD	8/28	0.27 J	2.5 J	0.09 - 0.92	0.486	1.14	16SS0270002
1,2,3,6,7,8-HXCDF	4/28	0.24 J	0.64 J	0.04 - 0.4	0.146	0.435	16SS0130002
1,2,3,7,8,9-HXCDD	14/28	0.47 J	4.7 J	0.1 - 1.1	0.865	1.48	16SS0270002
1,2,3,7,8,9-HXCDF	3/28	0.25 J	0.81 J	0.06 - 0.5	0.161	0.543	16SS0160002
1,2,3,7,8-PECDD	3/28	0.14 J	1.5 J	0.1 - 0.8	0.263	0.840	16SS0320002
2,3,4,6,7,8-HXCDF	5/28	0.12 J	0.75 J	0.05 - 0.4	0.166	0.434	16SS0270002
2,3,7,8-TCDF	2/28	0.51 J	0.75 J	0.05 - 0.4	0.138	0.630	16SS0270002
TEQ BIRD	28/28	0.0000790	2.86	---	0.594	0.594	16SS0270002
TEQ BIRD HALFND	28/28	0.174	3.09	---	1.18	1.18	16SS0270002
TEQ MAMMAL	28/28	0.0000790	3.30	---	0.826	0.826	16SS0270002
TEQ MAMMAL HALFND	28/28	0.146	3.48	---	1.28	1.28	16SS0270002
TOTAL HPCDD	27/28	2.3	302	3.3	59.9	62.0	16SS0270002
TOTAL HPCDF	12/28	0.48 J	27.5 J	0.08 - 1.4	2.78	6.13	16SS0130002
TOTAL HXCDD	20/28	1.6	45.9	0.1 - 2	6.63	9.14	16SS0270002
TOTAL HXCDF	15/28	0.17	11.7 J	0.05 - 0.51	1.62	2.90	16SS0270002
TOTAL PECDD	5/28	0.34	4.4 J	0.1 - 0.8	0.505	1.86	16SS0270002
TOTAL PECDF	8/28	1.3 J	7.6 J	0.07 - 0.87	1.20	3.79	16SS0130002
TOTAL TCDF	6/28	0.26	13.3 J	0.05 - 7.9	1.34	3.87	16SS0320002
Volatile Organics (µg/kg)							
2-BUTANONE	5/65	1.1 J	5 J	0.888 - 1.3	0.746	3.02	16SS0730102
2-HEXANONE	1/69	3 J	3 J	0.888 - 1.3	0.590	3.00	16SS0560102
4-METHYL-2-PENTANONE	1/69	1 J	1 J	0.888 - 1.3	0.561	1.00	16SS0730102
ACETONE	18/67	1 J	71 J	0.93 - 13	6.73	22.1	16SS0290002
CARBON DISULFIDE	2/69	2 J	3	0.888 - 1.3	0.612	2.50	16SS0720102
CHLOROFORM	1/69	1 J	1 J	0.888 - 1.3	0.561	1.00	16SS0990102
CIS-1,2-DICHLOROETHENE	9/69	1.1 J	73	0.888 - 1.3	2.51	15.6	16SS0660102
DICHLORODIFLUOROMETHANE	15/69	1 J	20 J	0.893 - 1.3	1.69	5.73	16SS0710102
METHYLENE CHLORIDE	1/69	3 J	3 J	0.888 - 13	1.21	3.00	16SS0710102
STYRENE	1/69	1 J	1 J	0.888 - 1.3	0.560	1.00	16SS0040002
TOLUENE	2/69	1 J	1 J	0.888 - 1.3	0.567	1.00	16SS0160002, 16SS0730102
TOTAL XYLENES	1/69	3	3	0.888 - 1.3	0.590	3.00	16SS0730102
TRANS-1,2-DICHLOROETHENE	5/69	1 J	2 J	0.888 - 1.3	0.617	1.45	16SS0030002, 16SS0390002
TRICHLOROETHENE	17/69	2 J	170	0.893 - 1.3	10.1	39.3	16SS0980102
TRICHLOROFLUOROMETHANE	33/69	1 J	3 J	0.888 - 1.3	1.32	2.18	7 SAMPLES
VINYL ACETATE	2/69	1 J	1 J	0.888 - 1.3	0.566	1.00	16SS0190002, 16SS0350002

TABLE 3-5

SUMMARY OF DESCRIPTIVE STATISTICS
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect
Semivolatile Organics (µg/kg)							
2-METHYLNAPHTHALENE	2/39	4 J	94	3.4 - 4.3	4.36	49.0	16SS0030002
ACENAPHTHENE	2/39	5 J	1800	3.5 - 4.3	48.1	903	16SS0030002
ACENAPHTHYLENE	3/39	4 J	680	3.5 - 4.3	19.7	232	16SS0030002
ANTHRACENE	4/39	5 J	3500	3.5 - 4.3	92.6	886	16SS0030002
BENZO(A)ANTHRACENE	12/39	4 J	9600	3.5 - 4.3	254	820	16SS0030002
BENZO(A)PYRENE	13/39	4 J	8400	3.5 - 4.3	223	665	16SS0030002
BENZO(B)FLUORANTHENE	16/39	4 J	9200	3.5 - 4.2	246	596	16SS0030002
BENZO(G,H,I)PERYLENE	12/39	4 J	5100	3.5 - 4.3	136	438	16SS0030002
BENZO(K)FLUORANTHENE	11/39	4 J	5000	3.5 - 4.3	134	471	16SS0030002
BIS(2-ETHYLHEXYL)PHTHALATE	9/39	92 J	1200	69 - 730	114	239	16SS0040002
CHRYSENE	15/39	4 J	11000	3.5 - 4.3	292	755	16SS0030002
DIBENZO(A,H)ANTHRACENE	3/39	8	1600	3.5 - 4.3	43.4	541	16SS0030002
DIBENZOFURAN	1/39	560 J	560 J	69 - 87	52.6	560	16SS0030002
FLUORANTHENE	15/39	4 J	19000	3.5 - 4.3	501	1300	16SS0030002
FLUORENE	4/39	4 J	2300	3.5 - 4.3	61.7	585	16SS0030002
INDENO(1,2,3-CD)PYRENE	10/39	5 J	4400	3.5 - 4.3	117	452	16SS0030002
NAPHTHALENE	3/39	4 J	180	3.4 - 4.3	6.64	63.0	16SS0030002
PHENANTHRENE	8/39	4 J	8700	3.5 - 4.3	231	1121	16SS0030002
PYRENE	17/39	4 J	35000	3.5 - 4.3	911	2088	16SS0030002
SAFROLE	5/39	340 J	15000	69 - 150	615	4528	16SS0130002
Energetics (mg/kg)							
HMX	1/39	0.34 J	0.34 J	0.25	0.131	0.340	16SS0330002
Herbicides (µg/kg)							
HEXACHLOROPHENE	1/39	2.6 J	2.6 J	0.62 - 1.1	0.501	2.60	16SS0030002
PENTACHLOROPHENOL	4/39	0.79 J	14	0.46 - 0.58	0.884	6.32	16SS0050002
Inorganics (mg/kg)							
ALUMINUM	48/49	1780 J	34200 J	3610	12037	12250	16SS0880002
ANTIMONY	22/49	0.51 J	27.2 J	0.19 - 3.4	2.85	5.71	16SS0140002
ARSENIC	49/49	0.75 J	12.7 J	---	5.28	5.28	16SS0880002
BARIUM	49/49	11.9 J	303 J	---	98.4	98.4	16SS0130002
BERYLLIUM	23/49	0.23 J	1.4 J	0.06 - 1	0.409	0.602	16SS0170002
CADMIUM	17/49	0.19 J	2.8 J	0.13 - 1	0.506	1.05	16SS0150002
CALCIUM	46/49	212 J	246000 J	152 - 236	10713	11406	16SS0030002
CHROMIUM	49/49	4.3 J	38.2 J	---	16.9	16.9	16SS0880002
COBALT	49/49	0.87 J	25.9 J	---	6.66	6.66	16SS0170002
COPPER	49/49	2.4 J	413 J	---	51.4	51.4	16SS0150002
IRON	49/49	2170 J	43000 J	---	19814	19814	16SS0200002
LEAD	48/49	3.5 J	1240 J	14.8	127	130	16SS0140002
LITHIUM	37/39	0.81 J	21.5 J	4.3 - 5.6	9.00	9.36	16SS0170002
MAGNESIUM	49/49	105 J	62500 J	---	3196	3196	16SS0030002
MANGANESE	49/49	3.8 J	1040 J	---	275	275	16SS0130002
MERCURY	34/49	0.015 J	0.22 J	0.002 - 0.021	0.0338	0.0471	16SS0050002
NICKEL	49/49	0.71 J	41.3 J	---	12.9	12.9	16SS0170002

TABLE 3-5

SUMMARY OF DESCRIPTIVE STATISTICS
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect
Inorganics (mg/kg) (Continued)							
POTASSIUM	49/49	206 J	2980 J	---	1036	1036	16SS0880002
SELENIUM	2/49	0.16 J	0.31 J	0.03 - 0.82	0.146	0.235	16SS0320002
SILVER	1/49	0.28 J	0.28 J	0.02 - 0.26	0.0406	0.280	16SS0330002
SODIUM	4/49	162 J	496 J	12.7 - 84.9	38.4	260	16SS0030002
STRONTIUM	39/39	4.5 J	252 J	---	49.6	49.6	16SS0030002
THALLIUM	2/49	0.16 J	0.32 J	0.03 - 0.5	0.0939	0.240	16SS0110002
TIN	8/49	0.25 J	12.3 J	0.32 - 2.4	0.744	2.37	16SS0080002
TITANIUM	44/44	7.5 J	348 J	---	99.6	99.6	16SS0110002
VANADIUM	49/49	3.6 J	65.2 J	---	24.6	24.6	16SS0880002
ZINC	36/49	24 J	1840 J	5.2 - 2510	312	373	16SS0420002
Miscellaneous Parameters							
CATION EXCHANGE CAPACITY (MEQ/1)	7/7	7.4	22	---	16.5	16.5	16SS0240002
PH (S.U.)	7/7	5.2	8	---	6.31	6.31	16SS0020002
TOTAL ORGANIC CARBON (mg/kg)	6/7	1000 J	6200 J	1000	3686	4217	16SS0120002

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
µg/kg = microgram per kilogram
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HPCDD = heptachlorodibenzo-p-idioxin
HPCDF = heptachlorodibenzofuran
HXCDD = hexachlorodibenzo-p-dioxin
HXCDF = hexachlorodibenzofuran
MEQ/1 = milliequivalents per 100 grams
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
OCDD = octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzofuran
PECDD = pentachlorodibenzo-p-dioxin
PECDF = pentachlorodibenzofuran
QC = quality control
S.U. = Standard Unit
TCDF = tetrachlorodibenzofuran
TEQ = Toxicity equivalent
TV = threshold value

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**
LOCATION	**16SB001**	**16SB002**	**16SB003**	**16SB004**	**16SB005**	**16SB006**	**16SB007**	**16SB008**	**16SB009**	**16SB010**	**16SB011**	**16SB012**
SAMPLE NUMBER	**16SS0010002**	**16SS0020002**	**16SS0030002**	**16SS0040002**	**16SS0050002**	**16SS0060002**	**16SS0070002**	**16SS0080002**	**16SS0090002**	**16SS0100002**	**16SS0110002**	**16SS0120002**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**
SAMPLE DATE	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/28/2003**
Dioxins (ng/kg)												
1,2,3,4,6,7,8,9-OCDD						4660	89.4 J	396 J	1600 J	815 J	3840	4980
1,2,3,4,6,7,8,9-OCDF						1.9 U	2.6 UJ	1.8 UJ	1.4 UJ	2 UJ	1.1 U	1 U
1,2,3,4,6,7,8-HPCDD						151	4.2 J	4.2 J	14.7	7	29.2	45.2
1,2,3,4,6,7,8-HPCDF						0.5 U	0.6 U	0.5 U	0.81 U	0.73 J	0.5 U	0.9 UJ
1,2,3,4,7,8,9-HPCDF						0.7 U	0.8 U	0.7 U	0.5 U	0.6 U	0.7 U	1.2 UJ
1,2,3,4,7,8-HXCDD						0.6 U	0.7 U	0.6 U	0.6 U	0.5 U	0.5 U	0.5 U
1,2,3,4,7,8-HXCDF						0.3 U	0.3 U	0.3 U	0.2 U	0.3 U	0.3 U	0.4 U
1,2,3,6,7,8-HXCDD						0.92 U	0.7 U	0.6 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3,6,7,8-HXCDF						0.3 U	0.3 U	0.3 U	0.2 U	0.2 U	0.3 U	0.4 U
1,2,3,7,8,9-HXCDD						2.2 J	0.7 U	0.6 U	0.6 U	0.5 U	1.1 J	0.5 U
1,2,3,7,8,9-HXCDF						0.4 U	0.4 U	0.4 U	0.3 U	0.3 U	0.4 U	0.5 U
1,2,3,7,8-PECDD						0.6 U	0.7 U	0.6 U	0.6 U	0.6 U	0.5 U	0.4 U
2,3,4,6,7,8-HXCDF						0.3 U	0.4 U	0.3 U	0.3 U	0.3 U	0.3 U	0.4 U
2,3,7,8-TCDF						0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.4 U	0.4 U
TEQ BIRD						0.83719	0.0134	0.04398	0.17484	0.096	0.5232	0.5642
TEQ BIRD HALFND						1.89779	1.1164	1.08298	1.14889	1.064	1.524255	1.44925
TEQ MAMMAL						2.19619	0.0512	0.08178	0.30714	0.159	0.786	0.971
TEQ MAMMAL HALFND						3.04319	0.9332	0.89278	1.07369	0.917	1.534555	1.63105
TOTAL HPCDD						208	4.2	9.7	32.7	15.1 J	52.2	82.4
TOTAL HPCDF						0.6 U	0.7 U	0.6 U	1.4 U	0.73	0.6 U	1 UJ
TOTAL HXCDD						18.2 J	0.7 U	0.6 U	2 U	0.5 U	2.8	2.3
TOTAL HXCDF						0.3 U	0.4 U	0.3 U	1.5	0.3 U	0.3 U	0.4 U
TOTAL PECDD						0.6 U	0.7 U	0.6 U	0.6 U	0.6 U	0.5 U	0.4 U
TOTAL PECDF						0.5 U	0.5 U	0.4 U	3.7 J	0.4 U	0.3 U	0.3 U
TOTAL TCDF						0.3 U	0.3 U	0.86	7.9 U	0.51 U	0.4 U	0.4 U
Volatile Organics (µg/kg)												
2-BUTANONE	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
2-HEXANONE	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
4-METHYL-2-PENTANONE	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
ACETONE	7 J	1.1 UJ	1.1 UJ	3 J	1.2 UJ	1.2 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.2 UJ	1.3 UJ	1.3 UJ
CARBON DISULFIDE	1 UJ	1.1 U	1.1 U	1.2 U	1.2 UJ	1.2 UJ	1.1 U	1.1 U	1.1 U	1.2 UJ	1.3 UJ	1.3 UJ
CHLOROFORM	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
CIS-1,2-DICHLOROETHENE	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	2 J	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
DICHLORODIFLUOROMETHANE	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
METHYLENE CHLORIDE	1 UJ	2 U	1 U	3 U	3 U	1.2 UJ	1.1 UJ	2 U	2 U	1.2 UJ	3 U	4 BU
STYRENE	1 U	1.1 U	1.1 U	1 J	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
TOLUENE	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
TOTAL XYLENES	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
TRANS-1,2-DICHLOROETHENE	1 U	1 J	2 J	1 J	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
TRICHLOROETHENE	1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	3	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
TRICHLOROFLUOROMETHANE	1 U	2 J	1.1 U	2 J	2 J	1.2 U	1.1 U	2 J	2 J	1.2 U	1.3 U	2 J
VINYL ACETATE	1 U	1.1 UJ	1.1 UJ	1.2 UJ	1.2 U	1.2 U	1.1 UJ	1.1 UJ	1.1 UJ	1.2 U	1.3 U	1.3 U

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**
LOCATION	**16SB001**	**16SB002**	**16SB003**	**16SB004**	**16SB005**	**16SB006**	**16SB007**	**16SB008**	**16SB009**	**16SB010**	**16SB011**	**16SB012**
SAMPLE NUMBER	**16SS0010002**	**16SS0020002**	**16SS0030002**	**16SS0040002**	**16SS0050002**	**16SS0060002**	**16SS0070002**	**16SS0080002**	**16SS0090002**	**16SS0100002**	**16SS0110002**	**16SS0120002**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**
SAMPLE DATE	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/28/2003**
Semivolatile Organics (µg/kg)												
2-METHYLNAPHTHALENE	3.4 U	3.8 U	94	3.9 U	3.8 U	4 U	3.7 U	3.6 U	3.8 U	3.8 U	4.1 U	4.2 U
ACENAPHTHENE	5 J	3.8 U	1800	3.9 U	3.8 U	4 U	3.7 U	3.6 U	3.8 U	3.8 U	4.1 U	4.2 U
ACENAPHTHYLENE	13	3.8 U	680	3.9 U	3.8 U	4 U	3.7 U	3.6 U	3.8 U	3.8 U	4.1 U	4.2 U
ANTHRACENE	27	3.8 U	3500	3.9 U	3.8 U	4 U	10	3.6 U	5 J	3.8 U	4.1 U	4.2 U
BENZO(A)ANTHRACENE	100	3.8 U	9600	15	3.8 U	4 U	25	4 J	28 J	3.8 U	4.1 U	4.2 U
BENZO(A)PYRENE	94	3.8 U	8400	12	3.8 U	4 U	17	4 J	32	3.8 U	4.1 U	4.2 U
BENZO(B)FLUORANTHENE	110	3.8 U	9200	17	3.8 U	4 U	19	5 J	50 J	9	4.1 U	4.2 U
BENZO(G,H,I)PERYLENE	48	3.8 U	5100	8	6 J	4 U	7 J	4 J	28	3.8 U	4.1 U	4.2 U
BENZO(K)FLUORANTHENE	58	3.8 U	5000	11	3.8 U	4 U	13	4 J	22	3.8 U	4.1 U	4.2 U
BIS(2-ETHYLHEXYL)PHTHALATE	69 U	76 U	150 U	92 J	77 U	160 J	75 U	73 U	76 U	98 J	170	85 U
CHRYSENE	130	4 J	11000	34	3.8 U	4 U	22	3.6 U	36	5 J	4.1 U	4.2 U
DIBENZO(A,H)ANTHRACENE	15	3.8 U	1600	3.9 U	3.8 U	4 U	3.7 U	3.6 U	8	3.8 U	4.1 U	4.2 U
DIBENZOFURAN	69 U	76 U	560 J	78 U	77 U	81 U	75 U	73 U	76 U	77 U	84 U	85 U
FLUORANTHENE	220	3.8 U	19000	41	3.8 U	4 U	58	5 J	64 J	6 J	4.1 U	4.2 U
FLUORENE	23	3.8 U	2300	4 J	3.8 U	4 U	11	3.6 U	3.8 U	3.8 U	4.1 U	4.2 U
INDENO(1,2,3-CD)PYRENE	41	3.8 U	4400	6 J	3.8 U	4 U	6 J	3.6 U	23	3.8 U	4.1 U	4.2 U
NAPHTHALENE	3.4 U	3.8 U	180	3.9 U	3.8 U	4 U	3.7 U	3.6 U	3.8 U	3.8 U	4.1 U	4.2 U
PHENANTHRENE	140	3.8 U	8700	24	3.8 U	4 U	49	3.6 U	28	3.8 U	4.1 U	4.2 U
PYRENE	200	6 J	35000	44	3.8 U	4 U	54	4 J	60	6 J	4.1 U	4.2 U
SAFROLE	69 U	76 U	150 U	78 U	77 U	81 U	75 U	73 U	76 U	77 U	84 U	85 U
Energetics (mg/kg)												
HMX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Herbicides (µg/kg)												
HEXACHLOROPHENE	0.62 U	0.68 U	2.6 J	0.7 U	0.69 U	0.72 U	0.67 U	0.66 U	0.68 U	0.69 U	0.75 U	1.1 U
PENTACHLOROPHENOL	0.46 U	0.51 U	0.49 U	0.53 U	14	0.54 U	0.5 U	0.49 U	0.51 U	0.52 U	0.56 U	0.57 U
Inorganics (mg/kg)												
ALUMINUM	10500 J	13600 J	3610 U	18800 J	2740 J	16000 J	7590 J	4230 J	5010 J	7410 J	23800 J	12000 J
ANTIMONY	0.43 U	0.4 U	0.36 U	0.62 U	0.95 U	0.75 U	0.29 U	2.9 U	8.9 J	7.3 J	3.4 U	3.6 J
ARSENIC	6 J	4 J	1.3 J	9 J	1.2 J	4 J	1.3 J	0.94 J	1.6 J	1.4 J	10.9 J	6.7 J
BARIUM	48.1 J	52 J	19.7 J	69.8 J	18 J	84.5 J	25.3 J	53.1 J	95 J	203 J	76.2 J	134 J
BERYLLIUM	0.36 J	0.43 J	0.12 U	0.59 J	0.25 U	0.47 J	0.54 J	0.49 J	0.49 J	0.8 J	0.73 J	0.64 U
CADMIUM	0.35 U	0.57 U	0.48 U	0.57 U	0.2 U	0.29 U	0.19 U	0.66 U	1.9 J	1 J	0.38 U	1.3 J
CALCIUM	56500 J	40000 J	246000 J	7760 J	20800 J	8910 J	4040 J	10400 J	17300 J	548 J	818 J	985 J
CHROMIUM	15.5 J	18.8 J	11.9 J	20.5 J	8.3 J	20.5 J	19.3 J	12.1 J	12.1 J	17.7 J	28.9 J	12.9 J
COBALT	3.2 J	3.6 J	1.1 J	5.9 J	0.87 J	5.7 J	3.8 J	4.4 J	3.6 J	7.4 J	5.6 J	11.5 J
COPPER	10.4 J	9.9 J	3.5 J	12.7 J	13.9 J	12.1 J	13.8 J	52.5 J	84 J	127 J	16.9 J	62.6 J
IRON	15800 J	18600 J	4230 J	22200 J	8590 J	20900 J	7890 J	14400 J	13600 J	23600 J	28900 J	18900 J
LEAD	8.8 J	12.3 J	4.7 J	11.4 J	15.9 J	15 J	16 J	195 J	311 J	345 J	15.2 J	258 J
LITHIUM	7.7 J	10.7 J	9.9 J	14.1 J	3 J	13.5 J	17.1 J	7.2 J	6.1 J	9.8 J	19.2 J	9.7 J
MAGNESIUM	2860 J	6350 J	62500 J	4650 J	8230 J	2980 J	1970 J	830 J	2490 J	957 J	1560 J	1520 J
MANGANESE	97 J	140 J	78.2 J	147 J	28.2 J	75 J	31 J	108 J	132 J	311 J	231 J	706 J
MERCURY	0.027 J	0.008 U	0.007 U	0.026 J	0.22 J	0.029 J	0.002 U	0.018 J	0.016 J	0.04 J	0.16 J	0.073 J
NICKEL	7.9 J	9.3 J	9.9 J	13.3 J	4.2 J	11.5 J	16.7 J	13 J	9.4 J	19.9 J	15.1 J	12.4 J

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**
LOCATION	**16SB001**	**16SB002**	**16SB003**	**16SB004**	**16SB005**	**16SB006**	**16SB007**	**16SB008**	**16SB009**	**16SB010**	**16SB011**	**16SB012**
SAMPLE NUMBER	**16SS0010002**	**16SS0020002**	**16SS0030002**	**16SS0040002**	**16SS0050002**	**16SS0060002**	**16SS0070002**	**16SS0080002**	**16SS0090002**	**16SS0100002**	**16SS0110002**	**16SS0120002**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**
SAMPLE DATE	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/28/2003**
Inorganics (mg/kg) (Continued)												
POTASSIUM	982 J	1180 J	1160 J	1690 J	807 J	1120 J	1510 J	1140 J	919 J	1240 J	2240 J	707 J
SELENIUM	0.23 U	0.22 U	0.22 U	0.41 U	0.14 U	0.17 U	0.2 U	0.04 U	0.12 U	0.12 U	0.26 U	0.43 U
SILVER	0.13 U	0.04 U	0.04 U	0.05 U	0.03 U	0.03 U	0.04 U	0.03 U	0.04 U	0.09 U	0.08 U	0.04 U
SODIUM	162 J	178 J	496 J	84.9 U	66 U	49.6 U	69.5 U	45.7 U	36.2 U	48.5 U	53.2 U	20.4 U
STRONTIUM	93.8 J	51.2 J	252 J	20.8 J	26.5 J	50.2 J	16.6 J	33.6 J	41.5 J	55 J	14.1 J	58.8 J
THALLIUM	0.18 U	0.15 U	0.06 U	0.23 U	0.05 U	0.17 U	0.12 U	0.06 U	0.08 U	0.1 U	0.32 J	0.15 U
TIN	0.43 U	0.47 U	0.38 U	0.57 U	0.33 U	0.63 U	0.42 U	12.3 J	2.4 U	1.1 U	0.83 U	0.98 U
TITANIUM	128 J	121 J	39.1 J	239 J	61.8 J	125 J	68.2 J	82.7 J	53.6 J	22.9 J	348 J	113 J
VANADIUM	27.1 J	29.3 J	13.9 J	37.1 J	10.8 J	32.3 J	12.3 J	11.1 J	10.6 J	14.1 J	52.8 J	23.3 J
ZINC	24.2 J	24 J	33.6 J	40.7 J	24.2 J	33.6 J	48.1 J	271 J	552 J	972 J	55.9 J	603 J
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)		20					7.4					17
PH (S.U.)		8					7.7					5.7
TOTAL ORGANIC CARBON (mg/kg)		3800 J					1000 U					6200 J

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**
LOCATION	**16SB013**	**16SB014**	**16SB015**	**16SB016**	**16SB017**	**16SB018**	**16SB019**	**16SB020**	**16SB021**	**16SB022**	**16SB023**	**16SB024**
SAMPLE NUMBER	**16SS0130002**	**16SS0140002**	**16SS0150002**	**16SS0160002**	**16SS0170002**	**16SS0180002**	**16SS0190002**	**16SS0200002**	**16SS0210002**	**16SS0220002**	**16SS0230002**	**16SS0240002**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**
SAMPLE DATE	**3/28/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**
Dioxins (ng/kg)												
1,2,3,4,6,7,8,9-OCDD	3070	735	282 J	731 J	935	2350	2510	49.4 U	1370	1290	1490 J	2070 J
1,2,3,4,6,7,8,9-OCDF	20.1	1.8 J	1.8 UJ	2.1 UJ	1.4 U	0.62 J	0.5 U	0.79 J	0.5 U	0.2 U	0.8 UJ	1.3 J
1,2,3,4,6,7,8-HPCDD	42.4	9.3	4.1 J	7.4	10.4	13.1	13.5	1.5 U	9.7	8.8	20.3	16.9 J
1,2,3,4,6,7,8-HPCDF	8	0.81 J	0.4 U	0.5 U	0.5 U	0.33 J	0.1 U	0.27 U	0.2 U	0.07 U	0.76 U	0.56 J
1,2,3,4,7,8,9-HPCDF	1.8 J	0.6 U	0.6 U	0.7 U	0.8 U	0.08 U	0.2 U	0.08 U	0.2 U	0.09 U	0.3 U	0.2 UJ
1,2,3,4,7,8-HXCDD	0.69 J	0.4 U	0.5 U	0.6 U	0.5 U	0.2 J	0.2 U	0.1 U	0.2 U	0.1 U	0.4 U	0.37 J
1,2,3,4,7,8-HXCDF	0.98 J	0.2 U	0.3 U	0.72 J	0.3 U	0.13 U	0.38 J	0.12 U	0.31 U	0.05 U	0.43 J	0.35 J
1,2,3,6,7,8-HXCDD	1.4 J	0.4 U	0.5 U	0.6 U	0.5 U	0.27 J	0.42 J	0.09 U	0.2 U	0.09 U	0.64 J	0.48 U
1,2,3,6,7,8-HXCDF	0.64 J	0.2 U	0.3 U	0.3 U	0.3 U	0.06 U	0.09 U	0.04 U	0.09 U	0.04 U	0.2 U	0.1 UJ
1,2,3,7,8,9-HXCDD	1.8 J	0.86 J	0.5 U	0.6 U	0.5 U	0.47 J	0.9 U	0.1 U	0.2 U	0.1 U	0.81 J	0.71 J
1,2,3,7,8,9-HXCDF	0.3 U	0.3 U	0.4 U	0.81 J	0.4 U	0.06 U	0.1 U	0.06 U	0.1 U	0.06 U	0.2 U	0.2 UJ
1,2,3,7,8-PECDD	0.4 U	0.3 U	0.6 U	0.8 U	0.5 U	0.14 J	0.3 U	0.1 U	0.2 U	0.1 U	0.4 UJ	0.3 UJ
2,3,4,6,7,8-HXCDF	0.7 J	0.2 U	0.3 U	0.3 U	0.3 U	0.12 J	0.1 U	0.05 U	0.1 U	0.05 U	0.2 U	0.21 U
2,3,7,8-TCDF	0.51 J	0.2 U	0.3 U	0.3 U	0.4 U	0.06 U	0.1 U	0.05 U	0.1 U	0.05 U	0.2 U	0.1 UJ
TEQ BIRD	1.41991	0.17708	0.03248	0.23371	0.1039	0.463162	0.3067	0.000079	0.1467	0.1378	1.31978	1.20613
TEQ BIRD HALFND	2.15991	0.74708	1.06248	1.38771	1.08047	0.594062	0.790725	0.174499	0.499725	0.31456	1.46508	1.21903
TEQ MAMMAL	1.50301	0.26078	0.06938	0.30031	0.1975	0.615362	0.466	0.000079	0.234	0.217	1.40008	1.17673
TEQ MAMMAL HALFND	2.08051	0.71378	0.86438	1.22631	0.94657	0.697762	0.851025	0.146299	0.503525	0.35881	1.46538	1.21123
TOTAL HPCDD	86.1	16.4	9 J	15.9 J	22.2	25.6	26.3	3.3 U	20.1	20.2	42.8	34.2 J
TOTAL HPCDF	27.5 J	1.4 J	0.5 U	0.6 U	1.3	0.48 J	0.1 U	0.53 U	0.2 U	0.08 U	0.76 U	0.56 J
TOTAL HXCDD	13.5	3.4	0.5 U	0.6 U	2	3.5 J	2.8 J	0.94 U	1.6	2 J	6.2 J	3.7 J
TOTAL HXCDF	10.3 J	0.46	0.3 U	1.5	0.4 U	0.42 J	0.67	0.51 U	0.5 J	0.05 U	1 J	0.83 J
TOTAL PECDD	0.79 U	0.3 U	0.6 U	0.8 U	0.5 U	0.34	0.3 U	0.1 U	0.2 U	0.1 U	0.4 UJ	0.3 UJ
TOTAL PECDF	7.6 J	0.87 U	0.4 U	0.5 U	0.3 U	0.07 U	0.36 U	0.07 U	0.2 U	0.07 U	0.2 UJ	0.2 UJ
TOTAL TCDF	7 U	2.7 U	0.3 U	0.3 U	0.4 U	0.06 U	0.1 U	0.26	0.1 U	0.05 U	2.4 J	0.1 UJ
Volatile Organics (µg/kg)												
2-BUTANONE	1.3 U	1.2 U	1.1 UJ	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 UJ	1.2 U	1.3 U	1.3 U
2-HEXANONE	1.3 U	1.2 U	1.1 UJ	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 UJ	1.2 U	1.3 U	1.3 U
4-METHYL-2-PENTANONE	1.3 U	1.2 U	1.1 UJ	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 UJ	1.2 U	1.3 U	1.3 U
ACETONE	1.3 UJ	1.2 UJ	1.1 UJ	1.2 UJ	1.2 UJ	1.2 UJ	8 J	1.1 UJ	1.1 UJ	3 J	30 J	1.3 UJ
CARBON DISULFIDE	1.3 UJ	1.2 U	1.1 U	1.2 U	1.2 U	1.2 UJ	1.2 UJ	1.1 UJ	1.1 UJ	1.2 UJ	1.3 UJ	1.3 UJ
CHLOROFORM	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
CIS-1,2-DICHLOROETHENE	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
DICHLORODIFLUOROMETHANE	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 UJ	1.1 U	1.1 U	1.2 UJ	1.3 UJ	1.3 U
METHYLENE CHLORIDE	6 BU	4 U	1 U	1.2 UJ	1 U	2 BU	12 BU	2 BU	5 BU	3 BU	6 BU	2 BU
STYRENE	1.3 U	1.2 U	1.1 UJ	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 UJ	1.2 U	1.3 U	1.3 U
TOLUENE	1.3 U	1.2 U	1.1 U	1 J	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
TOTAL XYLENES	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
TRANS-1,2-DICHLOROETHENE	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U
TRICHLOROETHENE	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	2 J	1.1 U	1.2 U	1.3 U	1.3 U
TRICHLOROFLUOROMETHANE	3 J	2 J	1.1 U	2 J	2 J	2 J	2 J	2 J	2 J	2 J	3 J	3 J
VINYL ACETATE	1.3 U	1.2 UJ	1.1 UJ	1.2 UJ	1.2 UJ	1.2 U	1 J	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**
LOCATION	**16SB013**	**16SB014**	**16SB015**	**16SB016**	**16SB017**	**16SB018**	**16SB019**	**16SB020**	**16SB021**	**16SB022**	**16SB023**	**16SB024**
SAMPLE NUMBER	**16SS0130002**	**16SS0140002**	**16SS0150002**	**16SS0160002**	**16SS0170002**	**16SS0180002**	**16SS0190002**	**16SS0200002**	**16SS0210002**	**16SS0220002**	**16SS0230002**	**16SS0240002**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**
SAMPLE DATE	**3/28/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**
Semivolatile Organics (µg/kg)												
2-METHYLNAPHTHALENE	4.3 U	4 U	3.8 U	4 U	3.8 U	3.9 U	3.8 U	4 J	3.8 U	3.9 U	4.2 U	4.2 U
ACENAPHTHENE	4.3 U	4 U	3.8 U	4 U	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
ACENAPHTHYLENE	4.3 U	4 U	3.8 U	4 U	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
ANTHRACENE	4.3 U	4 U	3.8 U	4 U	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
BENZO(A)ANTHRACENE	4.3 U	4 U	5 J	6 J	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
BENZO(A)PYRENE	4.3 U	4 U	4 J	10	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
BENZO(B)FLUORANTHENE	4 J	4 U	11	12	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
BENZO(G,H,I)PERYLENE	4.3 U	6 J	6 J	10	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
BENZO(K)FLUORANTHENE	4.3 U	4 U	3.8 U	8 J	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
BIS(2-ETHYLHEXYL)PHTHALATE	180 BU	96 J	97 J	110 J	130 J	78 UJ	730 BU	130 BU	110 BU	180 BU	270 BU	89 BU
CHRYSENE	4.3 U	4 U	6 J	10	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
DIBENZO(A,H)ANTHRACENE	4.3 U	4 U	3.8 U	4 U	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
DIBENZOFURAN	87 U	80 U	77 U	81 U	78 U	78 UJ	77 U	74 U	77 U	78 U	85 U	84 U
FLUORANTHENE	4.3 U	6 J	8	15	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
FLUORENE	4.3 U	4 U	3.8 U	4 U	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
INDENO(1,2,3-CD)PYRENE	4.3 U	5 J	5 J	8	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
NAPHTHALENE	4.3 U	4 U	3.8 U	4 U	3.8 U	3.9 U	3.8 U	5 J	3.8 U	3.9 U	4.2 U	4.2 U
PHENANTHRENE	4.3 U	4 U	4 J	7 J	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
PYRENE	4.3 U	7 J	8	15	3.8 U	3.9 U	3.8 U	3.6 U	3.8 U	3.9 U	4.2 U	4.2 U
SAFROLE	15000	80 U	77 U	81 U	78 U	78 UJ	77 U	74 U	77 U	78 U	1200 J	84 U
Energetics (mg/kg)												
HMX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Herbicides (µg/kg)												
HEXACHLOROPHENE	1.1 U	0.72 U	0.69 U	0.72 U	0.7 U	0.99 U	0.98 U	0.94 U	0.97 U	1 U	1.1 U	1.1 U
PENTACHLOROPHENOL	0.58 U	0.54 U	0.51 U	0.54 U	0.52 U	0.53 U	0.52 U	0.5 U	0.52 U	0.53 U	0.57 U	0.57 U
Inorganics (mg/kg)												
ALUMINUM	11000 J	13900 J	12900 J	11900 J	9880 J	4690 J	8340 J	3170 J	2510 J	9330 J	17300 J	8940 J
ANTIMONY	13 J	27.2 J	4.4 J	6.6 J	1.4 U	0.59 U	0.29 U	7.7 J	14.8 J	2 U	1.3 U	2 J
ARSENIC	7 J	4.7 J	5.9 J	4.7 J	2.7 J	1.5 J	3.4 J	1.2 J	1.1 J	3.3 J	10.5 J	5.6 J
BARIUM	303 J	144 J	177 J	148 J	119 J	48.2 J	36.2 J	159 J	243 J	61.3 J	85.2 J	91.7 J
BERYLLIUM	0.49 U	0.45 J	0.68 J	0.63 J	1.4 J	0.59 U	0.22 U	0.86 J	0.23 U	0.79 J	0.6 J	0.51 U
CADMIUM	2.4 J	0.6 U	2.8 J	0.94 J	0.75 J	0.16 U	0.21 U	0.66 J	0.56 U	0.57 U	0.43 U	0.3 U
CALCIUM	1580 J	63000 J	6860 J	2570 J	219 J	316 J	152 U	3290 J	3890 J	478 J	236 U	888 J
CHROMIUM	11.8 J	16 J	19.2 J	16.7 J	26 J	13.6 J	10.9 J	13.8 J	6.7 J	17 J	18.5 J	10 J
COBALT	13.7 J	4.5 J	9.4 J	9 J	25.9 J	8.7 J	2.9 J	15.6 J	8.3 J	6.6 J	7.8 J	6.6 J
COPPER	122 J	231 J	413 J	66.9 J	39.5 J	12.8 J	6.9 J	65.4 J	391 J	28.3 J	23 J	15.3 J
IRON	17200 J	15700 J	22500 J	17900 J	31000 J	19800 J	14200 J	43000 J	15800 J	42000 J	28500 J	13900 J
LEAD	405 J	1240 J	211 J	154 J	140 J	9.8 J	8.1 J	765 J	211 J	69.9 J	43 J	18 J
LITHIUM	8.7 J	10.7 J	12.1 J	10.1 J	21.5 J	8 J	5.6 J	5.7 J	3.4 J	8.3 J	12.8 J	8 J
MAGNESIUM	1400 J	2940 J	1890 J	1420 J	2330 J	854 J	1030 J	989 J	851 J	1190 J	2320 J	1250 J
MANGANESE	1040 J	301 J	575 J	566 J	536 J	155 J	130 J	945 J	244 J	208 J	275 J	205 J
MERCURY	0.07 J	0.042 J	0.015 J	0.009 U	0.026 J	0.002 U	0.011 U	0.015 U	0.026 J	0.006 U	0.047 J	0.047 J
NICKEL	13.4 J	9.9 J	15 J	12.1 J	41.3 J	15.9 J	5.6 J	23.6 J	15.7 J	13.5 J	15 J	8.4 J

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**
LOCATION	**16SB013**	**16SB014**	**16SB015**	**16SB016**	**16SB017**	**16SB018**	**16SB019**	**16SB020**	**16SB021**	**16SB022**	**16SB023**	**16SB024**
SAMPLE NUMBER	**16SS0130002**	**16SS0140002**	**16SS0150002**	**16SS0160002**	**16SS0170002**	**16SS0180002**	**16SS0190002**	**16SS0200002**	**16SS0210002**	**16SS0220002**	**16SS0230002**	**16SS0240002**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**
SAMPLE DATE	**3/28/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/27/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**
Inorganics (mg/kg) (Continued)												
POTASSIUM	595 J	791 J	1340 J	1280 J	1440 J	484 J	360 J	750 J	696 J	514 J	893 J	535 J
SELENIUM	0.54 U	0.22 U	0.31 U	0.24 U	0.25 U	0.11 U	0.09 U	0.16 U	0.05 U	0.17 U	0.49 U	0.28 U
SILVER	0.26 U	0.18 U	0.1 U	0.05 U	0.05 U	0.02 U	0.02 U	0.04 U	0.06 U	0.02 U	0.03 U	0.03 U
SODIUM	24.5 U	68.8 U	40.3 U	38.5 U	40.7 U	19.3 U	18.1 U	36 U	64.2 U	27.1 U	19.7 U	14.5 U
STRONTIUM	145 J	81.8 J	46.5 J	47 J	34.8 J	6.8 J	7.1 J	22.4 J	140 J	30.4 J	14.8 J	48.8 J
THALLIUM	0.26 U	0.17 U	0.2 U	0.18 U	0.17 U	0.1 U	0.07 U	0.22 U	0.08 U	0.09 U	0.21 U	0.12 U
TIN	2.3 U	1.9 U	2.1 U	2.2 U	0.58 U	0.53 U	0.46 U	0.65 U	2.2 U	0.68 U	0.64 U	0.47 U
TITANIUM	71.7 J	99.9 J	123 J	119 J	67 J	26.7 J	73.3 J	16.1 J	7.5 J	33.7 J	179 J	82.4 J
VANADIUM	22.8 J	25.7 J	30.3 J	26 J	21.6 J	10 J	16.1 J	8.2 J	5.8 J	23.8 J	32.1 J	17.5 J
ZINC	1560 J	575 J	1150 J	563 J	438 J	47.8 J	17.6 U	132 U	2510 U	197 U	102 J	174 J
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)						13						22
PH (S.U.)						5.3						6.5
TOTAL ORGANIC CARBON (mg/kg)						3800 J						5800 J

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	16SB025	16SB026	16SB027	16SB028	16SB029	16SB030	16SB031	16SB032	16SB033	16SB034	16SB035	16SB036
SAMPLE NUMBER	16SS0250002	16SS0260002	16SS0270002	16SS0280002	16SS0290002	16SS0300002	16SS0310002	16SS0320002	16SS0330002	16SS0340002	16SS0350002	16SS0360002
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	3/28/2003	4/9/2003	3/28/2003	3/28/2003	3/28/2003	3/28/2003	3/28/2003	4/9/2003	4/9/2003	4/9/2003	3/28/2003	4/9/2003
Dioxins (ng/kg)												
1,2,3,4,6,7,8,9-OCDD	3250	79.1	3300	2210	3950	3920	972	3130	11500			
1,2,3,4,6,7,8,9-OCDF	0.5 U	0.3 U	17.7	14.2	0.7 U	0.4 U	1.1 U	7.5 J	4.2 J			
1,2,3,4,6,7,8-HPCDD	32.9	1.1 J	90.9	63.2	48.4	38.4	18	36.1	34			
1,2,3,4,6,7,8-HPCDF	0.49 J	0.2 U	6.2 U	3.6 J	0.28 U	0.2 U	0.72 J	2.7 J	2.1 J			
1,2,3,4,7,8,9-HPCDF	0.2 U	0.1 U	0.49 U	0.45 U	0.3 U	0.2 U	0.1 U	0.3 UJ	0.2 UJ			
1,2,3,4,7,8-HXCDD	0.34 U	0.1 U	1.5 J	0.82 U	0.56 U	0.2 U	0.35 J	1.2 J	0.2 U			
1,2,3,4,7,8-HXCDF	0.17 J	0.06 U	0.88 J	0.4 U	0.2 U	0.1 U	0.44 U	0.36 J	0.33 J			
1,2,3,6,7,8-HXCDD	0.52 U	0.1 U	2.5 J	1.6 J	0.86 U	0.2 U	0.49 J	1.8 J	0.2 U			
1,2,3,6,7,8-HXCDF	0.1 U	0.05 U	0.45 J	0.32 U	0.2 U	0.1 U	0.21 U	0.41 J	0.24 J			
1,2,3,7,8,9-HXCDD	0.72 J	0.1 U	4.7 J	2.4 J	1.1 U	0.59 J	0.61 J	2.8 J	0.95 J			
1,2,3,7,8,9-HXCDF	0.1 U	0.07 U	0.25 J	0.1 U	0.2 U	0.1 U	0.09 U	0.57 J	0.2 U			
1,2,3,7,8-PECDD	0.2 U	0.2 U	0.88 J	0.2 U	0.4 U	0.2 U	0.2 U	1.5 J	0.3 U			
2,3,4,6,7,8-HXCDF	0.1 U	0.06 U	0.75 J	0.28 U	0.2 U	0.1 U	0.27 J	0.33 J	0.1 U			
2,3,7,8-TCDF	0.1 U	0.08 U	0.75 J	0.29 U	0.2 U	0.1 U	0.09 U	0.1 U	0.1 U			
TEQ BIRD	0.4518	0.00901	2.85567	0.57762	0.4434	0.4894	0.2328	2.40485	1.35942			
TEQ BIRD HALFND	0.833925	0.275025	3.09412	1.00537	1.169635	0.87742	0.526355	2.66485	1.78542			
TEQ MAMMAL	0.7479	0.01891	3.29877	1.29042	0.879	0.835	0.4564	2.95175	1.66542			
TEQ MAMMAL HALFND	1.064425	0.228675	3.48472	1.58067	1.487935	1.13702	0.678955	3.11175	2.00792			
TOTAL HPCDD	68.4	2.3	302	235	87	66	34.4	73.1	83.1			
TOTAL HPCDF	0.49	0.2 U	17.9 J	11.7 J	0.28 U	0.2 U	1.2	6.5	3.8 J			
TOTAL HXCDD	6.1 J	0.1 U	45.9	32.9 J	8.3 J	4.4 J	5.9 J	14.7 J	2.6			
TOTAL HXCDF	0.17	0.2 U	11.7 J	4.5 J	0.2 U	0.1 U	1.7 J	5.5 J	2.7			
TOTAL PECDD	0.2 U	0.2 U	4.4 J	0.59	0.4 U	0.2 U	0.87	3.1 J	0.3 U			
TOTAL PECDF	0.2 U	2.3 J	5.1 J	1.3 J	0.3 U	0.2 U	1.5 J	6.3 J	2.5 J			
TOTAL TCDF	0.1 U	3.9 U	4.5 J	1.9 J	0.2 U	0.1 U	1 U	13.3 J	2.4 U			
Volatile Organics (µg/kg)												
2-BUTANONE	1.2 U	1.1 UJ	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
2-HEXANONE	1.2 U	1.1 UJ	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
4-METHYL-2-PENTANONE	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 UJ	1.1 U	1.1 U	1.1 U	1.2 U
ACETONE	34 J	8 BU	1.1 UJ	1.2 UJ	71 J	32 J	1.2 UJ	1.2 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.2 UJ
CARBON DISULFIDE	1.2 UJ	1.1 UJ	1.1 UJ	1.2 UJ	1.3 UJ	1.3 UJ	1.2 UJ	1.2 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.2 UJ
CHLOROFORM	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
CIS-1,2-DICHLOROETHENE	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
DICHLORODIFLUOROMETHANE	1.2 UJ	1.1 UJ	1.1 U	1.2 U	1.3 UJ	1.3 U	1.2 U	1.2 UJ	10 J	1.1 UJ	1.1 U	1.2 UJ
METHYLENE CHLORIDE	8 BU	1.1 UJ	3 BU	4 BU	9 BU	3 BU	2 BU	1.2 UJ	1.1 UJ	1.1 UJ	13 BU	1.2 UJ
STYRENE	1.2 U	1.1 UJ	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
TOLUENE	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
TOTAL XYLENES	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
TRANS-1,2-DICHLOROETHENE	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
TRICHLOROETHENE	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U
TRICHLOROFLUOROMETHANE	2 J	1.1 U	2 J	2 J	3 J	2 J	2 J	2 J	3 J	2 J	3 J	2 J
VINYL ACETATE	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.1 U	1 J	1.2 U

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**
LOCATION	**16SB025**	**16SB026**	**16SB027**	**16SB028**	**16SB029**	**16SB030**	**16SB031**	**16SB032**	**16SB033**	**16SB034**	**16SB035**	**16SB036**
SAMPLE NUMBER	**16SS0250002**	**16SS0260002**	**16SS0270002**	**16SS0280002**	**16SS0290002**	**16SS0300002**	**16SS0310002**	**16SS0320002**	**16SS0330002**	**16SS0340002**	**16SS0350002**	**16SS0360002**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**
SAMPLE DATE	**3/28/2003**	**4/9/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**4/9/2003**	**4/9/2003**	**4/9/2003**	**3/28/2003**	**4/9/2003**
Semivolatile Organics (µg/kg)												
2-METHYLNAPHTHALENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	3.8 U	3.5 U	3.8 U	3.8 U
ACENAPHTHENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	3.8 U	3.5 U	3.8 U	3.8 U
ACENAPHTHYLENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	4 J	3.5 U	3.8 U	3.8 U
ANTHRACENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	3.8 U	3.5 U	3.8 U	3.8 U
BENZO(A)ANTHRACENE	4 U	10 J	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	36	3.5 U	8	3.8 U
BENZO(A)PYRENE	4 U	9 J	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	45	3.5 U	10	3.8 U
BENZO(B)FLUORANTHENE	4 U	13 J	3.7 U	5 J	4.2 U	4.2 U	4 U	4.1 UJ	62 J	3.5 UJ	12	3.8 UJ
BENZO(G,H,I)PERYLENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	23	3.5 U	5 J	3.8 U
BENZO(K)FLUORANTHENE	4 U	8 J	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	46	3.5 U	8	3.8 U
BIS(2-ETHYLHEXYL)PHTHALATE	150 BU	87 BU	110 BU	140 BU	410 BU	240 BU	140 BU	83 U	76 U	72 U	220 BU	1200 BJ
CHRYSENE	4 U	7 J	3.7 U	6 J	4.2 U	4.2 U	4 U	4.1 U	42	3.5 U	9	3.8 U
DIBENZO(A,H)ANTHRACENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	3.8 U	3.5 U	3.8 U	3.8 U
DIBENZOFURAN	82 U	74 U	76 U	78 U	85 U	85 U	81 U	83 U	76 U	72 U	76 U	78 U
FLUORANTHENE	4 U	4 J	3.7 U	7 J	4.2 U	4.2 U	4 U	4.1 U	50	3.5 U	6 J	3.8 U
FLUORENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	3.8 U	3.5 U	3.8 U	3.8 U
INDENO(1,2,3-CD)PYRENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	24	3.5 U	5 J	3.8 U
NAPHTHALENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	4 J	3.5 U	3.8 U	3.8 U
PHENANTHRENE	4 U	3.7 U	3.7 U	3.9 U	4.2 U	4.2 U	4 U	4.1 U	12	3.5 U	3.8 U	3.8 U
PYRENE	4 U	5 J	3.7 U	7 J	4.2 U	4.2 U	4 U	4.1 U	55	3.5 U	10	3.8 U
SAFROLE	4600	74 U	76 U	78 U	1500	340 J	81 U	83 U	76 U	72 U	76 U	78 U
Energetics (mg/kg)												
HMX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.34 J	0.25 U	0.25 U	0.25 U
Herbicides (µg/kg)												
HEXACHLOROPHENE	1 U	0.94 U	0.96 U	0.99 U	1.1 U	1.1 U	1 U	1.1 U	0.97 U	0.91 U	0.97 U	0.99 U
PENTACHLOROPHENOL	0.55 U	0.5 U	0.51 U	0.53 U	2.5 J	8 J	0.55 U	0.56 U	0.51 U	0.48 U	0.51 U	0.52 U
Inorganics (mg/kg)												
ALUMINUM	13800 J	4060 J	4230 J	9480 J	16900 J	16200 J	5750 J	12000 J	8020 J	1780 J	6760 J	11900 J
ANTIMONY	1.5 U	0.19 U	0.27 U	0.66 U	2.8 U	1.2 U	1.6 U	0.79 J	1.1 J	0.51 J	0.75 U	0.55 J
ARSENIC	7.6 J	1.6 J	1.4 J	7.3 J	10.4 J	11.2 J	3 J	8.5 J	4.8 J	0.75 J	2.6 J	4.8 J
BARIUM	57.8 J	44.4 J	33.7 J	69.5 J	138 J	59.6 J	134 J	41.8 J	55.6 J	11.9 J	33.7 J	39.4 J
BERYLLIUM	0.46 U	0.81 J	0.37 U	0.63 J	0.53 J	0.52 J	0.28 U	0.38 J	0.43 J	0.06 U	0.2 U	0.23 J
CADMIUM	0.41 U	0.48 J	0.27 U	1.2 J	0.64 J	0.39 U	0.47 U	0.33 J	0.45 J	0.19 J	0.21 U	0.2 J
CALCIUM	496 J	831 J	858 J	1650 J	821 J	198 U	898 J	1100 J	1980 J	212 J	727 J	1010 J
CHROMIUM	17 J	11.8 J	6.9 J	18.3 J	17.8 J	19.2 J	7 J	16.6 J	13.7 J	4.3 J	9 J	12.8 J
COBALT	4.1 J	20 J	1.4 J	4.1 J	7.2 J	5.1 J	1.9 J	4.2 J	2.5 J	1.5 J	1.3 J	2.7 J
COPPER	19 J	13 J	5.1 J	19.8 J	35 J	18.8 J	42.5 J	15.9 J	33.5 J	2.4 J	9.3 J	11.4 J
IRON	25000 J	19700 J	9380 J	23500 J	26300 J	29400 J	8870 J	22600 J	23100 J	2170 J	11500 J	17100 J
LEAD	24.9 J	14.8 U	8.3 J	31.8 J	85.7 J	16.9 J	150 J	17.2 J	123 J	3.5 J	11.9 J	9.6 J
LITHIUM	10.5 J	10.7 J	4.3 J	9.7 J	13.1 J	12.7 J	5.6 U	9 J	4 J	0.81 J	4.2 J	6 J
MAGNESIUM	1440 J	687 J	793 J	1320 J	2080 J	2320 J	794 J	1910 J	765 J	105 J	801 J	1210 J
MANGANESE	141 J	794 J	5.1 J	51.6 J	277 J	108 J	183 J	139 J	132 J	3.8 J	10.4 J	49.8 J
MERCURY	0.034 J	0.002 U	0.003 U	0.008 U	0.053 J	0.084 J	0.033 J	0.035 J	0.03 J	0.002 U	0.008 U	0.03 J
NICKEL	9.8 J	24.8 J	3.5 J	12.1 J	15.5 J	13.2 J	5 J	10.4 J	5.2 J	0.71 J	3.5 J	6.5 J

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**	**01**
LOCATION	**16SB025**	**16SB026**	**16SB027**	**16SB028**	**16SB029**	**16SB030**	**16SB031**	**16SB032**	**16SB033**	**16SB034**	**16SB035**	**16SB036**
SAMPLE NUMBER	**16SS0250002**	**16SS0260002**	**16SS0270002**	**16SS0280002**	**16SS0290002**	**16SS0300002**	**16SS0310002**	**16SS0320002**	**16SS0330002**	**16SS0340002**	**16SS0350002**	**16SS0360002**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**
SAMPLE DATE	**3/28/2003**	**4/9/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**3/28/2003**	**4/9/2003**	**4/9/2003**	**4/9/2003**	**3/28/2003**	**4/9/2003**
Inorganics (mg/kg) (Continued)												
POTASSIUM	664 J	751 J	466 J	462 J	827 J	807 J	400 J	496 J	266 J	312 J	311 J	378 J
SELENIUM	0.44 U	0.07 U	0.1 U	0.14 U	0.51 U	0.43 U	0.24 U	0.31 J	0.11 U	0.03 U	0.1 U	0.16 J
SILVER	0.04 U	0.09 U	0.14 U	0.03 U	0.06 U	0.06 U	0.06 U	0.11 U	0.28 J	0.16 U	0.02 U	0.07 U
SODIUM	16.2 U	27.6 U	29.3 U	26 U	19.4 U	22.3 U	28.5 U	33.8 U	23 U	12.7 U	20.6 U	20.5 U
STRONTIUM	21.8 J	13.5 J	48 J	136 J	82.8 J	10.4 J	86.2 J	18.7 J	39.8 J	4.5 J	27.1 J	38.6 J
THALLIUM	0.15 U	0.13 U	0.14 U	0.09 U	0.23 U	0.19 U	0.1 U	0.14 U	0.16 J	0.03 U	0.07 U	0.1 U
TIN	0.7 U	0.87 J	0.32 U	0.49 U	0.85 U	0.63 U	0.58 U	1.7 J	0.45 J	0.25 J	0.45 U	0.38 J
TITANIUM	99.9 J	29.6 J	10.2 J	32 J	147 J	210 J	57.3 J	145 J	54.8 J	12.2 J	24.8 J	84.1 J
VANADIUM	27.7 J	9.3 J	8.4 J	25.4 J	32.9 J	32.2 J	11.6 J	28.1 J	19.5 J	3.6 J	11.2 J	20.6 J
ZINC	97.2 J	49 J	24.3 U	144 U	401 U	68.2 J	633 J	40.6 J	193 U	5.2 U	23.5 U	24.1 J
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)							15					
PH (S.U.)							5.8					
TOTAL ORGANIC CARBON (mg/kg)							4700 J					

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	02	02	02	02	02	03	03	03	03
LOCATION	16SB037	16SB038	16SB039	16SB042	16SB043	16SB044	16SB045	16SB046	16SB051	16SB052	16SB053	16SB054
SAMPLE NUMBER	16SS0370002	16SS0380002	16SS0390002	16SS0420002	16SS0430002	16SS0440002	16SS0450002	16SS0460002	16SS0510102	16SS0520102	16SS0530102	16SS0540102
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	1 - 2	1 - 2	1 - 2	1 - 2
SAMPLE DATE	3/28/2003	3/28/2003	3/28/2003	12/5/2003	12/5/2003	12/5/2003	12/5/2003	12/5/2003	8/13/2004	8/12/2004	8/12/2004	8/13/2004
Dioxins (ng/kg)												
1,2,3,4,6,7,8,9-OCDD												
1,2,3,4,6,7,8,9-OCDF												
1,2,3,4,6,7,8-HPCDD												
1,2,3,4,6,7,8-HPCDF												
1,2,3,4,7,8,9-HPCDF												
1,2,3,4,7,8-HXCDD												
1,2,3,4,7,8-HXCDF												
1,2,3,6,7,8-HXCDD												
1,2,3,6,7,8-HXCDF												
1,2,3,7,8,9-HXCDD												
1,2,3,7,8,9-HXCDF												
1,2,3,7,8-PECDD												
2,3,4,6,7,8-HXCDF												
2,3,7,8-TCDF												
TEQ BIRD												
TEQ BIRD HALFND												
TEQ MAMMAL												
TEQ MAMMAL HALFND												
TOTAL HPCDD												
TOTAL HPCDF												
TOTAL HXCDD												
TOTAL HXCDF												
TOTAL PECDD												
TOTAL PECDF												
TOTAL TCDF												
Volatile Organics (µg/kg)												
2-BUTANONE	1.1 U	1.1 U	1.2 U						1.09 U	0.933 U	0.888 U	1.05 U
2-HEXANONE	1.1 U	1.1 U	1.2 U						1.09 U	0.933 U	0.888 U	1.05 U
4-METHYL-2-PENTANONE	1.1 U	1.1 U	1.2 U						1.09 U	0.933 U	0.888 U	1.05 U
ACETONE	1.1 UJ	1.1 UJ	1.2 UJ						1.09 U	3 J	1 J	1.05 U
CARBON DISULFIDE	1.1 UJ	1.1 UJ	1.2 UJ						1.09 U	0.933 U	0.888 U	1.05 U
CHLOROFORM	1.1 U	1.1 U	1.2 U						1.09 U	0.933 U	0.888 U	1.05 U
CIS-1,2-DICHLOROETHENE	1.1 U	1.1 U	23						1.09 U	0.933 U	0.888 U	1.05 U
DICHLORODIFLUOROMETHANE	1.1 U	1.1 U	1.2 UJ						1.09 U	2 J	7	2 J
METHYLENE CHLORIDE	1 BU	2 BU	3 BU						1.09 UJ	0.933 UJ	0.888 UJ	1.05 UJ
STYRENE	1.1 U	1.1 U	1.2 U						1.09 U	0.933 U	0.888 U	1.05 U
TOLUENE	1.1 U	1.1 U	1.2 U						1.09 U	0.933 U	0.888 U	1.05 U
TOTAL XYLENES	1.1 U	1.1 U	1.2 U						1.09 U	0.933 U	0.888 U	1.05 U
TRANS-1,2-DICHLOROETHENE	1.1 U	1.1 U	2 J						1.09 U	0.933 U	0.888 U	1.05 U
TRICHLOROETHENE	1.1 U	6	86						1.09 U	8	61	67
TRICHLOROFLUOROMETHANE	2 J	2 J	2 J						1.09 U	0.933 U	0.888 U	1.05 U
VINYL ACETATE	1.1 U	1.1 U	1.2 U						1.09 U	0.933 U	0.888 U	1.05 U

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	02	02	02	02	02	03	03	03	03
LOCATION	16SB037	16SB038	16SB039	16SB042	16SB043	16SB044	16SB045	16SB046	16SB051	16SB052	16SB053	16SB054
SAMPLE NUMBER	16SS0370002	16SS0380002	16SS0390002	16SS0420002	16SS0430002	16SS0440002	16SS0450002	16SS0460002	16SS0510102	16SS0520102	16SS0530102	16SS0540102
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	1 - 2	1 - 2	1 - 2	1 - 2
SAMPLE DATE	3/28/2003	3/28/2003	3/28/2003	12/5/2003	12/5/2003	12/5/2003	12/5/2003	12/5/2003	8/13/2004	8/12/2004	8/12/2004	8/13/2004
Semivolatile Organics (µg/kg)												
2-METHYLNAPHTHALENE	3.7 U	3.8 U	3.8 U									
ACENAPHTHENE	3.7 U	3.8 U	3.8 U									
ACENAPHTHYLENE	3.7 U	3.8 U	3.8 U									
ANTHRACENE	3.7 U	3.8 U	3.8 U									
BENZO(A)ANTHRACENE	5 J	3.8 U	3.8 U									
BENZO(A)PYRENE	5 J	3.8 U	4 J									
BENZO(B)FLUORANTHENE	5 J	3.8 U	9									
BENZO(G,H,I)PERYLENE	3.7 U	3.8 U	3.8 U									
BENZO(K)FLUORANTHENE	4 J	3.8 U	3.8 U									
BIS(2-ETHYLHEXYL)PHTHALATE	74 U	160 BU	170 BU									
CHRYSENE	4 J	3.8 U	7 J									
DIBENZO(A,H)ANTHRACENE	3.7 U	3.8 U	3.8 U									
DIBENZOFURAN	74 U	76 U	78 U									
FLUORANTHENE	4 J	3.8 U	3.8 U									
FLUORENE	3.7 U	3.8 U	3.8 U									
INDENO(1,2,3-CD)PYRENE	3.7 U	3.8 U	3.8 U									
NAPHTHALENE	3.7 U	3.8 U	3.8 U									
PHENANTHRENE	3.7 U	3.8 U	3.8 U									
PYRENE	5 J	3.8 U	5 J									
SAFROLE	74 U	76 U	78 U									
Energetics (mg/kg)												
HMX	0.25 U	0.25 U	0.25 UJ									
Herbicides (µg/kg)												
HEXACHLOROPHENE	0.94 U	0.97 U	0.99 U									
PENTACHLOROPHENOL	0.5 U	0.79 J	0.52 U									
Inorganics (mg/kg)												
ALUMINUM	5470 J	10900 J	13800 J	16000 J	23200 J	15900 J	15800 J	22100 J				
ANTIMONY	0.44 U	0.36 U	0.78 U	6.8 J	1.2 J	3.3 J	3.1 J	2.6 J				
ARSENIC	1.9 J	5.4 J	8.8 J	5 J	8.3 J	5.4 J	10.4 J	8.6 J				
BARIUM	17.6 J	81.9 J	83.4 J	188 J	111 J	215 J	170 J	112 J				
BERYLLIUM	0.27 U	0.27 U	0.42 U	0.66 U	0.87 U	0.7 U	0.63 U	0.68 U				
CADMIUM	0.13 U	0.3 U	0.28 U	2 J	0.47 U	1 U	0.71 U	0.7 U				
CALCIUM	347 J	6750 J	808 J	1930 J	366 J	870 J	1090 J	725 J				
CHROMIUM	7.6 J	13 J	15.9 J	23 J	24.3 J	16.9 J	22.7 J	26.2 J				
COBALT	1.1 J	3.6 J	4.7 J	7 J	10.2 J	9.4 J	5.2 J	7.4 J				
COPPER	5.3 J	13.9 J	13.1 J	115 J	19.2 J	72.9 J	32.2 J	33.1 J				
IRON	8360 J	18100 J	24000 J	20900 J	24300 J	15100 J	25500 J	24600 J				
LEAD	4.2 J	14 J	13.4 J	373 J	31.5 J	240 J	127 J	115 J				
LITHIUM	4.3 U	7.6 J	10.7 J									
MAGNESIUM	553 J	2160 J	2130 J	1740 J	2700 J	1770 J	1350 J	2440 J				
MANGANESE	6.8 J	91.6 J	256 J	318 J	446 J	797 J	213 J	241 J				
MERCURY	0.004 U	0.021 U	0.048 J	0.045 J	0.037 J	0.035 J	0.037 J	0.025 J				
NICKEL	2.9 J	10.4 J	11.1 J	14.7 J	17.5 J	14.1 J	10.6 J	16.1 J				

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**02**	**02**	**02**	**02**	**02**	**03**	**03**	**03**	**03**
LOCATION	**16SB037**	**16SB038**	**16SB039**	**16SB042**	**16SB043**	**16SB044**	**16SB045**	**16SB046**	**16SB051**	**16SB052**	**16SB053**	**16SB054**
SAMPLE NUMBER	**16SS0370002**	**16SS0380002**	**16SS0390002**	**16SS0420002**	**16SS0430002**	**16SS0440002**	**16SS0450002**	**16SS0460002**	**16SS0510102**	**16SS0520102**	**16SS0530102**	**16SS0540102**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**1 - 2**	**1 - 2**	**1 - 2**	**1 - 2**
SAMPLE DATE	**3/28/2003**	**3/28/2003**	**3/28/2003**	**12/5/2003**	**12/5/2003**	**12/5/2003**	**12/5/2003**	**12/5/2003**	**8/13/2004**	**8/12/2004**	**8/12/2004**	**8/13/2004**
Inorganics (mg/kg) (Continued)												
POTASSIUM	206 J	470 J	672 J	1480 J	1830 J	1220 J	1780 J	1810 J				
SELENIUM	0.06 U	0.14 U	0.47 U	0.4 U	0.52 U	0.37 U	0.82 U	0.47 U				
SILVER	0.02 U	0.02 U	0.13 U	0.16 U	0.09 U	0.08 U	0.06 U	0.08 U				
SODIUM	22.7 U	39.7 U	43.7 U	42.7 U	39.6 U	30.5 U	203 J	53 U				
STRONTIUM	7 J	48.8 J	13.5 J									
THALLIUM	0.06 U	0.1 U	0.19 U	0.27 U	0.32 U	0.25 U	0.24 U	0.29 U				
TIN	0.39 U	0.4 U	0.6 U	1.9 J	0.82 U	1.1 J	0.83 U	0.92 U				
TITANIUM	29 J	135 J	143 J	92.3 J	256 J	196 J	76 J	247 J				
VANADIUM	10.2 J	20.1 J	27.3 J	30.1 J	42.6 J	27.9 J	31.8 J	42.9 J				
ZINC	7.6 U	42.6 U	42.1 U	1840 J	144 J	967 J	455 J	260 J				
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)	21											
PH (S.U.)	5.2											
TOTAL ORGANIC CARBON (mg/kg)	1000 J											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB055	16SB056	16SB057	16SB058	16SB059	16SB060	16SB061	16SB062	16SB063	16SB064	16SB065	16SB066
SAMPLE NUMBER	16SS0550102	16SS0560102	16SS0570102	16SS0580102	16SS0590102	16SS0600102	16SS0610102	16SS0620102	16SS0630102	16SS0640102	16SS0650102	16SS0660102
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2
SAMPLE DATE	8/12/2004	8/12/2004	8/13/2004	8/13/2004	8/13/2004	8/11/2004	8/11/2004	8/13/2004	8/11/2004	8/11/2004	8/11/2004	8/12/2004
Dioxins (ng/kg)												
1,2,3,4,6,7,8,9-OCDD												
1,2,3,4,6,7,8,9-OCDF												
1,2,3,4,6,7,8-HPCDD												
1,2,3,4,6,7,8-HPCDF												
1,2,3,4,7,8,9-HPCDF												
1,2,3,4,7,8-HXCDD												
1,2,3,4,7,8-HXCDF												
1,2,3,6,7,8-HXCDD												
1,2,3,6,7,8-HXCDF												
1,2,3,7,8,9-HXCDD												
1,2,3,7,8,9-HXCDF												
1,2,3,7,8-PECDD												
2,3,4,6,7,8-HXCDF												
2,3,7,8-TCDF												
TEQ BIRD												
TEQ BIRD HALFND												
TEQ MAMMAL												
TEQ MAMMAL HALFND												
TOTAL HPCDD												
TOTAL HPCDF												
TOTAL HXCDD												
TOTAL HXCDF												
TOTAL PECDD												
TOTAL PECDF												
TOTAL TCDF												
Volatile Organics (µg/kg)												
2-BUTANONE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 UR	1.1 J	1 U	1.01 UR	1.05 UR	1.17 UR	1.26 U
2-HEXANONE	0.93 U	3 J	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U
4-METHYL-2-PENTANONE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U
ACETONE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	13 U	10 U	1 U	1.01 UR	1.1 U	1.17 UR	51 BJ
CARBON DISULFIDE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U
CHLOROFORM	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U
CIS-1,2-DICHLOROETHENE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	17	1.1 J	1 U	1.01 U	1.05 U	1.17 U	73
DICHLORODIFLUOROMETHANE	7	7	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	2 J	2 J	1.26 U
METHYLENE CHLORIDE	0.93 UJ	1.02 UJ	0.993 UJ	0.945 UJ	1.01 UJ	1.14 U	1.19 U	1 UJ	1.01 U	1.05 U	1.17 U	1.26 U
STYRENE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U
TOLUENE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U
TOTAL XYLENES	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U
TRANS-1,2-DICHLOROETHENE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 J
TRICHLOROETHENE	64	34	0.993 U	0.945 U	13	9	3 J	1 U	1.01 U	1.05 U	1.17 U	34
TRICHLOROFLUOROMETHANE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U
VINYL ACETATE	0.93 U	1.02 U	0.993 U	0.945 U	1.01 U	1.14 U	1.19 U	1 U	1.01 U	1.05 U	1.17 U	1.26 U

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB055	16SB056	16SB057	16SB058	16SB059	16SB060	16SB061	16SB062	16SB063	16SB064	16SB065	16SB066
SAMPLE NUMBER	16SS0550102	16SS0560102	16SS0570102	16SS0580102	16SS0590102	16SS0600102	16SS0610102	16SS0620102	16SS0630102	16SS0640102	16SS0650102	16SS0660102
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2
SAMPLE DATE	8/12/2004	8/12/2004	8/13/2004	8/13/2004	8/13/2004	8/11/2004	8/11/2004	8/13/2004	8/11/2004	8/11/2004	8/11/2004	8/12/2004
Semivolatile Organics (µg/kg)												
2-METHYLNAPHTHALENE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ANTHRACENE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BIS(2-ETHYLHEXYL)PHTHALATE												
CHRYSENE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
FLUORANTHENE												
FLUORENE												
INDENO(1,2,3-CD)PYRENE												
NAPHTHALENE												
PHENANTHRENE												
PYRENE												
SAFROLE												
Energetics (mg/kg)												
HMX												
Herbicides (µg/kg)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Inorganics (mg/kg)												
ALUMINUM												
ANTIMONY												
ARSENIC												
BARIUM												
BERYLLIUM												
CADMIUM												
CALCIUM												
CHROMIUM												
COBALT												
COPPER												
IRON												
LEAD												
LITHIUM												
MAGNESIUM												
MANGANESE												
MERCURY												
NICKEL												

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB055	16SB056	16SB057	16SB058	16SB059	16SB060	16SB061	16SB062	16SB063	16SB064	16SB065	16SB066
SAMPLE NUMBER	16SS0550102	16SS0560102	16SS0570102	16SS0580102	16SS0590102	16SS0600102	16SS0610102	16SS0620102	16SS0630102	16SS0640102	16SS0650102	16SS0660102
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2
SAMPLE DATE	8/12/2004	8/12/2004	8/13/2004	8/13/2004	8/13/2004	8/11/2004	8/11/2004	8/13/2004	8/11/2004	8/11/2004	8/11/2004	8/12/2004
Inorganics (mg/kg) (Continued)												
POTASSIUM												
SELENIUM												
SILVER												
SODIUM												
STRONTIUM												
THALLIUM												
TIN												
TITANIUM												
VANADIUM												
ZINC												
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)												
PH (S.U.)												
TOTAL ORGANIC CARBON (mg/kg)												

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB067	16SB068	16SB069	16SB070	16SB071	16SB072	16SB073	16SB074	16SB075	16SB076	16SB077	16SB078
SAMPLE NUMBER	16SS0670102	16SS0680102	16SS0690102	16SS0700102	16SS0710102	16SS0720102	16SS0730102	16SS0740102	16SS0750102	16SS0760102	16SS0770102	16SS0780102
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2
SAMPLE DATE	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/17/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004
Dioxins (ng/kg)												
1,2,3,4,6,7,8,9-OCDD												
1,2,3,4,6,7,8,9-OCDF												
1,2,3,4,6,7,8-HPCDD												
1,2,3,4,6,7,8-HPCDF												
1,2,3,4,7,8,9-HPCDF												
1,2,3,4,7,8-HXCDD												
1,2,3,4,7,8-HXCDF												
1,2,3,6,7,8-HXCDD												
1,2,3,6,7,8-HXCDF												
1,2,3,7,8,9-HXCDD												
1,2,3,7,8,9-HXCDF												
1,2,3,7,8-PECDD												
2,3,4,6,7,8-HXCDF												
2,3,7,8-TCDF												
TEQ BIRD												
TEQ BIRD HALFND												
TEQ MAMMAL												
TEQ MAMMAL HALFND												
TOTAL HPCDD												
TOTAL HPCDF												
TOTAL HXCDD												
TOTAL HXCDF												
TOTAL PECDD												
TOTAL PECDF												
TOTAL TCDF												
Volatile Organics (µg/kg)												
2-BUTANONE	4 J	2 J	0.995 U	0.923 U	0.943 UJ	3 J	5 J	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
2-HEXANONE	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	0.933 U	1 U	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
4-METHYL-2-PENTANONE	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	0.933 U	1 J	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
ACETONE	33 BJ	25 BJ	13 BU	4 U	15 J	28 J	51 BJ	3 BU	5 BU	2 J	3 U	1.02 U
CARBON DISULFIDE	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	3	2 J	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
CHLOROFORM	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	0.933 U	1 U	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
CIS-1,2-DICHLOROETHENE	3 J	5	0.995 U	0.923 U	0.943 UJ	13	3 J	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
DICHLORODIFLUOROMETHANE	4	2 J	0.995 U	0.923 U	20 J	0.933 UJ	1 U	1 J	2 J	13	0.893 UJ	1.02 U
METHYLENE CHLORIDE	3 BU	2 BU	0.995 U	2 U	3 J	2 U	2 U	0.938 UJ	3 U	0.953 UJ	0.893 UJ	1.02 UJ
STYRENE	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	0.933 U	1 U	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
TOLUENE	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	0.933 U	1 J	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
TOTAL XYLENES	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	0.933 U	3	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
TRANS-1,2-DICHLOROETHENE	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	0.933 U	1 U	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
TRICHLOROETHENE	3 J	0.963 U	0.995 U	0.923 U	0.943 UJ	2 J	1 U	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U
TRICHLOROFLUOROMETHANE	1.19 U	0.963 U	0.995 U	0.923 U	3 J	0.933 U	1 U	0.938 U	0.967 U	1 J	0.893 U	1.02 U
VINYL ACETATE	1.19 U	0.963 U	0.995 U	0.923 U	0.943 UJ	0.933 U	1 U	0.938 U	0.967 U	0.953 U	0.893 U	1.02 U

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB067	16SB068	16SB069	16SB070	16SB071	16SB072	16SB073	16SB074	16SB075	16SB076	16SB077	16SB078
SAMPLE NUMBER	16SS0670102	16SS0680102	16SS0690102	16SS0700102	16SS0710102	16SS0720102	16SS0730102	16SS0740102	16SS0750102	16SS0760102	16SS0770102	16SS0780102
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2
SAMPLE DATE	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/17/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004
Semivolatile Organics (µg/kg)												
2-METHYLNAPHTHALENE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ANTHRACENE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BIS(2-ETHYLHEXYL)PHTHALATE												
CHRYSENE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
FLUORANTHENE												
FLUORENE												
INDENO(1,2,3-CD)PYRENE												
NAPHTHALENE												
PHENANTHRENE												
PYRENE												
SAFROLE												
Energetics (mg/kg)												
HMX												
Herbicides (µg/kg)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Inorganics (mg/kg)												
ALUMINUM												
ANTIMONY												
ARSENIC												
BARIUM												
BERYLLIUM												
CADMIUM												
CALCIUM												
CHROMIUM												
COBALT												
COPPER												
IRON												
LEAD												
LITHIUM												
MAGNESIUM												
MANGANESE												
MERCURY												
NICKEL												

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB067	16SB068	16SB069	16SB070	16SB071	16SB072	16SB073	16SB074	16SB075	16SB076	16SB077	16SB078
SAMPLE NUMBER	16SS0670102	16SS0680102	16SS0690102	16SS0700102	16SS0710102	16SS0720102	16SS0730102	16SS0740102	16SS0750102	16SS0760102	16SS0770102	16SS0780102
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3	3
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2
SAMPLE DATE	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/17/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004
Inorganics (mg/kg) (Continued)												
POTASSIUM												
SELENIUM												
SILVER												
SODIUM												
STRONTIUM												
THALLIUM												
TIN												
TITANIUM												
VANADIUM												
ZINC												
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)												
PH (S.U.)												
TOTAL ORGANIC CARBON (mg/kg)												

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03
LOCATION	16SB085	16SB086	16SB087	16SB088	16SB089	16SB098	16SB099
SAMPLE NUMBER	16SS0850002	16SS0860002	16SS0870002	16SS0880002	16SS0890002	16SS0980102	16SS0990102
SOIL CLASSIFICATION	3	3	3	3	3	3	3
SAMPLE CODE	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0.5 - 2	0 - 2	0 - 2	0 - 2	1 - 2	1 - 2
SAMPLE DATE	8/14/2004	10/16/2004	8/14/2004	8/14/2004	8/14/2004	8/16/2004	8/16/2004
Dioxins (ng/kg)							
1,2,3,4,6,7,8,9-OCDD							
1,2,3,4,6,7,8,9-OCDF							
1,2,3,4,6,7,8-HPCDD							
1,2,3,4,6,7,8-HPCDF							
1,2,3,4,7,8,9-HPCDF							
1,2,3,4,7,8-HXCDD							
1,2,3,4,7,8-HXCDF							
1,2,3,6,7,8-HXCDD							
1,2,3,6,7,8-HXCDF							
1,2,3,7,8,9-HXCDD							
1,2,3,7,8,9-HXCDF							
1,2,3,7,8-PECDD							
2,3,4,6,7,8-HXCDF							
2,3,7,8-TCDF							
TEQ BIRD							
TEQ BIRD HALFND							
TEQ MAMMAL							
TEQ MAMMAL HALFND							
TOTAL HPCDD							
TOTAL HPCDF							
TOTAL HXCDD							
TOTAL HXCDF							
TOTAL PECDD							
TOTAL PECDF							
TOTAL TCDF							
Volatile Organics (µg/kg)							
2-BUTANONE						1.24 U	0.98 U
2-HEXANONE						1.24 U	0.98 U
4-METHYL-2-PENTANONE						1.24 U	0.98 U
ACETONE						1.24 J	0.98 U
CARBON DISULFIDE						1.24 U	0.98 U
CHLOROFORM						1.24 U	1 J
CIS-1,2-DICHLOROETHENE						1.24 U	0.98 U
DICHLORODIFLUOROMETHANE						1.24 U	5 J
METHYLENE CHLORIDE						1.24 UJ	0.98 UJ
STYRENE						1.24 U	0.98 U
TOLUENE						1.24 U	0.98 U
TOTAL XYLENES						1.24 U	0.98 U
TRANS-1,2-DICHLOROETHENE						1.24 U	0.98 U
TRICHLOROETHENE						170	103 J
TRICHLOROFLUOROMETHANE						1.24 U	0.98 U
VINYL ACETATE						1.24 U	0.98 U

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03
LOCATION	16SB085	16SB086	16SB087	16SB088	16SB089	16SB098	16SB099
SAMPLE NUMBER	16SS0850002	16SS0860002	16SS0870002	16SS0880002	16SS0890002	16SS0980102	16SS0990102
SOIL CLASSIFICATION	3	3	3	3	3	3	3
SAMPLE CODE	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0.5 - 2	0 - 2	0 - 2	0 - 2	1 - 2	1 - 2
SAMPLE DATE	8/14/2004	10/16/2004	8/14/2004	8/14/2004	8/14/2004	8/16/2004	8/16/2004
Semivolatile Organics (µg/kg)							
2-METHYLNAPHTHALENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
BIS(2-ETHYLHEXYL)PHTHALATE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
DIBENZOFURAN							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
SAFROLE							
Energetics (mg/kg)							
HMX							
Herbicides (µg/kg)							
HEXACHLOROPHENE							
PENTACHLOROPHENOL							
Inorganics (mg/kg)							
ALUMINUM	22300 J	18000 J	17800 J	34200 J	26100 J		
ANTIMONY	0.96 U	3 J	0.94 U	1.9 J	5.2 J		
ARSENIC	7.1 J	5.7 J	6 J	12.7 J	9.3 J		
BARIUM	80.3 J	146 J	87.2 J	142 J	175 J		
BERYLLIUM	0.55 U	0.63 U	0.54 U	1 U	0.75 U		
CADMIUM	0.48 U	0.53 J	0.22 U	0.7 U	0.75 U		
CALCIUM	1010 J	591 J	341 J	708 J	1390 J		
CHROMIUM	29.1 J	19.6 J	23.1 J	38.2 J	33.7 J		
COBALT	7.4 J	12.4 J	8.1 J	9.3 J	9.1 J		
COPPER	19.2 J	38.5 J	14.6 J	36.8 J	43.5 J		
IRON	21900 J	16300 J	15800 J	33500 J	24800 J		
LEAD	26 J	110 J	21.4 J	82.6 J	112 J		
LITHIUM							
MAGNESIUM	2340 J	1900 J	1510 J	3610 J	2820 J		
MANGANESE	233 J	764 J	233 J	448 J	256 J		
MERCURY	0.034 J	0.034 J	0.027 J	0.057 J	0.043 J		
NICKEL	15.1 J	16.6 J	15.6 J	26.2 J	20.3 J		

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SB085**	**16SB086**	**16SB087**	**16SB088**	**16SB089**	**16SB098**	**16SB099**
SAMPLE NUMBER	**16SS0850002**	**16SS0860002**	**16SS0870002**	**16SS0880002**	**16SS0890002**	**16SS0980102**	**16SS0990102**
SOIL CLASSIFICATION	**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE CODE	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 2**	**0.5 - 2**	**0 - 2**	**0 - 2**	**0 - 2**	**1 - 2**	**1 - 2**
SAMPLE DATE	**8/14/2004**	**10/16/2004**	**8/14/2004**	**8/14/2004**	**8/14/2004**	**8/16/2004**	**8/16/2004**
Inorganics (mg/kg) (Continued)							
POTASSIUM	1920 J	1520 J	1710 J	2980 J	2630 J		
SELENIUM	0.43 U	0.43 U	0.43 U	0.7 U	0.5 U		
SILVER	0.21 U	0.06 U	0.07 U	0.05 U	0.048 U		
SODIUM	68.6 U	46.2 U	40.1 U	49.9 U	47 U		
STRONTIUM							
THALLIUM	0.44 U	0.29 U	0.28 U	0.5 U	0.42 U		
TIN	0.63 U	0.69 U	0.56 U	0.7 U	1.2 U		
TITANIUM							
VANADIUM	42.9 J	32.9 J	34.6 J	65.2 J	53.3 J		
ZINC	135	368 J	88.6	280	683		
Miscellaneous Parameters							
CATION EXCHANGE CAPACITY (MEQ/1)							
PH (S.U.)							
TOTAL ORGANIC CARBON (mg/kg)							

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
µg/kg = microgram per kilogram
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazoline
HPCDD = heptachlorodibenzo-p-idioxin
HPCDF = heptachlorodibenzofuran
HXCDD = hexachlorodibenzo-p-dioxin
HXCDF = hexachlorodibenzofuran
MEQ/1 = milliequivalents per 100 grams
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
OCDD - octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzofuran
PECDD = pentachlorodibenzo-p-dioxin
PECDF = pentachlorodibenzofuran
QC = quality control
S.U. = Standard Unit
TCDF = tetrachlorodibenzofuran
TEQ = Toxicity equivalent
TV = threshold value

TABLE 3-7

SUMMARY OF DESCRIPTIVE STATISTICS
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect
Volatile Organics (µg/kg)							
1,1,2-TRICHLOROETHANE	2/79	4	8 J	0.814 - 1.48	0.680	6.00	16SB0560206
2-BUTANONE	3/70	1 J	2 J	0.814 - 1.48	0.572	1.33	16SB0600206
ACETONE	11/78	3 J	72 J	0.869 - 24	3.46	13.6	16SB0650206
BROMOMETHANE	1/79	4 J	4 J	0.814 - 1.48	0.586	4.00	16SB0560206
CARBON DISULFIDE	1/78	2 J	2 J	0.814 - 1.48	0.560	2.00	16SB0650206
CHLOROFORM	9/79	1.1 J	15	0.814 - 1.48	1.22	6.46	16SB0950607
CIS-1,2-DICHLOROETHENE	19/78	1 J	200	0.814 - 1.48	7.01	27.1	16SB0390203
DICHLORODIFLUOROMETHANE	49/78	1 J	170	0.929 - 1.45	10.4	16.3	16SB0470405
TOLUENE	1/78	1 J	1 J	0.814 - 1.48	0.549	1.00	16SB0980607
TOTAL XYLENES	4/78	1 J	2 J	0.869 - 1.48	0.606	1.75	16SB0470405, 16SB0480203, 16SB0490405
TRANS-1,2-DICHLOROETHENE	5/78	1 J	12	0.814 - 1.48	0.825	5.00	16SB0390203
TRICHLOROETHENE	50/79	1 J	9000	0.92 - 1.35	253	399	16SB0950406
TRICHLOROFLUOROMETHANE	15/78	1 J	2 J	0.814 - 1.45	0.768	1.74	11 Samples
VINYL CHLORIDE	2/79	6	12	0.814 - 1.48	0.753	9.00	16SB0650206
Semivolatile Organics (µg/kg)							
2-METHYLNAPHTHALENE	1/27	4 J	4 J	3.5 - 4.1	2.00	4.00	16SB0410507
BENZO(A)ANTHRACENE	2/27	4 J	7 J	3.5 - 4.1	2.19	5.50	16SB0340203
BENZO(A)PYRENE	2/27	6 J	10	3.5 - 4.1	2.38	8.00	16SB0340203
BENZO(B)FLUORANTHENE	2/27	8 J	16 J	3.5 - 4.1	2.67	12.0	16SB0340203
BENZO(G,H,I)PERYLENE	1/27	6 J	6 J	3.5 - 4.1	2.08	6.00	16SB0340203
BENZO(K)FLUORANTHENE	2/27	6 J	13	3.5 - 4.1	2.49	9.50	16SB0340203
BIS(2-ETHYLHEXYL)PHTHALATE	3/27	86 J	1400	70 - 1000	153	539	16SB0410507
CHRYSENE	3/27	6 J	10	3.5 - 4.1	2.60	8.00	16SB0340203
FLUORANTHENE	2/27	6 J	9	3.5 - 4.1	2.34	7.50	16SB0340203
INDENO(1,2,3-CD)PYRENE	1/27	6 J	6 J	3.5 - 4.1	2.08	6.00	16SB0340203
ISOSAFROLE	1/27	150 J	150 J	70 - 83	43.0	150	16SB0410507
NAPHTHALENE	2/27	5 J	6 J	3.5 - 4.1	2.18	5.50	16SB0410507
PHENANTHRENE	1/27	6 J	6 J	3.5 - 4.1	2.07	6.00	16SB0410507
PYRENE	3/27	6 J	12	3.5 - 4.1	2.64	8.33	16SB0340203
SAFROLE	2/27	480	67000	70 - 83	2535	33740	16SB0410507
Herbicides (µg/kg)							
HEXACHLOROPHENE	1/27	0.96 J	0.96 J	0.68 - 1	0.494	0.960	16SB0260204
PENTACHLOROPHENOL	1/27	1.6 J	1.6 J	0.47 - 0.56	0.312	1.60	16SB0300203
Inorganics (mg/kg)							
ALUMINUM	32/32	1540 J	26700 J	---	10285	10285	16SB0850204
ANTIMONY	4/32	0.33 J	1.4 J	0.14 - 1.5	0.298	0.715	16SB0870204
ARSENIC	32/32	0.35 J	11.5 J	---	4.79	4.79	16SB0890204
BARIUM	32/32	9.1 J	119 J	---	47.2	47.2	16SB0320204
BERYLLIUM	12/32	0.2 J	2.4 J	0.17 - 0.81	0.396	0.700	16SB0180203
CADMIUM	7/32	0.19 J	0.74 J	0.09 - 0.37	0.163	0.387	16SB0180203
CALCIUM	29/32	68.7 J	2150 J	35.6 - 380	475	513	16SB0340203
CHROMIUM	32/32	5.1 J	48.2 J	---	16.3	16.3	16SB0890204
COBALT	32/32	0.54 J	15.7 J	---	4.32	4.32	16SB0170204

TABLE 3-7

SUMMARY OF DESCRIPTIVE STATISTICS
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect
COPPER	32/32	3.6 J	34.8 J	---	11.7	11.7	16SB0180203
IRON	32/32	3630 J	34500 J	---	17559	17559	16SB0850204
LEAD	31/32	3.4 J	71.1 J	7.9	12.9	13.2	16SB0870204
LITHIUM	18/27	3.4 J	23.6 J	2 - 6.3	6.77	8.97	16SB0170204
MAGNESIUM	32/32	279 J	2620 J	---	1235	1235	16SB0410305
MANGANESE	32/32	3.2 J	415 J	---	104	104	16SB0390203
MERCURY	20/32	0.003 J	0.083 J	0.002 - 0.012	0.0238	0.0366	16SB0860204
NICKEL	32/32	2 J	35.6 J	---	10.4	10.4	16SB0170204
POTASSIUM	32/32	225 J	2980 J	---	811	811	16SB0890204
SELENIUM	2/32	0.22 J	0.63 J	0.02 - 0.62	0.119	0.425	16SB0180203
SILVER	1/32	0.42 J	0.42 J	0.02 - 0.22	0.0418	0.420	16SB0340203
SODIUM	1/32	50.5 J	50.5 J	13.9 - 75.8	18.9	50.5	16SB0320204
STRONTIUM	27/27	2.8 J	21.8 J	---	8.61	8.61	16SB0130204
TIN	5/32	0.31 J	1.3 J	0.22 - 0.71	0.290	0.546	16SB0320204
TITANIUM	27/27	12.2 J	177 J	---	68.7	68.7	16SB0410305
VANADIUM	32/32	2.9 J	55.2 J	---	20.3	20.3	16SB0890204
ZINC	24/32	10.2 J	130	4.5 - 39.7	29.4	36.1	16SB0870204
Miscellaneous Parameters							
CATION EXCHANGE CAPACITY (MEQ/1)	6/6	15	25	---	21.3	21.3	16SB0120204
PH (S.U.)	6/6	4.9	7.5	---	5.60	5.60	16SB0410305
TOTAL ORGANIC CARBON (mg/kg)	6/6	1400 J	14000 J	---	5367	5367	16SB0180203

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
µg/kg = micrograms per kilogram
MEQ/1 = milliequivalents per 100 grams
mg/kg = milligrams per kilogram
QC = quality control
S.U. = Standard units
TV = threshold value

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	8	8
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01
LOCATION	16SB001	16SB002	16SB011	16SB012	16SB013	16SB017	16SB018	16SB019	16SB022	16SB023	16SB024
SAMPLE NUMBER	16SB0010406	16SB0020406	16SB0110204	16SB0120204	16SB0130204	16SB0170204	16SB0180203	16SB0190203	16SB0220203	16SB0230203	16SB0240203
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
DEPTH RANGE	4 - 6	4 - 6	2 - 4	2 - 4	2 - 4	2 - 4	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3
SAMPLE DATE	3/27/2003	3/27/2003	3/27/2003	3/28/2003	3/28/2003	3/27/2003	3/28/2003	3/28/2003	3/28/2003	3/28/2003	3/28/2003
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE	1.2 U	1.1 U									
2-BUTANONE	1.2 U	1.1 U									
ACETONE	1.2 UJ	1.1 UJ									
BROMOMETHANE	1.2 UJ	1.1 UJ									
CARBON DISULFIDE	1.2 UJ	1.1 UJ									
CHLOROFORM	1.2 U	1.1 U									
CIS-1,2-DICHLOROETHENE	1.2 U	1.1 U									
DICHLORODIFLUOROMETHANE	1.2 U	1.1 UJ									
TOLUENE	1.2 U	1.1 U									
TOTAL XYLENES	1.2 U	1.1 U									
TRANS-1,2-DICHLOROETHENE	1.2 U	1.1 U									
TRICHLOROETHENE	1.2 U	1.1 U									
TRICHLOROFLUOROMETHANE	2 J	2 J									
VINYL CHLORIDE	1.2 U	1.1 U									
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 U	3.8 U
BENZO(A)ANTHRACENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
BENZO(A)PYRENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
BENZO(B)FLUORANTHENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
BENZO(G,H,I)PERYLENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
BENZO(K)FLUORANTHENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
BIS(2-ETHYLHEXYL)PHTHALATE	80 U	130 J	77 U	83 U	80 U	250 BU	390 BU	260 BU	77 U	81 BU	130 BU
CHRYSENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
FLUORANTHENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
INDENO(1,2,3-CD)PYRENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 U	3.8 U
ISOSAFROLE	80 U	76 U	77 U	83 U	80 U	74 U	80 U	76 U	77 U	79 U	76 U
NAPHTHALENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 U	3.8 U
PHENANTHRENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
PYRENE	3.9 U	3.7 U	3.8 U	4.1 U	3.9 U	3.7 U	3.9 U	3.8 U	3.8 U	3.9 UJ	3.8 U
SAFROLE	80 U	76 U	77 U	83 U	80 U	74 U	80 U	76 U	77 U	480	76 U
Herbicides (µg/kg)											
HEXACHLOROPHENE	1 U	0.68 U	0.98 U	1 U	1 U	0.94 U	1 U	0.97 U	0.98 U	1 U	0.97 U
PENTACHLOROPHENOL	0.54 U	0.51 U	0.52 U	0.55 U	0.54 U	0.5 U	0.54 U	0.51 U	0.52 U	0.53 U	0.51 U
Inorganics (mg/kg)											
ALUMINUM	8090 J	13800 J	7110 J	13500 J	12900 J	5160 J	3520 J	6040 J	2120 J	8380 J	6110 J
ANTIMONY	0.52 U	0.31 U	0.39 U	0.71 U	0.41 U	0.31 U	0.51 U	0.24 U	0.14 U	0.24 U	0.28 U
ARSENIC	2.7 J	3.2 J	3.3 J	8.3 J	3.5 J	1.8 J	5.9 J	2.3 J	0.63 J	4.1 J	2.2 J
BARIUM	20.6 J	76.3 J	34.8 J	40.2 J	91.8 J	23 J	32.6 J	33.2 J	20 J	30.9 J	26.5 J

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	8	8
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01
LOCATION	16SB001	16SB002	16SB011	16SB012	16SB013	16SB017	16SB018	16SB019	16SB022	16SB023	16SB024
SAMPLE NUMBER	16SB0010406	16SB0020406	16SB0110204	16SB0120204	16SB0130204	16SB0170204	16SB0180203	16SB0190203	16SB0220203	16SB0230203	16SB0240203
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
DEPTH RANGE	4 - 6	4 - 6	2 - 4	2 - 4	2 - 4	2 - 4	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3
SAMPLE DATE	3/27/2003	3/27/2003	3/27/2003	3/28/2003	3/28/2003	3/27/2003	3/28/2003	3/28/2003	3/28/2003	3/28/2003	3/28/2003
Inorganics (mg/kg) (Continued)											
BERYLLIUM	0.38 U	0.5 J	0.33 U	0.53 U	0.88 J	0.87 J	2.4 J	0.41 U	0.4 U	0.31 U	0.32 U
CADMIUM	0.16 U	0.18 U	0.17 U	0.19 U	0.22 J	0.24 U	0.74 J	0.13 U	0.1 U	0.16 U	0.12 U
CALCIUM	468 J	602 J	334 J	143 J	380 U	607 J	1510 J	234 J	218 J	68.7 J	139 J
CHROMIUM	11.9 J	17.8 J	11.3 J	16 J	25.1 J	11.8 J	20.2 J	10.7 J	6 J	12.4 J	9.4 J
COBALT	1.7 J	2.2 J	3 J	3.7 J	2.9 J	15.7 J	7 J	3 J	2.4 J	3 J	2.4 J
COPPER	6.7 J	6.7 J	8.7 J	13.2 J	19.3 J	15.5 J	34.8 J	6.8 J	3.6 J	8.6 J	7.8 J
IRON	14800 J	15100 J	15900 J	24600 J	13400 J	20500 J	8520 J	12500 J	12800 J	16900 J	13500 J
LEAD	6 J	7.2 J	8.1 J	10.3 J	9.5 J	6.1 J	14.2 J	6.3 J	3.4 J	7.3 J	5.8 J
LITHIUM	5.9 U	11.8 J	7 J	9.9 J	12.4 J	23.6 J	6.9 J	5.6 U	2 U	6.3 U	4.6 U
MAGNESIUM	939 J	1070 J	1250 J	1970 J	1260 J	1330 J	910 J	849 J	535 J	1350 J	955 J
MANGANESE	28.8 J	10 J	82 J	111 J	7.3 J	254 J	47.2 J	64.4 J	87.9 J	81.3 J	44.6 J
MERCURY	0.012 U	0.023 J	0.003 U	0.069 J	0.013 J	0.031 J	0.079 J	0.003 U	0.004 U	0.003 U	0.005 U
NICKEL	4.8 J	6.8 J	7.2 J	10.2 J	14.7 J	35.6 J	25.1 J	6.3 J	6.5 J	6.8 J	5.6 J
POTASSIUM	245 J	621 J	366 J	646 J	2070 J	867 J	413 J	325 J	350 J	407 J	334 J
SELENIUM	0.06 U	0.11 U	0.1 U	0.38 U	0.24 U	0.07 U	0.63 J	0.1 U	0.02 U	0.15 U	0.08 U
SILVER	0.11 U	0.03 U	0.04 U	0.14 U	0.14 U	0.03 U	0.05 U	0.02 U	0.05 U	0.02 U	0.02 U
SODIUM	70.8 U	75.8 U	34.3 U	28.4 U	46.2 U	32.5 U	52.5 U	23.1 U	29.6 U	18.9 U	13.9 U
STRONTIUM	4.9 J	13.6 J	4.6 J	5.6 J	21.8 J	5.3 J	9.9 J	4 J	7.9 J	3.8 J	4.3 J
TIN	0.67 U	0.57 U	0.52 U	0.56 U	0.5 U	0.47 U	0.34 U	0.31 U	0.36 U	0.36 U	0.36 U
TITANIUM	75.9 J	58.5 J	82.1 J	162 J	43.5 J	36.7 J	13.8 J	43.1 J	12.2 J	106 J	63.5 J
VANADIUM	17.5 J	24 J	15.6 J	25.8 J	21.3 J	7.9 J	6.9 J	12.3 J	5.5 J	17.5 J	12 J
ZINC	10.2 J	11.8 U	20.6 J	35.9 J	15.2 U	59 J	17.8 J	14 J	15.6 J	20.2 J	17.5 J
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)		24		25			24				18
PH (S.U.)		5		5.1			5.8				4.9
TOTAL ORGANIC CARBON (mg/kg)		3400 J		5300 J			14000 J				4700 J

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	9	8	8	8	8	8	9	9	9	8
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01
LOCATION	16SB025	16SB026	16SB027	16SB028	16SB029	16SB030	16SB032	16SB033	16SB034	16SB036	16SB038
SAMPLE NUMBER	16SB0250203	16SB0260204	16SB0270203	16SB0280203	16SB0290203	16SB0300203	16SB0320204	16SB0330204	16SB0340203	16SB0360203	16SB0380203
SAMPLE CODE	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 3	2 - 4	2 - 3	2 - 3	2 - 3	2 - 3	2 - 4	2 - 4	2 - 3	2 - 3	2 - 3
SAMPLE DATE	3/28/2003	4/9/2003	3/28/2003	3/28/2003	3/28/2003	3/28/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	3/28/2003
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE										1.2 U	1.1 U
2-BUTANONE										1.2 U	1.1 U
ACETONE										1.2 UJ	1.1 UJ
BROMOMETHANE										1.2 UJ	1.1 UJ
CARBON DISULFIDE										1.2 UJ	1.1 UJ
CHLOROFORM										1.2 U	1.1 U
CIS-1,2-DICHLOROETHENE										1.2 U	1.1 U
DICHLORODIFLUOROMETHANE										1.2 UJ	1.1 U
TOLUENE										1.2 U	1.1 U
TOTAL XYLENES										1.2 U	1.1 U
TRANS-1,2-DICHLOROETHENE										1.2 U	1.1 U
TRICHLOROETHENE										1.2 U	4
TRICHLOROFLUOROMETHANE										1.2 U	2 J
VINYL CHLORIDE										1.2 U	1.1 U
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	3.8 U	3.7 U	3.8 U	3.7 U
BENZO(A)ANTHRACENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	4 J	7 J	3.8 U	3.7 U
BENZO(A)PYRENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	6 J	10	3.8 U	3.7 U
BENZO(B)FLUORANTHENE	3.9 U	3.5 UJ	3.6 U	3.7 U	4 U	4 U	3.9 UJ	8 J	16 J	3.8 UJ	3.7 U
BENZO(G,H,I)PERYLENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	3.8 U	6 J	3.8 U	3.7 U
BENZO(K)FLUORANTHENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	6 J	13	3.8 U	3.7 U
BIS(2-ETHYLHEXYL)PHTHALATE	480 BU	70 U	91 BU	150 BU	82 U	420 BU	80 U	80 BU	74 U	110 BU	150 BU
CHRYSENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	6 J	10	3.8 U	3.7 U
FLUORANTHENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	6 J	9	3.8 U	3.7 U
INDENO(1,2,3-CD)PYRENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	3.8 U	6 J	3.8 U	3.7 U
ISOSAFROLE	80 U	70 U	73 U	75 U	82 U	81 U	80 U	76 U	74 U	77 U	75 U
NAPHTHALENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	3.8 U	3.7 U	3.8 U	3.7 U
PHENANTHRENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	3.8 U	3.7 U	3.8 U	3.7 U
PYRENE	3.9 U	3.5 U	3.6 U	3.7 U	4 U	4 U	3.9 U	7 J	12	3.8 U	3.7 U
SAFROLE	80 U	70 U	73 U	75 U	82 U	81 U	80 U	76 U	74 U	77 U	75 U
Herbicides (µg/kg)											
HEXACHLOROPHENE	1 U	0.96 J	0.93 U	0.96 U	1 U	1 U	1 U	0.97 U	0.94 U	0.98 U	0.96 U
PENTACHLOROPHENOL	0.53 U	0.47 U	0.49 U	0.51 U	0.55 U	1.6 J	0.54 U	0.51 U	0.5 U	0.52 U	0.51 U
Inorganics (mg/kg)											
ALUMINUM	9170 J	3610 J	1540 J	2540 J	9780 J	9080 J	10300 J	5330 J	4790 J	7450 J	4530 J
ANTIMONY	0.57 U	0.14 U	0.97 U	0.19 U	0.41 U	0.48 U	0.51 J	0.25 U	0.33 J	0.62 J	0.4 U
ARSENIC	3.5 J	1.6 J	0.35 J	1 J	5.6 J	5.6 J	10.2 J	2.1 J	2.8 J	2.6 J	2.4 J
BARIUM	33.2 J	24.1 J	9.4 J	9.1 J	42.5 J	37.6 J	119 J	30.2 J	34.7 J	45.3 J	26.7 J

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	9	8	8	8	8	8	9	9	9	8
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01
LOCATION	16SB025	16SB026	16SB027	16SB028	16SB029	16SB030	16SB032	16SB033	16SB034	16SB036	16SB038
SAMPLE NUMBER	16SB0250203	16SB0260204	16SB0270203	16SB0280203	16SB0290203	16SB0300203	16SB0320204	16SB0330204	16SB0340203	16SB0360203	16SB0380203
SAMPLE CODE	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 3	2 - 4	2 - 3	2 - 3	2 - 3	2 - 3	2 - 4	2 - 4	2 - 3	2 - 3	2 - 3
SAMPLE DATE	3/28/2003	4/9/2003	3/28/2003	3/28/2003	3/28/2003	3/28/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	3/28/2003
Inorganics (mg/kg) (Continued)											
BERYLLIUM	0.53 U	0.62 J	0.17 U	0.75 J	0.37 U	0.33 U	0.75 J	0.2 J	0.25 J	0.37 J	0.25 U
CADMIUM	0.2 U	0.32 J	0.09 U	0.17 U	0.18 U	0.18 U	0.43 J	0.19 J	0.57 J	0.24 J	0.19 U
CALCIUM	312 J	420 J	204 J	199 J	184 J	122 J	1040 J	146 J	2150 J	408 J	192 U
CHROMIUM	15.4 J	9.1 J	5.1 J	8 J	11.6 J	11.9 J	13.6 J	6.7 J	8 J	10.9 J	10 J
COBALT	2.5 J	13.9 J	0.54 J	7.9 J	3.2 J	3.3 J	7.8 J	0.89 J	1.6 J	1.8 J	1.5 J
COPPER	10 J	10.8 J	3.9 J	6.8 J	11.5 J	11.2 J	17.1 J	5.4 J	12.4 J	15.5 J	5.5 J
IRON	21500 J	8210 J	3630 J	21800 J	15400 J	16900 J	18200 J	8650 J	9870 J	13300 J	12800 J
LEAD	7.4 J	7.9 U	4.4 J	6.4 J	6.5 J	8.3 J	20.1 J	12.9 J	30 J	34 J	6.9 J
LITHIUM	7.1 J	11.6 J	2.1 U	4.1 U	6.3 U	5.9 U	8.3 J	3.4 J	3.7 J	4.6 J	4.3 J
MAGNESIUM	1010 J	737 J	279 J	628 J	1930 J	1740 J	1440 J	495 J	630 J	710 J	593 J
MANGANESE	9.8 J	286 J	3.2 J	35.9 J	55.9 J	77.8 J	143 J	8.1 J	16.7 J	15.6 J	24.7 J
MERCURY	0.01 U	0.004 J	0.002 U	0.006 U	0.074 J	0.007 U	0.017 J	0.007 J	0.002 U	0.003 J	0.002 U
NICKEL	5.7 J	16.6 J	2 J	20.8 J	8.5 J	7.6 J	10.4 J	3.6 J	3.4 J	4.3 J	3.8 J
POTASSIUM	383 J	752 J	487 J	333 J	487 J	458 J	461 J	282 J	270 J	285 J	225 J
SELENIUM	0.1 U	0.04 U	0.03 U	0.06 U	0.12 U	0.19 U	0.22 J	0.07 U	0.11 U	0.05 U	0.06 U
SILVER	0.03 U	0.14 U	0.02 U	0.06 U	0.03 U	0.03 U	0.05 U	0.05 U	0.42 J	0.08 U	0.02 U
SODIUM	30.3 U	26 U	23.6 U	15.8 U	26.9 U	23.1 U	50.5 J	20.8 U	19.3 U	27.1 U	27.9 U
STRONTIUM	5.4 J	11 J	2.8 J	3.1 J	5.8 J	4.7 J	19.6 J	7.8 J	15.9 J	16.6 J	4 J
TIN	0.6 U	0.31 J	0.22 U	0.32 U	0.49 U	0.5 U	1.3 J	0.31 J	0.35 J	0.46 J	0.3 U
TITANIUM	47.7 J	25.1 J	16.7 J	15.3 J	131 J	121 J	74.4 J	23 J	29.4 J	42.2 J	30.1 J
VANADIUM	18 J	5.9 J	2.9 J	7.4 J	16.7 J	17.9 J	21.6 J	9.5 J	11.2 J	14.5 J	12.1 J
ZINC	11.5 J	48.9 J	4.5 U	59.6 J	29.1 J	27.9 J	31.2 J	8.6 U	54.5 J	83.3 J	11.6 U
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	8	9
SAMPLING ROUND	01	01	01	01	01	02	02	02	02	03	03
LOCATION	16SB039	16SB040	16SB040	16SB041	16SB041	16SB047	16SB048	16SB049	16SB050	16SB051	16SB052
SAMPLE NUMBER	16SB0390203	16SB0400506	16SB0400608	16SB0410305	16SB0410507	16SB0470405	16SB0480203	16SB0490405	16SB0500103	16SB0510204	16SB0520205
SAMPLE CODE	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL
DEPTH RANGE	2 - 3	5 - 6	6 - 8	3 - 5	5 - 7	4 - 5	2 - 3	4 - 5	1 - 3	2 - 4	2 - 5
SAMPLE DATE	3/28/2003	3/28/2003	3/28/2003	3/27/2003	3/27/2003	12/5/2003	12/5/2003	12/5/2003	12/5/2003	8/13/2004	8/12/2004
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.18 U	1.12 U	0.814 U	0.978 U	1.17 U	1.05 U
2-BUTANONE	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.18 U	1.12 U	0.814 U	0.978 U	1.17 U	1.05 U
ACETONE	1.2 UJ	1.2 UJ	1.2 UJ	4 J	14 J	1.18 UJ	1.12 UJ	6 J	0.978 UJ	1.17 U	1.05 U
BROMOMETHANE	1.2 UJ	1.2 UJ	1.2 UJ	1.2 UJ	1.2 UJ	1.18 UJ	1.12 UJ	0.814 U	0.978 UJ	1.17 U	1.05 U
CARBON DISULFIDE	1.2 UJ	1.2 UJ	1.2 UJ	1.2 UJ	1.2 U	1.18 U	1.12 U	0.814 U	0.978 U	1.17 U	1.05 U
CHLOROFORM	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.18 U	1.12 U	0.814 U	0.978 U	1.17 U	1.05 U
CIS-1,2-DICHLOROETHENE	200	1.2 U	1.2 U	1.2 U	1.2 U	22	1.12 U	0.814 U	0.978 U	1.17 U	1.05 U
DICHLORODIFLUOROMETHANE	1.2 UJ	1.2 UJ	1.2 UJ	1.2 U	1.2 U	170	130 J	79 J	110	1.17 J	4
TOLUENE	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.18 U	1.12 U	0.814 U	0.978 U	1.17 U	1.05 U
TOTAL XYLENES	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	2 J	2 J	2 J	1 J	1.17 U	1.05 U
TRANS-1,2-DICHLOROETHENE	12	1.2 U	1.2 U	1.2 U	1.2 U	1.18 U	1.12 U	0.814 U	1 J	1.17 U	1.05 U
TRICHLOROETHENE	280	1.2 U	1.2 U	1.2 U	1.2 U	61	97 J	37	190 J	1.17 U	14
TRICHLOROFLUOROMETHANE	2 J	2 J	2 J	1.2 U	2 J	1.18 U	1.12 U	0.814 U	0.978 U	1.17 U	1.05 U
VINYL CHLORIDE	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.18 U	1.12 U	0.814 U	0.978 U	1.17 U	1.05 U
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE	4.1 U	3.9 U	3.9 U	4 U	4 J						
BENZO(A)ANTHRACENE	4.1 U	3.9 U	3.9 U	4 U	4.1 U						
BENZO(A)PYRENE	4.1 U	3.9 U	3.9 U	4 U	4.1 U						
BENZO(B)FLUORANTHENE	4.1 U	3.9 U	3.9 U	4 U	4.1 U						
BENZO(G,H,I)PERYLENE	4.1 U	3.9 U	3.9 U	4 U	4.1 U						
BENZO(K)FLUORANTHENE	4.1 U	3.9 U	3.9 U	4 U	4.1 U						
BIS(2-ETHYLHEXYL)PHTHALATE	1000 BU	1400 BJ	660 BU	81 U	86 J						
CHRYSENE	4.1 U	3.9 U	3.9 U	4 U	8						
FLUORANTHENE	4.1 U	3.9 U	3.9 U	4 U	4.1 U						
INDENO(1,2,3-CD)PYRENE	4.1 U	3.9 U	3.9 U	4 U	4.1 U						
ISOSAFROLE	82 U	80 U	80 U	81 U	150 J						
NAPHTHALENE	5 J	3.9 U	3.9 U	4 U	6 J						
PHENANTHRENE	4.1 U	3.9 U	3.9 U	4 U	6 J						
PYRENE	4.1 U	3.9 U	3.9 U	4 U	6 J						
SAFROLE	82 U	80 U	80 U	81 U	67000						
Herbicides (µg/kg)											
HEXACHLOROPHENE	1 U	1 U	1 U	0.73 U	0.74 U						
PENTACHLOROPHENOL	0.55 U	0.54 U	0.54 U	0.55 U	0.56 U						
Inorganics (mg/kg)											
ALUMINUM	12600 J	9140 J	8330 J	18600 J	11800 J						
ANTIMONY	1.5 U	0.54 U	0.57 U	0.75 U	0.33 U						
ARSENIC	7.9 J	5.7 J	4.6 J	6 J	9.4 J						
BARIUM	58.2 J	58.2 J	72.2 J	76.8 J	36.5 J						

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	8	9
SAMPLING ROUND	01	01	01	01	01	02	02	02	02	03	03
LOCATION	16SB039	16SB040	16SB040	16SB041	16SB041	16SB047	16SB048	16SB049	16SB050	16SB051	16SB052
SAMPLE NUMBER	16SB0390203	16SB0400506	16SB0400608	16SB0410305	16SB0410507	16SB0470405	16SB0480203	16SB0490405	16SB0500103	16SB0510204	16SB0520205
SAMPLE CODE	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL
DEPTH RANGE	2 - 3	5 - 6	6 - 8	3 - 5	5 - 7	4 - 5	2 - 3	4 - 5	1 - 3	2 - 4	2 - 5
SAMPLE DATE	3/28/2003	3/28/2003	3/28/2003	3/27/2003	3/27/2003	12/5/2003	12/5/2003	12/5/2003	12/5/2003	8/13/2004	8/12/2004
Inorganics (mg/kg) (Continued)											
BERYLLIUM	0.39 U	0.35 U	0.42 U	0.47 J	0.34 J						
CADMIUM	0.28 U	0.21 U	0.22 U	0.27 U	0.25 U						
CALCIUM	528 J	601 J	1130 J	1540 J	586 J						
CHROMIUM	14.5 J	13.5 J	11.4 J	20 J	21.8 J						
COBALT	6.7 J	7.1 J	7.9 J	4.4 J	4 J						
COPPER	13.7 J	8.7 J	17.2 J	11.5 J	7 J						
IRON	23900 J	17900 J	13600 J	20800 J	30300 J						
LEAD	11.6 J	14.1 J	12.3 J	9.7 J	8.6 J						
LITHIUM	9.7 J	7.9 J	7.3 J	13.5 J	8.4 J						
MAGNESIUM	2000 J	1100 J	1010 J	2620 J	1290 J						
MANGANESE	415 J	314 J	229 J	298 J	167 J						
MERCURY	0.047 J	0.032 J	0.026 J	0.058 J	0.02 J						
NICKEL	11 J	7.6 J	8.4 J	11.5 J	6.5 J						
POTASSIUM	610 J	429 J	448 J	1550 J	810 J						
SELENIUM	0.31 U	0.36 U	0.3 U	0.28 U	0.26 U						
SILVER	0.05 U	0.05 U	0.07 U	0.04 U	0.03 U						
SODIUM	44.2 U	19.9 U	38.2 U	69.4 U	62 U						
STRONTIUM	8.2 J	7.3 J	9.4 J	17.1 J	8 J						
TIN	0.66 U	0.49 U	0.5 U	0.55 U	0.49 U						
TITANIUM	99.3 J	82 J	70.3 J	177 J	173 J						
VANADIUM	24.3 J	20.1 J	17.7 J	33.9 J	32.4 J						
ZINC	39.7 U	26.7 U	33.3 U	31.8 J	17.6 J						
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)				22	15						
PH (S.U.)				7.5	5.3						
TOTAL ORGANIC CARBON (mg/kg)				1400 J	3400 J						

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	9	8	8	8	8	8	8	8	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB053	16SB054	16SB055	16SB055	16SB056	16SB056	16SB057	16SB058	16SB058	16SB059	16SB059
SAMPLE NUMBER	16SB0530205	16SB0540205	16SB0550206	16SB0550607	16SB0560206	16SB0560608	16SB0570206	16SB0580206	16SB0580607	16SB0590206	16SB0590608
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 5	2 - 5	2 - 6	6 - 7	2 - 6	6 - 8	2 - 6	2 - 6	6 - 7	2 - 6	6 - 8
SAMPLE DATE	8/12/2004	8/13/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/13/2004	8/13/2004	8/13/2004	8/13/2004	8/13/2004
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE	1.01 U	1.3 U	1.07 U	0.946 U	8 J	4	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
2-BUTANONE	1.01 U	1.3 U	1.07 U	0.946 U	1.05 UR	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
ACETONE	4 J	1.3 U	1.07 U	0.946 U	10 U	9 U	8 J	1.06 U	1.03 U	1.22 U	0.988 U
BROMOMETHANE	1.01 U	1.3 U	1.07 U	0.946 U	4 J	1.13 UJ	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
CARBON DISULFIDE	1.01 U	1.3 U	1.07 U	0.946 U	1.05 UR	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
CHLOROFORM	1.01 U	1.3 U	1.07 U	0.946 U	1.1 J	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
CIS-1,2-DICHLOROETHENE	1.01 U	1.3 U	1.07 U	0.946 U	1.05 UR	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
DICHLORODIFLUOROMETHANE	10	2 J	5	9	1.05 UR	1.13 U	5	1.06 U	1.03 U	1.22 J	0.988 U
TOLUENE	1.01 U	1.3 U	1.07 U	0.946 U	1.05 UR	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
TOTAL XYLENES	1.01 U	1.3 U	1.07 U	0.946 U	1.05 UR	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
TRANS-1,2-DICHLOROETHENE	1.01 U	1.3 U	1.07 U	0.946 U	1.05 UR	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
TRICHLOROETHENE	1300	210	79	2 J	930 J	200	1.04 U	18	28	190	9
TRICHLOROFLUOROMETHANE	1.01 U	1.3 U	1.07 U	0.946 U	1.05 UR	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
VINYL CHLORIDE	1.01 U	1.3 U	1.07 U	0.946 U	1.05 U	1.13 U	1.04 U	1.06 U	1.03 U	1.22 U	0.988 U
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
ISOSAFROLE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
SAFROLE											
Herbicides (µg/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM											
ANTIMONY											
ARSENIC											
BARIUM											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	9	8	8	8	8	8	8	8	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB053	16SB054	16SB055	16SB055	16SB056	16SB056	16SB057	16SB058	16SB058	16SB059	16SB059
SAMPLE NUMBER	16SB0530205	16SB0540205	16SB0550206	16SB0550607	16SB0560206	16SB0560608	16SB0570206	16SB0580206	16SB0580607	16SB0590206	16SB0590608
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 5	2 - 5	2 - 6	6 - 7	2 - 6	6 - 8	2 - 6	2 - 6	6 - 7	2 - 6	6 - 8
SAMPLE DATE	8/12/2004	8/13/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/13/2004	8/13/2004	8/13/2004	8/13/2004	8/13/2004
Inorganics (mg/kg) (Continued)											
BERYLLIUM											
CADMIUM											
CALCIUM											
CHROMIUM											
COBALT											
COPPER											
IRON											
LEAD											
LITHIUM											
MAGNESIUM											
MANGANESE											
MERCURY											
NICKEL											
POTASSIUM											
SELENIUM											
SILVER											
SODIUM											
STRONTIUM											
TIN											
TITANIUM											
VANADIUM											
ZINC											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	9	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB060	16SB060	16SB061	16SB061	16SB062	16SB062	16SB063	16SB063	16SB064	16SB064	16SB065
SAMPLE NUMBER	16SB0600206	16SB0600609	16SB0610206	16SB0610607	16SB0620206	16SB0620607	16SB0630206	16SB0630608	16SB0640206	16SB0640608	16SB0650206
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 6	6 - 9	2 - 6	6 - 7	2 - 6	6 - 7	2 - 6	6 - 8	2 - 6	6 - 8	2 - 6
SAMPLE DATE	8/11/2004	8/11/2004	8/11/2004	8/11/2004	8/13/2004	8/13/2004	8/11/2004	8/11/2004	8/11/2004	8/11/2004	8/11/2004
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE	1.04 UJ	1.02 U	1.09 U	1.2 U	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	1.27 U
2-BUTANONE	2 J	1.02 UR	1.09 UR	1.2 U	1.01 U	0.968 U	1.19 UR	1.3 UR	1.09 UR	1.24 UR	1.27 UR
ACETONE	19 U	24 U	3 U	5 U	1.01 U	0.968 U	1 U	1.3 UR	2 U	7 U	72 J
BROMOMETHANE	1.04 UJ	1.02 U	1.09 U	1.2 UJ	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	1.27 U
CARBON DISULFIDE	1.04 UJ	1.02 U	1.09 U	1.2 U	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	2 J
CHLOROFORM	1.04 UJ	1.02 U	1.09 U	1.2 U	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	1.27 U
CIS-1,2-DICHLOROETHENE	8 J	4	86	11	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	24
DICHLORODIFLUOROMETHANE	22 J	1.02 U	2 J	1.2 U	1.01 U	0.968 U	4 J	1.3 U	1.1 J	3 J	5
TOLUENE	1.04 UJ	1.02 U	1.09 U	1.2 U	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	1.27 U
TOTAL XYLENES	1.04 UJ	1.02 U	1.09 U	1.2 U	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	1.27 U
TRANS-1,2-DICHLOROETHENE	1.04 UJ	1.02 U	5	1.2 U	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	3 J
TRICHLOROETHENE	28 J	1.02 U	160	14	5	6	1.19 U	1.3 U	1.09 U	1.24 U	3 J
TRICHLOROFLUOROMETHANE	2 J	1.02 U	1.09 U	1.2 U	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	1.27 U
VINYL CHLORIDE	1.04 UJ	1.02 U	1.09 U	1.2 U	1.01 U	0.968 U	1.19 U	1.3 U	1.09 U	1.24 U	12
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
ISOSAFROLE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
SAFROLE											
Herbicides (µg/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM											
ANTIMONY											
ARSENIC											
BARIUM											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	9	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB060	16SB060	16SB061	16SB061	16SB062	16SB062	16SB063	16SB063	16SB064	16SB064	16SB065
SAMPLE NUMBER	16SB0600206	16SB0600609	16SB0610206	16SB0610607	16SB0620206	16SB0620607	16SB0630206	16SB0630608	16SB0640206	16SB0640608	16SB0650206
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 6	6 - 9	2 - 6	6 - 7	2 - 6	6 - 7	2 - 6	6 - 8	2 - 6	6 - 8	2 - 6
SAMPLE DATE	8/11/2004	8/11/2004	8/11/2004	8/11/2004	8/13/2004	8/13/2004	8/11/2004	8/11/2004	8/11/2004	8/11/2004	8/11/2004
Inorganics (mg/kg) (Continued)											
BERYLLIUM											
CADMIUM											
CALCIUM											
CHROMIUM											
COBALT											
COPPER											
IRON											
LEAD											
LITHIUM											
MAGNESIUM											
MANGANESE											
MERCURY											
NICKEL											
POTASSIUM											
SELENIUM											
SILVER											
SODIUM											
STRONTIUM											
TIN											
TITANIUM											
VANADIUM											
ZINC											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	8	9
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB065	16SB066	16SB066	16SB067	16SB067	16SB068	16SB068	16SB069	16SB069	16SB070	16SB070
SAMPLE NUMBER	16SB0650608	16SB0660206	16SB0660608	16SB0670206	16SB0670609	16SB0680206	16SB0680609	16SB0690206	16SB0690607	16SB0700206	16SB0700607
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	6 - 8	2 - 6	6 - 8	2 - 6	6 - 9	2 - 6	6 - 9	2 - 6	6 - 7	2 - 6	6 - 7
SAMPLE DATE	8/11/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE	1.45 U	1.23 U	0.92 U	1.09 U	1.21 U	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
2-BUTANONE	1.45 UR	1.23 U	1 J	1.09 U	1.21 U	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
ACETONE	6 U	6 U	21 U	6 BU	8 U	7 BU	5 BU	5 U	6 BU	2 U	5 U
BROMOMETHANE	1.45 U	1.23 UJ	0.92 UJ	1.09 UJ	1.21 UJ	1.02 UJ	1.12 UJ	1.05 UJ	1.35 UJ	1.2 UJ	0.978 UJ
CARBON DISULFIDE	1.45 U	1.23 U	0.92 U	1.09 U	1.21 U	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
CHLOROFORM	1.45 U	1.23 U	0.92 U	1.09 U	1.21 U	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
CIS-1,2-DICHLOROETHENE	27	23	1 J	1.09 U	1.21 U	7 J	5	1.05 U	1.35 U	1.2 U	2 J
DICHLORODIFLUOROMETHANE	1.45 U	5 J	5 J	1.09 U	16 J	1.02 U	1.12 U	1.05 UJ	1.35 U	1.2 U	0.978 U
TOLUENE	1.45 U	1.23 U	0.92 U	1.09 U	1.21 U	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
TOTAL XYLENES	1.45 U	1.23 U	0.92 U	1.09 U	1.21 U	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
TRANS-1,2-DICHLOROETHENE	4 J	1.23 U	0.92 U	1.09 U	1.21 U	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
TRICHLOROETHENE	17	9	0.92 U	2 J	2 J	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	10
TRICHLOROFLUOROMETHANE	1.45 U	1.23 U	0.92 U	1.09 U	2 J	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
VINYL CHLORIDE	6	1.23 U	0.92 U	1.09 U	1.21 U	1.02 U	1.12 U	1.05 U	1.35 U	1.2 U	0.978 U
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
ISOSAFROLE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
SAFROLE											
Herbicides (µg/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM											
ANTIMONY											
ARSENIC											
BARIUM											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	8	9
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB065	16SB066	16SB066	16SB067	16SB067	16SB068	16SB068	16SB069	16SB069	16SB070	16SB070
SAMPLE NUMBER	16SB0650608	16SB0660206	16SB0660608	16SB0670206	16SB0670609	16SB0680206	16SB0680609	16SB0690206	16SB0690607	16SB0700206	16SB0700607
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	6 - 8	2 - 6	6 - 8	2 - 6	6 - 9	2 - 6	6 - 9	2 - 6	6 - 7	2 - 6	6 - 7
SAMPLE DATE	8/11/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004
Inorganics (mg/kg) (Continued)											
BERYLLIUM											
CADMIUM											
CALCIUM											
CHROMIUM											
COBALT											
COPPER											
IRON											
LEAD											
LITHIUM											
MAGNESIUM											
MANGANESE											
MERCURY											
NICKEL											
POTASSIUM											
SELENIUM											
SILVER											
SODIUM											
STRONTIUM											
TIN											
TITANIUM											
VANADIUM											
ZINC											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	9	9	9	8	8	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB071	16SB072	16SB072	16SB073	16SB074	16SB075	16SB076	16SB076	16SB077	16SB077	16SB078
SAMPLE NUMBER	16SB0710206	16SB0720206	16SB0720607	16SB0730204	16SB0740206	16SB0750203	16SB0760206	16SB0760607	16SB0770206	16SB0770610	16SB0780206
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL
DEPTH RANGE	2 - 6	2 - 6	6 - 7	2 - 4	2 - 6	2 - 3	2 - 6	6 - 7	2 - 6	6 - 10	2 - 6
SAMPLE DATE	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/17/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE	1.16 U	0.986 U	1.22 U	1.03 U	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
2-BUTANONE	1.16 U	0.986 U	1.22 U	1.03 U	1.04 U	0.975 U	1 J	1.12 U	0.988 U	0.92 U	1.01 U
ACETONE	3 J	8 BU	7 BU	13 BU	4 BU	6 BU	13 J	1.12 U	0.988 U	0.92 U	1.01 U
BROMOMETHANE	1.16 U	0.986 UJ	1.22 UJ	1.03 UJ	1.04 U	0.975 UJ	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
CARBON DISULFIDE	1.16 U	0.986 U	1.22 U	1.03 U	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
CHLOROFORM	1.16 U	0.986 U	1.22 U	1.03 U	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
CIS-1,2-DICHLOROETHENE	1.16 U	32	53	5	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
DICHLORODIFLUOROMETHANE	10	0.986 U	1.22 U	13	5	11	12	9	11 J	2 J	6
TOLUENE	1.16 U	0.986 U	1.22 U	1.03 U	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
TOTAL XYLENES	1.16 U	0.986 U	1.22 U	1.03 U	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
TRANS-1,2-DICHLOROETHENE	1.16 U	0.986 U	1.22 U	1.03 U	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
TRICHLOROETHENE	1.16 U	5	11	1.03 U	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	1 J	1.01 U
TRICHLOROFLUOROMETHANE	1.16 U	0.986 U	1.22 U	1.03 J	1.04 U	1 J	1 J	1.12 U	1 J	0.92 U	1.01 U
VINYL CHLORIDE	1.16 U	0.986 U	1.22 U	1.03 U	1.04 U	0.975 U	0.929 U	1.12 U	0.988 U	0.92 U	1.01 U
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
ISOSAFROLE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
SAFROLE											
Herbicides (µg/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM											
ANTIMONY											
ARSENIC											
BARIUM											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	9	9	9	8	8	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB071	16SB072	16SB072	16SB073	16SB074	16SB075	16SB076	16SB076	16SB077	16SB077	16SB078
SAMPLE NUMBER	16SB0710206	16SB0720206	16SB0720607	16SB0730204	16SB0740206	16SB0750203	16SB0760206	16SB0760607	16SB0770206	16SB0770610	16SB0780206
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL
DEPTH RANGE	2 - 6	2 - 6	6 - 7	2 - 4	2 - 6	2 - 3	2 - 6	6 - 7	2 - 6	6 - 10	2 - 6
SAMPLE DATE	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/17/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004	8/12/2004
Inorganics (mg/kg) (Continued)											
BERYLLIUM											
CADMIUM											
CALCIUM											
CHROMIUM											
COBALT											
COPPER											
IRON											
LEAD											
LITHIUM											
MAGNESIUM											
MANGANESE											
MERCURY											
NICKEL											
POTASSIUM											
SELENIUM											
SILVER											
SODIUM											
STRONTIUM											
TIN											
TITANIUM											
VANADIUM											
ZINC											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	9	8	8	8	8	8	8	8	8	8	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB078	16SB085	16SB086	16SB087	16SB088	16SB089	16SB090	16SB090	16SB091	16SB091	16SB092
SAMPLE NUMBER	16SB0780609	16SB0850204	16SB0860204	16SB0870204	16SB0880204	16SB0890204	16SB0900406	16SB0900608	16SB0910406	16SB0910609	16SB0920406
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL
DEPTH RANGE	6 - 9	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	4 - 6	6 - 8	4 - 6	6 - 9	4 - 6
SAMPLE DATE	8/12/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE	1.04 UJ						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
2-BUTANONE	1.04 UJ						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
ACETONE	15 J						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
BROMOMETHANE	1.04 UJ						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
CARBON DISULFIDE	1.04 UJ						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
CHLOROFORM	1.04 UJ						0.955 U	1.17 U	5	6	0.932 U
CIS-1,2-DICHLOROETHENE	1.04 UJ						0.955 U	1.17 J	1 J	3 J	0.932 U
DICHLORODIFLUOROMETHANE	14 J						4 J	6 J	9 J	2 J	1 J
TOLUENE	1.04 UJ						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
TOTAL XYLENES	1.04 UJ						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
TRANS-1,2-DICHLOROETHENE	1.04 UJ						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
TRICHLOROETHENE	1.04 UJ						220 J	220 J	390 J	980	32
TRICHLOROFLUOROMETHANE	2 J						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
VINYL CHLORIDE	1.04 UJ						0.955 U	1.17 U	0.944 U	0.974 U	0.932 U
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
ISOSAFROLE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
SAFROLE											
Herbicides (µg/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM		26700 J	22100 J	24900 J	14600 J	25500 J					
ANTIMONY		0.65 U	0.56 U	1.4 J	0.34 U	0.62 U					
ARSENIC		6.5 J	7.9 J	9.5 J	8.6 J	11.5 J					
BARIUM		66.5 J	58.7 J	105 J	44.3 J	93.2 J					

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	9	8	8	8	8	8	8	8	8	8	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB078	16SB085	16SB086	16SB087	16SB088	16SB089	16SB090	16SB090	16SB091	16SB091	16SB092
SAMPLE NUMBER	16SB0780609	16SB0850204	16SB0860204	16SB0870204	16SB0880204	16SB0890204	16SB0900406	16SB0900608	16SB0910406	16SB0910609	16SB0920406
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL
DEPTH RANGE	6 - 9	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	4 - 6	6 - 8	4 - 6	6 - 9	4 - 6
SAMPLE DATE	8/12/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004
Inorganics (mg/kg) (Continued)											
BERYLLIUM		0.81 U	0.5 U	0.65 U	0.34 U	0.77 U					
CADMIUM		0.35 U	0.25 U	0.37 U	0.13 U	0.23 U					
CALCIUM		403 J	237 J	250 J	35.6 U	98.4 J					
CHROMIUM		41.7 J	27.9 J	36.3 J	23.1 J	48.2 J					
COBALT		3.1 J	3.4 J	4.4 J	1.1 J	4.3 J					
COPPER		12.5 J	14.2 J	25.5 J	6.6 J	16.7 J					
IRON		34500 J	29900 J	27900 J	13000 J	31300 J					
LEAD		15.6 J	13.2 J	71.1 J	9.4 J	21.2 J					
LITHIUM											
MAGNESIUM		1490 J	2270 J	1980 J	1040 J	2120 J					
MANGANESE		51.2 J	106 J	204 J	14.5 J	41.2 J					
MERCURY		0.03 J	0.083 J	0.039 J	0.021 J	0.056 J					
NICKEL		16.1 J	15.6 J	15.9 J	6.5 J	16.6 J					
POTASSIUM		1700 J	1820 J	2660 J	1880 J	2980 J					
SELENIUM		0.47 U	0.35 U	0.59 U	0.24 U	0.62 U					
SILVER		0.22 U	0.06 U	0.06 U	0.045 U	0.047 U					
SODIUM		43.8 U	37.5 U	46.3 U	29.5 U	51.8 U					
STRONTIUM											
TIN		0.61 U	0.65 U	0.71 U	0.35 U	0.61 U					
TITANIUM											
VANADIUM		44 J	43.3 J	48.5 J	26.9 J	55.2 J					
ZINC		40.6	35.7	130	18.2	35.4					
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	8	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB092	16SB093	16SB093	16SB094	16SB095	16SB095	16SB096	16SB096	16SB097	16SB097	16SB098
SAMPLE NUMBER	16SB0920608	16SB0930406	16SB0930608	16SB0940708	16SB0950406	16SB0950607	16SB0960406	16SB0960608	16SB0970406	16SB0970607	16SB0980206
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
DEPTH RANGE	6 - 8	4 - 6	6 - 8	7 - 8	4 - 6	6 - 7	4 - 6	6 - 8	4 - 6	6 - 7	2 - 6
SAMPLE DATE	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004
Volatile Organics (µg/kg)											
1,1,2-TRICHLOROETHANE	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
2-BUTANONE	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
ACETONE	0.869 U	0.95 U	1.05 U	1.48 U	4 J	7 J	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
BROMOMETHANE	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
CARBON DISULFIDE	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
CHLOROFORM	0.869 U	3	4	1.48 U	10	15	2 J	1.06 U	12 J	1.09 U	0.922 U
CIS-1,2-DICHLOROETHENE	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
DICHLORODIFLUOROMETHANE	5 J	8	12	26	1.01 J	6	4	2 J	6	5	1 J
TOLUENE	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
TOTAL XYLENES	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
TRANS-1,2-DICHLOROETHENE	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
TRICHLOROETHENE	28	250 J	360	20	9000	2000	120 J	11	1200	88 J	140
TRICHLOROFLUOROMETHANE	0.869 U	0.95 U	1.05 U	2 J	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
VINYL CHLORIDE	0.869 U	0.95 U	1.05 U	1.48 U	1.01 U	1.05 U	0.966 U	1.06 U	0.957 U	1.09 U	0.922 U
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
ISOSAFROLE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
SAFROLE											
Herbicides (µg/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM											
ANTIMONY											
ARSENIC											
BARIUM											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	8	8	8	8	8	8	8	8	8	8	8
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SB092	16SB093	16SB093	16SB094	16SB095	16SB095	16SB096	16SB096	16SB097	16SB097	16SB098
SAMPLE NUMBER	16SB0920608	16SB0930406	16SB0930608	16SB0940708	16SB0950406	16SB0950607	16SB0960406	16SB0960608	16SB0970406	16SB0970607	16SB0980206
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
DEPTH RANGE	6 - 8	4 - 6	6 - 8	7 - 8	4 - 6	6 - 7	4 - 6	6 - 8	4 - 6	6 - 7	2 - 6
SAMPLE DATE	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004	8/16/2004
Inorganics (mg/kg) (Continued)											
BERYLLIUM											
CADMIUM											
CALCIUM											
CHROMIUM											
COBALT											
COPPER											
IRON											
LEAD											
LITHIUM											
MAGNESIUM											
MANGANESE											
MERCURY											
NICKEL											
POTASSIUM											
SELENIUM											
SILVER											
SODIUM											
STRONTIUM											
TIN											
TITANIUM											
VANADIUM											
ZINC											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	9	8	8
SAMPLING ROUND	03	03	03
LOCATION	16SB098	16SB099	16SB099
SAMPLE NUMBER	16SB0980607	16SB0990206	16SB0990608
SAMPLE CODE	NORMAL	NORMAL	NORMAL
DEPTH RANGE	6 - 7	2 - 6	6 - 8
SAMPLE DATE	8/16/2004	8/16/2004	8/16/2004
Volatile Organics (µg/kg)			
1,1,2-TRICHLOROETHANE	0.929 U	1.11 U	1.06 U
2-BUTANONE	0.929 U	1.11 U	1.06 U
ACETONE	0.929 U	1.11 U	1.06 U
BROMOMETHANE	0.929 U	1.11 U	1.06 U
CARBON DISULFIDE	0.929 U	1.11 U	1.06 U
CHLOROFORM	0.929 U	1.11 U	1.06 U
CIS-1,2-DICHLOROETHENE	0.929 U	1.11 U	1.06 U
DICHLORODIFLUOROMETHANE	0.929 U	6 J	10 J
TOLUENE	1 J	1.11 U	1.06 U
TOTAL XYLENES	0.929 U	1.11 U	1.06 U
TRANS-1,2-DICHLOROETHENE	0.929 U	1.11 U	1.06 U
TRICHLOROETHENE	200 J	630	160
TRICHLOROFLUOROMETHANE	0.929 U	1.11 U	1.06 U
VINYL CHLORIDE	0.929 U	1.11 U	1.06 U
Semivolatile Organics (µg/kg)			
2-METHYLNAPHTHALENE			
BENZO(A)ANTHRACENE			
BENZO(A)PYRENE			
BENZO(B)FLUORANTHENE			
BENZO(G,H,I)PERYLENE			
BENZO(K)FLUORANTHENE			
BIS(2-ETHYLHEXYL)PHTHALATE			
CHRYSENE			
FLUORANTHENE			
INDENO(1,2,3-CD)PYRENE			
ISOSAFROLE			
NAPHTHALENE			
PHENANTHRENE			
PYRENE			
SAFROLE			
Herbicides (µg/kg)			
HEXACHLOROPHENE			
PENTACHLOROPHENOL			
Inorganics (mg/kg)			
ALUMINUM			
ANTIMONY			
ARSENIC			
BARIUM			

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

SOIL GROUP	**9**	**8**	**8**
SAMPLING ROUND	**03**	**03**	**03**
LOCATION	**16SB098**	**16SB099**	**16SB099**
SAMPLE NUMBER	**16SB0980607**	**16SB0990206**	**16SB0990608**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**6 - 7**	**2 - 6**	**6 - 8**
SAMPLE DATE	**8/16/2004**	**8/16/2004**	**8/16/2004**
Inorganics (mg/kg) (Continued)			
BERYLLIUM			
CADMIUM			
CALCIUM			
CHROMIUM			
COBALT			
COPPER			
IRON			
LEAD			
LITHIUM			
MAGNESIUM			
MANGANESE			
MERCURY			
NICKEL			
POTASSIUM			
SELENIUM			
SILVER			
SODIUM			
STRONTIUM			
TIN			
TITANIUM			
VANADIUM			
ZINC			
Miscellaneous Parameters			
CATION EXCHANGE CAPACITY (MEQ/1)			
PH (S.U.)			
TOTAL ORGANIC CARBON (mg/kg)			

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Subsurface soil samples not taken at locations 3,4,5,6,7,8,9,10,14,15,16,20,21,32,35,37,51, 52,53,54,57,71,73,74, and 75 due to refusal.
µg/kg = micrograms per kilogram
MEQ/1 = milliequivalents per 100 grams
mg/kg = milligrams per kilogram
QC = quality control
S.U. = Standard units

TABLE 3-9

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
SURFACE WATER SAMPLES								
Volatile Organics (µg/L)								
ACETONE	3/10	0.5 J	2.8 J	0.5	0.665	1.63	16SW2701	0.6 J
CIS-1,2-DICHLOROETHENE	2/11	1.4	3.4	0.3	0.559	2.40	16SW2901	ND
TRICHLOROETHENE	5/11	0.8 J	26	0.3	4.51	9.74	16SW2901	ND
Energetics (µg/L)								
2-AMINO-4,6-DINITROTOLUENE	1/7	0.29 J	0.29 J	0.25 - 0.255	0.149	0.290	16SW3001	ND
4-AMINO-2,6-DINITROTOLUENE	1/7	0.63	0.63	0.25 - 0.255	0.198	0.630	16SW3001	ND
HMX	3/7	0.27 J	4.8	0.25 - 0.255	0.869	1.86	16SW3001	ND
RDX	2/7	0.29 J	24	0.25 - 0.255	3.56	12.1	16SW3001	ND
Total Metals (µg/L)								
ALUMINUM	18/21	173 J	9510 J	87.3 - 128	1647	1913	16SW1501	485 J - 891 J
ANTIMONY	8/21	4.2 J	14.2 J	0.085 - 2.7	3.25	7.71	16SW0301	ND
ARSENIC	15/21	0.29 J	3.8 J	0.16 - 0.52	0.747	0.991	16SW1501	ND
BARIUM	21/21	44.3 J	425 J	---	155	155	16SW0601	53.4 J - 57.3 J
BERYLLIUM	12/21	0.02 J	0.5 J	0.02 - 0.52	0.115	0.148	16SW2801	ND
CADMIUM	15/21	0.2 J	4.4	0.04 - 0.4	1.35	1.86	16SW0601	ND
CALCIUM	21/21	6800 J	49600 J	---	20873	20873	16SW0601	16600 J - 38700 J
CHROMIUM	11/21	1.4 J	11.8 J	0.34 - 1.3	2.30	4.00	16SW1501	0.78 J
COBALT	18/21	0.11 J	4.6 J	0.1 - 0.48	1.10	1.26	16SW1501	ND
COPPER	19/21	0.95 J	134 J	1.1 - 1.5	34.1	37.6	16SW0401	ND
IRON	18/21	278 J	9990 J	44.6 - 114	1787	2078	16SW1501	263 J - 599 J
LEAD	17/21	4.8 J	281 J	0.27 - 0.55	48.4	59.8	16SW0401	ND
MAGNESIUM	21/21	1310 J	9450 J	---	4576	4576	16SW1501	5820 J - 7810 J
MANGANESE	18/21	4.9 J	443 J	3 - 10	71.1	82.4	16SW1501	19.2 J - 135 J
NICKEL	18/21	1.2 J	11.8	0.94 - 1.6	5.01	5.73	16SW2701	1.1 J - 2.3 J
POTASSIUM	21/21	727	4520 J	---	2155	2155	16SW1101	1780 J - 2230 J
SODIUM	16/21	1820 J	18900 J	1070 - 1540	4882	6208	16SW1101	9580 J - 15000 J
THALLIUM	1/21	0.16 J	0.16 J	0.04 - 0.41	0.0487	0.160	16SW0601	ND
TIN	2/21	0.47 J	0.84 J	0.05 - 0.52	0.147	0.655	16SW0401	ND
TITANIUM	4/4	2 J	156 J	---	46.3	46.3	16SW1501	3.4 J - 19.7 J
VANADIUM	15/21	0.63 J	19 J	0.56 - 1.14	3.37	4.51	16SW1501	0.85 J
ZINC	19/21	16.9 J	1340 J	4.2 - 12.3	308	340	16SW0401	16.6 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	8/21	21 J	124	8.35 - 71.1	37.2	69.8	16SW2701-F	164 J
ANTIMONY, FILTERED	6/21	4.3 J	10.8 J	0.21 - 3.4	2.48	7.12	16SW0301-F	ND
ARSENIC, FILTERED	3/21	0.26 J	0.65 J	0.07 - 0.22	0.117	0.407	16SW1101-F	ND
BARIUM, FILTERED	21/21	43.2 J	335 J	---	123	123	16SW0601-F	46.6 J - 57.2 J
BERYLLIUM, FILTERED	6/21	0.02 J	0.1 J	0.02 - 0.06	0.0267	0.0617	16SW1302-F, 16SW2701-F	ND
CADMIUM, FILTERED	15/21	0.12 J	3.7	0.039 - 0.09	1.13	1.57	16SW0901-F	ND
CALCIUM, FILTERED	21/21	6570 J	49100 J	---	19534	19534	16SW1501-F	15700 J - 37400 J
CHROMIUM, FILTERED	1/21	2.1 J	2.1 J	0.16 - 0.7	0.318	2.10	16SW3001-F	ND
COBALT, FILTERED	17/21	0.09 J	2.9 J	0.088 - 0.11	0.646	0.787	16SW1301-F	2.7 J - 3.1 J
COPPER, FILTERED	17/21	1 J	35.7 J	0.57 - 0.93	16.9	20.7	16SW1001-F	ND

TABLE 3-9

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Dissolved Metals (µg/L) (Continued)								
IRON, FILTERED	9/21	76.4 J	188 J	7.8 - 131	70.8	122	16SW2901-F	ND
LEAD, FILTERED	15/21	0.81 J	35.8 J	0.08 - 0.38	8.23	11.5	16SW0301-F	ND
MAGNESIUM, FILTERED	21/21	1280 J	8870 J	---	4215	4215	16SW1501-F	5400 J - 7390 J
MANGANESE, FILTERED	18/21	1.9 J	171 J	0.82 - 9.7	27.1	31.3	16SW1201-F	10.9 J - 29.8 J
MERCURY, FILTERED	1/21	0.04 J	0.04 J	0.02 - 0.03	0.0155	0.0400	16SW1501-F	ND
NICKEL, FILTERED	18/21	0.95 J	9.4	0.83 - 1.4	3.30	3.75	16SW1202-F	1.2 J
POTASSIUM, FILTERED	21/21	647	4720	---	1907	1907	16SW1101-F	1550 J - 2140 J
SODIUM, FILTERED	15/21	2030 J	19900 J	1060 - 1480	4878	6574	16SW1101-F	9010 J - 14000 J
TITANIUM, FILTERED	2/4	1.4 J	1.6 J	0.55 - 1.1	0.956	1.50	16SW1301-F	1.5 J - 8.5 J
ZINC, FILTERED	18/21	3.1 J	421 J	6 - 197	133	149	16SW1601-F	18.1 J - 33.3 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN	17/17	5.66	10.65	---	8.27	8.27	16SW0301	NA
DISSOLVED OXYGEN - METER	4/4	2.87	6.49	---	4.58	4.58	16SW1701	1.91 - 7.23
OXIDATION REDUCTION POTENTIAL (MV)	21/21	36.6	204	---	97.5	97.5	16SW1701	183.4 - 254.7
PH (S.U.)	21/21	6.4	7.95	---	7.31	7.31	16SW2901	6.78 - 7.14
SPECIFIC CONDUCTANCE (MS/cm)	21/21	0.056	0.84	---	0.167	0.167	16SW1302	0.184 - 0.299
TEMPERATURE (C)	21/21	9.61	16.45	---	13.2	13.2	16SW0601	11.7 - 15.12
TURBIDITY (NTU)	21/21	2	179	---	28.4	28.4	16SW2801	2.57 - 10.59
Miscellaneous Parameters (mg/L)								
NITRITE/NITRATE-N	4/7	0.11	0.55	0.025 - 0.05	0.203	0.340	16SW1302	0.07 - 3.2
SUMP SAMPLES								
Volatile Organics (µg/L)								
CHLOROFORM	1/3	2.4	2.4	0.3	0.900	2.40	16SW0202	ND
CIS-1,2-DICHLOROETHENE	2/3	2.9	7.1	0.3	3.38	5.00	16SW0202	ND
TRICHLOROETHENE	3/3	3.3	8.8	---	6.23	6.23	16SW0202	ND
Semivolatile Organics (µg/L)								
2-METHYLNAPHTHALENE	1/3	0.67 J	0.67 J	0.05	0.240	0.670	16SW0101	NA
ACENAPHTHENE	1/3	0.9 J	0.9 J	0.05	0.317	0.900	16SW0101	NA
ANTHRACENE	1/3	0.31 J	0.31 J	0.05	0.120	0.310	16SW0101	NA
BENZO(A)ANTHRACENE	1/3	0.31 J	0.31 J	0.05	0.120	0.310	16SW0101	NA
CHRYSENE	1/3	0.78 J	0.78 J	0.05	0.277	0.780	16SW0101	NA
FLUORANTHENE	1/3	1.09 J	1.09 J	0.05	0.380	1.09	16SW0101	NA
FLUORENE	1/3	0.59 J	0.59 J	0.05	0.213	0.590	16SW0101	NA
NAPHTHALENE	1/3	1.3 J	1.3 J	0.05	0.450	1.30	16SW0101	NA
PHENANTHRENE	1/3	1.26 J	1.26 J	0.05	0.437	1.26	16SW0101	NA
PYRENE	1/3	2.34 J	2.34 J	0.05	0.797	2.34	16SW0101	NA
BIS(2-ETHYLHEXYL)PHTHALATE	1/3	86	86	2 - 3	29.5	86.0	16SW0101	NA
Energetics (µg/L)								
2,4,6-TRINITROTOLUENE	1/3	2.1	2.1	0.455 - 0.8	0.909	2.10	16SW0701	ND
2-AMINO-4,6-DINITROTOLUENE	1/3	0.89 J	0.89 J	0.455 - 0.8	0.506	0.890	16SW0701	ND
4-AMINO-2,6-DINITROTOLUENE	1/3	2.2 J	2.2 J	0.455 - 0.8	0.943	2.20	16SW0701	ND
HMX	2/3	1.5 J	29000	0.55	9667	14501	16SW0101	ND
RDX	3/3	2.9	88000	---	29337	29337	16SW0101	ND

TABLE 3-9

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Herbicides (µg/L)								
HEXACHLOROPHENE	1/3	0.082 J	0.082 J	0.025	0.0357	0.0820	16SW0101	NA
PENTACHLOROPHENOL	2/2	0.02 J	0.19 J	---	0.105	0.105	16SW0101	NA
Total Metals (µg/L)								
ALUMINUM	1/3	298 J	298 J	7.6 - 82.4	114	298	16SW0701	485 J - 891 J
ARSENIC	2/3	2.9 J	3.4 J	0.38	2.16	3.15	16SW0201	ND
BARIUM	3/3	66.3 J	91 J	---	76.9	76.9	16SW0201	53.4 J - 57.3 J
CALCIUM	3/3	30300 J	37100 J	---	32600	32600	16SW0701	16600 J - 38700 J
CHROMIUM	2/3	2 J	3.4 J	0.25	1.84	2.70	16SW0201	0.78 J
COPPER	3/3	2 J	17.2 J	---	9.97	9.97	16SW0201	ND
IRON	1/3	60.5 J	60.5 J	77.1 - 194	65.4	60.5	16SW0101	263 J - 599 J
LEAD	2/3	4.6 J	13.1 J	0.15	5.93	8.85	16SW0201	ND
MAGNESIUM	3/3	5190 J	6560 J	---	5817	5817	16SW0701	5820 J - 7810 J
MANGANESE	3/3	5.2 J	44.3 J	---	20.0	20.0	16SW0101	19.2 J - 135 J
MERCURY	1/3	2	2	0.02	0.673	2.00	16SW0101	ND
NICKEL	2/3	0.95 J	1.8 J	0.61	1.02	1.38	16SW0101	1.1 J - 2.3 J
POTASSIUM	3/3	839 J	2430 J	---	1636	1636	16SW0701	1780 J - 2230 J
SODIUM	3/3	12400 J	84800 J	---	42167	42167	16SW0701	9580 J - 15000 J
STRONTIUM	3/3	190 J	226 J	---	210	210	16SW0701	NA
TITANIUM	2/3	2.2 J	10.2 J	0.24	4.17	6.20	16SW0701	3.4 J - 19.7 J
VANADIUM	1/3	1.2 J	1.2 J	0.05 - 0.39	0.473	1.20	16SW0701	0.85 J
ZINC	2/3	80.1 J	178 J	3.2	86.6	129	16SW0201	16.6 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	1/3	575	575	22.3 - 49.4	204	575	16SW0101-F	164 J
ARSENIC, FILTERED	2/3	2.8 J	3.2 J	0.6	2.10	3.00	16SW0201-F	ND
BARIUM, FILTERED	3/3	70.5 J	91.5 J	---	77.9	77.9	16SW0201-F	46.6 J - 57.2 J
CADMIUM, FILTERED	1/3	3.3 J	3.3 J	0.15 - 0.4	1.19	3.30	16SW0101-F	ND
CALCIUM, FILTERED	3/3	29200 J	37700 J	---	32633	32633	16SW0701-F	15700 J - 37400 J
CHROMIUM, FILTERED	3/3	1.5 J	3.2 J	---	2.13	2.13	16SW0201-F	ND
COPPER, FILTERED	3/3	9.1 J	17.9 J	---	14.4	14.4	16SW0101-F	ND
IRON, FILTERED	1/3	4100 J	4100 J	36.6 - 42.3	1380	4100	16SW0101-F	ND
LEAD, FILTERED	2/3	8.4 J	26.2 J	1.9	11.9	17.3	16SW0101-F	ND
MAGNESIUM, FILTERED	3/3	5310 J	6560 J	---	5830	5830	16SW0701-F	5400 J - 7390 J
MANGANESE, FILTERED	2/3	10.1 J	23.4 J	2.8	11.6	16.8	16SW0101-F	10.9 J - 29.8 J
NICKEL, FILTERED	2/3	0.84 J	2.2 J	0.5	1.10	1.52	16SW0101-F	1.2 J
POTASSIUM, FILTERED	3/3	842 J	2370 J	---	1717	1717	16SW0701-F	1550 J - 2140 J
SODIUM, FILTERED	3/3	12100 J	87000 J	---	42433	42433	16SW0701-F	9010 J - 14000 J
STRONTIUM, FILTERED	3/3	196 J	234 J	---	212	212	16SW0701-F	NA
TITANIUM, FILTERED	2/3	3.2 J	3.9 J	1.3	2.58	3.55	16SW0101-F	1.5 J - 8.5 J
ZINC, FILTERED	3/3	68 J	170 J	---	106	106	16SW0201-F	18.1 J - 33.3 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN - METER	5/5	10.51	12.65	---	11.1	11.1	16SW0102	1.91 - 7.23
OXIDATION REDUCTION POTENTIAL (MV)	5/5	89.1	193.9	---	128	128	16SW0102	183.4 - 254.7
PH (S.U.)	5/5	6.65	8.4	---	7.69	7.69	16SW0701	6.78 - 7.14

TABLE 3-9

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Field Parameters (mg/L) (Continued)								
SPECIFIC CONDUCTANCE (MS/cm)	5/5	0.224	0.591	---	0.395	0.395	16SW0701	0.184 - 0.299
TEMPERATURE (C)	5/5	6.92	12.2	---	9.91	9.91	16SW0702	11.7 - 15.12
TURBIDITY (NTU)	5/5	2.1	120	---	30.7	30.7	16SW0202	2.57 - 10.59
Miscellaneous Parameters (mg/L)								
AMMONIA-N	1/3	2.8 J	2.8 J	0.01	0.937	2.80	16SW0101	NA
NITRITE/NITRATE-N	3/3	0.22	3.3 J	---	1.67	1.67	16SW0101	0.07 - 3.2

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
µg = micrograms
C = Celsius
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
L = liter
mg = milligtams
MS/cm = milliSiemens per centimeter
MV = millivolt
NA = Not Analyzed
ND = Not Detected
NTU = nephelometric turbidity units
QC = quality control
RDX = 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. = Standard units
TV = threshold value

TABLE 3-10

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUND 1
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Surface Water Detects
SURFACE WATER SAMPLES								
SURFACE WATER WAS NOT ANALYZED DURING ROUND 1								
SUMP SAMPLES								
Semivolatile Organics (µg/L)								
2-METHYLNAPHTHALENE	1/3	0.67 J	0.67 J	0.05	0.240	0.670	16SW0101	NA
ACENAPHTHENE	1/3	0.9 J	0.9 J	0.05	0.317	0.900	16SW0101	NA
ANTHRACENE	1/3	0.31 J	0.31 J	0.05	0.120	0.310	16SW0101	NA
BENZO(A)ANTHRACENE	1/3	0.31 J	0.31 J	0.05	0.120	0.310	16SW0101	NA
CHRYSENE	1/3	0.78 J	0.78 J	0.05	0.277	0.780	16SW0101	NA
FLUORANTHENE	1/3	1.09 J	1.09 J	0.05	0.380	1.09	16SW0101	NA
FLUORENE	1/3	0.59 J	0.59 J	0.05	0.213	0.590	16SW0101	NA
NAPHTHALENE	1/3	1.3 J	1.3 J	0.05	0.450	1.30	16SW0101	NA
PHENANTHRENE	1/3	1.26 J	1.26 J	0.05	0.437	1.26	16SW0101	NA
PYRENE	1/3	2.34 J	2.34 J	0.05	0.797	2.34	16SW0101	NA
BIS(2-ETHYLHEXYL)PHTHALATE	1/3	86	86	2 - 3	29.5	86.0	16SW0101	NA
Energetics (µg/L)								
2,4,6-TRINITROTOLUENE	1/3	2.1	2.1	0.455 - 0.8	0.909	2.10	16SW0701	ND
2-AMINO-4,6-DINITROTOLUENE	1/3	0.89 J	0.89 J	0.455 - 0.8	0.506	0.890	16SW0701	ND
4-AMINO-2,6-DINITROTOLUENE	1/3	2.2 J	2.2 J	0.455 - 0.8	0.943	2.20	16SW0701	ND
HMX	2/3	1.5 J	29000	0.55	9667	14501	16SW0101	ND
RDX	3/3	2.9	88000	---	29337	29337	16SW0101	ND
Herbicides (µg/L)								
HEXACHLOROPHENE	1/3	0.082 J	0.082 J	0.025	0.0357	0.0820	16SW0101	NA
PENTACHLOROPHENOL	2/2	0.02 J	0.19 J	---	0.105	0.105	16SW0101	NA
Total Metals (µg/L)								
ALUMINUM	1/3	298 J	298 J	7.6 - 82.4	114	298	16SW0701	485 J - 891 J
ARSENIC	2/3	2.9 J	3.4 J	0.38	2.16	3.15	16SW0201	ND
BARIUM	3/3	66.3 J	91 J	---	76.9	76.9	16SW0201	53.4 J - 57.3 J
CALCIUM	3/3	30300 J	37100 J	---	32600	32600	16SW0701	16600 J - 38700 J
CHROMIUM	2/3	2 J	3.4 J	0.25	1.84	2.70	16SW0201	0.78 J
COPPER	3/3	2 J	17.2 J	---	9.97	9.97	16SW0201	ND
IRON	1/3	60.5 J	60.5 J	77.1 - 194	65.4	60.5	16SW0101	263 J - 599 J
LEAD	2/3	4.6 J	13.1 J	0.15	5.93	8.85	16SW0201	ND
MAGNESIUM	3/3	5190 J	6560 J	---	5817	5817	16SW0701	5820 J - 7810 J
MANGANESE	3/3	5.2 J	44.3 J	---	20.0	20.0	16SW0101	19.2 J - 135 J
MERCURY	1/3	2	2	0.02	0.673	2.00	16SW0101	ND
NICKEL	2/3	0.95 J	1.8 J	0.61	1.02	1.38	16SW0101	1.1 J - 2.3 J
POTASSIUM	3/3	839 J	2430 J	---	1636	1636	16SW0701	1780 J - 2230 J
SODIUM	3/3	12400 J	84800 J	---	42167	42167	16SW0701	9580 J - 15000 J
STRONTIUM	3/3	190 J	226 J	---	210	210	16SW0701	NA
TITANIUM	2/3	2.2 J	10.2 J	0.24	4.17	6.20	16SW0701	3.4 J - 19.7 J
VANADIUM	1/3	1.2 J	1.2 J	0.05 - 0.39	0.473	1.20	16SW0701	0.85 J
ZINC	2/3	80.1 J	178 J	3.2	86.6	129	16SW0201	16.6 J

TABLE 3-10

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUND 1
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Surface Water Detects
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	1/3	575	575	22.3 - 49.4	204	575	16SW0101-F	164 J
ARSENIC, FILTERED	2/3	2.8 J	3.2 J	0.6	2.10	3.00	16SW0201-F	ND
BARIUM, FILTERED	3/3	70.5 J	91.5 J	---	77.9	77.9	16SW0201-F	46.6 J - 57.2 J
CADMIUM, FILTERED	1/3	3.3 J	3.3 J	0.15 - 0.4	1.19	3.30	16SW0101-F	ND
CALCIUM, FILTERED	3/3	29200 J	37700 J	---	32633	32633	16SW0701-F	15700 J - 37400 J
CHROMIUM, FILTERED	3/3	1.5 J	3.2 J	---	2.13	2.13	16SW0201-F	ND
COPPER, FILTERED	3/3	9.1 J	17.9 J	---	14.4	14.4	16SW0101-F	ND
IRON, FILTERED	1/3	4100 J	4100 J	36.6 - 42.3	1380	4100	16SW0101-F	ND
LEAD, FILTERED	2/3	8.4 J	26.2 J	1.9	11.9	17.3	16SW0101-F	ND
MAGNESIUM, FILTERED	3/3	5310 J	6560 J	---	5830	5830	16SW0701-F	5400 J - 7390 J
MANGANESE, FILTERED	2/3	10.1 J	23.4 J	2.8	11.6	16.8	16SW0101-F	10.9 J - 29.8 J
NICKEL, FILTERED	2/3	0.84 J	2.2 J	0.5	1.10	1.52	16SW0101-F	1.2 J
POTASSIUM, FILTERED	3/3	842 J	2370 J	---	1717	1717	16SW0701-F	1550 J - 2140 J
SODIUM, FILTERED	3/3	12100 J	87000 J	---	42433	42433	16SW0701-F	9010 J - 14000 J
STRONTIUM, FILTERED	3/3	196 J	234 J	---	212	212	16SW0701-F	NA
TITANIUM, FILTERED	2/3	3.2 J	3.9 J	1.3	2.58	3.55	16SW0101-F	1.5 J - 8.5 J
ZINC, FILTERED	3/3	68 J	170 J	---	106	106	16SW0201-F	18.1 J - 33.3 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN - METER	2/2	10.51	10.63	---	10.6	10.6	16SW0701	1.91 - 7.23
OXIDATION REDUCTION POTENTIAL (MV)	2/2	89.1	90.9	---	90.0	90.0	16SW0201	183.4 - 254.7
PH (S.U.)	2/2	8.13	8.4	---	8.27	8.27	16SW0701	6.78 - 7.14
SPECIFIC CONDUCTANCE (MS/cm)	2/2	0.281	0.591	---	0.436	0.436	16SW0701	0.184 - 0.299
TEMPERATURE (C)	2/2	9.14	11.78	---	10.5	10.5	16SW0701	11.7 - 15.12
TURBIDITY (NTU)	2/2	2.1	4.2	---	3.15	3.15	16SW0701	2.57 - 10.59
Miscellaneous Parameters (mg/L)								
AMMONIA-N	1/3	2.8 J	2.8 J	0.01	0.937	2.80	16SW0101	NA
NITRITE/NITRATE-N	3/3	0.22	3.3 J	---	1.67	1.67	16SW0101	0.07 - 3.2

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
µg/L = micrograms per liter
C = Celsius
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L = milligram per liter
MS/cm = milliSiemens per centimeter
MV = millivolt
NA = Not Analyzed
ND = Not Detected
NTU = nephalometric turbidity unit
QC = quality control
RDX = 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. = Standard unit
TV = threshold value

TABLE 3-11

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
SURFACE WATER SAMPLES								
Volatile Organics (µg/L)								
CIS-1,2-DICHLOROETHENE	1/4	1.4	1.4	0.3	0.463	1.40	16SW1201	ND
TRICHLOROETHENE	1/4	15	15	0.3	3.86	15.0	16SW1201	ND
Energetics (µg/L)								
HMX	2/4	0.27 J	0.51 J	0.25	0.258	0.390	16SW1501	ND
RDX	1/4	0.29 J	0.29 J	0.25	0.166	0.290	16SW1501	ND
Total Metals (µg/L)								
ALUMINUM	3/4	378 J	9510 J	87.3	2765	3673	16SW1501	485 J - 891 J
ARSENIC	1/4	3.8 J	3.8 J	0.16 - 0.52	1.08	3.80	16SW1501	ND
BARIUM	4/4	53 J	150 J	---	89.6	89.6	16SW1501	53.4 J - 57.3 J
CALCIUM	4/4	13900 J	49500 J	---	25550	25550	16SW1501	16600 J - 38700 J
CHROMIUM	2/4	1.8 J	11.8 J	0.66 - 0.78	3.58	6.80	16SW1501	0.78 J
COBALT	3/4	0.86 J	4.6 J	0.48	1.93	2.49	16SW1501	ND
COPPER	2/4	3.1 J	5.9 J	1.1 - 1.5	2.58	4.50	16SW1501	ND
IRON	3/4	278 J	9990 J	44.6	2777	3695	16SW1501	263 J - 599 J
LEAD	2/4	4.8 J	5.2 J	0.51 - 0.55	2.63	5.00	16SW1301	ND
MAGNESIUM	4/4	6100 J	9450 J	---	7773	7773	16SW1501	5820 J - 7810 J
MANGANESE	3/4	209 J	443 J	10	235	311	16SW1501	19.2 J - 135 J
NICKEL	3/4	3.6 J	11.2 J	1.3	5.44	7.03	16SW1501	1.1 J - 2.3 J
POTASSIUM	4/4	1590 J	3860 J	---	2278	2278	16SW1501	1780 J - 2230 J
SODIUM	4/4	5080 J	17400 J	---	9303	9303	16SW1501	9580 J - 15000 J
TITANIUM	4/4	2 J	156 J	---	46.3	46.3	16SW1501	3.4 J - 19.7 J
VANADIUM	3/4	0.63 J	19 J	0.56	5.53	7.28	16SW1501	0.85 J
ZINC	3/4	31.5 J	120	12.3	48.6	62.7	16SW1301	16.6 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	2/4	63.7 J	64.2 J	10.8 - 22.4	36.1	64.0	16SW1201-F	164 J
BARIUM, FILTERED	4/4	50.1 J	76.4 J	---	67.1	67.1	16SW1501-F	46.6 J - 57.2 J
CALCIUM, FILTERED	4/4	13600 J	49100 J	---	25200	25200	16SW1501-F	15700 J - 37400 J
COBALT, FILTERED	3/4	2.6 J	2.9 J	0.11	2.06	2.73	16SW1301-F	2.7 J - 3.1 J
MAGNESIUM, FILTERED	4/4	5890 J	8870 J	---	7415	7415	16SW1501-F	5400 J - 7390 J
MANGANESE, FILTERED	3/4	36 J	171 J	9.7	91.5	120	16SW1201-F	10.9 J - 29.8 J
MERCURY, FILTERED	1/4	0.04 J	0.04 J	0.02	0.0175	0.0400	16SW1501-F	ND
NICKEL, FILTERED	3/4	1.2 J	4.3 J	0.83	2.40	3.07	16SW1301-F	1.2 J
POTASSIUM, FILTERED	4/4	1500 J	2170 J	---	1743	1743	16SW1501-F	1550 J - 2140 J
SODIUM, FILTERED	4/4	4850 J	17800 J	---	9208	9208	16SW1501-F	9010 J - 14000 J
TITANIUM, FILTERED	2/4	1.4 J	1.6 J	0.55 - 1.1	0.956	1.50	16SW1301-F	1.5 J - 8.5 J
ZINC, FILTERED	3/4	3.1 J	82.2	13.8	32.9	41.5	16SW1301-F	18.1 J - 33.3 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN - METER	4/4	2.87	6.49	---	4.58	4.58	16SW1701	1.91 - 7.23
OXIDATION REDUCTION POTENTIAL (MV)	4/4	68.3	204	---	165	165	16SW1701	183.4 - 254.7
PH (S.U.)	4/4	6.4	7.21	---	6.76	6.76	16SW1201	6.78 - 7.14
SPECIFIC CONDUCTANCE (MS/cm)	4/4	0.154	0.378	---	0.226	0.226	16SW1501	0.184 - 0.299
TEMPERATURE (C)	4/4	9.61	13.68	---	12.2	12.2	16SW1301	11.7 - 15.12
TURBIDITY (NTU)	4/4	3.39	15.9	---	9.81	9.81	16SW1301, 16SW1501	2.57 - 10.59

TABLE 3-11

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Miscellaneous Parameters (mg/L)								
NITRITE/NITRATE-N	2/4	0.11	0.27	0.05	0.108	0.190	16SW1301	0.07 - 3.2
SUMP SAMPLES								
Volatile Organics (µg/L)								
CHLOROFORM	1/3	2.4	2.4	0.3	0.900	2.40	16SW0202	ND
CIS-1,2-DICHLOROETHENE	2/3	2.9	7.1	0.3	3.38	5.00	16SW0202	ND
TRICHLOROETHENE	3/3	3.3	8.8	---	6.23	6.23	16SW0202	ND
Field Parameters (mg/L)								
DISSOLVED OXYGEN - METER	3/3	10.69	12.65	---	11.4	11.4	16SW0102	1.91 - 7.23
OXIDATION REDUCTION POTENTIAL (MV)	3/3	123.4	193.9	---	154	154	16SW0102	183.4 - 254.7
PH (S.U.)	3/3	6.65	7.68	---	7.31	7.31	16SW0702	6.78 - 7.14
SPECIFIC CONDUCTANCE (MS/cm)	3/3	0.224	0.575	---	0.368	0.368	16SW0702	0.184 - 0.299
TEMPERATURE (C)	3/3	6.92	12.2	---	9.54	9.54	16SW0702	11.7 - 15.12
TURBIDITY (NTU)	3/3	5.3	120	---	49.1	49.1	16SW0202	2.57 - 10.59

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
µg/L = microgram per liter
C = Celsius
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L = milligram per liter
MS/CM = milliSiemens per centimeter
MV = millivolt
ND = Not Detected
NTU = nephalometric turbidity units
QC = quality control
RDX = 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. = Standard unit
TV = threshold value

TABLE 3-12

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUND 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
SURFACE WATER SAMPLES								
Volatile Organics (µg/L)								
ACETONE	3/7	0.5 J	2.8 J	0.5	0.843	1.63	16SW2701	0.6 J
CIS-1,2-DICHLOROETHENE	1/7	3.4	3.4	0.3	0.614	3.40	16SW2901	ND
TRICHLOROETHENE	4/7	0.8 J	26	0.3	4.88	8.43	16SW2901	ND
Energetics (µg/L)								
2-AMINO-4,6-DINITROTOLUENE	1/3	0.29 J	0.29 J	0.25 - 0.255	0.181	0.290	16SW3001	ND
4-AMINO-2,6-DINITROTOLUENE	1/3	0.63	0.63	0.25 - 0.255	0.294	0.630	16SW3001	ND
HMX	1/3	4.8	4.8	0.25 - 0.255	1.68	4.80	16SW3001	ND
RDX	1/3	24	24	0.25 - 0.255	8.08	24.0	16SW3001	ND
Total Metals (µg/L)								
ALUMINUM	15/17	173 J	8790 J	94 - 128	1384	1561	16SW2801	485 J - 891 J
ANTIMONY	8/17	4.2 J	14.2 J	0.085 - 2.7	3.96	7.71	16SW0301	ND
ARSENIC	14/17	0.29 J	3.6 J	0.19 - 0.24	0.669	0.790	16SW2801	ND
BARIUM	17/17	44.3 J	425 J	---	170	170	16SW0601	53.4 J - 57.3 J
BERYLLIUM	12/17	0.02 J	0.5 J	0.02 - 0.17	0.113	0.148	16SW2801	ND
CADMIUM	15/17	0.2 J	4.4	0.07 - 0.17	1.65	1.86	16SW0601	ND
CALCIUM	17/17	6800 J	49600 J	---	19773	19773	16SW0601	16600 J - 38700 J
CHROMIUM	9/17	1.4 J	11 J	0.34 - 1.3	2.00	3.38	16SW2801	0.78 J
COBALT	15/17	0.11 J	4.1 J	0.1 - 0.29	0.902	1.01	16SW2801	ND
COPPER	17/17	0.95 J	134 J	---	41.5	41.5	16SW0401	ND
IRON	15/17	311 J	9810 J	77.8 - 114	1554	1755	16SW2801	263 J - 599 J
LEAD	15/17	5.8 J	281 J	0.27 - 0.31	59.2	67.1	16SW0401	ND
MAGNESIUM	17/17	1310 J	5700 J	---	3824	3824	16SW2601	5820 J - 7810 J
MANGANESE	15/17	4.9 J	164	3 - 5.8	32.6	36.6	16SW2801	19.2 J - 135 J
NICKEL	15/17	1.2 J	11.8	0.94 - 1.6	4.90	5.47	16SW2701	1.1 J - 2.3 J
POTASSIUM	17/17	727	4520 J	---	2126	2126	16SW1101	1780 J - 2230 J
SODIUM	12/17	1820 J	18900 J	1070 - 1540	3842	5177	16SW1101	9580 J - 15000 J
THALLIUM	1/17	0.16 J	0.16 J	0.043 - 0.2	0.0384	0.160	16SW0601	ND
TIN	2/17	0.47 J	0.84 J	0.05 - 0.52	0.155	0.655	16SW0401	ND
VANADIUM	12/17	1.4 J	16.3 J	1.14	2.86	3.82	16SW2801	0.85 J
ZINC	16/17	16.9 J	1340 J	4.2	369	392	16SW0401	16.6 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	6/17	21 J	124	8.35 - 71.1	37.5	71.8	16SW2701-F	164 J
ANTIMONY, FILTERED	6/17	4.3 J	10.8 J	0.21 - 3.4	3.02	7.12	16SW0301-F	ND
ARSENIC, FILTERED	3/17	0.26 J	0.65 J	0.09 - 0.22	0.134	0.407	16SW1101-F	ND
BARIUM, FILTERED	17/17	43.2 J	335 J	---	136	136	16SW0601-F	46.6 J - 57.2 J
BERYLLIUM, FILTERED	6/17	0.02 J	0.1 J	0.02 - 0.03	0.0285	0.0617	16SW1302-F, 16SW2701-F	ND
CADMIUM, FILTERED	15/17	0.12 J	3.7	0.039	1.39	1.57	16SW0901-F	ND
CALCIUM, FILTERED	17/17	6570 J	41000 J	---	18201	18201	16SW0601-F	15700 J - 37400 J
CHROMIUM, FILTERED	1/17	2.1 J	2.1 J	0.28 - 0.7	0.364	2.10	16SW3001-F	ND
COBALT, FILTERED	14/17	0.09 J	1.5	0.088 - 0.09	0.313	0.370	16SW1202-F	2.7 J - 3.1 J
COPPER, FILTERED	17/17	1 J	35.7 J	---	20.7	20.7	16SW1001-F	ND
IRON, FILTERED	9/17	76.4 J	188 J	7.8 - 131	82.7	122	16SW2901-F	ND

TABLE 3-12

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY SURFACE WATER AND SUMP SAMPLES ROUND 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Dissolved Metals (µg/L) (Continued)								
LEAD, FILTERED	15/17	0.81 J	35.8 J	0.1 - 0.14	10.1	11.5	16SW0301-F	ND
MAGNESIUM, FILTERED	17/17	1280 J	5920 J	---	3462	3462	16SW2601-F	5400 J - 7390 J
MANGANESE, FILTERED	15/17	1.9 J	47.4	0.82 - 1.7	12.0	13.5	16SW1202-F	10.9 J - 29.8 J
NICKEL, FILTERED	15/17	0.95 J	9.4	1.2 - 1.4	3.51	3.89	16SW1202-F	1.2 J
POTASSIUM, FILTERED	17/17	647	4720	---	1946	1946	16SW1101-F	1550 J - 2140 J
SODIUM, FILTERED	11/17	2030 J	19900 J	1060 - 1480	3859	5616	16SW1101-F	9010 J - 14000 J
ZINC, FILTERED	15/17	17.5 J	421 J	6 - 197	157	171	16SW1601-F	18.1 J - 33.3 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN	17/17	5.66	10.65	---	8.27	8.27	16SW0301	NA
OXIDATION REDUCTION POTENTIAL (MV)	17/17	36.6	147	---	81.5	81.5	16SW2901	183.4 - 254.7
PH (S.U.)	17/17	6.99	7.95	---	7.44	7.44	16SW2901	6.78 - 7.14
SPECIFIC CONDUCTANCE (MS/cm)	17/17	0.056	0.84	---	0.153	0.153	16SW1302	0.184 - 0.299
TEMPERATURE (C)	17/17	10.46	16.45	---	13.4	13.4	16SW0601	11.7 - 15.12
TURBIDITY (NTU)	17/17	2	179	---	32.8	32.8	16SW2801	2.57 - 10.59
Miscellaneous Parameters (mg/L)								
NITRITE/NITRATE-N	2/3	0.43	0.55	0.025	0.331	0.490	16SW1302	0.07 - 3.2
SUMP SAMPLES								
SUMPS WERE NOT ANALYZED DURING ROUND 3								

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
µg/L = microgram per liter
C = Celsius
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L = milligram per liter
MS/cm = milliSiemens per centimeter
MV = millivolt
NA = Not Analyzed
ND = Not Detected
NTU = nephalometric turbidity units
QC = quality control
RDX = 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. = Standard unit
TV = threshold value

TABLE 3-13

SUMMARY OF DESCRIPTIVE STATISTICS
TURKEY CREEK MAINSTREAM SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Energetics (µg/L)								
HMX	1/1	0.32 J	0.32 J	---	0.320	0.320	16SW2401	ND
Total Metals (µg/L)								
ALUMINUM	2/3	146 J	822 J	48.7	331	484	16SW1901	ND
ARSENIC	1/3	0.37 J	0.37 J	0.09 - 0.23	0.177	0.370	16SW1901	ND
BARIUM	3/3	48.1 J	95.7 J	---	74.1	74.1	16SW2401	23 J
BERYLLIUM	1/3	0.09 J	0.09 J	0.02 - 0.03	0.0383	0.0900	16SW1901	ND
CADMIUM	1/3	0.66 J	0.66 J	0.039 - 0.05	0.235	0.660	16SW1901	ND
CALCIUM	3/3	9360 J	17900 J	---	14820	14820	16SW2501	9930 J
COBALT	3/3	0.14 J	0.72 J	---	0.433	0.433	16SW2501	ND
COPPER	3/3	0.24 J	4.1 J	---	1.55	1.55	16SW1901	2.7 J
IRON	3/3	43.6 J	886 J	---	457	457	16SW1901	ND
LEAD	1/3	1.2	1.2	0.11 - 0.31	0.470	1.20	16SW1901	ND
MAGNESIUM	3/3	3370	6340 J	---	5337	5337	16SW2501	2460 J
MANGANESE	3/3	21.5	476	---	200	200	16SW2501	30 J
NICKEL	3/3	4.5 J	5.7	---	5.30	5.30	16SW2401	ND
NICKEL	3/3	4.5 J	5.7	---	5.30	5.30	16SW2501	ND
POTASSIUM	3/3	989 J	1680	---	1336	1336	16SW1901	790 J
SODIUM	3/3	3660 J	8600 J	---	6703	6703	16SW2401	8330 J
VANADIUM	1/3	1.5 J	1.5 J	1.14	0.880	1.50	16SW1901	ND
ZINC	3/3	6.9 J	18.7 J	---	11.1	11.1	16SW1901	ND
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	2/3	90.1	119 J	61.8	80.0	105	16SW2401-F	ND
BARIUM, FILTERED	3/3	43.7 J	98.3 J	---	77.6	77.6	16SW2401-F	48.2 J
BERYLLIUM, FILTERED	1/3	0.04 J	0.04 J	0.02	0.0200	0.0400	16SW1901-F	ND
CADMIUM, FILTERED	1/3	1.4	1.4	0.039	0.480	1.40	16SW1901-F	ND
CALCIUM, FILTERED	3/3	9910 J	17400 J	---	14503	14503	16SW2501-F	10100 J
COBALT, FILTERED	3/3	0.16 J	1.9	---	0.743	0.743	16SW2501-F	2.6 J
COPPER, FILTERED	3/3	0.22 J	3.9 J	---	1.49	1.49	16SW1901-F	ND
IRON, FILTERED	3/3	11.8 J	163	---	92.9	92.9	16SW2501-F	ND
LEAD, FILTERED	1/3	0.54 J	0.54 J	0.11 - 0.19	0.230	0.540	16SW1901-F	ND
MAGNESIUM, FILTERED	3/3	3020 J	6450	---	5137	5137	16SW2501-F	3770 J
MANGANESE, FILTERED	3/3	7.7	1970 J	---	702	702	16SW2501-F	12.5 J
NICKEL, FILTERED	3/3	4 J	8.6	---	6.50	6.50	16SW2501-F	ND
POTASSIUM, FILTERED	3/3	1030 J	1900 J	---	1523	1523	16SW2501-F	846 J
SODIUM, FILTERED	3/3	3840 J	8190 J	---	6530	6530	16SW2401-F	4360 J
ZINC, FILTERED	3/3	9.1 J	21.8 J	---	15.8	15.8	16SW2401-F	ND
Field Parameters								
DISSOLVED OXYGEN (mg/L)	3/3	3.86	7.72	---	5.45	5.45	16SW1901	NA
OXIDATION REDUCTION POTENTIAL (MV)	3/3	55.3	269	---	176	176	16SW2501	251.6
PH (S.U.)	3/3	6.35	7.53	---	6.82	6.82	16SW1901	6.39
SPECIFIC CONDUCTANCE (MS/cm)	3/3	0.081	130	---	85.4	85.4	16SW2401	0.108
TEMPERATURE (C)	3/3	11.21	15.83	---	13.3	13.3	16SW1901	12.88
TURBIDITY (NTU)	3/3	1	25	---	9.33	9.33	16SW1901	1
Miscellaneous Parameters (mg/L)								
NITRITE/NITRATE-N	1/1	0.05	0.05	---	0.0500	0.0500	16SW2401	ND

Notes:
Field dups are excluded from these summaries because they are considered to be field QC
Turkey Creek Main Stream SW samples were collected in rnd 3

TABLE 3-13

SUMMARY OF DESCRIPTIVE STATISTICS
TURKEY CREEK MAINSTREAM SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
CRANE, INDIANA

(1) - Means incorporate TV/2 for NDs where TV = threshold value
µg/L = micrograms per liter
C = Celsius
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L = milligram per liter
MS/cm = milliSiemens per centimeter
MV = millivolt
NA - Not Analyzed
ND - Not Detected
NTU = nephalometric turbidity units
QC = quality control
S.U. = Standard unit
TV = threshold value

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**01**	**02**	**01**	**01**	**02**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD01**	**16SW/SD01**	**16SW/SD01**	**16SW/SD02**	**16SW/SD02**	**16SW/SD02**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**	**16SW/SD05**
SAMPLE NUMBER	**16SW0101**	**16SW0101-F**	**16SW0102**	**16SW0201**	**16SW0201-F**	**16SW0202**	**16SW0301**	**16SW0301-F**	**16SW0401**	**16SW0401-F**	**16SW0501**
SUBMATRIX	**SU**	**SUF**	**SU**	**SU**	**SUF**	**SU**	**SW**	**SF**	**SW**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**12/6/2003**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**
Volatile Organics (µg/L)											
ACETONE			0.5 UJ			0.5 UJ					
CHLOROFORM			0.3 U			2.4					
CIS-1,2-DICHLOROETHENE			0.3 U			7.1					
TRICHLOROETHENE			3.3			8.8					
Semivolatile Organics (µg/L)											
2-METHYLNAPHTHALENE	0.67 J			0.05 U							
ACENAPHTHENE	0.9 J			0.05 UJ							
ANTHRACENE	0.31 J			0.05 U							
BENZO(A)ANTHRACENE	0.31 J			0.05 U							
BIS(2-ETHYLHEXYL)PHTHALATE	86 BJ			2 BU							
CHRYSENE	0.78 J			0.05 U							
FLUORANTHENE	1.09 J			0.05 U							
FLUORENE	0.59 J			0.05 U							
NAPHTHALENE	1.3 J			0.05 U							
PHENANTHRENE	1.26 J			0.05 U							
PYRENE	2.34 J			0.05 U							
Energetics (µg/L)											
2,4,6-TRINITROTOLUENE	0.455 U			0.8 U							
2-AMINO-4,6-DINITROTOLUENE	0.455 U			0.8 U							
4-AMINO-2,6-DINITROTOLUENE	0.455 U			0.8 U							
HMX	29000			1.5 J							
RDX	88000			9.2							
Herbicides (µg/L)											
HEXACHLOROPHENE	0.082 J			0.025 U							
PENTACHLOROPHENOL	0.19 J			0.02 J							
Total Metals (µg/L)											
ALUMINUM	7.6 U			82.4 U			704 J		1660 J		698 J
ANTIMONY	1.3 U			2.9 U			14.2 J		10.6 J		4.8 J
ARSENIC	0.38 U			3.4 J			0.29 J		0.57 J		0.46 J
BARIUM	66.3 J			91 J			371 J		210 J		192 J
BERYLLIUM	0.03 U			0.03 U			0.02 J		0.08 J		0.03 J
CADMIUM	0.05 U			0.4 U			3		3.1		1.7
CALCIUM	30300 J			30400 J			17400 J		17100 J		18700 J
CHROMIUM	0.25 U			3.4 J			1.3 U		3.3 J		1.4 J
COBALT	0.78 U			0.05 U			0.34 J		0.62 J		0.33 J
COPPER	2 J			17.2 J			117 J		134 J		67.5 J
IRON	60.5 J			77.1 U			816 J		1690 J		741 J
LEAD	0.15 U			13.1 J			261		281 J		82.9 J
MAGNESIUM	5190 J			5700 J			1920		2230 J		2680 J

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**01**	**02**	**01**	**01**	**02**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD01**	**16SW/SD01**	**16SW/SD01**	**16SW/SD02**	**16SW/SD02**	**16SW/SD02**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**	**16SW/SD05**
SAMPLE NUMBER	**16SW0101**	**16SW0101-F**	**16SW0102**	**16SW0201**	**16SW0201-F**	**16SW0202**	**16SW0301**	**16SW0301-F**	**16SW0401**	**16SW0401-F**	**16SW0501**
SUBMATRIX	**SU**	**SUF**	**SU**	**SU**	**SUF**	**SU**	**SW**	**SF**	**SW**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**12/6/2003**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**
Total Metals (µg/L) (Continued)											
MANGANESE	44.3 J			10.6 J			8.8 J		24.2		11.1
MERCURY	2			0.02 U			0.03 U		0.03 U		0.03 U
NICKEL	1.8 J			0.61 U			1.6 J		3.2 J		1.8 J
POTASSIUM	1640 J			839 J			727		1470 J		2610 J
SODIUM	12400 J			29300 J			1070 U		1180 U		1120 U
STRONTIUM	190 J			213 J							
THALLIUM	0.04 U			0.05 U			0.043 U		0.043 U		0.043 U
TIN	0.67 U			0.03 U			0.52 U		0.84 J		0.25 U
TITANIUM	0.24 U			2.2 J							
VANADIUM	0.05 U			0.39 U			1.6 J		3.1 J		1.4 J
ZINC	3.2 U			178 J			1110 J		1340 J		541 J
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED		575			22.3 U			49.9 J		29.5 U	
ANTIMONY, FILTERED		2.1 U			2.8 U			10.8 J		5.5 J	
ARSENIC, FILTERED		0.6 U			3.2 J			0.1 U		0.13 U	
BARIUM, FILTERED		70.5 J			91.5 J			283 J		139 J	
BERYLLIUM, FILTERED		0.03 U			0.03 U			0.02 U		0.02 U	
CADMIUM, FILTERED		3.3 J			0.4 U			2.4		1.5	
CALCIUM, FILTERED		31000 J			29200 J			17300 J		11100 J	
CHROMIUM, FILTERED		1.7 J			3.2 J			0.47 U		0.46 U	
COBALT, FILTERED		0.28 U			0.15 U			0.1 J		0.09 J	
COPPER, FILTERED		17.9 J			16.2 J			32.3 J		31.6 J	
IRON, FILTERED		4100 J			36.6 U			76.4 J		61.5 U	
LEAD, FILTERED		26.2 J			8.4 J			35.8 J		21.6 J	
MAGNESIUM, FILTERED		5310 J			5620 J			1920 J		1590 J	
MANGANESE, FILTERED		23.4 J			10.1 J			2.7 J		4.1 J	
MERCURY, FILTERED		0.02 U			0.02 U			0.03 U		0.03 U	
NICKEL, FILTERED		2.2 J			0.5 U			0.99 J		1.4 J	
POTASSIUM, FILTERED		1940 J			842 J			647		1220	
SODIUM, FILTERED		12100 J			28200 J			1160 U		1110 U	
STRONTIUM, FILTERED		196 J			207 J						
TITANIUM, FILTERED		3.9 J			1.3 U						
ZINC, FILTERED		78.6 J			170 J			200 J		218 J	

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**SUMP**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**01**	**02**	**01**	**01**	**02**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD01**	**16SW/SD01**	**16SW/SD01**	**16SW/SD02**	**16SW/SD02**	**16SW/SD02**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**	**16SW/SD05**
SAMPLE NUMBER	**16SW0101**	**16SW0101-F**	**16SW0102**	**16SW0201**	**16SW0201-F**	**16SW0202**	**16SW0301**	**16SW0301-F**	**16SW0401**	**16SW0401-F**	**16SW0501**
SUBMATRIX	**SU**	**SUF**	**SU**	**SU**	**SUF**	**SU**	**SW**	**SF**	**SW**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**12/6/2003**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**
Field Parameters											
DISSOLVED OXYGEN (mg/L)							10.65		5.66		6.62
DISSOLVED OXYGEN - METER (mg/L)			12.65	10.51		10.69					
OXIDATION REDUCTION POTENTIAL (MV)			193.9	90.9		143.200000	36.6		107		113
PH (S.U.)			6.65	8.13		7.61	7.93		7.49		7.25
SPECIFIC CONDUCTANCE (MS/cm)			0.305	0.281		0.224	0.07		0.056		0.098
TEMPERATURE (C)			6.92	9.14		9.49	16.3		10.46		10.96
TURBIDITY (NTU)			22	2.1		120	14		65		24
Miscellaneous Parameters (mg/L)											
AMMONIA-N	2.8 J			0.01 U							
NITRITE/NITRATE-N	3.3 J			0.22							

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**SUMP**	**SUMP**	**SUMP**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**01**	**01**	**02**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD08**	**16SW/SD08**	**16SW/SD09**	**16SW/SD09**	**16SW/SD10**
SAMPLE NUMBER	**16SW0501-F**	**16SW0601**	**16SW0601-F**	**16SW0701**	**16SW0701-F**	**16SW0702**	**16SW0801**	**16SW0801-F**	**16SW0901**	**16SW0901-F**	**16SW1001**
SUBMATRIX	**SF**	**SW**	**SF**	**SU**	**SUF**	**SU**	**SW**	**SF**	**SF**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**11/2/2004**	**11/2/2004**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**11/11/2004**	**11/11/2004**	**11/2/2004**	**11/2/2004**	**11/11/2004**
Volatile Organics (µg/L)											
ACETONE						0.5 UJ					
CHLOROFORM						0.3 U					
CIS-1,2-DICHLOROETHENE						2.9					
TRICHLOROETHENE						6.6					
Semivolatile Organics (µg/L)											
2-METHYLNAPHTHALENE				0.05 U							
ACENAPHTHENE				0.05 UJ							
ANTHRACENE				0.05 U							
BENZO(A)ANTHRACENE				0.05 U							
BIS(2-ETHYLHEXYL)PHTHALATE				3 BU							
CHRYSENE				0.05 U							
FLUORANTHENE				0.05 U							
FLUORENE				0.05 U							
NAPHTHALENE				0.05 U							
PHENANTHRENE				0.05 U							
PYRENE				0.05 U							
Energetics (µg/L)											
2,4,6-TRINITROTOLUENE				2.1							
2-AMINO-4,6-DINITROTOLUENE				0.89 J							
4-AMINO-2,6-DINITROTOLUENE				2.2 J							
HMX				0.55 U							
RDX				2.9							
Herbicides (µg/L)											
HEXACHLOROPHENE				0.025 U							
PENTACHLOROPHENOL				0.015 R							
Total Metals (µg/L)											
ALUMINUM		173 J		298 J			1650 J		879 J		1100 J
ANTIMONY		7.3 J		2.5 U			4.8 J		6 J		9.8 J
ARSENIC		0.49 J		2.9 J			0.88 J		0.51 J		0.47 J
BARIUM		425 J		73.4 J			143 J		352 J		196 J
BERYLLIUM		0.24 J		0.04 U			0.09 J		0.02 U		0.07 J
CADMIUM		4.4		0.16 U			0.57 J		2.9		2.2
CALCIUM		49600 J		37100 J			25100 J		40800 J		14200 J
CHROMIUM		1.2 U		2 J			3.6 J		1.3 U		1.9 J
COBALT		0.7 J		0.76 U			0.71 J		0.36 J		0.38 J
COPPER		47.3 J		10.7 J			40.7 J		43.7 J		78.1 J
IRON		398 J		194 U			1670 J		1140 J		1020 J
LEAD		101		4.6 J			44.8 J		30.8		87.8 J
MAGNESIUM		4270		6560 J			4880 J		4590		2610 J

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**SUMP**	**SUMP**	**SUMP**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**01**	**01**	**02**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD08**	**16SW/SD08**	**16SW/SD09**	**16SW/SD09**	**16SW/SD10**
SAMPLE NUMBER	**16SW0501-F**	**16SW0601**	**16SW0601-F**	**16SW0701**	**16SW0701-F**	**16SW0702**	**16SW0801**	**16SW0801-F**	**16SW0901**	**16SW0901-F**	**16SW1001**
SUBMATRIX	**SF**	**SW**	**SF**	**SU**	**SUF**	**SU**	**SW**	**SF**	**SF**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**11/2/2004**	**11/2/2004**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**11/11/2004**	**11/11/2004**	**11/2/2004**	**11/2/2004**	**11/11/2004**
Total Metals (µg/L) (Continued)											
MANGANESE		38.8		5.2 J			39.8		11.2 J		13
MERCURY		0.03 U		0.02 U			0.03 U		0.03 U		0.03 U
NICKEL		2.8 J		0.95 J			5.4 J		2.2 J		2.5 J
POTASSIUM		2170		2430 J			2390 J		2740		1760 J
SODIUM		2420 J		84800 J			1480 U		2070 J		1820 J
STRONTIUM				226 J							
THALLIUM		0.16 J		0.08 U			0.05 U		0.043 U		0.043 U
TIN		0.31 U		0.08 U			0.22 U		0.08 U		0.27 U
TITANIUM				10.2 J							
VANADIUM		1.14 U		1.2 J			3.8 J		2		2 J
ZINC		333 J		80.1 J			302 J		185 J		749 J
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED	8.6 U		8.6 U		49.4 U			64.2 U		21 J	
ANTIMONY, FILTERED	3.4 U		7.8 J		2.5 U			4.3 J		5.8 J	
ARSENIC, FILTERED	0.2 U		0.22 U		2.8 J			0.26 J		0.21 U	
BARIUM, FILTERED	160 J		335 J		71.8 J			118 J		277 J	
BERYLLIUM, FILTERED	0.02 U		0.02 U		0.03 U			0.02 U		0.02 U	
CADMIUM, FILTERED	1		3.5		0.15 U			0.41 J		3.7	
CALCIUM, FILTERED	17100 J		41000 J		37700 J			24600 J		32800 J	
CHROMIUM, FILTERED	0.38 U		0.6 U		1.5 J			0.6 U		0.49 U	
COBALT, FILTERED	0.09 J		0.12 J		0.71 U			0.15 J		0.1 J	
COPPER, FILTERED	33.2 J		27.1 J		9.1 J			29.8 J		30.6 J	
IRON, FILTERED	82 U		148 J		42.3 U			131 U		120 J	
LEAD, FILTERED	20.9 J		12.2 J		1.9 U			17.8 J		10.5 J	
MAGNESIUM, FILTERED	2470 J		4470 J		6560 J			4320 J		3800 J	
MANGANESE, FILTERED	1.9 J		4.5 J		2.8 U			18.2		4.8 J	
MERCURY, FILTERED	0.03 U		0.03 U		0.02 U			0.03 U		0.03 U	
NICKEL, FILTERED	1.3 J		2.2 J		0.84 J			3.5 J		1.7 J	
POTASSIUM, FILTERED	2370		2310		2370 J			2000		2560	
SODIUM, FILTERED	1060 U		2740 J		87000 J			1450 U		2030 J	
STRONTIUM, FILTERED					234 J						
TITANIUM, FILTERED					3.2 J						
ZINC, FILTERED	217 J		171 J		68 J			197 U		126 J	

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**SUMP**	**SUMP**	**SUMP**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**01**	**01**	**02**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD08**	**16SW/SD08**	**16SW/SD09**	**16SW/SD09**	**16SW/SD10**
SAMPLE NUMBER	**16SW0501-F**	**16SW0601**	**16SW0601-F**	**16SW0701**	**16SW0701-F**	**16SW0702**	**16SW0801**	**16SW0801-F**	**16SW0901**	**16SW0901-F**	**16SW1001**
SUBMATRIX	**SF**	**SW**	**SF**	**SU**	**SUF**	**SU**	**SW**	**SF**	**SF**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**11/2/2004**	**11/2/2004**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**11/11/2004**	**11/11/2004**	**11/2/2004**	**11/2/2004**	**11/11/2004**
Field Parameters											
DISSOLVED OXYGEN (mg/L)		10.33					7.62		10.38		6.02
DISSOLVED OXYGEN - METER (mg/L)				10.63		10.78					
OXIDATION REDUCTION POTENTIAL (MV)		48		89.1		123.4	122		45.9		120
PH (S.U.)		7.57		8.4		7.68	6.99		7.37		7.26
SPECIFIC CONDUCTANCE (MS/CM)		0.169		0.591		0.575	0.108		0.162		0.066
TEMPERATURE (C)		16.45		11.78		12.2	11.28		16.42		10.74
TURBIDITY (NTU)		2		4.2		5.3	39		16.5		46.7
Miscellaneous Parameters (mg/L)											
AMMONIA-N				0.01 U							
NITRITE/NITRATE-N				1.5							

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**02**	**02**	**03**	**03**	**02**	**02**	**03**	**03**
LOCATION	**16SW/SD10**	**16SW/SD11**	**16SW/SD11**	**16SW/SD12**	**16SW/SD12**	**16SW/SD12**	**16SW/SD12**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**
SAMPLE NUMBER	**16SW1001-F**	**16SW1101**	**16SW1101-F**	**16SW1201**	**16SW1201-F**	**16SW1202**	**16SW1202-F**	**16SW1301**	**16SW1301-F**	**16SW1302**	**16SW1302-F**
SUBMATRIX	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**11/11/2004**	**11/11/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**
Volatile Organics (µg/L)											
ACETONE				0.5 UJ		1.6 J		0.5 UJ		0.5 U	
CHLOROFORM				0.3 U		0.3 U		0.3 U		0.3 U	
CIS-1,2-DICHLOROETHENE				1.4		0.3 U		0.3 U		0.3 U	
TRICHLOROETHENE				15		5.6		0.3 U		0.3 U	
Semivolatile Organics (µg/L)											
2-METHYLNAPHTHALENE											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
FLUORENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (µg/L)											
2,4,6-TRINITROTOLUENE				0.25 U		0.255 U		0.25 U		0.25 U	
2-AMINO-4,6-DINITROTOLUENE				0.25 U		0.255 U		0.25 U		0.25 U	
4-AMINO-2,6-DINITROTOLUENE				0.25 U		0.255 U		0.25 U		0.25 U	
HMX				0.27 J		0.255 U		0.25 U		0.25 U	
RDX				0.25 U		0.255 U		0.25 U		0.25 U	
Herbicides (µg/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (µg/L)											
ALUMINUM		364 J		378 J		2080 J		1130 J		1260 J	
ANTIMONY		1.9 U		0.4 U		0.085 UJ		0.53 U		0.45 U	
ARSENIC		0.76 J		0.16 U		0.79 J		0.35 U		0.5 J	
BARIUM		74 J		53 J		74.3 J		86 J		84.9 J	
BERYLLIUM		0.02 U		0.04 U		0.2 J		0.06 U		0.2 J	
CADMIUM		0.2 J		0.04 U		1.8		0.24 U		1.8	
CALCIUM		28200 J		19100 J		14800 J		13900 J		9740 J	
CHROMIUM		0.81 U		0.66 U		2.7 J		1.8 J		1.7 J	
COBALT		0.44 J		0.86 J		2.5 J		2 J		1.8 J	
COPPER		19.6 J		1.1 U		13.6 J		3.1 J		14.8 J	
IRON		447 J		278 J		2350 J		817 J		1510 J	
LEAD		5.8 J		0.51 U		6.2		5.2 J		8.9	
MAGNESIUM		4110 J		8200 J		4250		7340 J		4180	

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**02**	**02**	**03**	**03**	**02**	**02**	**03**	**03**
LOCATION	**16SW/SD10**	**16SW/SD11**	**16SW/SD11**	**16SW/SD12**	**16SW/SD12**	**16SW/SD12**	**16SW/SD12**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**
SAMPLE NUMBER	**16SW1001-F**	**16SW1101**	**16SW1101-F**	**16SW1201**	**16SW1201-F**	**16SW1202**	**16SW1202-F**	**16SW1301**	**16SW1301-F**	**16SW1302**	**16SW1302-F**
SUBMATRIX	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**11/11/2004**	**11/11/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**
Total Metals (µg/L) (Continued)											
MANGANESE		4.9 J		209 J		75.4		282 J		58.2	
MERCURY		0.03 U		0.02 U		0.03 U		0.02 U		0.03 U	
NICKEL		2.5 J		3.6 J		10.9		6.3 J		11.5	
POTASSIUM		4520 J		1790 J		1800		1870 J		1760	
SODIUM		18900 J		8690 J		2700 J		6040 J		3360 J	
STRONTIUM											
THALLIUM		0.06 U		0.04 U		0.043 U		0.04 U		0.043 U	
TIN		0.1 U		0.1 U		0.08 U		0.1 U		0.08 U	
TITANIUM				5.8 J				21.2 J			
VANADIUM		1.14 U		0.63 J		4.1		2.2 J		2.8	
ZINC		86.5 J		36.6 J		113 J		120		150 J	
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED	50 U		17.9 U		64.2 J		84.2		63.7 J		87.4
ANTIMONY, FILTERED	8.5 J		1.9 U		0.56 U		0.43 U		0.47 U		0.3 U
ARSENIC, FILTERED	0.14 U		0.65 J		0.07 U		0.13 U		0.07 U		0.09 U
BARIUM, FILTERED	155 J		72.5 J		50.1 J		60.4 J		73.4 J		71.2 J
BERYLLIUM, FILTERED	0.02 U		0.02 U		0.03 U		0.09 J		0.03 U		0.1 J
CADMIUM, FILTERED	1.8		0.24 J		0.04 U		1.8		0.06 U		1.7
CALCIUM, FILTERED	13300 J		29500 J		18300 J		14100 J		13600 J		9450 J
CHROMIUM, FILTERED	0.38 U		0.48 U		0.25 U		0.67 U		0.28 U		0.56 U
COBALT, FILTERED	0.11 J		0.36 J		2.7 J		1.5		2.9 J		0.76 J
COPPER, FILTERED	35.7 J		18.6 J		0.71 U		10.1 J		0.89 U		10.4 J
IRON, FILTERED	81.4 U		150 J		37.7 U		121 J		62.2 U		86.8 J
LEAD, FILTERED	22.9 J		2.6 J		0.08 U		0.81 J		0.38 U		2.4 J
MAGNESIUM, FILTERED	2290 J		4300 J		7760 J		3570 J		7140 J		3300 J
MANGANESE, FILTERED	6.5		2.4 J		171 J		47.4		154 J		27.8
MERCURY, FILTERED	0.03 U		0.03 U		0.02 U		0.03 U		0.02 U		0.03 U
NICKEL, FILTERED	1.6 J		2.2 J		3.7 J		9.4		4.3 J		8.8
POTASSIUM, FILTERED	1520		4720		1640 J		1490		1500 J		1570
SODIUM, FILTERED	1480 U		19900 J		8240 J		2600 J		5940 J		3280 J
STRONTIUM, FILTERED											
TITANIUM, FILTERED					1.4 J				1.6 J		
ZINC, FILTERED	354 J		70.3 J		39.2 J		76 J		82.2		117 J

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**02**	**02**	**03**	**03**	**02**	**02**	**03**	**03**
LOCATION	**16SW/SD10**	**16SW/SD11**	**16SW/SD11**	**16SW/SD12**	**16SW/SD12**	**16SW/SD12**	**16SW/SD12**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**
SAMPLE NUMBER	**16SW1001-F**	**16SW1101**	**16SW1101-F**	**16SW1201**	**16SW1201-F**	**16SW1202**	**16SW1202-F**	**16SW1301**	**16SW1301-F**	**16SW1302**	**16SW1302-F**
SUBMATRIX	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**11/11/2004**	**11/11/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**
Field Parameters											
DISSOLVED OXYGEN (mg/L)		8.01				9.38				9.18	
DISSOLVED OXYGEN - METER (mg/L)				6				2.94			
OXIDATION REDUCTION POTENTIAL (MV)		96		195.4		51.4		68.3		49.4	
PH (S.U.)		7.37		7.21		7.16		6.4		7.64	
SPECIFIC CONDUCTANCE (MS/CM)		0.201		0.204		0.1		0.168		0.84	
TEMPERATURE (C)		11.99		13.24		16.24		13.68		16.03	
TURBIDITY (NTU)		10		4.06		38.4		15.9		22.8	
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
NITRITE/NITRATE-N				0.11		0.43		0.27		0.55	

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**02**	**02**	**03**	**03**	**02**	**02**	**02**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD15**	**16SW/SD15**	**16SW/SD16**	**16SW/SD16**	**16SW/SD17**	**16SW/SD17**	**16SW/SD22**	**16SW/SD23**	**16SW/SD23**	**16SW/SD26**	**16SW/SD26**
SAMPLE NUMBER	**16SW1501**	**16SW1501-F**	**16SW1601**	**16SW1601-F**	**16SW1701**	**16SW1701-F**	**16SW2201**	**16SW2301**	**16SW2301-F**	**16SW2601**	**16SW2601-F**
SUBMATRIX	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SW**	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**ORIG**	**DRY**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**
SAMPLE DATE	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/24/2003**	**10/24/2003**	**10/24/2003**	**11/11/2004**	**11/11/2004**	**10/26/2004**	**10/26/2004**
Volatile Organics (µg/L)											
ACETONE	0.5 UJ				0.5 UR					0.5 U	
CHLOROFORM	0.3 U				0.3 U					0.3 U	
CIS-1,2-DICHLOROETHENE	0.3 U				0.3 U					0.3 U	
TRICHLOROETHENE	0.3 U				0.3 U					0.3 U	
Semivolatile Organics (µg/L)											
2-METHYLNAPHTHALENE											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
FLUORENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (µg/L)											
2,4,6-TRINITROTOLUENE	0.25 U				0.25 U						
2-AMINO-4,6-DINITROTOLUENE	0.25 U				0.25 U						
4-AMINO-2,6-DINITROTOLUENE	0.25 U				0.25 U						
HMX	0.51 J				0.25 U						
RDX	0.29 J				0.25 U						
Herbicides (µg/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (µg/L)											
ALUMINUM	9510 J		840 J		87.3 U			273 J		94 U	
ANTIMONY	0.28 U		2.6 U		0.63 U			2.7 U		0.49 U	
ARSENIC	3.8 J		0.37 J		0.52 U			0.19 U		0.24 U	
BARIUM	150 J		114 J		69.4 J			203 J		44.3 J	
BERYLLIUM	0.52 U		0.08 J		0.39 U			0.02 U		0.17 U	
CADMIUM	0.17 U		2.8		0.4 U			0.6 J		0.17 U	
CALCIUM	49500 J		6800 J		19700 J			13900 J		17400 J	
CHROMIUM	11.8 J		1.2 U		0.78 U			0.8 U		0.39 U	
COBALT	4.6 J		0.26 J		0.48 U			0.11 J		0.29 U	
COPPER	5.9 J		25.2 J		1.5 U			21 J		0.95 J	
IRON	9990 J		890 J		44.6 U			311 J		77.8 U	
LEAD	4.8 J		7.2		0.55 U			18.4 J		0.27 U	
MAGNESIUM	9450 J		3470		6100 J			1310 J		5700 J	

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**02**	**02**	**03**	**03**	**02**	**02**	**02**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD15**	**16SW/SD15**	**16SW/SD16**	**16SW/SD16**	**16SW/SD17**	**16SW/SD17**	**16SW/SD22**	**16SW/SD23**	**16SW/SD23**	**16SW/SD26**	**16SW/SD26**
SAMPLE NUMBER	**16SW1501**	**16SW1501-F**	**16SW1601**	**16SW1601-F**	**16SW1701**	**16SW1701-F**	**16SW2201**	**16SW2301**	**16SW2301-F**	**16SW2601**	**16SW2601-F**
SUBMATRIX	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SW**	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**ORIG**	**DRY**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**
SAMPLE DATE	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/24/2003**	**10/24/2003**	**10/24/2003**	**11/11/2004**	**11/11/2004**	**10/26/2004**	**10/26/2004**
Total Metals (µg/L) (Continued)											
MANGANESE	443 J		11.4		10 U			5.7		3 U	
MERCURY	0.02 U		0.03 U		0.02 U			0.03 U		0.03 U	
NICKEL	11.2 J		6.4 J		1.3 U			1.2 J		0.94 U	
POTASSIUM	3860 J		2040		1590 J			1000 J		1380 J	
SODIUM	17400 J		2210 J		5080 J			2110 J		10300 J	
STRONTIUM											
THALLIUM	0.25 U		0.043 U		0.41 U			0.043 U		0.16 U	
TIN	0.3 U		0.08 U		0.4 U			0.08 U		0.21 U	
TITANIUM	156 J				2 J						
VANADIUM	19 J		1.5 J		0.56 U			1.14 U		1.14 U	
ZINC	31.5 J		445 J		12.3 U			149 J		4.2 U	
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED		22.4 U		64		10.8 U			68.5 U		8.35 U
ANTIMONY, FILTERED		0.29 U		2.5 U		0.25 U			2.7 U		0.21 U
ARSENIC, FILTERED		0.11 U		0.14 U		0.11 U			0.11 U		0.15 U
BARIUM, FILTERED		76.4 J		101 J		68.5 J			194 J		43.9 J
BERYLLIUM, FILTERED		0.06 U		0.04 J		0.03 U			0.02 U		0.03 U
CADMIUM, FILTERED		0.09 U		2		0.04 U			0.49 J		0.039 U
CALCIUM, FILTERED		49100 J		6570 J		19800 J			13900 J		18200 J
CHROMIUM, FILTERED		0.16 U		0.45 U		0.27 U			0.51 U		0.28 U
COBALT, FILTERED		2.6 J		0.088 U		0.11 U			0.1 J		0.088 U
COPPER, FILTERED		0.57 U		21.8 J		0.93 U			16.5 J		1 J
IRON, FILTERED		18.1 U		111 J		44.3 U			99.3 U		7.8 U
LEAD, FILTERED		0.15 U		3.2 J		0.08 U			7.6 J		0.14 U
MAGNESIUM, FILTERED		8870 J		2780 J		5890 J			1280 J		5920 J
MANGANESE, FILTERED		36 J		4.6 J		9.7 U			2.5 J		0.82 U
MERCURY, FILTERED		0.04 J		0.03 U		0.02 U			0.03 U		0.03 U
NICKEL, FILTERED		1.2 J		5.8 J		0.83 U			0.95 J		1.2 U
POTASSIUM, FILTERED		2170 J		1880		1660 J			969		1430 J
SODIUM, FILTERED		17800 J		2160 J		4850 J			2130 J		10800 J
STRONTIUM, FILTERED											
TITANIUM, FILTERED		1.1 U				0.55 U					
ZINC, FILTERED		3.1 J		421 J		13.8 U			116 J		6 U

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**02**	**02**	**03**	**03**	**02**	**02**	**02**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD15**	**16SW/SD15**	**16SW/SD16**	**16SW/SD16**	**16SW/SD17**	**16SW/SD17**	**16SW/SD22**	**16SW/SD23**	**16SW/SD23**	**16SW/SD26**	**16SW/SD26**
SAMPLE NUMBER	**16SW1501**	**16SW1501-F**	**16SW1601**	**16SW1601-F**	**16SW1701**	**16SW1701-F**	**16SW2201**	**16SW2301**	**16SW2301-F**	**16SW2601**	**16SW2601-F**
SUBMATRIX	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SW**	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**ORIG**	**DRY**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**
SAMPLE DATE	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/24/2003**	**10/24/2003**	**10/24/2003**	**11/11/2004**	**11/11/2004**	**10/26/2004**	**10/26/2004**
Field Parameters											
DISSOLVED OXYGEN (mg/L)			6.7					7.41		9	
DISSOLVED OXYGEN - METER (mg/L)	2.87				6.49						
OXIDATION REDUCTION POTENTIAL (MV)	194.100000		64.2		204			95		55.8	
PH (S.U.)	6.51		7.55		6.93			7.75		7.5	
SPECIFIC CONDUCTANCE (MS/CM)	0.378		0.067		0.154			0.064		0.171	
TEMPERATURE (C)	12.45		15.97		9.61			10.9		12.65	
TURBIDITY (NTU)	15.9		14.9		3.39			7.2		4.74	
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
NITRITE/NITRATE-N	0.05 U				0.05 U					0.025 U	

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	03	02	02	02
LOCATION	16SW/SD27	16SW/SD27	16SW/SD28	16SW/SD28	16SW/SD29	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD14	16SW/SD14	16SW/SD20
SAMPLE NUMBER	16SW2701	16SW2701-F	16SW2801	16SW2801-F	16SW2901	16SW2901-F	16SW3001	16SW3001-F	16SW1401	16SW1401-F	16SW2001
SUBMATRIX	SW	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004	11/11/2004	10/26/2004	10/26/2004	10/24/2003	10/24/2003	10/25/2003
Volatile Organics (µg/L)											
ACETONE	2.8 J		0.5 UJ		0.5 J		0.5 U		0.5 UR		0.6 J
CHLOROFORM	0.3 U		0.3 U		0.3 U		0.3 U		0.3 U		0.3 U
CIS-1,2-DICHLOROETHENE	0.3 U		0.3 U		3.4		0.3 U		0.3 U		0.3 U
TRICHLOROETHENE	0.8 J		1.3		26		0.3 U		0.3 U		0.3 U
Semivolatile Organics (µg/L)											
2-METHYLNAPHTHALENE											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
FLUORENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (µg/L)											
2,4,6-TRINITROTOLUENE							0.24 U		0.25 U		0.26 U
2-AMINO-4,6-DINITROTOLUENE							0.29 J		0.25 U		0.26 U
4-AMINO-2,6-DINITROTOLUENE							0.63		0.25 U		0.26 U
HMX							4.8		0.25 U		0.26 U
RDX							24		0.25 U		0.26 U
Herbicides (µg/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (µg/L)											
ALUMINUM	1770 J		8790 J		1170 J		128 U		87.6 U		485 J
ANTIMONY	0.72 U		1.6 U		4.2 J		0.58 U		0.26 U		0.03 U
ARSENIC	0.73 J		3.6 J		0.64 J		0.21 U		0.25 U		0.16 U
BARIUM	94.3 J		120 J		128 J		61.5 J		57.3 J		54.2 J
BERYLLIUM	0.2 J		0.5 J		0.07 J		0.04 U		0.15 U		0.03 U
CADMIUM	1.8		0.4 J		0.61 J		0.07 U		0.13 U		0.04 U
CALCIUM	11200 J		14200 J		21000 J		16000 J		38700 J		18400 J
CHROMIUM	2.2 J		11 J		2.6 J		0.34 U		0.41 U		0.78 J
COBALT	1.9 J		4.1 J		0.59 J		0.1 U		0.15 U		0.32 U
COPPER	16.7 J		29.4 J		34.3 J		1.5 J		0.72 U		0.96 U
IRON	2220 J		9810 J		1310 J		114 U		47.7 U		263 J
LEAD	10.1		34.8 J		25.8 J		0.31 U		0.26 U		0.26 U
MAGNESIUM	4280		3620 J		5400 J		5500 J		7810 J		6700 J

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**02**	**02**	**02**
LOCATION	**16SW/SD27**	**16SW/SD27**	**16SW/SD28**	**16SW/SD28**	**16SW/SD29**	**16SW/SD29**	**16SW/SD30**	**16SW/SD30**	**16SW/SD14**	**16SW/SD14**	**16SW/SD20**
SAMPLE NUMBER	**16SW2701**	**16SW2701-F**	**16SW2801**	**16SW2801-F**	**16SW2901**	**16SW2901-F**	**16SW3001**	**16SW3001-F**	**16SW1401**	**16SW1401-F**	**16SW2001**
SUBMATRIX	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**	**10/26/2004**	**10/26/2004**	**10/24/2003**	**10/24/2003**	**10/25/2003**
Total Metals (µg/L) (Continued)											
MANGANESE	50.4		164		32.1		5.8 U		9.1 U		19.2 J
MERCURY	0.03 U		0.03 U		0.03 U		0.03 U		0.02 U		0.02 U
NICKEL	11.8		10.6 J		7.7 J		1.6 U		0.71 U		1.1 J
POTASSIUM	1880		3650 J		2540 J		1710 J		1780 J		2230 J
SODIUM	3490 J		1540 U		3310 J		9430 J		15000 J		10700 J
STRONTIUM											
THALLIUM	0.043 U		0.2 U		0.043 U		0.043 U		0.17 U		0.04 U
TIN	0.16 U		0.47 J		0.17 U		0.05 U		0.16 U		0.1 U
TITANIUM									3.4 J		9.5 J
VANADIUM	4.7		16.3 J		2.5 J		1.14 U		0.33 U		0.85 J
ZINC	159 J		208 J		380 J		16.9 J		5.7 U		16.6 J
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED		124		71.1 U		49.4 U		38.2 U		54.4 U	
ANTIMONY, FILTERED		0.63 U		1.4 U		3.2 U		0.6 U		0.32 U	
ARSENIC, FILTERED		0.12 U		0.31 J		0.2 U		0.19 U		0.15 U	
BARIUM, FILTERED		81.7 J		43.2 J		113 J		63.1 J		57.2 J	
BERYLLIUM, FILTERED		0.1 J		0.02 J		0.02 J		0.02 U		0.03 U	
CADMIUM, FILTERED		2.4		0.12 J		0.52 J		0.039 U		0.04 U	
CALCIUM, FILTERED		10600 J		12100 J		21300 J		16500 J		37400 J	
CHROMIUM, FILTERED		0.7 U		0.54 U		0.61 U		2.1 J		0.35 U	
COBALT, FILTERED		1.1		0.36 J		0.24 J		0.09 U		2.7 J	
COPPER, FILTERED		12.8 J		12.1 J		27.2 J		1.9 J		0.7 U	
IRON, FILTERED		97.6 J		106 U		188 J		45.2 U		34.9 U	
LEAD, FILTERED		3 J		0.89 J		10.2 J		0.1 U		0.06 U	
MAGNESIUM, FILTERED		3710 J		2510 J		5040 J		5580 J		7390 J	
MANGANESE, FILTERED		32.1		21.2		21.3		1.7 U		10.9 J	
MERCURY, FILTERED		0.03 U		0.03 U		0.03 U		0.03 U		0.02 U	
NICKEL, FILTERED		9.2		2.9 J		6.4 J		1.4 U		0.74 U	
POTASSIUM, FILTERED		1590		2790		2270		1740 J		1810 J	
SODIUM, FILTERED		3320 J		1390 U		3240 J		9580 J		14000 J	
STRONTIUM, FILTERED											
TITANIUM, FILTERED										3.4 J	
ZINC, FILTERED		118 J		77.8 J		265 J		17.5 J		13.8 U	

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**02**	**02**	**02**
LOCATION	**16SW/SD27**	**16SW/SD27**	**16SW/SD28**	**16SW/SD28**	**16SW/SD29**	**16SW/SD29**	**16SW/SD30**	**16SW/SD30**	**16SW/SD14**	**16SW/SD14**	**16SW/SD20**
SAMPLE NUMBER	**16SW2701**	**16SW2701-F**	**16SW2801**	**16SW2801-F**	**16SW2901**	**16SW2901-F**	**16SW3001**	**16SW3001-F**	**16SW1401**	**16SW1401-F**	**16SW2001**
SUBMATRIX	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**	**10/26/2004**	**10/26/2004**	**10/24/2003**	**10/24/2003**	**10/25/2003**
Field Parameters											
DISSOLVED OXYGEN (mg/L)	8.87		7.86		7.96		8.9				
DISSOLVED OXYGEN - METER (mg/L)									7.22		7.23
OXIDATION REDUCTION POTENTIAL (MV)	55.2		126		147		53.6		254.700000		183.4
PH (S.U.)	7.23		7.17		7.95		7.37		7.14		7.08
SPECIFIC CONDUCTANCE (MS/CM)	0.091		0.068		0.116		0.159		0.299		0.202
TEMPERATURE (C)	16.06		11.33		11.28		13.28		11.7		13.75
TURBIDITY (NTU)	31.9		179		32.2		9.49		2.57		7.95
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
NITRITE/NITRATE-N									3.2		0.05 U

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02
LOCATION	16SW/SD20	16SW/SD21	16SW/SD21
SAMPLE NUMBER	16SW2001-F	16SW2101	16SW2101-F
SUBMATRIX	SF	SW	SF
SAMPLE CODE	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/25/2003	10/24/2003	10/24/2003
Volatile Organics (µg/L)			
ACETONE		0.5 UR	
CHLOROFORM		0.3 U	
CIS-1,2-DICHLOROETHENE		0.3 U	
TRICHLOROETHENE		0.3 U	
Semivolatile Organics (µg/L)			
2-METHYLNAPHTHALENE			
ACENAPHTHENE			
ANTHRACENE			
BENZO(A)ANTHRACENE			
BIS(2-ETHYLHEXYL)PHTHALATE			
CHRYSENE			
FLUORANTHENE			
FLUORENE			
NAPHTHALENE			
PHENANTHRENE			
PYRENE			
Energetics (µg/L)			
2,4,6-TRINITROTOLUENE		0.25 U	
2-AMINO-4,6-DINITROTOLUENE		0.25 U	
4-AMINO-2,6-DINITROTOLUENE		0.25 U	
HMX		0.25 U	
RDX		0.25 U	
Herbicides (µg/L)			
HEXACHLOROPHENE			
PENTACHLOROPHENOL			
Total Metals (µg/L)			
ALUMINUM		891 J	
ANTIMONY		0.05 U	
ARSENIC		0.39 U	
BARIUM		53.4 J	
BERYLLIUM		0.04 U	
CADMIUM		0.05 U	
CALCIUM		16600 J	
CHROMIUM		1.3 U	
COBALT		0.38 U	
COPPER		1.7 U	
IRON		599 J	
LEAD		0.5 U	
MAGNESIUM		5820 J	

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**02**	**02**	**02**
LOCATION	**16SW/SD20**	**16SW/SD21**	**16SW/SD21**
SAMPLE NUMBER	**16SW2001-F**	**16SW2101**	**16SW2101-F**
SUBMATRIX	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**10/25/2003**	**10/24/2003**	**10/24/2003**
Total Metals (µg/L) (Continued)			
MANGANESE		135 J	
MERCURY		0.02 U	
NICKEL		2.3 J	
POTASSIUM		2030 J	
SODIUM		9580 J	
STRONTIUM			
THALLIUM		0.04 U	
TIN		0.1 U	
TITANIUM		19.7 J	
VANADIUM		1.6 U	
ZINC		10.9 U	
Dissolved Metals (µg/L)			
ALUMINUM, FILTERED	33.9 U		164 J
ANTIMONY, FILTERED	0.14 U		0.25 U
ARSENIC, FILTERED	0.09 U		0.18 U
BARIUM, FILTERED	50.9 J		46.6 J
BERYLLIUM, FILTERED	0.03 U		0.03 U
CADMIUM, FILTERED	0.04 U		0.04 U
CALCIUM, FILTERED	18100 J		15700 J
CHROMIUM, FILTERED	0.24 U		0.49 U
COBALT, FILTERED	2.9 J		3.1 J
COPPER, FILTERED	0.64 U		0.78 U
IRON, FILTERED	30.1 U		123 U
LEAD, FILTERED	0.08 U		0.11 U
MAGNESIUM, FILTERED	6510 J		5400 J
MANGANESE, FILTERED	14.5 J		29.8 J
MERCURY, FILTERED	0.02 U		0.02 U
NICKEL, FILTERED	1.2 J		1.3 U
POTASSIUM, FILTERED	2140 J		1550 J
SODIUM, FILTERED	10600 J		9010 J
STRONTIUM, FILTERED			
TITANIUM, FILTERED	1.5 J		8.5 J
ZINC, FILTERED	18.1 J		33.3 J

TABLE 3-14

SUMMARY OF CHEMICALS DETECTED
GULLY SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**02**	**02**	**02**
LOCATION	**16SW/SD20**	**16SW/SD21**	**16SW/SD21**
SAMPLE NUMBER	**16SW2001-F**	**16SW2101**	**16SW2101-F**
SUBMATRIX	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**10/25/2003**	**10/24/2003**	**10/24/2003**
Field Parameters			
DISSOLVED OXYGEN (mg/L)			
DISSOLVED OXYGEN - METER (mg/L)		1.91	
OXIDATION REDUCTION POTENTIAL (MV)		239.600000	
PH (S.U.)		6.78	
SPECIFIC CONDUCTANCE (MS/CM)		0.184	
TEMPERATURE (C)		15.12	
TURBIDITY (NTU)		10.59	
Miscellaneous Parameters (mg/L)			
AMMONIA-N			
NITRITE/NITRATE-N		0.07	

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
µg/L = microgram per liter
C = Celsius
mg/L = milligram per liter
MS/cm = milliSiemens per centimeter
MV = millivolt
NTU = nephalometric turbidity unit
QC = quality control
S.U. = Standard unit

TABLE 3-15

SUMMARY OF CHEMICALS DETECTED
TURKEY CREEK MAINSTREAM SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD
STREAM ORDER	TCMS	TCMS	TCMS	TCMS	TCMS	TCMS	TCMS	TCMS
SAMPLING ROUND	03	03	03	03	03	03	02	02
LOCATION	16SW/SD19	16SW/SD19	16SW/SD24	16SW/SD24	16SW/SD25	16SW/SD25	16SW/SD18	16SW/SD18
SAMPLE NUMBER	16SW1901	16SW1901-F	16SW2401	16SW2401-F	16SW2501	16SW2501-F	16SW1801	16SW1801-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	NORMAL	ORIG	ORIG	NORMAL	NORMAL
SAMPLE DATE	11/2/2004	11/2/2004	10/8/2004	10/12/2004	10/8/2004	10/12/2004	10/24/2003	10/24/2003
Energetics (µg/L)								
HMX			0.32 J				0.25 U	
Total Metals (µg/L)								
ALUMINUM	822 J		146 J		48.7 U		32.9 U	
ARSENIC	0.37 J		0.09 U		0.23 U		0.57 U	
BARIUM	48.1 J		95.7 J		78.6 J		23 J	
BERYLLIUM	0.09 J		0.03 U		0.02 U		0.06 U	
CADMIUM	0.66 J		0.05 U		0.039 U		0.04 U	
CALCIUM	9360 J		17200 J		17900 J		9930 J	
COBALT	0.44 J		0.14 J		0.72 J		0.33 U	
COPPER	4.1 J		0.3 J		0.24 J		2.7 J	
IRON	886 J		43.6 J		440		15 U	
LEAD	1.2		0.11 U		0.31 U		0.64 U	
MAGNESIUM	3370		6300 J		6340 J		2460 J	
MANGANESE	21.5		102		476		30 J	
NICKEL	4.5 J		5.7		5.7		0.61 U	
POTASSIUM	1680		989 J		1340 J		790 J	
SODIUM	3660 J		8600 J		7850 J		8330 J	
VANADIUM	1.5 J		1.14 U		1.14 U		0.39 U	
ZINC	18.7 J		7.7 J		6.9 J		4.9 U	
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED		90.1		119 J		61.8 U		18.2 U
BARIUM, FILTERED		43.7 J		98.3 J		90.9 J		48.2 J
BERYLLIUM, FILTERED		0.04 J		0.02 U		0.02 U		0.1 U
CADMIUM, FILTERED		1.4		0.039 U		0.039 U		0.1 U
CALCIUM, FILTERED		9910 J		16200 J		17400 J		10100 J
COBALT, FILTERED		0.16 J		0.17 J		1.9		2.6 J
COPPER, FILTERED		3.9 J		0.22 J		0.34 J		0.26 U
IRON, FILTERED		104 J		11.8 J		163		17.4 U
LEAD, FILTERED		0.54 J		0.19 U		0.11 U		0.14 U
MAGNESIUM, FILTERED		3020 J		5940		6450		3770 J
MANGANESE, FILTERED		7.7		128 J		1970 J		12.5 J
NICKEL, FILTERED		4 J		6.9		8.6		1.4 U
POTASSIUM, FILTERED		1640		1030 J		1900 J		846 J
SODIUM, FILTERED		3840 J		8190 J		7560 J		4360 J
ZINC, FILTERED		16.6 J		21.8 J		9.1 J		3.5 U

TABLE 3-15

SUMMARY OF CHEMICALS DETECTED
TURKEY CREEK MAINSTREAM SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**TCMS**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**02**	**02**
LOCATION	**16SW/SD19**	**16SW/SD19**	**16SW/SD24**	**16SW/SD24**	**16SW/SD25**	**16SW/SD25**	**16SW/SD18**	**16SW/SD18**
SAMPLE NUMBER	**16SW1901**	**16SW1901-F**	**16SW2401**	**16SW2401-F**	**16SW2501**	**16SW2501-F**	**16SW1801**	**16SW1801-F**
SAMPLE CODE	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**ORIG**	**ORIG**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/2/2004**	**11/2/2004**	**10/8/2004**	**10/12/2004**	**10/8/2004**	**10/12/2004**	**10/24/2003**	**10/24/2003**
Field Parameters								
DISSOLVED OXYGEN (mg/L)	7.72		4.78		3.86			
OXIDATION REDUCTION POTENTIAL (MV)	55.3		205		269		251.600000	
PH (S.U.)	7.53		6.35		6.57		6.39	
SPECIFIC CONDUCTANCE (MS/cm)	0.081		130		126		0.108	
TEMPERATURE (C)	15.83		12.92		11.21		12.88	
TURBIDITY (NTU)	25		1		2		1	
Miscellaneous Parameters (mg/L)								
NITRITE/NITRATE-N			0.05				0.05 U	

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Mainstream surface water samples were only collected in Round 3.
µg/L = microgram per liter
C = Celsius
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L = milligram per liter
MS/cm = milliSiemen per centimeter
MV = millivolts
NTU = nephalometric turbidity units
QC = quality control
S.U. = Standard units
TCMS - Turkey Creek Mainstream

TABLE 3-16

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/kg)								
ACETONE	6/10	3 J	69 J	1.3 - 10	14.1	21.8	16SD2201	5 J - 7 J
CIS-1,2-DICHLOROETHENE	1/10	3 J	3 J	0.948 - 1.58	0.877	3.00	16SD1201	ND
DICHLORODIFLUOROMETHANE	1/10	2 J	2 J	0.948 - 1.58	0.772	2.00	16SD2701	ND
TRICHLOROETHENE	2/10	2 J	19	0.948 - 1.58	2.61	10.5	16SD2901	ND
Semivolatile Organics (µg/kg)								
2-METHYLNAPHTHALENE	1/10	5 J	5 J	4 - 5.8	2.51	5.00	16SD0301	NA
ACENAPHTHENE	1/10	8 J	8 J	3.9 - 5.8	2.81	8.00	16SD0501	NA
ACENAPHTHYLENE	3/10	4 J	8	4.1 - 5.8	3.30	5.67	16SD0301	NA
ANTHRACENE	4/10	5 J	15	3.9 - 4.6	4.39	7.75	16SD0501	NA
BENZO(A)ANTHRACENE	8/10	5 J	66	4.3 - 4.4	15.2	18.5	16SD0501	NA
BENZO(A)PYRENE	6/10	7 J	84	3.9 - 4.6	18.4	29.2	16SD0501	NA
BENZO(B)FLUORANTHENE	7/10	6 J	120	3.9 - 4.6	28.1	39.3	16SD0501	NA
BENZO(G,H,I)PERYLENE	7/10	5 J	65	4.3 - 4.6	27.5	38.3	16SD0501	NA
BENZO(K)FLUORANTHENE	6/10	7 J	65	3.9 - 4.6	14.4	22.5	16SD0501	NA
CHRYSENE	8/10	5 J	100	4.4 - 4.6	30.2	37.1	16SD0501	NA
DI-N-BUTYL PHTHALATE	1/9	130 J	130 J	79 - 120	54.1	130	16SD0801	NA
DIBENZO(A,H)ANTHRACENE	1/10	18	18	3.9 - 5.8	3.81	18.0	16SD0501	NA
DIPHENYLAMINE	2/9	140 J	170 J	82 - 120	69.9	155	16SD0301	NA
FLUORANTHENE	9/10	5 J	160	4.6	32.8	36.2	16SD0501	NA
FLUORENE	1/10	8 J	8 J	3.9 - 5.8	2.81	8.00	16SD0501	NA
INDENO(1,2,3-CD)PYRENE	6/10	7 J	55	4.1 - 4.6	19.5	31.0	16SD0501	NA
NAPHTHALENE	2/10	5 J	6 J	4.1 - 5.8	2.91	5.50	16SD0301	NA
PHENANTHRENE	8/10	4 J	100	4.3 - 4.6	19.8	24.3	16SD0501	NA
PYRENE	9/10	6 J	170	4.6	40.8	45.1	16SD0501	NA
Energetics (mg/kg)								
2,6-DINITROTOLUENE	2/14	0.54 J	0.92 J	0.25	0.211	0.730	16SD1501	ND
RDX	1/14	0.27 J	0.27 J	0.25	0.135	0.270	16SD0301	ND
Herbicides (µg/kg)								
PENTACHLOROPHENOL	5/9	2.6 J	19 J	0.55 - 0.6	4.74	8.30	16SD1101	NA
Inorganics (mg/kg)								
ALUMINUM	31/31	5560	19500 J	---	11885	11885	16SD0402	8710 J - 12800 J
ANTIMONY	30/31	0.65 J	174 J	0.6	30.9	31.9	16SD0601	1.3 J - 1.7 J
ARSENIC	31/31	2.5 J	34.1 J	---	10.9	10.9	16SD2601	24.4 J - 27.5 J
BARIUM	31/31	56.6 J	2820 J	---	511	511	16SD0301	84.5 J - 454 J
BERYLLIUM	21/31	0.43 J	2.3 J	0.39 - 1.4	0.802	1.03	16SD1301	1.6 J - 3 J
CADMIUM	30/31	0.47 J	27.2 J	0.33	6.27	6.48	16SD0402	0.38 J - 0.62 J
CALCIUM	31/31	395 J	98100 J	---	11620	11620	16SD0602	539 J - 846 J
CHROMIUM	31/31	13.3 J	85.2 J	---	33.2	33.2	16SD1002	36.9 J - 85 J
COBALT	31/31	2.5 J	41.2 J	---	16.2	16.2	16SD1201	29.7 J - 38.7 J
COPPER	31/31	9.2 J	2570 J	---	468	468	16SD0601	14.8 J - 15 J
IRON	31/31	16500 J	127000 J	---	40797	40797	16SD1002	74000 J - 141000 J
LEAD	31/31	13.6 J	15200 J	---	1730	1730	16SD0601	29.6 J - 73.2 J
LITHIUM	9/9	2.9 J	10.4 J	---	6.53	6.53	16SD0401	NA

TABLE 3-16

SUMMARY OF DESCRIPTIVE STATISTICS
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Inorganics (mg/kg) (Continued)								
MAGNESIUM	31/31	470 J	6080 J	---	1786	1786	16SD0501	491 J - 916 J
MANGANESE	31/31	54.6 J	2510 J	---	1005	1005	16SD2601	2270 J - 3650 J
MERCURY	26/31	0.023 J	4.6	0.03 - 0.056	0.437	0.518	16SD0402	0.026 J - 0.043 J
NICKEL	31/31	8.9 J	804 J	---	48.7	48.7	16SD0602	34.5 J - 39.2 J
POTASSIUM	31/31	282 J	1530 J	---	958	958	16SD0902	739 J - 1120 J
SELENIUM	18/31	0.33 J	1.5 J	0.14 - 0.57	0.488	0.700	16SD1301	0.7 J - 1.2 J
SILVER	1/31	1.5 J	1.5 J	0.01 - 0.53	0.136	1.50	16SD2901	ND
SODIUM	8/31	33.8 J	283 J	11.7 - 65.3	44.5	117	16SD1102	40.3 J - 43.9 J
STRONTIUM	9/9	51 J	2740 J	---	554	554	16SD0301	NA
TIN	20/31	0.4 J	19.6 J	0.31 - 1.8	4.80	7.26	16SD0602	ND
TITANIUM	14/14	9.4 J	156 J	---	73.8	73.8	16SD0401	39.5 J - 54.3 J
VANADIUM	31/31	12.8 J	71.7 J	---	33.7	33.7	16SD1301	43.7 J - 52.4 J
ZINC	30/31	68.3 J	23400 J	270	3669	3787	16SD0301	109 J - 131 J
AVS/SEM Parameters (UMO/g)								
ACID VOLATILE SULFIDE, SEM	3/3	0.53	0.59	---	0.560	0.560	16SD0901	NA
CADMIUM, SEM	3/3	0.024 J	0.145 J	---	0.0813	0.0813	16SD0601	NA
COPPER, SEM	3/3	1.83	18.3	---	8.37	8.37	16SD0601	NA
LEAD, SEM	3/3	2.6	16.3	---	7.68	7.68	16SD0601	NA
MERCURY, SEM	3/3	0.00011	0.00015	---	0.000133	0.000133	16SD0901	NA
NICKEL, SEM	3/3	0.028	0.068	---	0.0437	0.0437	16SD0601	NA
SEM/AVS, SEM	3/3	50	220	---	107	107	16SD0601	NA
ZINC, SEM	3/3	20.6 J	91 J	---	44.7	44.7	16SD0601	NA
Miscellaneous Parameters								
CATION EXCHANGE CAPACITY (MEQ/1)	3/3	5.7 J	25 J	---	16.2	16.2	16SD2301	NA
PH (S.U.)	3/3	7.4	8	---	7.73	7.73	16SD0601	NA
TOTAL ORGANIC CARBON (mg/kg)	3/3	1600	8600	---	4700	4700	16SD2301	NA

Notes:
Field duplicate samples were excluded from these summaries because they are considered to be field QC samples.
(1) - No sediment was available in the sumps.
(2) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
µg/mg = microbram per kilogram
mg/kg = milligram per kilogram
NA = Not analyzed
ND = Not detected
QC = quality control
RDX = 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. = Standard unit
SEM = Simultaneously extracted metal
TV = threshold value

TABLE 3-17

SUMMARY OF DESCRIPTIVE STATISTICS
TURKEY CREEK MAINSTREAM SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/kg)								
ACETONE	1/1	7 J	7 J	---	7.00	7.00	16SD1901	ND
DICHLORODIFLUOROMETHANE	1/1	22	22	---	22.0	22.0	16SD1901	ND
Inorganics (mg/kg)								
ALUMINUM	4/4	8730 J	10500 J	---	9658	9658	16SD1902	8090 J
ANTIMONY	3/4	0.8 J	1.1 J	0.74	0.843	1.00	16SD1901, 16SD2501	1.2 J
ARSENIC	4/4	7 J	30.8 J	---	21.1	21.1	16SD1901	34.8 J
BARIUM	4/4	69.7 J	110 J	---	86.5	86.5	16SD1901	62.5 J
BERYLLIUM	3/4	1.5 J	2.4 J	0.4	1.55	2.00	16SD1901	2.6 J
CADMIUM	3/4	0.54 J	0.79 J	0.47	0.534	0.633	16SD1901	0.54 J
CALCIUM	4/4	539 J	973 J	---	808	808	16SD1901	362 J
CHROMIUM	4/4	16.3 J	79.9 J	---	51.7	51.7	16SD2401	78.5 J
COBALT	4/4	16.1 J	26.9 J	---	22.0	22.0	16SD1901	21.4 J
COPPER	4/4	13.4 J	15.1 J	---	14.1	14.1	16SD1902	12.6 J
IRON	4/4	15800 J	122000 J	---	74325	74325	16SD1901	124000 J
LEAD	4/4	23.3 J	32.9 J	---	28.0	28.0	16SD2501	28.1 J
MAGNESIUM	4/4	400 J	916 J	---	687	687	16SD2501	292 J
MANGANESE	4/4	398 J	1900 J	---	1337	1337	16SD1901	1370 J
MERCURY	1/4	0.022 J	0.022 J	0.036 - 0.046	0.0214	0.0220	16SD1901	0.025 J
NICKEL	4/4	20.8 J	43.4 J	---	34.6	34.6	16SD1901	43 J
POTASSIUM	4/4	462 J	1040 J	---	811	811	16SD2501	438 J
SELENIUM	3/4	0.5 J	0.8 J	0.31	0.544	0.673	16SD2401	0.5 J
TITANIUM	1/1	50.6 J	50.6 J	---	50.6	50.6	16SD1901	56.4 J
VANADIUM	4/4	21.1 J	51.2 J	---	40.0	40.0	16SD2401	56.3 J
ZINC	4/4	84.4 J	206 J	---	123	123	16SD1901	92.5 J

Notes:
Turkey Creek Mainstream sediment samples were only collected in Rounds 2 and 3
(1) - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**SUMP**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**SUMP**	**GULLY**
SAMPLING ROUND	**01**	**01**	**03**	**01**	**03**	**01**	**03**	**01**	**03**	**01**	**01**
LOCATION	**16SW/SD01**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**	**16SW/SD05**	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**	**16SW/SD08**
SAMPLE NUMBER	**16SD0101**	**16SD0301**	**16SD0302**	**16SD0401**	**16SD0402**	**16SD0501**	**16SD0502**	**16SD0601**	**16SD0602**	**16SD0701**	**16SD0801**
SAMPLE CODE	**NO SED**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NO SED**	**NORMAL**
DEPTH RANGE	**---**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**---**	**0 - 0.3**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**4/1/2003**
Volatile Organics (µg/kg)											
ACETONE											
CIS-1,2-DICHLOROETHENE											
DICHLORODIFLUOROMETHANE											
TRICHLOROETHENE											
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE		5 J		4.3 U		4 U		4.1 U			4.4 U
ACENAPHTHENE		3.9 U		4.3 U		8 J		4.1 U			4.4 U
ACENAPHTHYLENE		8		5 J		4 J		4.1 U			4.4 U
ANTHRACENE		3.9 U		5 J		15		4.1 U			4.4 U
BENZO(A)ANTHRACENE		13 J		7 J		66		5 J			4.4 UJ
BENZO(A)PYRENE		3.9 UJ		12		84		7 J			4.4 UJ
BENZO(B)FLUORANTHENE		3.9 UJ		32		120		10			4.4 UJ
BENZO(G,H,I)PERYLENE		62 J		33		65		5 J			4.4 UJ
BENZO(K)FLUORANTHENE		3.9 UJ		8 J		65		7 J			4.4 UJ
CHRYSENE		60 J		18		100		12			4.4 UJ
DI-N-BUTYL PHTHALATE		79 U		86 U		82 U		84 U			130 J
DIBENZO(A,H)ANTHRACENE		3.9 UJ		4.3 U		18		4.1 U			4.4 UJ
DIPHENYLAMINE		170 J		86 U		82 U		84 UJ			90 U
FLUORANTHENE		22		12		160		11			5 J
FLUORENE		3.9 U		4.3 U		8 J		4.1 U			4.4 U
INDENO(1,2,3-CD)PYRENE		43 J		24		55		4.1 U			4.4 UJ
NAPHTHALENE		6 J		4.3 U		5 J		4.1 U			4.4 U
PHENANTHRENE		14		8 J		100		6 J			4 J
PYRENE		44 J		17		170		13			9 J
Energetics (mg/kg)											
2,6-DINITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U			0.25 U
RDX		0.27 J		0.25 U		0.25 U		0.25 U			0.25 U
Herbicides (µg/kg)											
PENTACHLOROPHENOL		2.9 J		7.6		0.55 U		0.56 U			0.6 U
Inorganics (mg/kg)											
ALUMINUM		6060 J	9300 J	12900 J	19500 J	6620 J	12100 J	5560	11900 J		8190 J
ANTIMONY		69.6 J	22.4 J	42 J	159 J	35.3 J	55.4 J	174 J	152 J		4.3 J
ARSENIC		3.4 J	2.5 J	8.7 J	11.1 J	6.6 J	4.8 J	3.9 J	5.2 J		8.8 J
BARIUM		2820 J	306 J	231 J	1520 J	1460 J	1030 J	1680 J	1120 J		143 J
BERYLLIUM		0.39 U	0.43 U	0.56 J	0.69 U	0.43 J	0.4 U	0.52 J	0.5 U		0.59 J
CADMIUM		18.1 J	3.1 J	7.1 J	27.2 J	18.1 J	12.9 J	19.5 J	15.4 J		0.8 J
CALCIUM		54200 J	7820 J	2450 J	38900 J	59800 J	8250 J	28600 J	98100 J		1520 J
CHROMIUM		15.4 J	15.4 J	19.6 J	71 J	24.7 J	22.4 J	23.8 J	36.2 J		13.3 J
COBALT		3.4 J	2.5 J	11.2 J	10.1 J	9.3 J	5.5 J	6.3 J	8 J		12.8 J
COPPER		1980 J	294 J	68.7 J	1340 J	1790 J	1630 J	2570 J	1660 J		85.3 J

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	SUMP	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	SUMP	GULLY
SAMPLING ROUND	01	01	03	01	03	01	03	01	03	01	01
LOCATION	16SW/SD01	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD07	16SW/SD08
SAMPLE NUMBER	16SD0101	16SD0301	16SD0302	16SD0401	16SD0402	16SD0501	16SD0502	16SD0601	16SD0602	16SD0701	16SD0801
SAMPLE CODE	NO SED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NO SED	NORMAL
DEPTH RANGE	---	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	---	0 - 0.3
SAMPLE DATE	4/1/2003	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	4/1/2003
Inorganics (mg/kg) (Continued)											
IRON		21000 J	18500 J	25500 J	37700 J	25800 J	17300 J	30500 J	24200 J		18200 J
LEAD		4990 J	748 J	229 J	4640 J	3570 J	2530 J	15200 J	8830 J		336 J
LITHIUM		2.9 J		10.4 J		4.7 J		4.1 J			7.2 J
MAGNESIUM		4820 J	1850 J	2100 J	3660 J	6080 J	2320 J	2220 J	4420 J		1310 J
MANGANESE		175 J	54.6 J	300 J	504 J	790 J	349 J	376 J	415 J		966 J
MERCURY		2.7 J	0.043 J	0.35 J	4.6	0.18 J	0.23	0.22 J	0.12		0.08 J
NICKEL		12.5 J	8.9 J	13.2 J	21.5 J	17.6 J	15 J	16.5 J	804 J		10.6 J
POTASSIUM		282 J	884 J	645 J	1520 J	350 J	1000 J	438 J	1180 J		492 J
SELENIUM		0.17 U	0.17 U	0.46 J	0.56 U	0.33 J	0.3 U	0.14 U	0.38 U		0.5 J
SILVER		0.29 U	0.05 U	0.15 U	0.53 U	0.21 U	0.2 U	0.39 U	0.41 U		0.11 U
SODIUM		43.8 U	31.1 U	23.6 U	86.7 J	34.4 U	42 U	20.6 U	66.8 J		44 U
STRONTIUM		2740 J		109 J		791 J		886 J			62.2 J
THALLIUM		0.06 U	0.11 U	0.19 U	0.35 U	0.09 U	0.2 U	0.09 U	0.33 U		0.16 U
TIN		12.3 J	3.8 J	3.2 J	15.7 J	12.5 J	15.7 J	19 J	19.6 J		1.1 J
TITANIUM		35.7 J		156 J		64.3 J		9.4 J			112 J
VANADIUM		12.8 J	16.5 J	35.8 J	36 J	21 J	20.1 J	17.1 J	22 J		25 J
ZINC		23400 J	3120 J	952 J	14700 J	14300 J	17000 J	7700 J	6670 J		573 J
AVS/SEM Parameters (µMO/g)											
ACID VOLATILE SULFIDE, SEM								0.56			
CADMIUM, SEM								0.145 J			
COPPER, SEM								18.3			
LEAD, SEM								16.3			
MERCURY, SEM								0.00014			
NICKEL, SEM								0.068			
ZINC, SEM								91 J			
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)								5.7 J			
PH (S.U.)								8			
TOTAL ORGANIC CARBON (mg/kg)								1600			

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**01**	**03**	**01**	**03**	**01**	**03**	**02**	**03**	**02**	**03**
LOCATION	**16SW/SD08**	**16SW/SD09**	**16SW/SD09**	**16SW/SD10**	**16SW/SD10**	**16SW/SD11**	**16SW/SD11**	**16SW/SD12**	**16SW/SD12**	**16SW/SD13**	**16SW/SD13**
SAMPLE NUMBER	**16SD0802**	**16SD0901**	**16SD0902**	**16SD1001**	**16SD1002**	**16SD1101**	**16SD1102**	**16SD1201**	**16SD1202**	**16SD1301**	**16SD1302**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**
DEPTH RANGE	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**
SAMPLE DATE	**10/10/2004**	**4/1/2003**	**10/7/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**10/25/2003**	**10/10/2004**	**10/25/2003**	**10/7/2004**
Volatile Organics (µg/kg)											
ACETONE								11 J		6 J	
CIS-1,2-DICHLOROETHENE								3 J		1.2 U	
DICHLORODIFLUOROMETHANE								1.4 U		1.2 U	
TRICHLOROETHENE								2 J		1.2 U	
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE		4.3 U		4.3 U		5.8 U					
ACENAPHTHENE		4.3 U		4.3 U		5.8 U					
ACENAPHTHYLENE		4.3 U		4.3 U		5.8 U					
ANTHRACENE		4.3 U		5 J		6 J					
BENZO(A)ANTHRACENE		4.3 U		15		31 J					
BENZO(A)PYRENE		4.3 U		21		43 J					
BENZO(B)FLUORANTHENE		6 J		30		57 J					
BENZO(G,H,I)PERYLENE		4.3 U		29		63 J					
BENZO(K)FLUORANTHENE		4.3 U		18		28 J					
CHRYSENE		5 J		31		52					
DI-N-BUTYL PHTHALATE		87 U		87 U		120 U					
DIBENZO(A,H)ANTHRACENE		4.3 U		4.3 U		5.8 UJ					
DIPHENYLAMINE		140 J		87 U		120 U					
FLUORANTHENE		6 J		30		55					
FLUORENE		4.3 U		4.3 U		5.8 U					
INDENO(1,2,3-CD)PYRENE		4.3 U		19		38 J					
NAPHTHALENE		4.3 U		4.3 U		5.8 U					
PHENANTHRENE		4.3 U		18		30					
PYRENE		6 J		39		88					
Energetics (mg/kg)											
2,6-DINITROTOLUENE		0.25 U		0.25 U		0.25 U		0.54 J		0.25 U	
RDX		0.25 U		0.25 U		0.25 U		0.25 U		0.25 U	
Herbicides (µg/kg)											
PENTACHLOROPHENOL		2.6 J		9.4 J		19 J					
Inorganics (mg/kg)											
ALUMINUM	16300 J	9830	17100 J	6940 J	15600 J	10300 J	19200 J	9490 J	14200 J	11200 J	12000 J
ANTIMONY	5 J	15.1 J	55.8 J	25.5 J	42.8 J	8.1 J	11 J	2.7 J	1.9 J	4.1 J	3.9 J
ARSENIC	7.9 J	9.8 J	8.2 J	14.1 J	21.7 J	10.3 J	8.9 J	9.8 J	8 J	29.8 J	10.5 J
BARIUM	168 J	572 J	534 J	257 J	346 J	171 J	172 J	107 J	123 J	137 J	126 J
BERYLLIUM	0.64 U	0.56 J	0.57 J	0.88 J	1.4 U	0.8 J	0.68 U	1.1 J	1.3 J	2.3 J	1.4 J
CADMIUM	1.1 J	11.1 J	11.9 J	6.8 J	11 J	3 J	2.9 J	0.81 J	0.83 J	1.9 J	1.8 J
CALCIUM	2020 J	4240 J	10800 J	1480 J	3970 J	7740 J	7710 J	891 J	1260 J	616 J	2200 J
CHROMIUM	22.3 J	19.6 J	22.6 J	68.5 J	85.2 J	27 J	30.3 J	19.8 J	25.4 J	80.9 J	36.3 J
COBALT	10.6 J	11.6 J	7.3 J	14 J	24.5 J	10.2 J	9.3 J	41.2 J	26.7 J	39.9 J	34.8 J
COPPER	69.4 J	332 J	402 J	250 J	386 J	266 J	260 J	20.1 J	22.2 J	28.5 J	40.9 J

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	01	03	01	03	01	03	02	03	02	03
LOCATION	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12	16SW/SD13	16SW/SD13
SAMPLE NUMBER	16SD0802	16SD0901	16SD0902	16SD1001	16SD1002	16SD1101	16SD1102	16SD1201	16SD1202	16SD1301	16SD1302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
DEPTH RANGE	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33
SAMPLE DATE	10/10/2004	4/1/2003	10/7/2004	4/1/2003	10/10/2004	4/1/2003	10/10/2004	10/25/2003	10/10/2004	10/25/2003	10/7/2004
Inorganics (mg/kg) (Continued)											
IRON	19400 J	25700 J	20600 J	65100 J	127000 J	28500 J	33800 J	43300 J	27100 J	126000 J	60000 J
LEAD	310 J	1480 J	1490 J	1010 J	1740 J	1120 J	1060 J	81.4 J	77.4 J	145 J	128 J
LITHIUM		8.1 J		4.5 J		8.1 J					
MAGNESIUM	1920 J	1540 J	2430 J	677 J	1190 J	1700 J	2100 J	705 J	1210 J	470 J	1190 J
MANGANESE	1100 J	596 J	483 J	918 J	1520 J	976 J	890 J	1460 J	1330 J	2410 J	1230 J
MERCURY	0.023 J	0.1 J	0.14 J	1.1 J	0.77	0.25 J	0.23	0.036 J	0.085 J	0.037 J	0.036 U
NICKEL	15.2 J	12.1 J	16.5 J	12.1 J	30.2 J	22.5 J	24.9 J	43 J	40.6 J	58 J	49.4 J
POTASSIUM	1360 J	605 J	1530 J	328 J	1030 J	589 J	1420 J	866 J	1390 J	704 J	1320 J
SELENIUM	0.56 U	0.47 J	0.43 J	0.39 J	1.1 J	0.9 J	1 J	0.57 J	0.57 U	1.5 J	0.77 J
SILVER	0.09 U	0.11 U	0.11 U	0.09 U	0.09 U	0.46 U	0.38 U	0.24 U	0.41 U	0.13 U	0.14 U
SODIUM	119 J	16.3 U	54.4 U	11.7 U	37.1 U	160 J	283 J	34.1 U	62.1 U	34.9 J	65.3 U
STRONTIUM		227 J		57.8 J		58 J					
THALLIUM	0.23 U	0.14 U	0.23 U	0.09 U	0.19 U	0.16 U	0.25 U	0.14 U	0.29 U	0.16 U	0.15 U
TIN	1.1 U	2.4 J	13.3 J	2.8 J	2.4 J	5.3 J	4.2 J	0.4 J	0.57 U	0.31 U	0.56 U
TITANIUM		60.7 J		95.3 J		100 J		43.8 J		61.2 J	
VANADIUM	32.9 J	29.5 J	32.3 J	48.9 J	71 J	40.3 J	45 J	24.6 J	29.2 J	71.7 J	33.5 J
ZINC	624 J	1570 J	2590 J	2330 J	4530 J	2680 J	2240 J	243 J	270 U	514 J	527 J
AVS/SEM Parameters (µMO/g)											
ACID VOLATILE SULFIDE, SEM		0.59									
CADMIUM, SEM		0.075 J									
COPPER, SEM		4.98									
LEAD, SEM		4.14									
MERCURY, SEM		0.00015									
NICKEL, SEM		0.035									
ZINC, SEM		20.6 J									
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)		18 J									
PH (S.U.)		7.8									
TOTAL ORGANIC CARBON (mg/kg)		3900									

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	01	03	03	03	03	03
LOCATION	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD22	16SW/SD23	16SW/SD23	16SW/SD26	16SW/SD27	16SW/SD28	16SW/SD29
SAMPLE NUMBER	16SD1501	16SD1601	16SD1602	16SD1701	16SD2201	16SD2301	16SD2302	16SD2601	16SD2701	16SD2801	16SD2901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
SAMPLE DATE	10/24/2003	10/24/2003	10/14/2004	10/24/2003	10/24/2003	4/1/2003	10/10/2004	10/7/2004	10/7/2004	10/8/2004	10/8/2004
Volatile Organics (µg/kg)											
ACETONE	7 J	3 J		1.3 U	69 J				7 BU	35 BJ	10 BU
CIS-1,2-DICHLOROETHENE	1.2 U	1.3 U		1.3 U	1.58 U				1.49 U	1.12 U	1.4 U
DICHLORODIFLUOROMETHANE	1.2 U	1.3 U		1.3 UJ	1.58 U				2 J	1.12 U	1.4 U
TRICHLOROETHENE	1.2 U	1.3 U		1.3 U	1.58 U				1.49 U	1.12 U	19
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE					4.6 U	4.4 U					
ACENAPHTHENE					4.6 U	4.4 U					
ACENAPHTHYLENE					4.6 U	4.4 U					
ANTHRACENE					4.6 U	4.4 U					
BENZO(A)ANTHRACENE					5 J	6 J					
BENZO(A)PYRENE					4.6 U	8 J					
BENZO(B)FLUORANTHENE					4.6 U	20					
BENZO(G,H,I)PERYLENE					4.6 U	11					
BENZO(K)FLUORANTHENE					4.6 U	9					
CHRYSENE					4.6 U	19					
DI-N-BUTYL PHTHALATE						89 U					
DIBENZO(A,H)ANTHRACENE					4.6 U	4.4 U					
DIPHENYLAMINE						89 U					
FLUORANTHENE					4.6 U	25					
FLUORENE					4.6 U	4.4 U					
INDENO(1,2,3-CD)PYRENE					4.6 U	7 J					
NAPHTHALENE					4.6 U	4.4 U					
PHENANTHRENE					4.6 U	14					
PYRENE					4.6 U	20					
Energetics (mg/kg)											
2,6-DINITROTOLUENE	0.92 J	0.25 U		0.25 U		0.25 U					
RDX	0.25 U	0.25 U		0.25 U		0.25 U					
Herbicides (µg/kg)											
PENTACHLOROPHENOL						0.6 U					
Inorganics (mg/kg)											
ALUMINUM	13700 J	12700 J	14600 J	11200 J		11800	11100 J	11300 J	8760 J	11700 J	11800 J
ANTIMONY	0.65 J	9.5 J	10.9 J	1 J		7.8 J	19.9 J	1.7 J	4.4 J	1.8 J	9.4 J
ARSENIC	18.7 J	9.5 J	6 J	17.4 J		11.2 J	4.6 J	34.1 J	6.6 J	12.7 J	10.3 J
BARIUM	76.6 J	198 J	201 J	113 J		1240 J	421 J	105 J	145 J	83.9 J	168 J
BERYLLIUM	1.8 J	1.1 J	0.85 U	1.5 J		0.63 J	0.49 U	1.9 J	0.99 J	1 J	0.75 J
CADMIUM	0.47 J	3 J	2.3 J	0.53 J		4.8 J	2.3 J	0.64 J	1.8 J	0.73 J	2.4 J
CALCIUM	779 J	1120 J	1350 J	1980 J		2980 J	1860 J	843 J	2260 J	1150 J	2940 J
CHROMIUM	57.2 J	22.7 J	18 J	38.3 J		20.5 J	17.2 J	73.1 J	17.2 J	34.6 J	25.7 J
COBALT	17.8 J	20.2 J	11.5 J	21.2 J		12.4 J	4.7 J	34.6 J	24.5 J	29.5 J	14.2 J
COPPER	13.1 J	121 J	160 J	13.4 J		172 J	315 J	14.5 J	67.9 J	17.9 J	120 J

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	01	03	03	03	03	03
LOCATION	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD22	16SW/SD23	16SW/SD23	16SW/SD26	16SW/SD27	16SW/SD28	16SW/SD29
SAMPLE NUMBER	16SD1501	16SD1601	16SD1602	16SD1701	16SD2201	16SD2301	16SD2302	16SD2601	16SD2701	16SD2801	16SD2901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
SAMPLE DATE	10/24/2003	10/24/2003	10/14/2004	10/24/2003	10/24/2003	4/1/2003	10/10/2004	10/7/2004	10/7/2004	10/8/2004	10/8/2004
Inorganics (mg/kg) (Continued)											
IRON	87700 J	29800 J	16500 J	58500 J		30600 J	20500 J	91700 J	17700 J	45400 J	40800 J
LEAD	19.7 J	371 J	466 J	34.1 J		770 J	1300 J	55.2 J	242 J	69.5 J	565 J
LITHIUM						8.8 J					
MAGNESIUM	748 J	838 J	1310 J	839 J		1620 J	982 J	655 J	1030 J	908 J	1390 J
MANGANESE	834 J	2140 J	1450 J	1650 J		893 J	594 J	2510 J	867 J	1630 J	924 J
MERCURY	0.034 J	0.93	0.71	0.037 J		0.17 J	0.15	0.056 U	0.048 U	0.033 U	0.13 J
NICKEL	34.4 J	21 J	21.5 J	27.1 J		13.5 J	10.8 J	29.9 J	40.2 J	27.1 J	22.3 J
POTASSIUM	1030 J	1120 J	1450 J	1130 J		606 J	957 J	872 J	928 J	965 J	1220 J
SELENIUM	0.53 J	0.47 J	0.45 U	0.59 J		0.55 J	0.41 U	1.4 J	0.43 U	0.64 J	0.54 U
SILVER	0.01 U	0.06 U	0.07 U	0.15 U		0.04 U	0.06 U	0.05 U	0.19 U	0.15 U	1.5 J
SODIUM	33.8 J	26.5 U	38.8 U	25.9 U		40.2 U	28.5 U	154 J	49.4 U	47.6 U	63.6 U
STRONTIUM						51 J					
THALLIUM	0.17 U	0.21 U	0.2 U	0.14 U		0.14 U	0.15 U	0.13 U	0.13 U	0.14 U	0.17 U
TIN	0.31 U	1.8 U	2.5 J	0.59 U		2.2 J	5.3 J	0.33 U	1 U	0.43 U	1.5 J
TITANIUM	77.6 J	61.7 J		73.4 J		82.5 J					
VANADIUM	47.6 J	28.3 J	24.2 J	36.1 J		34.9 J	24 J	60.9 J	20 J	38.1 J	32.8 J
ZINC	74.9 J	844 J	936 J	79.9 J		1700 J	1860 J	155 J	447 J	220 J	971 J
AVS/SEM Parameters (µMO/g)											
ACID VOLATILE SULFIDE, SEM						0.53					
CADMIUM, SEM						0.024 J					
COPPER, SEM						1.83					
LEAD, SEM						2.6					
MERCURY, SEM						0.00011					
NICKEL, SEM						0.028					
ZINC, SEM						22.4 J					
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)						25 J					
PH (S.U.)						7.4					
TOTAL ORGANIC CARBON (mg/kg)						8600					

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**02**	**02**	**02**
LOCATION	**16SW/SD30**	**16SW/SD14**	**16SW/SD20**	**16SW/SD21**
SAMPLE NUMBER	**16SD3001**	**16SD1401**	**16SD2001**	**16SD2101**
SAMPLE CODE	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**
SAMPLE DATE	**10/8/2004**	**10/24/2003**	**10/25/2003**	**10/24/2003**
Volatile Organics (µg/kg)				
ACETONE	2 BU	7 J	5 J	1.1 UJ
CIS-1,2-DICHLOROETHENE	0.948 U	1.2 U	1.2 U	1.1 U
DICHLORODIFLUOROMETHANE	0.948 U	1.2 U	1.2 U	1.1 U
TRICHLOROETHENE	0.948 U	1.2 U	1.2 U	1.1 U
Semivolatile Organics (µg/kg)				
2-METHYLNAPHTHALENE				
ACENAPHTHENE				
ACENAPHTHYLENE				
ANTHRACENE				
BENZO(A)ANTHRACENE				
BENZO(A)PYRENE				
BENZO(B)FLUORANTHENE				
BENZO(G,H,I)PERYLENE				
BENZO(K)FLUORANTHENE				
CHRYSENE				
DI-N-BUTYL PHTHALATE				
DIBENZO(A,H)ANTHRACENE				
DIPHENYLAMINE				
FLUORANTHENE				
FLUORENE				
INDENO(1,2,3-CD)PYRENE				
NAPHTHALENE				
PHENANTHRENE				
PYRENE				
Energetics (mg/kg)				
2,6-DINITROTOLUENE		0.25 U	0.25 U	0.25 U
RDX		0.25 U	0.25 U	0.25 U
Herbicides (µg/kg)				
PENTACHLOROPHENOL				
Inorganics (mg/kg)				
ALUMINUM	15500 J	8930 J	8710 J	12800 J
ANTIMONY	0.6 U	1.7 J	1.4 J	1.3 J
ARSENIC	12.3 J	27.5 J	24.4 J	25.9 J
BARIUM	56.6 J	84.5 J	454 J	127 J
BERYLLIUM	0.94 J	1.6 J	3 J	1.9 J
CADMIUM	0.33 U	0.38 J	0.62 J	0.45 J
CALCIUM	395 J	846 J	539 J	805 J
CHROMIUM	24.7 J	36.9 J	85 J	48 J
COBALT	13.8 J	38.7 J	29.7 J	38.2 J
COPPER	9.2 J	14.8 J	14.9 J	15 J

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED
GULLY AND SUMP SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**02**	**02**	**02**
LOCATION	**16SW/SD30**	**16SW/SD14**	**16SW/SD20**	**16SW/SD21**
SAMPLE NUMBER	**16SD3001**	**16SD1401**	**16SD2001**	**16SD2101**
SAMPLE CODE	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**
SAMPLE DATE	**10/8/2004**	**10/24/2003**	**10/25/2003**	**10/24/2003**
Inorganics (mg/kg) (Continued)				
IRON	30300 J	74000 J	141000 J	80800 J
LEAD	13.6 J	29.6 J	73.2 J	39.6 J
LITHIUM				
MAGNESIUM	1140 J	491 J	646 J	916 J
MANGANESE	809 J	2270 J	3650 J	2670 J
MERCURY	0.03 U	0.026 J	0.043 J	0.034 J
NICKEL	18 J	39.2 J	34.5 J	36.4 J
POTASSIUM	1500 J	739 J	757 J	1120 J
SELENIUM	0.36 U	0.99 J	0.7 J	1.2 J
SILVER	0.045 U	0.16 U	0.8 U	0.04 U
SODIUM	44 U	43.9 J	26.7 U	40.3 J
STRONTIUM				
THALLIUM	0.17 U	0.26 U	0.48 J	0.19 U
TIN	0.43 U	0.17 U	0.26 U	0.25 U
TITANIUM		54.3 J	39.5 J	44 J
VANADIUM	34.1 J	43.7 J	46.3 J	52.4 J
ZINC	68.3 J	124 J	131 J	109 J
AVS/SEM Parameters (µMO/g)				
ACID VOLATILE SULFIDE, SEM				
CADMIUM, SEM				
COPPER, SEM				
LEAD, SEM				
MERCURY, SEM				
NICKEL, SEM				
ZINC, SEM				
Miscellaneous Parameters				
CATION EXCHANGE CAPACITY (MEQ/1)				
PH (S.U.)				
TOTAL ORGANIC CARBON (mg/kg)				

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
MEQ/1 - milliequivalents per 100 grams
mg/kg - milligram per kilogram
QC - quality control
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
SEM - simultaneoulsy extracted metal
µg/kg -microgram per kilogram
µMO/g - micromole per gram

TABLE 3-19

SUMMARY OF CHEMICALS DETECTED
TURKEY CREEK MAINSTREAM SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**
STREAM ORDER	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**TCMS**
SAMPLING ROUND	**02**	**03**	**03**	**03**	**02**
LOCATION	**16SW/SD19**	**16SW/SD19**	**16SW/SD24**	**16SW/SD25**	**16SW/SD18**
SAMPLE NUMBER	**16SD1901**	**16SD1902**	**16SD2401**	**16SD2501**	**16SD1801**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**
SAMPLE DATE	**10/24/2003**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**
Volatile Organics (µg/kg)					
ACETONE	7 J				1.2 U
DICHLORODIFLUOROMETHANE	22				1.2 U
Inorganics (mg/kg)					
ALUMINUM	8730 J	10500 J	9940 J	9460 J	8090 J
ANTIMONY	1.1 J	0.8 J	0.74 U	1.1 J	1.2 J
ARSENIC	30.8 J	19.2 J	27.5 J	7 J	34.8 J
BARIUM	110 J	88.9 J	77.2 J	69.7 J	62.5 J
BERYLLIUM	2.4 J	1.5 J	2.1 J	0.4 U	2.6 J
CADMIUM	0.79 J	0.57 J	0.54 J	0.47 U	0.54 J
CALCIUM	973 J	875 J	539 J	843 J	362 J
CHROMIUM	71.8 J	38.7 J	79.9 J	16.3 J	78.5 J
COBALT	26.9 J	22.2 J	22.8 J	16.1 J	21.4 J
COPPER	13.5 J	15.1 J	14.3 J	13.4 J	12.6 J
IRON	122000 J	68600 J	90900 J	15800 J	124000 J
LEAD	27.1 J	23.3 J	28.6 J	32.9 J	28.1 J
MAGNESIUM	400 J	884 J	547 J	916 J	292 J
MANGANESE	1900 J	1730 J	1320 J	398 J	1370 J
MERCURY	0.022 J	0.045 U	0.036 U	0.046 U	0.025 J
NICKEL	43.4 J	35.2 J	38.8 J	20.8 J	43 J
POTASSIUM	462 J	950 J	790 J	1040 J	438 J
SELENIUM	0.72 J	0.5 J	0.8 J	0.31 U	0.5 J
TITANIUM	50.6 J				56.4 J
VANADIUM	50.2 J	37.5 J	51.2 J	21.1 J	56.3 J
ZINC	206 J	84.4 J	89.4 J	114 J	92.5 J

Notes:
TCMS - Turkey Creek Mainstream
Turkey Creek Mainstream sediment samples were only collected in sampling Rounds 2 and 3.
mg/kg - milligram per kilogram
µg/kg - microgram per kilogram

TABLE 3-20

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGHEXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/L)								
1,1,2,2-TETRACHLOROETHANE	2/23	1.6 J	2.1	0.3 - 60	2.24	1.85	16GWT0604	ND
1,1,2-TRICHLOROETHANE	7/23	2.1	220 J	0.3 - 60	27.6	86.0	16GWT0603	ND
1,1-DICHLOROETHENE	6/23	1.4	160	0.3 - 60	15.8	52.9	16GWT0604	ND
1,2,3-TRICHLOROPROPANE	1/23	0.6 J	0.6 J	0.3 - 60	2.11	0.600	16GWT0604	ND
1,2-DICHLOROETHANE	2/23	0.6 J	2.3	0.3 - 60	2.21	1.45	16GWT0604	ND
2-HEXANONE	2/23	1.4 J	16 J	0.5 - 100	4.22	8.70	16GWT0603	ND
4-METHYL-2-PENTANONE	3/23	3.5 J	27	0.5 - 100	5.09	12.5	16GWT0604	ND
ACETONE	3/17	0.5 J	18 J	0.5 - 100	4.91	6.60	16GWT0603	ND
BENZENE	5/23	0.9 J	3.5	0.3 - 60	2.49	1.98	16GWT0604	ND
BROMODICHLOROMETHANE	1/23	0.8 J	0.8 J	0.3 - 60	2.12	0.800	16GWT0601	ND
CARBON DISULFIDE	3/23	0.8 J	4.3	0.3 - 60	2.43	2.71	16GWT0603	ND
CARBON TETRACHLORIDE	4/23	0.8 J	15	0.3 - 60	3.84	10.2	16GW0301	ND
CHLOROFORM	12/23	0.8 J	15	0.3 - 60	4.81	5.35	16GWT0604	ND
CIS-1,2-DICHLOROETHENE	16/23	0.2 J	4200	0.3	435	625	16GWT0603	ND
ETHANE	4/4	0.013	7.7	---	2.12	2.12	16GWT0603	0.062
ETHENE	4/4	0.027	65	---	16.5	16.5	16GWT0603	0.018
ETHYLBENZENE	3/23	1.6	3.9	0.3 - 60	2.43	2.70	16GWT0604	ND
METHANE	4/4	0.032	280	---	75.0	75.0	16GWT0603	15
METHYLENE CHLORIDE	1/23	59 J	59 J	0.3 - 60	4.01	59.0	16GWT1301	ND
TETRACHLOROETHENE	5/23	1.4	160	0.3 - 60	16.5	66.3	16GWT0603	ND
TOLUENE	4/23	2.8	310 J	0.3 - 60	28.8	154	16GWT0604	ND
TOTAL XYLENES	3/23	2.8	6.5	0.3 - 60	2.63	4.27	16GWT0604	ND
TRANS-1,2-DICHLOROETHENE	6/23	1	22	0.3 - 60	4.32	8.68	16GWT0603	ND
TRICHLOROETHENE	23/23	1.2	330000	---	32017	32017	16GWT0604	ND
VINYL CHLORIDE	7/23	0.3 J	390 J	0.3 - 60	36.8	114	16GWT0604	ND
Semivolatile Organics (µg/L)								
2-METHYLNAPHTHALENE	1/4	0.11	0.11	0.05	0.0463	0.110	16GWT0601	ND
ACENAPHTHENE	1/4	0.07 J	0.07 J	0.05	0.0363	0.0700	16GWT0601	ND
BENZO(B)FLUORANTHENE	1/4	0.09 J	0.09 J	0.05	0.0413	0.0900	16GWT0601	ND
CHRYSENE	1/4	0.1 J	0.1 J	0.05	0.0438	0.100	16GWT0601	ND
DIETHYL PHTHALATE	1/5	1 J	1 J	1	0.600	1.00	16GWT0601	ND
FLUORANTHENE	1/4	0.11	0.11	0.05	0.0463	0.110	16GWT0601	ND
FLUORENE	1/4	0.1 J	0.1 J	0.05	0.0438	0.100	16GWT0601	ND
PHENANTHRENE	1/4	0.54	0.54	0.05	0.154	0.540	16GWT0601	ND
PYRENE	1/4	0.2	0.2	0.05	0.0688	0.200	16GWT0601	ND
PYRIDINE	1/5	9	9	1	2.20	9.00	16GWT0602	ND
Energetics (µg/L)								
1,3,5-TRINITROBENZENE	1/21	1.8	1.8	0.242 - 0.55	0.228	1.80	16GWT0604	ND
2,4,6-TRINITROTOLUENE	1/21	4.8	4.8	0.242 - 0.55	0.371	4.80	16GWT0604	ND
2,4-DIAMINO-6-NITROTOLUENE	1/8	0.27 J	0.27 J	0.25 - 0.287	0.151	0.270	16GWT0603	ND
2,4-DINITROTOLUENE	1/21	0.8	0.8	0.242 - 0.55	0.180	0.800	16GWT0604	ND
2-AMINO-4,6-DINITROTOLUENE	7/21	0.31 J	29 J	0.26 - 0.55	1.81	5.14	16GWT0604	ND
3-NITROTOLUENE	2/21	1.5 J	2.1 J	0.242 - 0.55	0.307	1.80	16GWT1002	ND

TABLE 3-20

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGHEXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [1]	Average of Positive Detects [1]	Sample of Maximum Detect	Range of Upgradient Detects
Energetics (µg/L) (Continued)								
4-AMINO-2,6-DINITROTOLUENE	8/21	0.56	14	0.26 - 0.55	1.08	2.59	16GWT0604	ND
DNX	1/8	0.63 J	0.63 J	0.25 - 0.287	0.195	0.630	16GWT0402	ND
HMX	13/21	0.27 J	21	0.26 - 0.385	4.31	6.87	16GWT0402	ND
MNX	4/8	0.5 J	4.1	0.25 - 0.275	0.881	1.63	16GWT0402	ND
RDX	18/21	0.79	200	0.26 - 0.275	40.6	47.3	16GWT0402	ND
Total Metals (µg/L)								
ALUMINUM	11/12	168	5810 J	29.1	1250	1363	16GWT1001	85.6
ARSENIC	4/12	0.81 J	4.5 J	0.1 - 1.9	0.920	2.00	16GWT0601	0.66 J
BARIUM	12/12	13.4 J	107 J	---	50.5	50.5	16GWT0201	17.8 J - 21.6 J
BERYLLIUM	1/12	1.9 J	1.9 J	0.03 - 1.3	0.353	1.90	16GWT1001	ND
CALCIUM	12/12	22600 J	101000 J	---	57242	57242	16GWT0603	97300 J - 212000 J
CHROMIUM	4/12	0.68 J	5.5 J	0.3 - 1.3	1.05	2.65	16GWT1301	ND
COBALT	12/12	2 J	131 J	---	34.2	34.2	16GWT1001	9.2 J - 18.7 J
COPPER	7/12	0.82 J	12.4 J	0.56 - 1.2	3.31	5.35	16GWT1001	0.87 J
IRON	12/12	171 J	50200 J	---	10233	10233	16GWT1001	287 J - 13700 J
LEAD	3/12	2.6 J	6.6 J	0.12 - 0.55	1.27	4.53	16GWT1001	ND
LITHIUM	3/4	8.5 J	33.2 J	0.72	16.0	21.2	16GW0301	32.7 J - 33.6 J
MAGNESIUM	12/12	8270 J	78800 J	---	23549	23549	16GWT1001	6240 J - 35200 J
MANGANESE	12/12	353 J	24600 J	---	4670	4670	16GWT1001	864 J - 2440 J
NICKEL	12/12	1.5 J	219 J	---	75.2	75.2	16GWT1001	27 J - 36.7 J
POTASSIUM	12/12	1360 J	11900 J	---	4398	4398	16GWT0601	738 J - 2640 J
SELENIUM	1/12	1.2 J	1.2 J	0.04 - 1.4	0.284	1.20	16GWT0601	ND
SODIUM	12/12	6770 J	149000 J	---	33230	33230	16GWT0603	17900 J - 20200 J
STRONTIUM	4/4	186 J	387 J	---	276	276	16GWT0201	88.4 J - 98.4 J
TITANIUM	7/12	1 J	35 J	0.45 - 4.5	6.39	10.4	16GWT0603	3 J - 3.8 J
VANADIUM	4/12	0.51 J	4.1 J	0.05 - 0.36	0.691	1.90	16GWT1301	ND
ZINC	12/12	6.2 J	443 J	---	97.7	97.7	16GWT1001	15.8 J - 50 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	1/1	342 J	342 J	---	342	342	16GWT1301-F	NA
BARIUM, FILTERED	1/1	56.6 J	56.6 J	---	56.6	56.6	16GWT1301-F	NA
CALCIUM, FILTERED	1/1	38800 J	38800 J	---	38800	38800	16GWT1301-F	NA
COBALT, FILTERED	1/1	58.5 J	58.5 J	---	58.5	58.5	16GWT1301-F	NA
COPPER, FILTERED	1/1	5.4 J	5.4 J	---	5.40	5.40	16GWT1301-F	NA
IRON, FILTERED	1/1	5230 J	5230 J	---	5230	5230	16GWT1301-F	NA
MAGNESIUM, FILTERED	1/1	11800 J	11800 J	---	11800	11800	16GWT1301-F	NA
MANGANESE, FILTERED	1/1	3600 J	3600 J	---	3600	3600	16GWT1301-F	NA
NICKEL, FILTERED	1/1	193 J	193 J	---	193	193	16GWT1301-F	NA
POTASSIUM, FILTERED	1/1	7280 J	7280 J	---	7280	7280	16GWT1301-F	NA
SODIUM, FILTERED	1/1	18500 J	18500 J	---	18500	18500	16GWT1301-F	NA
ZINC, FILTERED	1/1	244 J	244 J	---	244	244	16GWT1301-F	NA

TABLE 3-20

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGHEXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Field Parameters (mg/L)								
ALKALINITY	2/5	75	200	10	58.0	138	16GWT0603	300
CARBON DIOXIDE	5/5	19	280	---	122	122	16GWT1001	105
DISSOLVED OXYGEN	14/14	0.08	6	---	1.44	1.44	16GWT1301	0.12 - 0.2
DISSOLVED OXYGEN - METER	15/15	0.48	7.27	---	2.55	2.55	16GWT1301	0.64 - 6.3
HYDROGEN SULFIDE (H2S)	5/5	0	0	---	---	---	---	0
IRON(+2)	5/5	0.03	5.19	---	2.47	2.47	16GWT0402	3.3 >
MANGANESE(+2)	5/5	1	22 >	---	6.60	6.60	16GWT1001	1.5
NITRITE-N	5/5	0.002	0.016	---	0.00740	0.00740	16GWT0603	0.003
OXIDATION REDUCTION POTENTIAL (MV)	24/24	-117.1	541	---	207	207	16GWT1302	-46.1 - 124
PH (S.U.)	24/24	3.21	7.7	---	5.50	5.50	16GWT0601	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	24/24	0.225	2.5	---	0.809	0.809	16GWT0103	0.496 - 1.75
SULFIDE	5/5	0	0.07	---	0.0240	0.0240	16GWT0603	0
TEMPERATURE (C)	24/24	11.51	21.88	---	16.1	16.1	16GWT1301	11.8 - 17.24
TURBIDITY (NTU)	24/24	1.06	999 >	---	59.1	59.1	16GWT0101	0 - 2.2
Miscellaneous Parameters (mg/L)								
AMMONIA-N	4/4	0.02	0.57	---	0.288	0.288	16GWT0601	0.04
CHLORIDE	6/8	5	120	14 - 17	36.1	45.5	16GWT1701	14
NITRITE/NITRATE-N	8/12	0.03	0.7	0.025 - 0.05	0.284	0.415	16GW0302	ND
SULFATE	6/8	40	980 J	180 - 210	266	322	16GWT1001	270
TOTAL ORGANIC CARBON	1/1	1.4	1.4	---	1.40	1.40	16GWT0402	1.7

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
C - Celsius
DNX - hexahydro-1,3-dinitroso-5-dinitro-1,3,5-triazine
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
MEQ/1 - milliequivalents per 100 grams
mg/L - milligrams per liter
MNX - hexahydro-1,3,5-trinitroso-1,3,5-triazine
MS/cm - milliSiemens per centimeter
MV - milliVolt
NA - Not Analyzed
ND - Not Detected
NTU - nephelometric turbidity units
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L - microgram per liter

TABLE 3-21

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 1
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/L)								
1,1,2-TRICHLOROETHANE	1/5	38 J	38 J	0.3	7.72	38.0	16GWT0601	ND
1,1-DICHLOROETHENE	1/5	26 J	26 J	0.3	5.32	26.0	16GWT0601	ND
4-METHYL-2-PENTANONE	1/5	3.5 J	3.5 J	0.5	0.900	3.50	16GWT0601	ND
ACETONE	1/2	1.3 J	1.3 J	10	3.15	1.30	16GWT0101	ND
BENZENE	1/5	0.9 J	0.9 J	0.3	0.300	0.900	16GWT0601	ND
BROMODICHLOROMETHANE	1/5	0.8 J	0.8 J	0.3	0.280	0.800	16GWT0601	ND
CARBON DISULFIDE	1/5	0.8 J	0.8 J	0.3	0.280	0.800	16GWT0601	ND
CARBON TETRACHLORIDE	1/5	15	15	0.3	3.12	15.0	16GW0301	ND
CHLOROFORM	2/5	5.6	12 J	0.3	3.61	8.80	16GWT0601	ND
CIS-1,2-DICHLOROETHENE	3/5	0.4 J	600	0.3	121	201	16GWT0601	ND
TETRACHLOROETHENE	1/5	13 J	13 J	0.3	2.72	13.0	16GWT0601	ND
TOLUENE	1/5	32 J	32 J	0.3	6.52	32.0	16GWT0601	ND
TRANS-1,2-DICHLOROETHENE	1/5	3.1 J	3.1 J	0.3	0.740	3.10	16GWT0601	ND
TRICHLOROETHENE	5/5	1.2	35000	---	7005	7005	16GWT0601	ND
VINYL CHLORIDE	2/5	0.3 J	65 J	0.3	13.2	32.7	16GWT0601	ND
Semivolatile Organics (µg/L)								
2-METHYLNAPHTHALENE	1/4	0.11	0.11	0.05	0.0463	0.110	16GWT0601	ND
ACENAPHTHENE	1/4	0.07 J	0.07 J	0.05	0.0363	0.0700	16GWT0601	ND
BENZO(B)FLUORANTHENE	1/4	0.09 J	0.09 J	0.05	0.0413	0.0900	16GWT0601	ND
CHRYSENE	1/4	0.1 J	0.1 J	0.05	0.0438	0.100	16GWT0601	ND
DIETHYL PHTHALATE	1/5	1 J	1 J	1	0.600	1.00	16GWT0601	ND
FLUORANTHENE	1/4	0.11	0.11	0.05	0.0463	0.110	16GWT0601	ND
FLUORENE	1/4	0.1 J	0.1 J	0.05	0.0438	0.100	16GWT0601	ND
PHENANTHRENE	1/4	0.54	0.54	0.05	0.154	0.540	16GWT0601	ND
PYRENE	1/4	0.2	0.2	0.05	0.0688	0.200	16GWT0601	ND
PYRIDINE	1/5	9	9	1	2.20	9.00	16GWT0602	ND
Energetics (µg/L)								
2-AMINO-4,6-DINITROTOLUENE	1/4	0.48 J	0.48 J	0.34 - 0.55	0.279	0.480	16GW0301	ND
4-AMINO-2,6-DINITROTOLUENE	1/4	0.86 J	0.86 J	0.34 - 0.55	0.374	0.860	16GW0301	ND
HMX	2/4	5.7	7.8	0.34 - 0.385	3.47	6.75	16GWT0401	ND
RDX	4/4	0.79	77	---	33.4	33.4	16GWT0401	ND

TABLE 3-21

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 1
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Total Metals (µg/L)								
ALUMINUM	4/4	168	1050	---	623	623	16GW0301, 16GWT0401	85.6
ARSENIC	2/4	0.81 J	4.5 J	0.1 - 0.41	1.39	2.66	16GWT0601	0.66 J
BARIUM	4/4	13.5 J	107 J	---	56.5	56.5	16GWT0201	17.8 J - 21.6 J
CALCIUM	4/4	22600 J	96800 J	---	53875	53875	16GWT0601	97300 J - 212000 J
CHROMIUM	2/4	0.68 J	0.93 J	0.44 - 0.56	0.528	0.805	16GWT0601	ND
COBALT	4/4	2 J	15.1 J	---	7.03	7.03	16GW0301	9.2 J - 18.7 J
COPPER	4/4	0.82 J	4.9 J	---	2.98	2.98	16GWT0601	0.87 J
IRON	4/4	171 J	5850 J	---	1822	1822	16GWT0201	287 J - 13700 J
LITHIUM	3/4	8.5 J	33.2 J	0.72	16.0	21.2	16GW0301	32.7 J - 33.6 J
MAGNESIUM	4/4	8270 J	19700 J	---	13218	13218	16GWT0601	6240 J - 35200 J
MANGANESE	4/4	353 J	2590 J	---	1346	1346	16GWT0201	864 J - 2440 J
NICKEL	4/4	1.5 J	43.1 J	---	18.5	18.5	16GW0301	27 J - 36.7 J
POTASSIUM	4/4	1360 J	11900 J	---	4360	4360	16GWT0601	738 J - 2640 J
SELENIUM	1/4	1.2 J	1.2 J	0.2 - 0.43	0.424	1.20	16GWT0601	ND
SODIUM	4/4	7190 J	37100 J	---	22348	22348	16GWT0601	17900 J - 20200 J
STRONTIUM	4/4	186 J	387 J	---	276	276	16GWT0201	88.4 J - 98.4 J
TITANIUM	4/4	1 J	8.4 J	---	4.43	4.43	16GWT0401	3 J - 3.8 J
VANADIUM	2/4	0.51 J	0.8 J	0.05 - 0.36	0.379	0.655	16GWT0601	ND
ZINC	4/4	6.2 J	69.5 J	---	30.9	30.9	16GW0301	15.8 J - 50 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN - METER	6/6	480	6940	---	3298	3298	16GWT0602	0.64 - 6.3
OXIDATION REDUCTION POTENTIAL (MV)	6/6	-117.1	154.2	---	11.1	11.1	16GW0301	-46.1 - 124
PH (S.U.)	6/6	5.84	7.7	---	6.60	6.60	16GWT0601	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	6/6	0.225	1.061	---	0.608	0.608	16GWT0101	0.496 - 1.75
TEMPERATURE (C)	6/6	11.51	15	---	13.4	13.4	16GWT0601	11.8 - 17.24
TURBIDITY (NTU)	6/6	2.8	999 >	---	178	178	16GWT0101	0 - 2.2
Miscellaneous Parameters (mg/L)								
AMMONIA-N	4/4	20	570	---	288	288	16GWT0601	0.04
NITRITE/NITRATE-N	4/4	30	600	---	418	418	16GWT0401	ND

Notes:
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligrams per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
ND - Not Detected
NTU - nephelometric turbidity units
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
µg/L - microgram per liter

TABLE 3-22

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detects	Range of Upgradient Detects
Volatile Organics (µg/L)								
1,1,2,2-TETRACHLOROETHANE	1/9	1.6 J	1.6 J	0.3 - 30	1.96	1.60	16GWT0603	ND
1,1,2-TRICHLOROETHANE	3/9	32	220 J	0.3	37.1	111	16GWT0603	ND
1,1-DICHLOROETHENE	2/9	5.3	120	0.3 - 30	15.7	62.7	16GWT0603	ND
2-HEXANONE	1/9	16 J	16 J	0.5 - 50	4.75	16.0	16GWT0603	ND
4-METHYL-2-PENTANONE	1/9	7.1	7.1	0.5 - 50	3.76	7.10	16GWT0603	ND
ACETONE	2/6	0.5 J	18 J	0.5	3.25	9.25	16GWT0603	ND
BENZENE	2/9	1.1	3.3	0.3 - 30	2.26	2.20	16GWT0603	ND
CARBON DISULFIDE	1/9	4.3	4.3	0.3 - 30	2.26	4.30	16GWT0603	ND
CARBON TETRACHLORIDE	2/9	0.8 J	11	0.3 - 30	3.08	5.90	16GW0302	ND
CHLOROFORM	5/9	0.9 J	10	0.3 - 30	4.04	4.18	16GWT0603	ND
CIS-1,2-DICHLOROETHENE	8/9	0.2 J	4200	0.3	526	592	16GWT0603	ND
ETHANE	4/4	0.013	7.7	---	2.12	2.12	16GWT0603	0.062
ETHENE	4/4	0.027	65	---	16.5	16.5	16GWT0603	0.018
ETHYLBENZENE	1/9	2.6	2.6	0.3 - 30	2.07	2.60	16GWT0603	ND
METHANE	4/4	0.032	280	---	75.0	75.0	16GWT0603	15
METHYLENE CHLORIDE	1/9	59 J	59 J	0.3	6.69	59.0	16GWT1301	ND
TETRACHLOROETHENE	2/9	1.4	160	0.3 - 30	19.7	80.7	16GWT0603	ND
TOLUENE	1/9	270 J	270 J	0.3 - 30	31.8	270	16GWT0603	ND
TOTAL XYLENES	1/9	3.5	3.5	0.3 - 30	2.17	3.50	16GWT0603	ND
TRANS-1,2-DICHLOROETHENE	2/9	4.1	22	0.3 - 30	4.67	13.1	16GWT0603	ND
TRICHLOROETHENE	9/9	1.9	250000	---	35917	35917	16GWT0603	ND
VINYL CHLORIDE	2/9	2.1	340 J	0.3 - 30	39.8	171	16GWT0603	ND
Energetics (µg/L)								
2,4-DIAMINO-6-NITROTOLUENE	1/8	0.27 J	0.27 J	0.25 - 0.287	0.151	0.270	16GWT0603	ND
2-AMINO-4,6-DINITROTOLUENE	4/8	0.31 J	4.2 J	0.26 - 0.287	0.768	1.40	16GWT0603	ND
4-AMINO-2,6-DINITROTOLUENE	4/8	0.69 J	1.5	0.26 - 0.287	0.604	1.07	16GWT0603	ND
DNX	1/8	0.63 J	0.63 J	0.25 - 0.287	0.195	0.630	16GWT0402	ND
HMX	6/8	0.27 J	21	0.26 - 0.275	5.90	7.82	16GWT0402	ND
MNX	4/8	0.5 J	4.1	0.25 - 0.275	0.881	1.63	16GWT0402	ND
RDX	7/8	1.8	200	0.26	56.1	64.1	16GWT0402	ND
Total Metals (µg/L)								
ALUMINUM	7/8	187 J	5810 J	29.1	1564	1786	16GWT1001	85.6
ARSENIC	2/8	1.2 J	1.5 J	0.1 - 1.9	0.685	1.35	16GWT0603	0.66 J
BARIUM	8/8	13.4 J	88.3 J	---	47.5	47.5	16GWT0202	17.8 J - 21.6 J
BERYLLIUM	1/8	1.9 J	1.9 J	0.07 - 1.3	0.483	1.90	16GWT1001	ND
CALCIUM	8/8	32600 J	101000 J	---	58925	58925	16GWT0603	97300 J - 212000 J
CHROMIUM	2/8	3.5 J	5.5 J	0.3 - 1.3	1.32	4.50	16GWT1301	ND
COBALT	8/8	7 J	131 J	---	47.7	47.7	16GWT1001	9.2 J - 18.7 J
COPPER	3/8	5.8 J	12.4 J	0.56 - 1.2	3.48	8.50	16GWT1001	0.87 J
IRON	8/8	1240 J	50200 J	---	14439	14439	16GWT1001	287 J - 13700 J
LEAD	3/8	2.6 J	6.6 J	0.24 - 0.55	1.81	4.53	16GWT1001	ND
MAGNESIUM	8/8	9120 J	78800 J	---	28715	28715	16GWT1001	6240 J - 35200 J
MANGANESE	8/8	962 J	24600 J	---	6332	6332	16GWT1001	864 J - 2440 J

TABLE 3-22

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detects	Range of Upgradient Detects
Total Metals (µg/L) (Continued)								
NICKEL	8/8	3.3 J	219 J	---	104	104	16GWT1001	27 J - 36.7 J
POTASSIUM	8/8	1530 J	8440 J	---	4418	4418	16GWT0603	738 J - 2640 J
SODIUM	8/8	6770 J	149000 J	---	38671	38671	16GWT0603	17900 J - 20200 J
TITANIUM	3/8	2.6 J	35 J	0.45 - 4.5	7.38	18.3	16GWT0603	3 J - 3.8 J
VANADIUM	2/8	2.2 J	4.1 J	0.07 - 0.3	0.847	3.15	16GWT1301	ND
ZINC	8/8	17.5 J	443 J	---	131	131	16GWT1001	15.8 J - 50 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	1/1	342 J	342 J	---	342	342	16GWT1301-F	NA
BARIUM, FILTERED	1/1	56.6 J	56.6 J	---	56.6	56.6	16GWT1301-F	NA
CALCIUM, FILTERED	1/1	38800 J	38800 J	---	38800	38800	16GWT1301-F	NA
COBALT, FILTERED	1/1	58.5 J	58.5 J	---	58.5	58.5	16GWT1301-F	NA
COPPER, FILTERED	1/1	5.4 J	5.4 J	---	5.40	5.40	16GWT1301-F	NA
IRON, FILTERED	1/1	5230 J	5230 J	---	5230	5230	16GWT1301-F	NA
MAGNESIUM, FILTERED	1/1	11800 J	11800 J	---	11800	11800	16GWT1301-F	NA
MANGANESE, FILTERED	1/1	3600 J	3600 J	---	3600	3600	16GWT1301-F	NA
NICKEL, FILTERED	1/1	193 J	193 J	---	193	193	16GWT1301-F	NA
POTASSIUM, FILTERED	1/1	7280 J	7280 J	---	7280	7280	16GWT1301-F	NA
SODIUM, FILTERED	1/1	18500 J	18500 J	---	18500	18500	16GWT1301-F	NA
ZINC, FILTERED	1/1	244 J	244 J	---	244	244	16GWT1301-F	NA
Field Parameters (mg/L)								
ALKALINITY	2/5	75	200	10	58.0	138	16GWT0603	300
CARBON DIOXIDE	5/5	19	280	---	122	122	16GWT1001	105
DISSOLVED OXYGEN	5/5	0.35	6	---	2.17	2.17	16GWT1301	0.12 - 0.2
DISSOLVED OXYGEN - METER	9/9	0.63	7.27	---	2.05	2.05	16GWT1301	0.64 - 6.3
HYDROGEN SULFIDE (H2S)	5/5	0	0	---	---	---	---	0
IRON(+2)	5/5	0.03	5.19	---	2.47	2.47	16GWT0402	3.3 >
MANGANESE(+2)	5/5	1	22 >	---	6.60	6.60	16GWT1001	1.5
NITRITE-N	5/5	0.002	0.016	---	0.00740	0.00740	16GWT0603	0.003
OXIDATION REDUCTION POTENTIAL (MV)	9/9	111.5	350	---	242	242	16GW0302	-46.1 - 124
PH (S.U.)	9/9	3.72	6.49	---	5.22	5.22	16GWT0603	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	9/9	0.355	2.322	---	0.848	0.848	16GWT0102	0.496 - 1.75
SULFIDE	5/5	0	0.07	---	0.0240	0.0240	16GWT0603	0
TEMPERATURE (C)	9/9	11.63	21.88	---	15.4	15.4	16GWT1301	11.8 - 17.24
TURBIDITY (NTU)	9/9	1.06	85.7	---	13.6	13.6	16GWT0102	0 - 2.2

TABLE 3-22

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detects	Range of Upgradient Detects
Miscellaneous Parameters (mg/L)								
CHLORIDE	6/8	5	120	14 - 17	36.1	45.5	16GWT1701	14
NITRITE/NITRATE-N	4/8	0.19 J	0.7	0.025 - 0.05	0.217	0.413	16GW0302	ND
SULFATE	6/8	40	980 J	180 - 210	266	322	16GWT1001	270
TOTAL ORGANIC CARBON	1/1	1.4	1.4	---	1.40	1.40	16GWT0402	1.7

Notes:
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
C - Celsius
DNX - hexahydro-1,3-dinitroso-5-dinitro-1,3,5-triazine
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MNX - hexahydro-1,3,5-trinitroso-1,3,5-triazine
MS/cm - milliSiemen per centimeter
MV - milliVolt
NA -Not Analyzed
ND - Not Detected
NTU - nephelometric turbidity unit
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L -microgram per liter

TABLE 3-23

SUMMARY OF DESCRIPTIVE STATISTICS
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/L)								
1,1,2,2-TETRACHLOROETHANE	1/9	2.1	2.1	0.3 - 60	3.68	2.10	16GWT0604	ND
1,1,2-TRICHLOROETHANE	3/9	2.1	190	0.3 - 60	29.1	77.0	16GWT0604	ND
1,1-DICHLOROETHENE	3/9	1.4	160	0.3 - 60	21.8	55.3	16GWT0604	ND
1,2,3-TRICHLOROPROPANE	1/9	0.6 J	0.6 J	0.3 - 60	3.52	0.600	16GWT0604	ND
1,2-DICHLOROETHANE	2/9	0.6 J	2.3	0.3 - 60	3.76	1.45	16GWT0604	ND
2-HEXANONE	1/9	1.4 J	1.4 J	0.5 - 100	5.91	1.40	16GWT0604	ND
4-METHYL-2-PENTANONE	1/9	27	27	0.5 - 100	8.75	27.0	16GWT0604	ND
BENZENE	2/9	1.1	3.5	0.3 - 60	3.94	2.30	16GWT0604	ND
CARBON DISULFIDE	1/9	3.04	3.04	0.3 - 60	3.79	3.04	16GWT0604	ND
CARBON TETRACHLORIDE	1/9	14	14	0.3 - 60	5.01	14.0	16GW0303	ND
CHLOROFORM	5/9	0.8 J	15	0.3 - 60	6.24	5.14	16GWT0604	ND
CIS-1,2-DICHLOROETHENE	5/9	0.6 J	4100	0.3	518	932	16GWT0604	ND
ETHYLBENZENE	2/9	1.6	3.9	0.3 - 60	4.04	2.75	16GWT0604	ND
TETRACHLOROETHENE	2/9	7.2	150	0.3 - 60	20.9	78.6	16GWT0604	ND
TOLUENE	2/9	2.8	310 J	0.3 - 60	38.2	156	16GWT0604	ND
TOTAL XYLENES	2/9	2.8	6.5	0.3 - 60	4.47	4.65	16GWT0604	ND
TRANS-1,2-DICHLOROETHENE	3/9	1	20	0.3 - 60	5.96	7.63	16GWT0604	ND
TRICHLOROETHENE	9/9	1.9	330000	---	42013	42013	16GWT0604	ND
VINYL CHLORIDE	3/9	0.7 J	390 J	0.3 - 60	46.9	131	16GWT0604	ND
Energetics (µg/L)								
1,3,5-TRINITROBENZENE	1/9	1.8	1.8	0.242 - 0.275	0.318	1.80	16GWT0604	ND
2,4,6-TRINITROTOLUENE	1/9	4.8	4.8	0.242 - 0.275	0.652	4.80	16GWT0604	ND
2,4-DINITROTOLUENE	1/9	0.8	0.8	0.242 - 0.275	0.207	0.800	16GWT0604	ND
2-AMINO-4,6-DINITROTOLUENE	2/9	0.89	29 J	0.26 - 0.275	3.43	14.9	16GWT0604	ND
3-NITROTOLUENE	2/9	1.5 J	2.1 J	0.242 - 0.275	0.502	1.80	16GWT1002	ND
4-AMINO-2,6-DINITROTOLUENE	3/9	0.56	14	0.26 - 0.275	1.82	5.19	16GWT0604	ND
HMX	5/9	0.93 J	8.6	0.26 - 0.275	3.27	5.79	16GWT0403	ND
RDX	7/9	1.1	79	0.26 - 0.275	29.9	38.4	16GWT0902	ND
Field Parameters (mg/L)								
DISSOLVED OXYGEN	9/9	0.08	5.43	---	1.04	1.04	16GWT0103	0.12 - 0.2
OXIDATION REDUCTION POTENTIAL (MV)	9/9	54	541	---	302	302	16GWT1302	-46.1 - 124
PH (S.U.)	9/9	3.21	6.03	---	5.04	5.04	16GWT0203	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	9/9	0.232	2.5	---	0.906	0.906	16GWT0103	0.496 - 1.75
TEMPERATURE (C)	9/9	16.75	20.46	---	18.7	18.7	16GWT0203	11.8 - 17.24
TURBIDITY (NTU)	9/9	2.32	105	---	25.5	25.5	16GWT1302	0 - 2.2

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV - threshold value.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemens per centimeter
MV - milliVolt
ND - Not Detected
NTU - nephelometric turbidity unit
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L - microgram per liter

TABLE 3-24

SUMMARY OF DESCRIPTIVE STATISTICS
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/L)								
CARBON DISULFIDE	1/19	0.3 J	0.3 J	0.3	0.158	0.300	16GWT1601	ND
CIS-1,2-DICHLOROETHENE	2/19	0.3 J	0.3 J	0.3	0.166	0.300	16GW0401, 16GWT1601	ND
ETHANE	2/2	0.032	0.37 J	---	0.201	0.201	16GWT1201	0.062
ETHENE	2/2	0.0093	0.031 J	---	0.0202	0.0202	16GWT1201	0.018
METHANE	2/2	0.86	11	---	5.93	5.93	16GWT1201	15
TETRACHLOROETHENE	1/19	0.3 J	0.3 J	0.3	0.158	0.300	16GWT1601	ND
TRICHLOROETHENE	9/19	0.5 J	340	0.3	28.3	59.5	16GWT1602	ND
Energetics (µg/L)								
2-NITROTOLUENE	1/19	1	1	0.165 - 0.65	0.199	1.00	16GWT1602	ND
HMX	6/19	0.39	1.3 J	0.25 - 0.65	0.381	0.858	16GWT1201	ND
RDX	6/19	0.66	4.8	0.25 - 0.6	0.837	2.31	16GW0501	ND
Total Metals (µg/L)								
ALUMINUM	12/13	19.2 J	53900 J	26.4	10578	11458	16GWT1601	85.6
ARSENIC	12/13	1.1 J	32.1 J	1.5	7.62	8.19	16GW0102	0.66 J
BARIUM	13/13	5 J	286 J	---	48.4	48.4	16GWT1601	17.8 J - 21.6 J
BERYLLIUM	6/13	2 J	8.3 J	0.16 - 2.7	2.53	4.87	16GWT1601	ND
CADMIUM	4/13	0.83 J	4 J	0.05 - 1.4	0.818	2.16	16GWT1601	ND
CALCIUM	12/13	39500 J	194000 J	106000	82123	84550	16GW0101	97300 J - 212000 J
CHROMIUM	3/13	12.4 J	73.6 J	0.27 - 0.68	8.09	34.2	16GWT1601	ND
COBALT	13/13	32 J	563 J	---	147	147	16GWT1602	9.2 J - 18.7 J
COPPER	6/13	1.4 J	51.5 J	0.06 - 0.32	8.29	17.9	16GWT1602	0.87 J
IRON	13/13	2190 J	83900 J	---	34097	34097	16GW0102	287 J - 13700 J
LEAD	7/13	0.89 J	54.8 J	0.03 - 0.7	8.54	15.7	16GWT1601	ND
LITHIUM	5/5	92.7 J	328 J	---	190	190	16GW0101	32.7 J - 33.6 J
MAGNESIUM	13/13	25000 J	133000 J	---	50831	50831	16GWT1601	6240 J - 35200 J
MANGANESE	13/13	2450 J	29300 J	---	9178	9178	16GW0101	864 J - 2440 J
NICKEL	13/13	86.3 J	808 J	---	278	278	16GWT1602	27 J - 36.7 J
POTASSIUM	13/13	2970 J	19300 J	---	6614	6614	16GWT1601	738 J - 2640 J
SELENIUM	2/13	2.8 J	5.2 J	0.04 - 0.9	0.700	4.00	16GWT1601	ND
SODIUM	13/13	10400 J	107000 J	---	30538	30538	16GWT1601	17900 J - 20200 J
STRONTIUM	5/5	106 J	279 J	---	188	188	16GW0501	88.4 J - 98.4 J
TIN	2/13	1.8 J	2.5 J	0.03 - 0.58	0.395	2.15	16GWT1601	ND
TITANIUM	7/12	1.2 J	134 J	0.07 - 1.5	20.2	34.3	16GWT1601	3 J - 3.8 J
VANADIUM	8/13	0.6 J	64.8 J	0.05 - 1.7	7.69	12.3	16GWT1601	ND
ZINC	13/13	86.1 J	791 J	---	297	297	16GWT1601	15.8 J - 50 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	1/2	2460 J	2460 J	33	1238	2460	16GWT1601-F	NA
ARSENIC, FILTERED	1/2	4.6 J	4.6 J	1.2	2.60	4.60	16GWT1601-F	NA
BARIUM, FILTERED	2/2	12.9 J	17 J	---	15.0	15.0	16GWT1601-F	NA
BERYLLIUM, FILTERED	1/2	3.8 J	3.8 J	0.17	1.94	3.80	16GWT1601-F	NA
CADMIUM, FILTERED	1/2	3 J	3 J	0.04	1.51	3.00	16GWT1601-F	NA
CALCIUM, FILTERED	2/2	38900 J	158000 J	---	98450	98450	16GWT1601-F	NA
COBALT, FILTERED	2/2	36.9 J	522 J	---	279	279	16GWT1601-F	NA
COPPER, FILTERED	1/2	20 J	20 J	0.49	10.1	20.0	16GWT1601-F	NA
IRON, FILTERED	1/2	43200 J	43200 J	1140	21885	43200	16GWT0302-F	NA

TABLE 3-24

SUMMARY OF DESCRIPTIVE STATISTICS
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Dissolved Metals (µg/L) (Continued)								
LEAD, FILTERED	1/2	6.2 J	6.2 J	0.15	3.14	6.20	16GWT1601-F	NA
MAGNESIUM, FILTERED	2/2	27200 J	131000 J	---	79100	79100	16GWT1601-F	NA
MANGANESE, FILTERED	2/2	4030 J	16700 J	---	10365	10365	16GWT1601-F	NA
NICKEL, FILTERED	2/2	80.6 J	622 J	---	351	351	16GWT1601-F	NA
POTASSIUM, FILTERED	2/2	3920 J	16500 J	---	10210	10210	16GWT1601-F	NA
SELENIUM, FILTERED	1/2	3.1 J	3.1 J	0.05	1.56	3.10	16GWT1601-F	NA
SODIUM, FILTERED	2/2	29000 J	105000 J	---	67000	67000	16GWT1601-F	NA
TITANIUM, FILTERED	1/2	2.4 J	2.4 J	2.3	1.78	2.40	16GWT1601-F	NA
ZINC, FILTERED	2/2	67 J	596 J	---	332	332	16GWT1601-F	NA
Field Parameters (mg/L)								
CARBON DIOXIDE	2/2	150	260	---	205	205	16GWT1201	105
DISSOLVED OXYGEN	7/7	0.06	54.72	---	12.0	12.0	16GW0103	0.12 - 0.2
DISSOLVED OXYGEN - METER	12/12	0.2	5.24	---	1.02	1.02	16GWT1601	0.64 - 6.3
HYDROGEN SULFIDE (H2S)	2/2	0	0	---	---	---	16GW0502, 16GWT1201	0
IRON(+2)	2/2	2.91	3.3 >	---	3.11	3.11	16GWT1201	3.3 >
MANGANESE(+2)	2/2	2.7	9.4	---	6.05	6.05	16GWT1201	1.5
NITRITE-N	2/2	0	0.005	---	0.00250	0.00250	16GW0502	0.003
OXIDATION REDUCTION POTENTIAL (MV)	19/19	-130	328.7	---	151	151	16GW0402	-46.1 - 124
PH (S.U.)	19/19	3.65	6.4	---	4.94	4.94	16GW0101	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	19/19	0.536	2.785	---	1.04	1.04	16GWT1202	0.496 - 1.75
SULFIDE	2/2	0.01	0.1	---	0.0550	0.0550	16GW0502	0
TEMPERATURE (C)	19/19	12.26	20.33	---	15.2	15.2	16GWT1602	11.8 - 17.24
TURBIDITY (NTU)	19/19	0	1000 >	---	112	112	16GWT1601, 16GWT1602	0 - 2.2
Miscellaneous Parameters (mg/L)								
AMMONIA-N	5/5	0.03	0.41	---	0.234	0.234	16GW0101	0.04
CHLORIDE	4/6	7	12	2 - 15	7.25	8.75	16GW0402	14
NITRITE/NITRATE-N	1/11	0.07	0.07	0.02 - 0.05	0.0189	0.0700	16GW0102	ND
SULFATE	6/6	260 J	860	---	428	428	16GW0102	270

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligrams per liter
MS/m - milliSiemen per centimeter
MV - milliVolt
NA - Not Analyzed
ND - Not Detected
NTU - nephelometric turbidity unit
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L - microgram per liter

TABLE 3-25

SUMMARY OF DESCRIPTIVE STATISTICS
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUND 1
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/L)								
CIS-1,2-DICHLOROETHENE	1/5	0.3 J	0.3 J	0.3	0.180	0.300	16GW0401	ND
TRICHLOROETHENE	3/5	0.5 J	2	0.3	0.660	1.00	16GW0101	ND
Energetics (µg/L)								
HMX	2/5	0.39	1.2 J	0.375 - 0.65	0.471	0.795	16GW0501	ND
RDX	2/5	1.7	4.8	0.355 - 0.6	1.44	3.25	16GW0501	ND
Total Metals (µg/L)								
ALUMINUM	5/5	19.2 J	9680	---	4178	4178	16GW0401	85.6
ARSENIC	5/5	1.5 J	3.5 J	---	2.18	2.18	16GWT0501	0.66 J
BARIUM	5/5	5 J	18.1 J	---	11.7	11.7	16GWT0301	17.8 J - 21.6 J
BERYLLIUM	2/5	2 J	4.7 J	0.16 - 1.1	1.49	3.35	16GWT0501	ND
CADMIUM	2/5	0.83 J	1.1 J	0.05 - 0.21	0.432	0.965	16GW0501	ND
CALCIUM	5/5	39500 J	194000 J	---	86040	86040	16GW0101	97300 J - 212000 J
COBALT	5/5	34.4 J	154 J	---	74.6	74.6	16GW0101	9.2 J - 18.7 J
COPPER	2/5	1.4 J	2.1 J	0.06 - 0.12	0.729	1.75	16GWT0301	0.87 J
IRON	5/5	2190 J	52700 J	---	25772	25772	16GW0101	287 J - 13700 J
LEAD	3/5	0.89 J	1.8 J	0.03 - 0.43	0.804	1.26	16GWT0501	ND
LITHIUM	5/5	92.7 J	328 J	---	190	190	16GW0101	32.7 J - 33.6 J
MAGNESIUM	5/5	25000 J	84500 J	---	39260	39260	16GW0101	6240 J - 35200 J
MANGANESE	5/5	2550 J	29300 J	---	9200	9200	16GW0101	864 J - 2440 J
NICKEL	5/5	93.4 J	304 J	---	183	183	16GWT0501	27 J - 36.7 J
POTASSIUM	5/5	3240 J	9390 J	---	4848	4848	16GW0101	738 J - 2640 J
SODIUM	5/5	13400 J	26700 J	---	18760	18760	16GWT0301	17900 J - 20200 J
STRONTIUM	5/5	106 J	279 J	---	188	188	16GW0501	88.4 J - 98.4 J
TITANIUM	5/5	1.2 J	3.2 J	---	2.26	2.26	16GWT0501	3 J - 3.8 J
VANADIUM	3/5	0.6 J	0.86 J	0.05 - 0.14	0.431	0.687	16GW0401	ND
ZINC	5/5	108 J	329 J	---	212	212	16GWT0501	15.8 J - 50 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN - METER	5/5	0.2	0.9	---	0.470	0.470	16GW0501	0.64 - 6.3
OXIDATION REDUCTION POTENTIAL (MV)	5/5	-130	207.4	---	89.9	89.9	16GW0401	-46.1 - 124
PH (S.U.)	5/5	3.68	6.4	---	4.82	4.82	16GW0101	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	5/5	0.607	1.606	---	0.848	0.848	16GW0101	0.496 - 1.75
TEMPERATURE (C)	5/5	12.26	14.47	---	13.4	13.4	16GWT0501	11.8 - 17.24
TURBIDITY (NTU)	5/5	0	10	---	3.47	3.47	16GWT0301	0 - 2.2
Miscellaneous Parameters (mg/L)								
AMMONIA-N	5/5	0.03	0.41	---	0.234	0.234	16GW0101	0.04

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
ND - Not Detected
NTU - nephelometric turbidity unit
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L - microgram per liter

TABLE 3-26

SUMMARY OF DESCRIPTIVE STATISTICS
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detects	Range of Upgradient Detects
Volatile Organics (µg/L)								
CARBON DISULFIDE	1/7	0.3 J	0.3 J	0.3	0.171	0.300	16GWT1601	ND
CIS-1,2-DICHLOROETHENE	1/7	0.3 J	0.3 J	0.3	0.171	0.300	16GWT1601	ND
ETHANE	2/2	0.032	0.37 J	---	0.201	0.201	16GWT1201	0.062
ETHENE	2/2	0.0093	0.031 J	---	0.0202	0.0202	16GWT1201	0.018
METHANE	2/2	0.86	11	---	5.93	5.93	16GWT1201	15
TETRACHLOROETHENE	1/7	0.3 J	0.3 J	0.3	0.171	0.300	16GWT1601	ND
TRICHLOROETHENE	4/7	0.5 J	190	0.3	27.5	48.0	16GWT1601	ND
Energetics (µg/L)								
HMX	3/7	0.45 J	1.3 J	0.253 - 0.263	0.439	0.853	16GWT1201	ND
RDX	2/7	1.8	1.9	0.253 - 0.269	0.621	1.85	16GW0402	ND
Total Metals (µg/L)								
ALUMINUM	6/7	4730 J	53900 J	26.4	15795	18425	16GWT1601	85.6
ARSENIC	6/7	1.1 J	32.1 J	1.5	10.0	11.6	16GW0102	0.66 J
BARIUM	7/7	6 J	286 J	---	67.9	67.9	16GWT1601	17.8 J - 21.6 J
BERYLLIUM	3/7	3.5 J	8.3 J	0.66 - 2.7	2.75	5.47	16GWT1601	ND
CADMIUM	1/7	4 J	4 J	0.05 - 1.4	0.826	4.00	16GWT1601	ND
CALCIUM	6/7	45600 J	168000 J	106000	71629	74733	16GWT1601	97300 J - 212000 J
CHROMIUM	2/7	16.7 J	73.6 J	0.38 - 0.68	13.1	45.2	16GWT1601	ND
COBALT	7/7	32 J	530 J	---	139	139	16GWT1601	9.2 J - 18.7 J
COPPER	3/7	2.8 J	43.3 J	0.07 - 0.32	7.51	17.4	16GWT1601	0.87 J
IRON	7/7	2820 J	83900 J	---	42314	42314	16GW0102	287 J - 13700 J
LEAD	3/7	2.4 J	54.8 J	0.12 - 0.7	10.5	24.2	16GWT1601	ND
MAGNESIUM	7/7	25000 J	133000 J	---	49214	49214	16GWT1601	6240 J - 35200 J
MANGANESE	7/7	2450 J	17900 J	---	8130	8130	16GWT1601	864 J - 2440 J
NICKEL	7/7	86.3 J	714 J	---	269	269	16GWT1601	27 J - 36.7 J
POTASSIUM	7/7	2970 J	19300 J	---	6691	6691	16GWT1601	738 J - 2640 J
SELENIUM	1/7	5.2 J	5.2 J	0.04 - 0.9	0.854	5.20	16GWT1601	ND
SODIUM	7/7	10400 J	107000 J	---	30200	30200	16GWT1601	17900 J - 20200 J
TIN	1/7	2.5 J	2.5 J	0.1 - 0.58	0.461	2.50	16GWT1601	ND
TITANIUM	2/7	95.1 J	134 J	0.07 - 1.5	33.0	115	16GWT1601	3 J - 3.8 J
VANADIUM	4/7	0.65 J	64.8 J	0.21 - 1.7	11.9	20.5	16GWT1601	ND
ZINC	7/7	86.1 J	791 J	---	306	306	16GWT1601	15.8 J - 50 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	1/2	2460 J	2460 J	33	1238	2460	16GWT1601-F	NA
ARSENIC, FILTERED	1/2	4.6 J	4.6 J	1.2	2.60	4.60	16GWT1601-F	NA
BARIUM, FILTERED	2/2	12.9 J	17 J	---	15.0	15.0	16GWT1601-F	NA
BERYLLIUM, FILTERED	1/2	3.8 J	3.8 J	0.17	1.94	3.80	16GWT1601-F	NA
CADMIUM, FILTERED	1/2	3 J	3 J	0.04	1.51	3.00	16GWT1601-F	NA
CALCIUM, FILTERED	2/2	38900 J	158000 J	---	98450	98450	16GWT1601-F	NA
COBALT, FILTERED	2/2	36.9 J	522 J	---	279	279	16GWT1601-F	NA
COPPER, FILTERED	1/2	20 J	20 J	0.49	10.1	20.0	16GWT1601-F	NA
IRON, FILTERED	1/2	43200 J	43200 J	1140	21885	43200	16GWT0302-F	NA
LEAD, FILTERED	1/2	6.2 J	6.2 J	0.15	3.14	6.20	16GWT1601-F	NA

TABLE 3-26

SUMMARY OF DESCRIPTIVE STATISTICS
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detects	Range of Upgradient Detects
Dissolved Metals (µg/L) (Continued)								
MAGNESIUM, FILTERED	2/2	27200 J	131000 J	---	79100	79100	16GWT1601-F	NA
MANGANESE, FILTERED	2/2	4030 J	16700 J	---	10365	10365	16GWT1601-F	NA
NICKEL, FILTERED	2/2	80.6 J	622 J	---	351	351	16GWT1601-F	NA
POTASSIUM, FILTERED	2/2	3920 J	16500 J	---	10210	10210	16GWT1601-F	NA
SELENIUM, FILTERED	1/2	3.1 J	3.1 J	0.05	1.56	3.10	16GWT1601-F	NA
SODIUM, FILTERED	2/2	29000 J	105000 J	---	67000	67000	16GWT1601-F	NA
TITANIUM, FILTERED	1/2	2.4 J	2.4 J	2.3	1.78	2.40	16GWT1601-F	NA
ZINC, FILTERED	2/2	67 J	596 J	---	332	332	16GWT1601-F	NA
Field Parameters (mg/L)								
CARBON DIOXIDE	2/2	150	260	---	205	205	16GWT1201	105
DISSOLVED OXYGEN	2/2	0.1	0.25	---	0.175	0.175	16GW0502	0.12 - 0.2
DISSOLVED OXYGEN - METER	7/7	0.28	5.24	---	1.42	1.42	16GWT1601	0.64 - 6.3
HYDROGEN SULFIDE (H2S)	2/2	0	0	---	---	---	16GW0502, 16GWT1201	0
IRON(+2)	2/2	2.91	3.3 >	---	3.11	3.11	16GWT1201	3.3 >
MANGANESE(+2)	2/2	2.7	9.4	---	6.05	6.05	16GWT1201	1.5
NITRITE-N	2/2	0	0.005	---	0.00250	0.00250	16GW0502	0.003
OXIDATION REDUCTION POTENTIAL (MV)	7/7	-5	328.7	---	220	220	16GW0402	-46.1 - 124
PH (S.U.)	7/7	3.65	6.17	---	4.82	4.82	16GW0102	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	7/7	0.536	1.86	---	0.947	0.947	16GWT1601	0.496 - 1.75
SULFIDE	2/2	0.01	0.1	---	0.0550	0.0550	16GW0502	0
TEMPERATURE (C)	7/7	12.35	17.61	---	14.5	14.5	16GWT1601	11.8 - 17.24
TURBIDITY (NTU)	7/7	0.13	1000 >	---	152	152	16GWT1601	0 - 2.2
Miscellaneous Parameters (mg/L)								
CHLORIDE	4/6	7	12	2 - 15	7.25	8.75	16GW0402	14
NITRITE/NITRATE-N	1/6	0.07	0.07	0.025 - 0.05	0.0263	0.0700	16GW0102	ND
SULFATE	6/6	260 J	860	---	428	428	16GW0102	270

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
NA - Not Analyzed
ND - Not Detected
MV - milliVolt
NTU - nephelometric turbidity unit
QC - quality control
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L - microgram per liter

TABLE 3-27

SUMMARY OF DESCRIPTIVE STATISTICS
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUND 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/L)								
TRICHLOROETHENE	2/7	0.7 J	340	0.3	48.8	170	16GWT1602	ND
Energetics (µg/L)								
2-NITROTOLUENE	1/7	1	1	0.264 - 0.29	0.260	1.00	16GWT1602	ND
HMX	1/7	1 J	1 J	0.25 - 0.29	0.258	1.00	16GW0503	ND
RDX	2/7	0.66	3	0.25 - 0.29	0.620	1.83	16GW0503	ND
Total Metals (µg/L)								
ALUMINUM	1/1	6060 J	6060 J	---	6060	6060	16GWT1602	85.6
ARSENIC	1/1	17.9 J	17.9 J	---	17.9	17.9	16GWT1602	0.66 J
BARIUM	1/1	95.6 J	95.6 J	---	95.6	95.6	16GWT1602	17.8 J - 21.6 J
BERYLLIUM	1/1	6.1 J	6.1 J	---	6.10	6.10	16GWT1602	ND
CADMIUM	1/1	2.7 J	2.7 J	---	2.70	2.70	16GWT1602	ND
CALCIUM	1/1	136000 J	136000 J	---	136000	136000	16GWT1602	97300 J - 212000 J
CHROMIUM	1/1	12.4 J	12.4 J	---	12.4	12.4	16GWT1602	ND
COBALT	1/1	563 J	563 J	---	563	563	16GWT1602	9.2 J - 18.7 J
COPPER	1/1	51.5 J	51.5 J	---	51.5	51.5	16GWT1602	0.87 J
IRON	1/1	18200 J	18200 J	---	18200	18200	16GWT1602	287 J - 13700 J
LEAD	1/1	33.3 J	33.3 J	---	33.3	33.3	16GWT1602	ND
MAGNESIUM	1/1	120000 J	120000 J	---	120000	120000	16GWT1602	6240 J - 35200 J
MANGANESE	1/1	16400 J	16400 J	---	16400	16400	16GWT1602	864 J - 2440 J
NICKEL	1/1	808 J	808 J	---	808	808	16GWT1602	27 J - 36.7 J
POTASSIUM	1/1	14900 J	14900 J	---	14900	14900	16GWT1602	738 J - 2640 J
SELENIUM	1/1	2.8 J	2.8 J	---	2.80	2.80	16GWT1602	ND
SODIUM	1/1	91800 J	91800 J	---	91800	91800	16GWT1602	17900 J - 20200 J
TIN	1/1	1.8 J	1.8 J	---	1.80	1.80	16GWT1602	ND
VANADIUM	1/1	14.8	14.8	---	14.8	14.8	16GWT1602	ND
ZINC	1/1	661 J	661 J	---	661	661	16GWT1602	15.8 J - 50 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN	5/5	0.06	54.72	---	16.7	16.7	16GW0103	0.12 - 0.2
OXIDATION REDUCTION POTENTIAL (MV)	7/7	-69.9	259.9	---	126	126	16GWT0303	-46.1 - 124
PH (S.U.)	7/7	4.1	6.24	---	5.13	5.13	16GWT1602	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	7/7	0.62	2.785	---	1.27	1.27	16GWT1202	0.496 - 1.75
TEMPERATURE (C)	7/7	15.03	20.33	---	17.2	17.2	16GWT1602	11.8 - 17.24
TURBIDITY (NTU)	7/7	4.53	1000 >	---	150	150	16GWT1602	0 - 2.2

Notes:
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV - threshold value.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
NTU - nephelometric turbidity unit
ND - Not Detected
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L - microgram per liter

TABLE 3-28

SUMMARY OF DESCRIPTIVE STATISTICS
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/L)								
ACETONE	4/10	0.8 J	7.4 J	0.5	1.50	3.38	16GWT2101	ND
BENZENE	1/10	0.7 J	0.7 J	0.3	0.205	0.700	16GWT1501	ND
CHLOROFORM	5/10	0.8 J	16	0.3	3.76	7.36	16GWT1101	ND
ETHANE	2/2	1	5.4	---	3.20	3.20	16GWT1801	0.062
ETHENE	2/2	0.14	0.22	---	0.180	0.180	16GWT1501	0.018
ETHYLBENZENE	1/10	0.9 J	0.9 J	0.3	0.225	0.900	16GWT2101	ND
METHANE	2/2	4500	5800	---	5150	5150	16GWT1801	15
METHYLENE CHLORIDE	1/10	0.6 J	0.6 J	0.3	0.195	0.600	16GWT0801	ND
PROPIONITRILE	1/10	26 J	26 J	20	11.6	26.0	16GWT1501	ND
TOLUENE	1/10	1.3	1.3	0.3	0.265	1.30	16GWT2101	ND
TOTAL XYLENES	1/10	2.2	2.2	0.3	0.355	2.20	16GWT2101	ND
Total Metals (µg/L)								
ALUMINUM	7/8	65.8 J	296000 J	8.35	48418	55334	16GWT0801	85.6
ANTIMONY	2/8	2.1 J	6.3 J	0.09 - 1.3	1.34	4.20	16GWT1101	ND
ARSENIC	5/8	1.9 J	29.2 J	0.13 - 1.5	6.23	9.78	16GWT0801	0.66 J
BARIUM	8/8	41.7 J	1700 J	---	624	624	16GWT0801	17.8 J - 21.6 J
BERYLLIUM	2/8	4.8 J	15.1 J	0.02 - 0.5	2.58	9.95	16GWT0801	ND
CALCIUM	7/8	6800 J	91800 J	19700	25511	27749	16GWT2101	97300 J - 212000 J
CHROMIUM	5/8	5.1 J	452 J	0.69 - 1.1	72.8	116	16GWT0801	ND
COBALT	7/8	0.3 J	95.7 J	0.71	18.1	20.6	16GWT0801	9.2 J - 18.7 J
COPPER	5/8	2.5	86.1 J	0.24 - 0.47	16.2	25.9	16GWT0801	0.87 J
IRON	6/8	376	241000 J	19.8 - 73.5	36700	48926	16GWT0801	287 J - 13700 J
LEAD	3/8	3 J	127 J	0.069 - 2	20.7	54.7	16GWT0801	ND
MAGNESIUM	8/8	108 J	39000 J	---	13164	13164	16GWT1901	6240 J - 35200 J
MANGANESE	8/8	5.7	3800 J	---	735	735	16GWT0801	864 J - 2440 J
MERCURY	2/8	0.028 J	0.12 J	0.007 - 0.049	0.0305	0.0740	16GWT0801	ND
NICKEL	8/8	1.6	338 J	---	66.6	66.6	16GWT0801	27 J - 36.7 J
POTASSIUM	8/8	1140 J	74400 J	---	16491	16491	16GWT0801	738 J - 2640 J
SELENIUM	3/8	2.1 J	5 J	0.094 - 1.4	1.38	3.30	16GWT0801	ND
SODIUM	8/8	11100 J	231000 J	---	115988	115988	16GWT2101	17900 J - 20200 J
TIN	1/8	3.9 J	3.9 J	0.06 - 2.6	0.826	3.90	16GWT0801	ND
TITANIUM	4/4	32.3 J	1020 J	---	329	329	16GWT0801	3 J - 3.8 J
VANADIUM	5/8	4.4 J	410 J	1.14	64.8	103	16GWT0801	ND
ZINC	6/8	6.5 J	454 J	2.7 - 4.8	85.6	114	16GWT0801	15.8 J - 50 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	1/3	126 J	126 J	65.9 - 85.5	67.2	126	16GWT1801-F	NA
ANTIMONY, FILTERED	2/3	1.5 J	8.8 J	1.5	3.68	5.15	16GWT1101-F	NA
ARSENIC, FILTERED	1/3	1.3 J	1.3 J	1.3 - 1.5	0.900	1.30	16GWT1801-F	NA
BARIUM, FILTERED	3/3	28 J	341 J	---	195	195	16GWT1801-F	NA
CALCIUM, FILTERED	3/3	7910 J	10600 J	---	9603	9603	16GWT1101-F	NA
CHROMIUM, FILTERED	1/3	0.59 J	0.59 J	0.42 - 0.69	0.382	0.590	16GWT1801-F	NA
COBALT, FILTERED	2/3	4.8 J	7.5 J	1.1	4.28	6.15	16GWT1101-F	NA
COPPER, FILTERED	1/3	2.8 J	2.8 J	0.72 - 1.5	1.30	2.80	16GWT1501-F	NA

TABLE 3-28

SUMMARY OF DESCRIPTIVE STATISTICS
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Dissolved Metals (µg/L) (Continued)								
MAGNESIUM, FILTERED	3/3	2850 J	3500 J	---	3137	3137	16GWT1801-F	NA
MANGANESE, FILTERED	3/3	17.7 J	194 J	---	89.9	89.9	16GWT1101-F	NA
NICKEL, FILTERED	2/3	4.6 J	5.2 J	1.4	3.50	4.90	16GWT1101-F	NA
POTASSIUM, FILTERED	3/3	3410 J	5880 J	---	4650	4650	16GWT1801-F	NA
SODIUM, FILTERED	3/3	77500 J	218000 J	---	130933	130933	16GWT1801-F	NA
TITANIUM, FILTERED	1/3	1.9 J	1.9 J	0.68 - 0.85	0.888	1.90	16GWT1801-F	NA
VANADIUM, FILTERED	1/3	0.53 J	0.53 J	0.31 - 0.59	0.327	0.530	16GWT1801-F	NA
ZINC, FILTERED	3/3	1.6 J	48.2 J	---	19.4	19.4	16GWT1101-F	NA
Field Parameters (mg/L)								
ALKALINITY	2/2	250	500	---	375	375	16GWT1801	300
CARBON DIOXIDE	1/2	18	18	10	11.5	18.0	16GWT1801	105
DISSOLVED OXYGEN	8/8	0.87	6.91	---	3.09	3.09	16GWT2001	0.12 - 0.2
DISSOLVED OXYGEN - METER	4/4	2.13	4.51	---	3.07	3.07	16GWT1101	0.64 - 6.3
HYDROGEN SULFIDE (H2S)	1/1	0	0	---	---	---	16GWT1501	0
IRON(+2)	2/2	0	0.12	---	0.0600	0.0600	16GWT1801	3.3 >
MANGANESE(+2)	2/2	0	0.3	---	0.150	0.150	16GWT1501	1.5
NITRITE-N	2/2	0.005	0.007	---	0.00600	0.00600	16GWT1501	0.003
OXIDATION REDUCTION POTENTIAL (MV)	10/10	-69	341.9	---	108	108	16GWT1901	-46.1 - 124
PH (S.U.)	10/10	4.73	11.96	---	7.02	7.02	16GWT2101	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	10/10	0.126	2.48	---	0.703	0.703	16GWT2101	0.496 - 1.75
SULFIDE	2/2	0.01	0.04	---	0.0250	0.0250	16GWT1801	0
TEMPERATURE (C)	10/10	7.29	24.93	---	16.4	16.4	16GWT1102	11.8 - 17.24
TURBIDITY (NTU)	10/10	2	1000 >	---	286	286	16GWT0801, 16GWT1801	0 - 2.2
Miscellaneous Parameters (mg/L)								
CHLORIDE	2/2	4	4	---	4.00	4.00	16GWT1501, 16GWT1801	14
SULFATE	2/2	6	8	---	7.00	7.00	16GWT1501	270
TOTAL ORGANIC CARBON	1/1	2.6	2.6	---	2.60	2.60	16GWT1501	1.7

Notes:
Field dup samples are excluded from these summaries because they are considered to be field QC samples
Samples only collected in rnds 2 and 3
(1) - Means incorporate TV/2 for non-detects where TV = threshold value
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
NA - Not Analyzed
ND - Not Detected
NTU - nephelometric turbidity unit
QC - quality control
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L - microgram per liter

TABLE 3-29

SUMMARY OF DESCRIPTIVE STATISTICS
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detects	Range of Upgradient Detects
Volatile Organics (µg/L)								
ACETONE	3/4	0.8 J	3.7 J	0.5	1.59	2.03	16GWT0801	ND
BENZENE	1/4	0.7 J	0.7 J	0.3	0.288	0.700	16GWT1501	ND
CHLOROFORM	4/4	1	16	---	9.00	9.00	16GWT1101	ND
ETHANE	2/2	1	5.4	---	3.20	3.20	16GWT1801	0.062
ETHENE	2/2	0.14	0.22	---	0.180	0.180	16GWT1501	0.018
METHANE	2/2	4500	5800	---	5150	5150	16GWT1801	15
METHYLENE CHLORIDE	1/4	0.6 J	0.6 J	0.3	0.263	0.600	16GWT0801	ND
PROPIONITRILE	1/4	26 J	26 J	20	14.0	26.0	16GWT1501	ND
Total Metals (µg/L)								
ALUMINUM	4/4	2930 J	296000 J	---	96708	96708	16GWT0801	85.6
ANTIMONY	2/4	2.1 J	6.3 J	1.2 - 1.3	2.41	4.20	16GWT1101	ND
ARSENIC	3/4	2.2 J	29.2 J	1.5	11.0	14.4	16GWT0801	0.66 J
BARIUM	4/4	262 J	1700 J	---	894	894	16GWT0801	17.8 J - 21.6 J
BERYLLIUM	2/4	4.8 J	15.1 J	0.15 - 0.42	5.05	9.95	16GWT0801	ND
CALCIUM	3/4	8240 J	12700 J	19700	10198	10313	16GWT1101	97300 J - 212000 J
CHROMIUM	4/4	5.1 J	452 J	---	139	139	16GWT0801	ND
COBALT	3/4	4.2 J	95.7 J	0.71	32.9	43.7	16GWT0801	9.2 J - 18.7 J
COPPER	4/4	3.1 J	86.1 J	---	31.7	31.7	16GWT0801	0.87 J
IRON	4/4	1110 J	241000 J	---	72958	72958	16GWT0801	287 J - 13700 J
LEAD	3/4	3 J	127 J	2	41.3	54.7	16GWT0801	ND
MAGNESIUM	4/4	3130 J	36700 J	---	13293	13293	16GWT0801	6240 J - 35200 J
MANGANESE	4/4	33.6 J	3800 J	---	1230	1230	16GWT0801	864 J - 2440 J
MERCURY	2/4	0.028 J	0.12 J	0.007 - 0.03	0.0416	0.0740	16GWT0801	ND
NICKEL	4/4	3 J	338 J	---	109	109	16GWT0801	27 J - 36.7 J
POTASSIUM	4/4	5170 J	74400 J	---	25470	25470	16GWT0801	738 J - 2640 J
SELENIUM	2/4	2.8 J	5 J	0.44 - 1.4	2.18	3.90	16GWT0801	ND
SODIUM	4/4	70500 J	224000 J	---	115500	115500	16GWT1801	17900 J - 20200 J
TIN	1/4	3.9 J	3.9 J	0.54 - 2.6	1.57	3.90	16GWT0801	ND
TITANIUM	4/4	32.3 J	1020 J	---	329	329	16GWT0801	3 J - 3.8 J
VANADIUM	4/4	4.4 J	410 J	---	128	128	16GWT0801	ND
ZINC	4/4	10.6 J	454 J	---	155	155	16GWT0801	15.8 J - 50 J
Dissolved Metals (µg/L)								
ALUMINUM, FILTERED	1/3	126 J	126 J	65.9 - 85.5	67.2	126	16GWT1801-F	NA
ANTIMONY, FILTERED	2/3	1.5 J	8.8 J	1.5	3.68	5.15	16GWT1101-F	NA
ARSENIC, FILTERED	1/3	1.3 J	1.3 J	1.3 - 1.5	0.900	1.30	16GWT1801-F	NA
BARIUM, FILTERED	3/3	28 J	341 J	---	195	195	16GWT1801-F	NA
CALCIUM, FILTERED	3/3	7910 J	10600 J	---	9603	9603	16GWT1101-F	NA
CHROMIUM, FILTERED	1/3	0.59 J	0.59 J	0.42 - 0.69	0.382	0.590	16GWT1801-F	NA
COBALT, FILTERED	2/3	4.8 J	7.5 J	1.1	4.28	6.15	16GWT1101-F	NA
COPPER, FILTERED	1/3	2.8 J	2.8 J	0.72 - 1.5	1.30	2.80	16GWT1501-F	NA
MAGNESIUM, FILTERED	3/3	2850 J	3500 J	---	3137	3137	16GWT1801-F	NA
MANGANESE, FILTERED	3/3	17.7 J	194 J	---	89.9	89.9	16GWT1101-F	NA
NICKEL, FILTERED	2/3	4.6 J	5.2 J	1.4	3.50	4.90	16GWT1101-F	NA

TABLE 3-29

SUMMARY OF DESCRIPTIVE STATISTICS
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detects	Range of Upgradient Detects
Dissolved Metals (µg/L) (Continued)								
POTASSIUM, FILTERED	3/3	3410 J	5880 J	---	4650	4650	16GWT1801-F	NA
SODIUM, FILTERED	3/3	77500 J	218000 J	---	130933	130933	16GWT1801-F	NA
TITANIUM, FILTERED	1/3	1.9 J	1.9 J	0.68 - 0.85	0.888	1.90	16GWT1801-F	NA
VANADIUM, FILTERED	1/3	0.53 J	0.53 J	0.31 - 0.59	0.327	0.530	16GWT1801-F	NA
ZINC, FILTERED	3/3	1.6 J	48.2 J	---	19.4	19.4	16GWT1101-F	NA
Field Parameters (mg/L)								
ALKALINITY	2/2	250	500	---	375	375	16GWT1801	300
CARBON DIOXIDE	1/2	18	18	10	11.5	18.0	16GWT1801	105
DISSOLVED OXYGEN	2/2	3.5	4	---	3.75	3.75	16GWT1801	0.12 - 0.2
DISSOLVED OXYGEN - METER	4/4	2.13	4.51	---	3.07	3.07	16GWT1101	0.64 - 6.3
HYDROGEN SULFIDE (H2S)	1/1	0	0	---	---	---	16GWT1501	0
IRON(+2)	2/2	0	0.12	---	0.0600	0.0600	16GWT1801	3.3 >
MANGANESE(+2)	2/2	0	0.3	---	0.150	0.150	16GWT1501	1.5
NITRITE-N	2/2	0.005	0.007	---	0.00600	0.00600	16GWT1501	0.003
OXIDATION REDUCTION POTENTIAL (MV)	4/4	-69	188	---	89.4	89.4	16GWT1101	-46.1 - 124
PH (S.U.)	4/4	7.16	7.99	---	7.43	7.43	16GWT1501	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	4/4	0.256	0.65	---	0.389	0.389	16GWT1801	0.496 - 1.75
SULFIDE	2/2	0.01	0.04	---	0.0250	0.0250	16GWT1801	0
TEMPERATURE (C)	4/4	7.29	14.18	---	11.5	11.5	16GWT1801	11.8 - 17.24
TURBIDITY (NTU)	4/4	22.5	1000 >	---	668	668	16GWT0801, 16GWT1801	0 - 2.2
Miscellaneous Parameters (mg/L)								
CHLORIDE	2/2	4	4	---	4.00	4.00	16GWT1501, 16GWT1801	14
SULFATE	2/2	6	8	---	7.00	7.00	16GWT1501	270
TOTAL ORGANIC CARBON	1/1	2.6	2.6	---	2.60	2.60	16GWT1501	1.7

Notes:
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
NA - Not Analyzed
ND - Not Detected
NTU - nephelometric turbidity unit
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
TV - threshold value
µg/L - microgram per liter

TABLE 3-30

SUMMARY OF DESCRIPTIVE STATISTICS
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUND 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect	Range of Upgradient Detects
Volatile Organics (µg/L)								
ACETONE	1/6	7.4 J	7.4 J	0.5	1.44	7.40	16GWT2101	ND
CHLOROFORM	1/6	0.8 J	0.8 J	0.3	0.258	0.800	16GWT1502	ND
ETHYLBENZENE	1/6	0.9 J	0.9 J	0.3	0.275	0.900	16GWT2101	ND
TOLUENE	1/6	1.3	1.3	0.3	0.342	1.30	16GWT2101	ND
TOTAL XYLENES	1/6	2.2	2.2	0.3	0.492	2.20	16GWT2101	ND
Total Metals (µg/L)								
ALUMINUM	3/4	65.8 J	356 J	8.35	129	170	16GWT2101	85.6
ARSENIC	2/4	1.9 J	3.8 J	0.13 - 0.32	1.48	2.85	16GWT1102	0.66 J
BARIUM	4/4	41.7 J	1250 J	---	353	353	16GWT1102	17.8 J - 21.6 J
CALCIUM	4/4	6800 J	91800 J	---	40825	40825	16GWT2101	97300 J - 212000 J
CHROMIUM	1/4	24.5 J	24.5 J	0.69 - 1.1	6.45	24.5	16GWT2101	ND
COBALT	4/4	0.3 J	6.4 J	---	3.28	3.28	16GWT1901	9.2 J - 18.7 J
COPPER	1/4	2.5	2.5	0.24 - 0.47	0.764	2.50	16GWT2101	0.87 J
IRON	2/4	376	1350 J	19.8 - 73.5	443	863	16GWT1102	287 J - 13700 J
MAGNESIUM	4/4	108 J	39000 J	---	13035	13035	16GWT1901	6240 J - 35200 J
MANGANESE	4/4	5.7	502 J	---	240	240	16GWT1901	864 J - 2440 J
NICKEL	4/4	1.6	82.1 J	---	24.4	24.4	16GWT1901	27 J - 36.7 J
POTASSIUM	4/4	1140 J	22200 J	---	7513	7513	16GWT2101	738 J - 2640 J
SELENIUM	1/4	2.1 J	2.1 J	0.094 - 0.19	0.573	2.10	16GWT2101	ND
SODIUM	4/4	11100 J	231000 J	---	116475	116475	16GWT2101	17900 J - 20200 J
VANADIUM	1/4	5.9	5.9	1.14	1.90	5.90	16GWT2101	ND
ZINC	2/4	6.5 J	56 J	2.7 - 4.8	16.6	31.3	16GWT1901	15.8 J - 50 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN	6/6	0.87	6.91	---	2.87	2.87	16GWT2001	0.12 - 0.2
OXIDATION REDUCTION POTENTIAL (MV)	6/6	6.7	341.9	---	121	121	16GWT1901	-46.1 - 124
PH (S.U.)	6/6	4.73	11.96	---	6.74	6.74	16GWT2101	5.75 - 6.69
SPECIFIC CONDUCTANCE (MS/cm)	6/6	0.126	2.48	---	0.913	0.913	16GWT2101	0.496 - 1.75
TEMPERATURE (C)	6/6	13.22	24.93	---	19.7	19.7	16GWT1102	11.8 - 17.24
TURBIDITY (NTU)	6/6	2	150	---	31.2	31.2	16GWT1802	0 - 2.2

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
ND - Not detected
NTU - nephelometric turbidity unit
QC - quality control
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
µg/L - microgram per liter

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**01**	**02**	**03**	**01**	**02**	**03**	**01**	**02**	**03**	**01**	**02**
LOCATION	**WES-14-03-83**	**WES-14-03-83**	**WES-14-03-83**	**16MWT01**	**16MWT01**	**16MWT01**	**16MWT02**	**16MWT02**	**16MWT02**	**16MWT04**	**16MWT04**
SAMPLE NUMBER	**16GW0301**	**16GW0302**	**16GW0303**	**16GWT0101**	**16GWT0102**	**16GWT0103**	**16GWT0201**	**16GWT0202**	**16GWT0203**	**16GWT0401**	**16GWT0402**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**5/11/2003**	**11/8/2003**	**8/24/2004**	**4/22/2003**	**11/9/2003**	**8/28/2004**	**4/22/2003**	**10/26/2003**	**8/29/2004**	**4/22/2003**	**11/8/2003**
Volatile Organics (µg/L)											
1,1,2,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,2-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	2.1	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	1.4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-HEXANONE	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-METHYL-2-PENTANONE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ACETONE	0.5 UR	0.5 UJ	0.5 UJ	1.3 J	0.5 UJ	0.5 UJ	0.5 UR	0.5 UJ	0.5 UJ	0.5 UR	0.5 UJ
BENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMODICHLOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON TETRACHLORIDE	15	11	14	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROFORM	5.6	3.8	4.2	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE	0.4 J	0.5 J	0.6 J	1.9	42	130	0.3 U	0.8 J	0.3 U	0.3 U	0.3 U
ETHANE											0.013
ETHENE											0.027
ETHYLBENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
METHANE											0.93
METHYLENE CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TETRACHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TOLUENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TOTAL XYLENES	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	1	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRICHLOROETHENE	5.6	5	4.3	16	230	1100	1.2	6.5	3.5	2.2	3.9
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 J	0.3 U	0.7 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Semivolatile Organics (µg/L)											
2-METHYLNAPHTHALENE	0.05 U						0.05 U			0.05 U	
ACENAPHTHENE	0.05 U						0.05 U			0.05 U	
BENZO(B)FLUORANTHENE	0.05 U						0.05 U			0.05 U	
CHRYSENE	0.05 U						0.05 U			0.05 U	
DIETHYL PHTHALATE	1 U						1 U			1 U	
FLUORANTHENE	0.05 U						0.05 U			0.05 U	
FLUORENE	0.05 U						0.05 U			0.05 U	
PHENANTHRENE	0.05 U						0.05 U			0.05 U	
PYRENE	0.05 U						0.05 U			0.05 U	
PYRIDINE	1 U						1 U			1 U	

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	01	02	03	01	02	03	01	02	03	01	02
LOCATION	WES-14-03-83	WES-14-03-83	WES-14-03-83	16MWT01	16MWT01	16MWT01	16MWT02	16MWT02	16MWT02	16MWT04	16MWT04
SAMPLE NUMBER	16GW0301	16GW0302	16GW0303	16GWT0101	16GWT0102	16GWT0103	16GWT0201	16GWT0202	16GWT0203	16GWT0401	16GWT0402
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/11/2003	11/8/2003	8/24/2004	4/22/2003	11/9/2003	8/28/2004	4/22/2003	10/26/2003	8/29/2004	4/22/2003	11/8/2003
Energetics (µg/L)											
1,3,5-TRINITROBENZENE	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U	0.26 U	0.26 U	0.55 U	0.255 UJ
2,4,6-TRINITROTOLUENE	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U	0.26 U	0.26 U	0.55 U	0.255 UJ
2,4-DIAMINO-6-NITROTOLUENE		0.25 U						0.26 U			0.255 U
2,4-DINITROTOLUENE	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U	0.26 U	0.26 U	0.55 U	0.255 UJ
2-AMINO-4,6-DINITROTOLUENE	0.48 J	0.62 J	0.89			0.275 U	0.385 U	0.26 U	0.26 U	0.55 U	0.47 J
3-NITROTOLUENE	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U	0.26 U	0.26 U	0.55 U	0.255 UJ
4-AMINO-2,6-DINITROTOLUENE	0.86 J	1.1	1 J			0.275 U	0.385 U	0.26 U	0.26 U	0.55 U	1 J
DNX		0.25 U						0.26 U			0.63 J
HMX	5.7	7.5	6.1			0.275 U	0.385 U	0.26 U	0.26 U	7.8	21
MNX		0.82						0.26 U			4.1
RDX	52	71	50			0.275 U	0.79	0.26 U	0.26 U	77	200
Total Metals (µg/L)											
ALUMINUM	1050	1550 J					168	29.1 U		1050	554 J
ARSENIC	0.1 U	0.11 U					0.81 J	1.2 J		0.41 U	0.1 U
BARIUM	13.5 J	13.4 J					107 J	88.3 J		68.7 J	71.2 J
BERYLLIUM	0.48 U	0.77 U					0.06 U	0.07 U		0.16 U	0.25 U
CALCIUM	48900 J	43200 J					47200 J	39900 J		22600 J	32600 J
CHROMIUM	0.44 U	0.32 U					0.56 U	0.3 U		0.68 J	0.31 U
COBALT	15.1 J	13.9 J					3.9 J	7 J		7.1 J	9.7 J
COPPER	0.82 J	0.92 U					2.8 J	1.1 U		3.4 J	1.2 U
IRON	698 J	1380 J					5850 J	7490 J		568 J	3180 J
LEAD	0.12 U	0.28 U					0.51 U	0.44 U		0.43 U	0.28 U
LITHIUM	33.2 J						0.72 U			8.5 J	
MAGNESIUM	14000 J	12400 J					10900 J	9120 J		8270 J	10400 J
MANGANESE	1960 J	2160 J					2590 J	5830 J		353 J	962 J
NICKEL	43.1 J	37.5 J					1.5 J	3.3 J		21.1 J	24.9 J
POTASSIUM	2780 J	2990 J					1400 J	1790 J		1360 J	1530 J
SELENIUM	0.36 U	0.31 U					0.2 U	0.11 U		0.43 U	0.04 U
SODIUM	7190 J	6770 J					26900 J	31900 J		18200 J	12000 J
STRONTIUM	254 J						387 J			278 J	
TITANIUM	1 J	4.5 U					4.3 J	0.45 U		8.4 J	1.7 U
VANADIUM	0.05 U	0.13 U					0.36 U	0.12 U		0.51 J	0.16 U
ZINC	69.5 J	61.5 J					31.9 J	17.5 J		15.9 J	42.5 J

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	01	02	03	01	02	03	01	02	03	01	02
LOCATION	WES-14-03-83	WES-14-03-83	WES-14-03-83	16MWT01	16MWT01	16MWT01	16MWT02	16MWT02	16MWT02	16MWT04	16MWT04
SAMPLE NUMBER	16GW0301	16GW0302	16GW0303	16GWT0101	16GWT0102	16GWT0103	16GWT0201	16GWT0202	16GWT0203	16GWT0401	16GWT0402
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/11/2003	11/8/2003	8/24/2004	4/22/2003	11/9/2003	8/28/2004	4/22/2003	10/26/2003	8/29/2004	4/22/2003	11/8/2003
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED											
BARIUM, FILTERED											
CALCIUM, FILTERED											
COBALT, FILTERED											
COPPER, FILTERED											
IRON, FILTERED											
MAGNESIUM, FILTERED											
MANGANESE, FILTERED											
NICKEL, FILTERED											
POTASSIUM, FILTERED											
SODIUM, FILTERED											
ZINC, FILTERED											
Field Parameters (mg/L)											
ALKALINITY		10 U									75
CARBON DIOXIDE		130									19
DISSOLVED OXYGEN		1	0.1			5.43			0.87		2
DISSOLVED OXYGEN - METER	1.63	0.74		4.51	2.59		0.82	1.08		5.41	0.89
HYDROGEN SULFIDE (H2S)		0									0
IRON(+2)		0.54									5.19
MANGANESE(+2)		2.1									1
NITRITE-N		0.007									0.004
OXIDATION REDUCTION POTENTIAL (MV)	154.200000	350	438.1	63.1	177	244.600000	-7.1	273.200000	60	79.7	152
PH (S.U.)	5.84	4.82	5.28	6.51	5.97	5.83	6.33	5.76	6.03	6.28	5.84
SPECIFIC CONDUCTANCE (MS/cm)	0.483	0.355	0.43	1.061	2.322	2.5	0.4	0.391	0.343	0.225	0.582
SULFIDE		0.01									0
TEMPERATURE (C)	14.17	13.62	18.66	13.01	15.05	17.28	11.51	14.81	20.46	12.41	15.73
TURBIDITY (NTU)	2.8	1.06	15.5	999 >	85.7	48.7	3.4	6.7	8.7	9.2	2.2
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.02						0.53			0.03	
CHLORIDE		5						83			10
NITRITE/NITRATE-N	0.54	0.7					0.03	0.05 U		0.6	0.49
SULFATE		170						40			70
TOTAL ORGANIC CARBON											1.4

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**03**	**01**	**01**	**02**	**03**	**02**	**03**	**02**	**03**	**02**	**03**
LOCATION	**16MWT04**	**16MWT06**	**16MWT06**	**16MWT06**	**16MWT06**	**16MWT07**	**16MWT07**	**16MWT09**	**16MWT09**	**16MWT10**	**16MWT10**
SAMPLE NUMBER	**16GWT0403**	**16GWT0601**	**16GWT0602**	**16GWT0603**	**16GWT0604**	**16GWT0701**	**16GWT0702**	**16GWT0901**	**16GWT0902**	**16GWT1001**	**16GWT1002**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**DRY**	**DRY**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**
SAMPLE DATE	**8/15/2004**	**4/28/2003**	**5/11/2003**	**11/8/2003**	**8/24/2004**	**11/8/2003**	**8/24/2004**	**11/22/2003**	**8/17/2004**	**11/21/2003**	**8/17/2004**
Volatile Organics (µg/L)											
1,1,2,2-TETRACHLOROETHANE	0.3 U	0.3 UJ		1.6 J	2.1			0.3 U	0.3 U	0.3 U	0.3 U
1,1,2-TRICHLOROETHANE	0.3 U	38 J		220 J	190			0.3 U	0.3 U	0.3 U	0.3 U
1,1-DICHLOROETHENE	0.3 U	26 J		120	160			0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.3 U	0.3 U		0.3 UJ	0.6 J			0.3 U	0.3 U	0.3 U	0.3 U
1,2-DICHLOROETHANE	0.3 U	0.3 U		0.3 U	2.3			0.3 U	0.3 U	0.3 U	0.3 U
2-HEXANONE	0.5 U	0.5 UJ		16 J	1.4 J			0.5 UJ	0.5 U	0.5 UJ	0.5 U
4-METHYL-2-PENTANONE	0.5 U	3.5 J		7.1	27			0.5 U	0.5 U	0.5 U	0.5 U
ACETONE	0.5 UJ	10 U		18 J	12 U			0.5 UR	0.5 UJ	0.5 UR	0.5 UJ
BENZENE	0.3 U	0.9 J		3.3	3.5			0.3 U	0.3 U	0.3 U	0.3 U
BROMODICHLOROMETHANE	0.3 U	0.8 J		0.3 U	0.3 U			0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	0.3 U	0.8 J		4.3	3.04			0.3 U	0.3 U	0.3 U	0.3 U
CARBON TETRACHLORIDE	0.3 U	0.3 UJ		0.8 J	0.3 U			0.3 U	0.3 U	0.3 U	0.3 U
CHLOROFORM	0.3 U	12 J		10	15			0.9 J	0.8 J	3.4	2.6
CIS-1,2-DICHLOROETHENE	0.3 U	600		4200	4100			0.2 J	0.3 U	0.2 J	0.3 U
ETHANE				7.7						0.33	
ETHENE				65						0.16	
ETHYLBENZENE	0.3 U	0.3 UJ		2.6	3.9			0.3 U	0.3 U	0.3 U	0.3 U
METHANE				280						19	
METHYLENE CHLORIDE	0.3 UJ	0.3 U		0.3 U	0.3 UJ			0.3 UJ	0.3 UJ	0.3 UJ	0.3 UJ
TETRACHLOROETHENE	0.3 U	13 J		160	150			0.3 U	0.3 U	0.3 U	0.3 U
TOLUENE	0.3 U	32 J		270 J	310 J			0.3 U	0.3 U	0.3 U	0.3 U
TOTAL XYLENES	0.3 U	0.3 UJ		3.5	6.5			0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,2-DICHLOROETHENE	0.3 U	3.1 J		22	20			0.3 U	0.3 U	0.3 U	0.3 U
TRICHLOROETHENE	2.1	35000		250000	330000			7.6	7.1	1.9	1.9
VINYL CHLORIDE	0.3 U	65 J		340 J	390 J			0.3 U	0.3 U	0.3 U	0.3 U
Semivolatile Organics (µg/L)											
2-METHYLNAPHTHALENE		0.11									
ACENAPHTHENE		0.07 J									
BENZO(B)FLUORANTHENE		0.09 J									
CHRYSENE		0.1 J									
DIETHYL PHTHALATE		1 J	1 U								
FLUORANTHENE		0.11									
FLUORENE		0.1 J									
PHENANTHRENE		0.54									
PYRENE		0.2									
PYRIDINE		1 U	9								

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**03**	**01**	**01**	**02**	**03**	**02**	**03**	**02**	**03**	**02**	**03**
LOCATION	**16MWT04**	**16MWT06**	**16MWT06**	**16MWT06**	**16MWT06**	**16MWT07**	**16MWT07**	**16MWT09**	**16MWT09**	**16MWT10**	**16MWT10**
SAMPLE NUMBER	**16GWT0403**	**16GWT0601**	**16GWT0602**	**16GWT0603**	**16GWT0604**	**16GWT0701**	**16GWT0702**	**16GWT0901**	**16GWT0902**	**16GWT1001**	**16GWT1002**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**DRY**	**DRY**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**
SAMPLE DATE	**8/15/2004**	**4/28/2003**	**5/11/2003**	**11/8/2003**	**8/24/2004**	**11/8/2003**	**8/24/2004**	**11/22/2003**	**8/17/2004**	**11/21/2003**	**8/17/2004**
Energetics (µg/L)											
1,3,5-TRINITROBENZENE	0.27 U	0.34 U		0.25 UJ	1.8			0.272 U	0.27 U	0.287 U	0.27 U
2,4,6-TRINITROTOLUENE	0.27 U	0.34 U		0.25 UJ	4.8			0.272 U	0.27 U	0.287 U	0.27 U
2,4-DIAMINO-6-NITROTOLUENE				0.27 J				0.272 U		0.287 U	
2,4-DINITROTOLUENE	0.27 U	0.34 U		0.25 UJ	0.8			0.272 U	0.27 U	0.287 U	0.27 U
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.34 U		4.2 J	29 J			0.31 J	0.27 U	0.287 U	0.27 U
3-NITROTOLUENE	0.27 U	0.34 U		0.25 UJ	0.25 U			0.272 U	1.5 J	0.287 U	2.1 J
4-AMINO-2,6-DINITROTOLUENE	0.56	0.34 U		1.5	14			0.69 J	0.27 U	0.287 U	0.27 U
DNX				0.25 U				0.272 U		0.287 U	
HMX	8.6	0.34 U		0.27 J	0.93 J			11	8.1	6.7	5.2
MNX				0.25 U				1.1		0.5 J	
RDX	70	4		1.8	8.8			110	79	55	55
Total Metals (µg/L)											
ALUMINUM		222 J		1060 J				1050 J		5810 J	
ARSENIC		4.5 J		1.5 J				0.65 U		1.5 U	
BARIUM		36.9 J		49.5 J				28 J		15.7 J	
BERYLLIUM		0.03 U		0.07 U				0.78 U		1.9 J	
CALCIUM		96800 J		101000 J				33300 J		85100 J	
CHROMIUM		0.93 J		3.5 J				0.42 U		1.3 U	
COBALT		2 J		49.5 J				44.3 J		131 J	
COPPER		4.9 J		0.85 U				5.8 J		12.4 J	
IRON		171 J		1240 J				15800 J		50200 J	
LEAD		0.4 U		0.55 U				2.6 J		6.6 J	
LITHIUM		21.9 J									
MAGNESIUM		19700 J		72800 J				17100 J		78800 J	
MANGANESE		482 J		3210 J				4350 J		24600 J	
NICKEL		8.1 J		119 J				87.8 J		219 J	
POTASSIUM		11900 J		8440 J				3300 J		4060 J	
SELENIUM		1.2 J		1.4 U				0.33 U		0.43 U	
SODIUM		37100 J		149000 J				16700 J		13400 J	
STRONTIUM		186 J									
TITANIUM		4 J		35 J				0.63 U		2.6 J	
VANADIUM		0.8 J		2.2 J				0.07 U		0.3 U	
ZINC		6.2 J		19.9 J				94.1 J		443 J	

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**03**	**01**	**01**	**02**	**03**	**02**	**03**	**02**	**03**	**02**	**03**
LOCATION	**16MWT04**	**16MWT06**	**16MWT06**	**16MWT06**	**16MWT06**	**16MWT07**	**16MWT07**	**16MWT09**	**16MWT09**	**16MWT10**	**16MWT10**
SAMPLE NUMBER	**16GWT0403**	**16GWT0601**	**16GWT0602**	**16GWT0603**	**16GWT0604**	**16GWT0701**	**16GWT0702**	**16GWT0901**	**16GWT0902**	**16GWT1001**	**16GWT1002**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**DRY**	**DRY**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**
SAMPLE DATE	**8/15/2004**	**4/28/2003**	**5/11/2003**	**11/8/2003**	**8/24/2004**	**11/8/2003**	**8/24/2004**	**11/22/2003**	**8/17/2004**	**11/21/2003**	**8/17/2004**
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED											
BARIUM, FILTERED											
CALCIUM, FILTERED											
COBALT, FILTERED											
COPPER, FILTERED											
IRON, FILTERED											
MAGNESIUM, FILTERED											
MANGANESE, FILTERED											
NICKEL, FILTERED											
POTASSIUM, FILTERED											
SODIUM, FILTERED											
ZINC, FILTERED											
Field Parameters (mg/L)											
ALKALINITY				200						10 U	
CARBON DIOXIDE				40						280	
DISSOLVED OXYGEN	1.81			1.5	0.39				0.37	0.35	0.14
DISSOLVED OXYGEN - METER		0.48	6.94	1.67				2.33		1.28	
HYDROGEN SULFIDE (H2S)				0						0	
IRON(+2)				0.03						3.3 >	
MANGANESE(+2)				3.8						22 >	
NITRITE-N				0.016						0.002	
OXIDATION REDUCTION POTENTIAL (MV)	54	-106	-117.10000	188.600000	402			329.8	199.700000	328.900000	501.200000
PH (S.U.)	5.6	7.7	6.93	6.49	4.69			4.1	4.7	3.72	3.21
SPECIFIC CONDUCTANCE (MS/cm)	0.232	0.516	0.96	1.216	1.219			0.502	0.937	1.178	1.284
SULFIDE				0.07						0.02	
TEMPERATURE (C)	19.45	15	14.2	14.55	18.77			16.56	19.68	14.77	16.75
TURBIDITY (NTU)	5.13	8.8	43.1	1.99	29			4.82	2.32	5.56	6.31
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.57									
CHLORIDE				47				14 U		8 J	
NITRITE/NITRATE-N		0.5		0.025 U				0.05 U		0.27 J	
SULFATE				520				210 U		980 J	
TOTAL ORGANIC CARBON											

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	02	02	03	02	03	01	01	02	03
LOCATION	16MWT13	16MWT13	16MWT13	16MWT17	16MWT17	WES-14-02-83	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GWT1301	16GWT1301-F	16GWT1302	16GWT1701	16GWT1702	16GW0201	16GW0202	16GW0203	16GW0204
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/22/2003	11/22/2003	8/18/2004	12/5/2003	8/25/2004	4/24/2003	5/11/2003	10/26/2003	8/25/2004
Volatile Organics (µg/L)									
1,1,2,2-TETRACHLOROETHANE	30 U		0.3 U	0.3 U	60 U	0.3 U		0.3 U	0.3 U
1,1,2-TRICHLOROETHANE	81 J		39	32	60 U	0.3 U		0.3 U	0.3 U
1,1-DICHLOROETHENE	30 U		4.4	5.3	60 U	0.3 U		0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	30 U		0.3 U	0.3 U	60 U	0.3 U		0.3 U	0.3 U
1,2-DICHLOROETHANE	30 U		0.6 J	0.3 U	60 U	0.3 U		0.3 U	0.3 U
2-HEXANONE	50 UJ		0.5 U	0.5 U	100 U	0.5 U		0.5 U	0.5 U
4-METHYL-2-PENTANONE	50 U		0.5 U	0.5 U	100 U	0.5 U		0.5 U	0.5 U
ACETONE	50 UR		0.5 UJ	0.5 J	100 UJ	0.5 UR		0.5 UJ	0.5 UJ
BENZENE	30 U		1.1	1.1	60 U	0.3 U		0.3 U	0.3 U
BROMODICHLOROMETHANE	30 U		0.3 U	0.3 U	60 U	0.3 U		0.3 U	0.3 U
CARBON DISULFIDE	30 U		0.3 U	0.3 U	60 U	0.3 U		0.3 U	0.3 U
CARBON TETRACHLORIDE	30 U		0.3 U	0.3 U	60 U	0.3 U		0.3 U	0.3 U
CHLOROFORM	30 U		3.1	2.8	60 U	0.3 U		0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE	280		140	210	290	0.3 U		0.3 U	0.3 U
ETHANE	0.45							0.062	
ETHENE	0.67							0.018	
ETHYLBENZENE	30 U		1.6	0.3 U	60 U	0.3 U		0.3 U	0.3 U
METHANE	0.032							15	
METHYLENE CHLORIDE	59 J		0.3 UJ	0.3 U	60 U	0.3 U		0.3 U	0.3 U
TETRACHLOROETHENE	30 U		7.2	1.4	60 U	0.3 U		0.3 U	0.3 U
TOLUENE	30 U		2.8	0.3 U	60 U	0.3 U		0.3 U	0.3 U
TOTAL XYLENES	30 U		2.8	0.3 U	60 U	0.3 U		0.3 U	0.3 U
TRANS-1,2-DICHLOROETHENE	30 U		1.9	4.1	60 U	0.3 U		0.3 U	0.3 U
TRICHLOROETHENE	62000		28000	11000	19000	0.3 U		0.3 U	0.3 U
VINYL CHLORIDE	30 U		0.8 J	2.1	60 U	0.3 U		0.3 U	0.3 U
Semivolatile Organics (µg/L)									
2-METHYLNAPHTHALENE						0.05 U			
ACENAPHTHENE						0.05 U			
BENZO(B)FLUORANTHENE						0.05 U			
CHRYSENE						0.05 U			
DIETHYL PHTHALATE						1 U	1 U		
FLUORANTHENE						0.05 U			
FLUORENE						0.05 U			
PHENANTHRENE						0.05 U			
PYRENE						0.05 U			
PYRIDINE						1 U	1 U		

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**02**	**02**	**03**	**02**	**03**	**01**	**01**	**02**	**03**
LOCATION	**16MWT13**	**16MWT13**	**16MWT13**	**16MWT17**	**16MWT17**	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**
SAMPLE NUMBER	**16GWT1301**	**16GWT1301-F**	**16GWT1302**	**16GWT1701**	**16GWT1702**	**16GW0201**	**16GW0202**	**16GW0203**	**16GW0204**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/22/2003**	**11/22/2003**	**8/18/2004**	**12/5/2003**	**8/25/2004**	**4/24/2003**	**5/11/2003**	**10/26/2003**	**8/25/2004**
Energetics (µg/L)									
1,3,5-TRINITROBENZENE	0.275 U		0.271 U	0.269 U	0.27 U	0.21 U		0.24 U	0.27 U
2,4,6-TRINITROTOLUENE	0.275 U		0.271 U	0.269 U	0.27 U	0.21 U		0.24 U	0.27 U
2,4-DIAMINO-6-NITROTOLUENE	0.275 U			0.269 U				0.24 U	
2,4-DINITROTOLUENE	0.275 U		0.271 U	0.269 U	0.27 U	0.21 U		0.24 U	0.27 U
2-AMINO-4,6-DINITROTOLUENE	0.275 U		0.271 U	0.269 U	0.27 U	0.21 U		0.24 U	0.27 U
3-NITROTOLUENE	0.275 U		0.271 U	0.269 U	0.27 U	0.21 U		0.24 U	0.27 U
4-AMINO-2,6-DINITROTOLUENE	0.275 U		0.271 U	0.269 U	0.27 U	0.21 U		0.24 U	0.27 U
DNX	0.275 U			0.269 U				0.24 U	
HMX	0.275 U		0.271 U	0.43 J	0.27 U	0.21 U		0.24 U	0.27 U
MNX	0.275 U			0.269 U				0.24 U	
RDX	6.7		1.1	4.3	5.2	0.195 U		0.24 U	0.27 U
Total Metals (µg/L)									
ALUMINUM	2290 J			187 J		85.6	60.6 U	8.3 U	
ARSENIC	1.9 U			1.3 U		0.16 U	0.33 U	0.66 J	
BARIUM	71.2 J			42.7 J		21.6 J	18 J	17.8 J	
BERYLLIUM	1.3 U			0.69 U		0.42 U	0.34 U	0.06 U	
CALCIUM	94100 J			42200 J		99400 J	97300 J	212000 J	
CHROMIUM	5.5 J			0.39 U		0.43 U	0.29 U	0.17 U	
COBALT	62.1 J			64.4 J		12.9 J	9.2 J	18.7 J	
COPPER	7.3 J			0.56 U		0.87 J	0.15 U	0.12 U	
IRON	9220 J			27000 J		287 J	415 J	13700 J	
LEAD	4.4 J			0.24 U		0.21 U	0.28 U	0.18 U	
LITHIUM						32.7 J	33.6 J		
MAGNESIUM	12400 J			16700 J		6240 J	6480 J	35200 J	
MANGANESE	3600 J			5940 J		916 J	864 J	2440 J	
NICKEL	212 J			125 J		34.2 J	27 J	36.7 J	
POTASSIUM	7850 J			5380 J		738 J	3390 U	2640 J	
SELENIUM	0.73 U			0.07 U		0.05 U	0.06 U	0.04 U	
SODIUM	18300 J			61300 J		18000 J	17900 J	20200 J	
STRONTIUM						88.4 J	98.4 J		
TITANIUM	17.4 J			0.74 U		3.8 J	3 J	0.17 U	
VANADIUM	4.1 J			0.17 U		0.3 U	0.35 U	0.09 U	
ZINC	248 J			122 J		50 J	42.9 J	15.8 J	

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**02**	**02**	**03**	**02**	**03**	**01**	**01**	**02**	**03**
LOCATION	**16MWT13**	**16MWT13**	**16MWT13**	**16MWT17**	**16MWT17**	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**
SAMPLE NUMBER	**16GWT1301**	**16GWT1301-F**	**16GWT1302**	**16GWT1701**	**16GWT1702**	**16GW0201**	**16GW0202**	**16GW0203**	**16GW0204**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/22/2003**	**11/22/2003**	**8/18/2004**	**12/5/2003**	**8/25/2004**	**4/24/2003**	**5/11/2003**	**10/26/2003**	**8/25/2004**
Dissolved Metals (µg/L)									
ALUMINUM, FILTERED		342 J							
BARIUM, FILTERED		56.6 J							
CALCIUM, FILTERED		38800 J							
COBALT, FILTERED		58.5 J							
COPPER, FILTERED		5.4 J							
IRON, FILTERED		5230 J							
MAGNESIUM, FILTERED		11800 J							
MANGANESE, FILTERED		3600 J							
NICKEL, FILTERED		193 J							
POTASSIUM, FILTERED		7280 J							
SODIUM, FILTERED		18500 J							
ZINC, FILTERED		244 J							
Field Parameters (mg/L)									
ALKALINITY	10 U							300	
CARBON DIOXIDE	140							105	
DISSOLVED OXYGEN	6		0.08		0.18			0.2	0.12
DISSOLVED OXYGEN - METER	7.27			0.63		0.64	1.18	6.3	
HYDROGEN SULFIDE (H2S)	0							0	
IRON(+2)	3.3 >							3.3 >	
MANGANESE(+2)	4.1							1.5	
NITRITE-N	0.008							0.003	
OXIDATION REDUCTION POTENTIAL (MV)	264.8		541	111.5	274.3	7.1	-46.1	-0.8	124
PH (S.U.)	4.72		5.42	5.58	4.59	6.65	6.69	6.54	5.75
SPECIFIC CONDUCTANCE (MS/cm)	0.433		0.42	0.649	0.786	0.568	0.496	1.75	0.502
SULFIDE	0.02							0	
TEMPERATURE (C)	21.88		18.44	11.63	18.56	11.8	12.84	15.27	17.24
TURBIDITY (NTU)	8.67		105	5.92	9.1	2.2	0.4	0.8	0
Miscellaneous Parameters (mg/L)									
AMMONIA-N						0.04			
CHLORIDE	17 U			120				14	
NITRITE/NITRATE-N	0.19 J			0.05 UJ		0.02 U		0.05 U	
SULFATE	180 U			150				270	
TOTAL ORGANIC CARBON								1.7	

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
NTU - nephelometric turbidity unit
QC - quality control
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
µg/L - microgram per liter

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**
SAMPLING ROUND	**01**	**02**	**03**	**01**	**02**	**03**	**01**	**02**	**03**	**01**	**02**
LOCATION	**WES-14-01-83**	**WES-14-01-83**	**WES-14-01-83**	**WES-14-04-83**	**WES-14-04-83**	**WES-14-04-83**	**WES-14-05-83**	**WES-14-05-83**	**WES-14-05-83**	**16MWT03**	**16MWT03**
SAMPLE NUMBER	**16GW0101**	**16GW0102**	**16GW0103**	**16GW0401**	**16GW0402**	**16GW0403**	**16GW0501**	**16GW0502**	**16GW0503**	**16GWT0301**	**16GWT0302**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**4/23/2003**	**10/26/2003**	**8/26/2004**	**4/23/2003**	**10/26/2003**	**8/25/2004**	**4/22/2003**	**10/26/2003**	**8/25/2004**	**4/25/2003**	**11/9/2003**
Volatile Organics (µg/L)											
CARBON DISULFIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
ETHANE								0.032			
ETHENE								0.0093			
METHANE								0.86			
TETRACHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRICHLOROETHENE	2	0.6 J	0.3 U	0.5 J	0.3 U	0.7 J	0.5 J	0.5 J	0.3 U	0.3 U	0.7 J
Energetics (µg/L)											
2-NITROTOLUENE	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.264 U	0.42 U	0.25 U	0.27 U	0.5 U	0.255 UJ
HMX	0.65 U	0.26 U	0.27 U	0.39	0.45 J	0.264 U	1.2 J	0.81	1 J	0.5 U	0.255 U
RDX	0.6 U	0.26 U	0.27 U	1.7	1.9	0.66	4.8	1.8	3	0.48 U	0.255 U
Total Metals (µg/L)											
ALUMINUM	19.2 J	26.4 U		9680	9330 J		5030	4730 J		140	29200 J
ARSENIC	2.7 J	32.1 J		1.5 J	1.1 J		1.6 J	1.3 J		1.6 J	6.6 J
BARIUM	5 J	6 J		9.4 J	7.8 J		12 J	9.4 J		18.1 J	139 J
BERYLLIUM	0.16 U	0.66 U		2 J	2.7 U		1.1 U	1.3 U		0.28 U	1.1 U
CADMIUM	0.05 U	0.05 U		0.83 J	0.91 U		1.1 J	0.93 U		0.2 U	0.1 U
CALCIUM	194000 J	106000 U		66900 J	64000 J		72800 J	63100 J		39500 J	45600 J
CHROMIUM	0.27 U	0.38 U		0.55 U	0.64 U		0.51 U	0.51 U		0.41 U	16.7 J
COBALT	154 J	129 J		51.7 J	57.3 J		34.4 J	32 J		40.9 J	37.3 J
COPPER	0.06 U	0.07 U		0.12 U	0.26 U		0.11 U	0.12 U		2.1 J	6.1 J
IRON	52700 J	83900 J		4870 J	6580 J		2190 J	2820 J		39400 J	79600 J
LEAD	0.03 U	0.12 U		0.43 U	0.53 U		0.89 J	0.7 U		1.1 J	15.5 J
LITHIUM	328 J			120 J			92.7 J			101 J	
MAGNESIUM	84500 J	63100 J		29000 J	25000 J		30600 J	25500 J		25000 J	33600 J
MANGANESE	29300 J	12600 J		3710 J	4310 J		2550 J	2450 J		3930 J	4500 J
NICKEL	198 J	169 J		186 J	195 J		134 J	124 J		93.4 J	86.3 J
POTASSIUM	9390 J	8490 J		3240 J	3070 J		3760 J	2970 J		4260 J	6300 J
SELENIUM	0.05 U	0.05 U		0.05 U	0.04 U		0.05 U	0.04 U		0.32 U	0.48 U
SODIUM	25900 J	21300 J		13400 J	11500 J		13500 J	10400 J		26700 J	33100 J
STRONTIUM	197 J			199 J			279 J			158 J	
TIN	0.03 U	0.1 U		0.03 U	0.1 U		0.05 U	0.1 U		0.06 U	0.48 U
TITANIUM	1.2 J	0.07 U		2 J	0.31 U		2 J	0.83 U		2.9 J	95.1 J
VANADIUM	0.05 U	0.21 U		0.86 J	0.74 J		0.6 J	0.65 J		0.14 U	15.7 J
ZINC	157 J	231 J		244 J	260		222 J	227		108 J	86.1 J

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	01	02	03	01	02	03	01	02	03	01	02
LOCATION	WES-14-01-83	WES-14-01-83	WES-14-01-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-05-83	WES-14-05-83	WES-14-05-83	16MWT03	16MWT03
SAMPLE NUMBER	16GW0101	16GW0102	16GW0103	16GW0401	16GW0402	16GW0403	16GW0501	16GW0502	16GW0503	16GWT0301	16GWT0302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/23/2003	10/26/2003	8/26/2004	4/23/2003	10/26/2003	8/25/2004	4/22/2003	10/26/2003	8/25/2004	4/25/2003	11/9/2003
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED											
ARSENIC, FILTERED											
BARIUM, FILTERED											
BERYLLIUM, FILTERED											
CADMIUM, FILTERED											
CALCIUM, FILTERED											
COBALT, FILTERED											
COPPER, FILTERED											
IRON, FILTERED											
LEAD, FILTERED											
MAGNESIUM, FILTERED											
MANGANESE, FILTERED											
NICKEL, FILTERED											
POTASSIUM, FILTERED											
SELENIUM, FILTERED											
SODIUM, FILTERED											
TITANIUM, FILTERED											
ZINC, FILTERED											
Field Parameters (mg/L)											
ALKALINITY								10 U			
CARBON DIOXIDE								150			
DISSOLVED OXYGEN			54.72					0.25	19.79		
DISSOLVED OXYGEN - METER	0.32	0.7		0.29	0.54		0.9	0.28		0.64	1.23
HYDROGEN SULFIDE (H2S)								0			
IRON(+2)								2.91			
MANGANESE(+2)								2.7			
NITRITE-N								0.005			
OXIDATION REDUCTION POTENTIAL (MV)	-130	-5	-69.9	207.4	328.700000	124	152	263	57.5	35	129.9
PH (S.U.)	6.4	6.17	5.76	3.68	3.65	4.1	4.38	4.77	5.73	5.23	5.46
SPECIFIC CONDUCTANCE (MS/cm)	1.606	1.452	1.5	0.72	0.735	0.838	0.625	0.587	0.694	0.607	0.536
SULFIDE								0.1			
TEMPERATURE (C)	13.79	12.72	17.28	13.31	13.21	15.03	12.95	13.39	15.26	12.26	12.35
TURBIDITY (NTU)	0.05	0.61	4.53	0.5	0.13	8.9	0	1.96	9.7	10	49

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**
SAMPLING ROUND	**01**	**02**	**03**	**01**	**02**	**03**	**01**	**02**	**03**	**01**	**02**
LOCATION	**WES-14-01-83**	**WES-14-01-83**	**WES-14-01-83**	**WES-14-04-83**	**WES-14-04-83**	**WES-14-04-83**	**WES-14-05-83**	**WES-14-05-83**	**WES-14-05-83**	**16MWT03**	**16MWT03**
SAMPLE NUMBER	**16GW0101**	**16GW0102**	**16GW0103**	**16GW0401**	**16GW0402**	**16GW0403**	**16GW0501**	**16GW0502**	**16GW0503**	**16GWT0301**	**16GWT0302**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**4/23/2003**	**10/26/2003**	**8/26/2004**	**4/23/2003**	**10/26/2003**	**8/25/2004**	**4/22/2003**	**10/26/2003**	**8/25/2004**	**4/25/2003**	**11/9/2003**
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.41			0.08			0.03			0.33	
CHLORIDE		7			12			7			9
NITRITE/NITRATE-N	0.02 U	0.07		0.02 U	0.05 U		0.02 U	0.05 U		0.02 U	0.025 U
SULFATE		860			430			340			290
TOTAL ORGANIC CARBON											

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**
WATER BEARING ZONE	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**UPPER**
SAMPLING ROUND	**02**	**03**	**01**	**02**	**03**	**02**	**03**	**02**	**02**	**03**	**01**
LOCATION	**16MWT03**	**16MWT03**	**16MWT05**	**16MWT05**	**16MWT05**	**16MWT12**	**16MWT12**	**16MWT16**	**16MWT16**	**16MWT16**	**WES-14-02-83**
SAMPLE NUMBER	**16GWT0302-F**	**16GWT0303**	**16GWT0501**	**16GWT0502**	**16GWT0503**	**16GWT1201**	**16GWT1202**	**16GWT1601**	**16GWT1601-F**	**16GWT1602**	**16GW0201**
SAMPLE CODE	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/9/2003**	**8/28/2004**	**4/24/2003**	**11/22/2003**	**8/26/2004**	**11/21/2003**	**8/24/2004**	**11/22/2003**	**11/23/2003**	**8/27/2004**	**4/24/2003**
Volatile Organics (µg/L)											
CARBON DISULFIDE		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 J		0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 J		0.3 U	0.3 U
ETHANE						0.37 J					
ETHENE						0.031 J					
METHANE						11					
TETRACHLOROETHENE		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 J		0.3 U	0.3 U
TRICHLOROETHENE		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	190		340	0.3 U
Energetics (µg/L)											
2-NITROTOLUENE		0.29 U	0.375 U	0.263 U	0.28 U	0.269 U	0.264 U	0.253 U		1	0.21 U
HMX		0.29 U	0.375 U	0.263 U	0.28 U	1.3 J	0.264 U	0.253 U		0.25 U	0.21 U
RDX		0.29 U	0.355 U	0.263 U	0.28 U	0.269 U	0.264 U	0.253 U		0.25 U	0.195 U
Total Metals (µg/L)											
ALUMINUM			6020	6650 J		6740 J		53900 J		6060 J	85.6
ARSENIC			3.5 J	1.5 U		2.3 J		26.1 J		17.9 J	0.16 U
BARIUM			14.2 J	9.7 J		17.5 J		286 J		95.6 J	21.6 J
BERYLLIUM			4.7 J	4.6 J		3.5 J		8.3 J		6.1 J	0.42 U
CADMIUM			0.21 U	0.17 U		1.4 U		4 J		2.7 J	0.31 U
CALCIUM			57000 J	62100 J		45600 J		168000 J		136000 J	99400 J
CHROMIUM			0.58 U	0.53 U		0.68 U		73.6 J		12.4 J	0.43 U
COBALT			92.1 J	77.2 J		113 J		530 J		563 J	12.9 J
COPPER			1.4 J	0.32 U		2.8 J		43.3 J		51.5 J	0.87 J
IRON			29700 J	30600 J		28000 J		64700 J		18200 J	287 J
LEAD			1.8 J	0.57 U		2.4 J		54.8 J		33.3 J	0.21 U
LITHIUM			310 J								32.7 J
MAGNESIUM			27200 J	31600 J		32700 J		133000 J		120000 J	6240 J
MANGANESE			6510 J	7030 J		8120 J		17900 J		16400 J	916 J
NICKEL			304 J	284 J		312 J		714 J		808 J	34.2 J
POTASSIUM			3590 J	3100 J		3610 J		19300 J		14900 J	738 J
SELENIUM			0.19 U	0.04 U		0.9 U		5.2 J		2.8 J	0.05 U
SODIUM			14300 J	13800 J		14300 J		107000 J		91800 J	18000 J
STRONTIUM			106 J								88.4 J
TIN			0.03 U	0.1 U		0.58 U		2.5 J		1.8 J	0.06 U
TITANIUM			3.2 J	1.5 U		0.77 U		134 J			3.8 J
VANADIUM			0.6 J	1.7 U		0.46 U		64.8 J		14.8	0.3 U
ZINC			329 J	254 J		290 J		791 J		661 J	50 J

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**
WATER BEARING ZONE	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**UPPER**
SAMPLING ROUND	**02**	**03**	**01**	**02**	**03**	**02**	**03**	**02**	**02**	**03**	**01**
LOCATION	**16MWT03**	**16MWT03**	**16MWT05**	**16MWT05**	**16MWT05**	**16MWT12**	**16MWT12**	**16MWT16**	**16MWT16**	**16MWT16**	**WES-14-02-83**
SAMPLE NUMBER	**16GWT0302-F**	**16GWT0303**	**16GWT0501**	**16GWT0502**	**16GWT0503**	**16GWT1201**	**16GWT1202**	**16GWT1601**	**16GWT1601-F**	**16GWT1602**	**16GW0201**
SAMPLE CODE	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/9/2003**	**8/28/2004**	**4/24/2003**	**11/22/2003**	**8/26/2004**	**11/21/2003**	**8/24/2004**	**11/22/2003**	**11/23/2003**	**8/27/2004**	**4/24/2003**
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED	33 U								2460 J		
ARSENIC, FILTERED	1.2 U								4.6 J		
BARIUM, FILTERED	12.9 J								17 J		
BERYLLIUM, FILTERED	0.17 U								3.8 J		
CADMIUM, FILTERED	0.04 U								3 J		
CALCIUM, FILTERED	38900 J								158000 J		
COBALT, FILTERED	36.9 J								522 J		
COPPER, FILTERED	0.49 U								20 J		
IRON, FILTERED	43200 J								1140 U		
LEAD, FILTERED	0.15 U								6.2 J		
MAGNESIUM, FILTERED	27200 J								131000 J		
MANGANESE, FILTERED	4030 J								16700 J		
NICKEL, FILTERED	80.6 J								622 J		
POTASSIUM, FILTERED	3920 J								16500 J		
SELENIUM, FILTERED	0.05 U								3.1 J		
SODIUM, FILTERED	29000 J								105000 J		
TITANIUM, FILTERED	2.3 U								2.4 J		
ZINC, FILTERED	67 J								596 J		
Field Parameters (mg/L)											
ALKALINITY						10 U					
CARBON DIOXIDE						260					
DISSOLVED OXYGEN					0.06	0.1	3.66			5.5	
DISSOLVED OXYGEN - METER			0.2	1.3		0.64		5.24			0.64
HYDROGEN SULFIDE (H2S)						0					
IRON(+2)						3.3 >					
MANGANESE(+2)						9.4					
NITRITE-N						0					
OXIDATION REDUCTION POTENTIAL (MV)		259.900000	185	210	231.600000	306.8	220.700000	306		58	7.1
PH (S.U.)		4.54	4.42	4.38	4.92	4.27	4.64	5.03		6.24	6.65
SPECIFIC CONDUCTANCE (MS/cm)		0.62	0.684	0.663	0.67	0.795	2.785	1.86		1.789	0.568
SULFIDE						0.01					
TEMPERATURE (C)		18.06	14.47	15.85	16.63	16.04	17.81	17.61		20.33	11.8
TURBIDITY (NTU)		7.25	6.8	7.72	9.55	4.11	7.63	1000 >		1000 >	2.2

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**
WATER BEARING ZONE	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**UPPER**
SAMPLING ROUND	**02**	**03**	**01**	**02**	**03**	**02**	**03**	**02**	**02**	**03**	**01**
LOCATION	**16MWT03**	**16MWT03**	**16MWT05**	**16MWT05**	**16MWT05**	**16MWT12**	**16MWT12**	**16MWT16**	**16MWT16**	**16MWT16**	**WES-14-02-83**
SAMPLE NUMBER	**16GWT0302-F**	**16GWT0303**	**16GWT0501**	**16GWT0502**	**16GWT0503**	**16GWT1201**	**16GWT1202**	**16GWT1601**	**16GWT1601-F**	**16GWT1602**	**16GW0201**
SAMPLE CODE	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/9/2003**	**8/28/2004**	**4/24/2003**	**11/22/2003**	**8/26/2004**	**11/21/2003**	**8/24/2004**	**11/22/2003**	**11/23/2003**	**8/27/2004**	**4/24/2003**
Miscellaneous Parameters (mg/L)											
AMMONIA-N			0.32								0.04
CHLORIDE				2 U		15 U					
NITRITE/NITRATE-N			0.02 U	0.025 U		0.025 U					0.02 U
SULFATE				390 J		260 J					
TOTAL ORGANIC CARBON											

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**	**UPGRAD**	**UPGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**01**	**02**	**03**
LOCATION	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**
SAMPLE NUMBER	**16GW0202**	**16GW0203**	**16GW0204**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**5/11/2003**	**10/26/2003**	**8/25/2004**
Volatile Organics (µg/L)			
CARBON DISULFIDE		0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE		0.3 U	0.3 U
ETHANE		0.062	
ETHENE		0.018	
METHANE		15	
TETRACHLOROETHENE		0.3 U	0.3 U
TRICHLOROETHENE		0.3 U	0.3 U
Energetics (µg/L)			
2-NITROTOLUENE		0.24 U	0.27 U
HMX		0.24 U	0.27 U
RDX		0.24 U	0.27 U
Total Metals (µg/L)			
ALUMINUM	60.6 U	8.3 U	
ARSENIC	0.33 U	0.66 J	
BARIUM	18 J	17.8 J	
BERYLLIUM	0.34 U	0.06 U	
CADMIUM	0.22 U	0.04 U	
CALCIUM	97300 J	212000 J	
CHROMIUM	0.29 U	0.17 U	
COBALT	9.2 J	18.7 J	
COPPER	0.15 U	0.12 U	
IRON	415 J	13700 J	
LEAD	0.28 U	0.18 U	
LITHIUM	33.6 J		
MAGNESIUM	6480 J	35200 J	
MANGANESE	864 J	2440 J	
NICKEL	27 J	36.7 J	
POTASSIUM	3390 U	2640 J	
SELENIUM	0.06 U	0.04 U	
SODIUM	17900 J	20200 J	
STRONTIUM	98.4 J		
TIN	0.07 U	0.1 U	
TITANIUM	3 J	0.17 U	
VANADIUM	0.35 U	0.09 U	
ZINC	42.9 J	15.8 J	

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER
SAMPLING ROUND	01	02	03
LOCATION	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GW0202	16GW0203	16GW0204
SAMPLE CODE	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/11/2003	10/26/2003	8/25/2004
Dissolved Metals (µg/L)			
ALUMINUM, FILTERED			
ARSENIC, FILTERED			
BARIUM, FILTERED			
BERYLLIUM, FILTERED			
CADMIUM, FILTERED			
CALCIUM, FILTERED			
COBALT, FILTERED			
COPPER, FILTERED			
IRON, FILTERED			
LEAD, FILTERED			
MAGNESIUM, FILTERED			
MANGANESE, FILTERED			
NICKEL, FILTERED			
POTASSIUM, FILTERED			
SELENIUM, FILTERED			
SODIUM, FILTERED			
TITANIUM, FILTERED			
ZINC, FILTERED			
Field Parameters (mg/L)			
ALKALINITY		300	
CARBON DIOXIDE		105	
DISSOLVED OXYGEN		0.2	0.12
DISSOLVED OXYGEN - METER	1.18	6.3	
HYDROGEN SULFIDE (H2S)		0	
IRON(+2)		3.3 >	
MANGANESE(+2)		1.5	
NITRITE-N		0.003	
OXIDATION REDUCTION POTENTIAL (MV)	-46.1	-0.8	124
PH (S.U.)	6.69	6.54	5.75
SPECIFIC CONDUCTANCE (MS/cm)	0.496	1.75	0.502
SULFIDE		0	
TEMPERATURE (C)	12.84	15.27	17.24
TURBIDITY (NTU)	0.4	0.8	0

TABLE 3-32

SUMMARY OF CHEMICALS DETECTED
MIDDLE AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**	**UPGRAD**	**UPGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**01**	**02**	**03**
LOCATION	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**
SAMPLE NUMBER	**16GW0202**	**16GW0203**	**16GW0204**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**5/11/2003**	**10/26/2003**	**8/25/2004**
Miscellaneous Parameters (mg/L)			
AMMONIA-N			
CHLORIDE		14	
NITRITE/NITRATE-N		0.05 U	
SULFATE		270	
TOTAL ORGANIC CARBON		1.7	

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
NTU - nephelometric turbidity unit
QC - quality control
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
µg/L - microgram per liter

TABLE 3-33

SUMMARY OF CHEMICALS DETECTED
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**
SAMPLING ROUND	**02**	**03**	**02**	**02**	**03**	**02**	**02**	**03**	**02**	**02**	**03**
LOCATION	**16MWT08**	**16MWT08**	**16MWT11**	**16MWT11**	**16MWT11**	**16MWT15**	**16MWT15**	**16MWT15**	**16MWT18**	**16MWT18**	**16MWT18**
SAMPLE NUMBER	**16GWT0801**	**16GWT0802**	**16GWT1101**	**16GWT1101-F**	**16GWT1102**	**16GWT1501**	**16GWT1501-F**	**16GWT1502**	**16GWT1801**	**16GWT1801-F**	**16GWT1802**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**12/6/2003**	**10/30/2004**	**12/6/2003**	**12/7/2003**	**8/25/2004**	**12/6/2003**	**12/6/2003**	**8/17/2004**	**1/25/2004**	**1/25/2004**	**8/27/2004**
Volatile Organics (µg/L)											
ACETONE	3.7 J		0.8 J		0.5 UJ	1.6 J		0.5 UJ	0.5 UJ		0.5 UJ
BENZENE	0.3 U		0.3 U		0.3 U	0.7 J		0.3 U	0.3 U		0.3 U
CHLOROFORM	15		16		0.3 U	4		0.8 J	1		0.3 U
ETHANE						1			5.4		
ETHENE						0.22			0.14		
ETHYLBENZENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
METHANE						4500			5800		
METHYLENE CHLORIDE	0.6 J		0.3 U		0.3 U	0.3 U		0.3 UJ	0.3 UJ		0.3 U
PROPIONITRILE	20 U		20 U		20 U	26 J		20 U	20 U		20 U
TOLUENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
TOTAL XYLENES	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
Total Metals (µg/L)											
ALUMINUM	296000 J		77200 J		8.35 U	2930 J			10700 J		
ANTIMONY	1.2 U		6.3 J		1.1 U	1.3 U			2.1 J		
ARSENIC	29.2 J		11.8 J		3.8 J	1.5 U			2.2 J		
BARIUM	1700 J		1170 J		1250 J	262 J			444 J		
BERYLLIUM	15.1 J		4.8 J		0.02 U	0.15 U			0.42 U		
CALCIUM	19700 U		12700 J		26600 J	10000 J			8240 J		
CHROMIUM	452 J		84.9 J		0.77 U	5.1 J			14.8 J		
COBALT	95.7 J		31.3 J		2.3 J	0.71 U			4.2 J		
COPPER	86.1 J		33.1 J		0.24 U	4.5 J			3.1 J		
IRON	241000 J		46200 J		1350 J	1110 J			3520 J		
LEAD	127 J		34.2 J		0.069 U	2 U			3 J		
LITHIUM											
MAGNESIUM	36700 J		9370 J		8510 J	3130 J			3970 J		
MANGANESE	3800 J		991 J		224 J	33.6 J			93.7 J		
MERCURY	0.12 J		0.028 J		0.03 U	0.007 U			0.03 U		
NICKEL	338 J		84.7 J		7 J	3 J			9.6 J		
POTASSIUM	74400 J		13900 J		5300 J	5170 J			8410 J		
SELENIUM	5 J		2.8 J		0.094 U	1.4 U			0.44 U		
SODIUM	71300 J		70500 J		211000 J	96200 J			224000 J		
STRONTIUM											
TIN	3.9 J		2.6 U		0.08 U	1.6 U			0.54 U		
TITANIUM	1020 J		203 J			32.3 J			59.1 J		
VANADIUM	410 J		80.9 J		1.14 U	4.4 J			15.6		
ZINC	454 J		143 J		2.7 U	11.3 J			10.6 J		

TABLE 3-33

SUMMARY OF CHEMICALS DETECTED
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
SAMPLING ROUND	02	03	02	02	03	02	02	03	02	02	03
LOCATION	16MWT08	16MWT08	16MWT11	16MWT11	16MWT11	16MWT15	16MWT15	16MWT15	16MWT18	16MWT18	16MWT18
SAMPLE NUMBER	16GWT0801	16GWT0802	16GWT1101	16GWT1101-F	16GWT1102	16GWT1501	16GWT1501-F	16GWT1502	16GWT1801	16GWT1801-F	16GWT1802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/6/2003	10/30/2004	12/6/2003	12/7/2003	8/25/2004	12/6/2003	12/6/2003	8/17/2004	1/25/2004	1/25/2004	8/27/2004
Dissolved Metals (µg/L)											
ALUMINUM, FILTERED				85.5 U			65.9 U			126 J	
ANTIMONY, FILTERED				8.8 J			1.5 U			1.5 J	
ARSENIC, FILTERED				1.3 U			1.5 U			1.3 J	
BARIUM, FILTERED				28 J			215 J			341 J	
CALCIUM, FILTERED				10600 J			10300 J			7910 J	
CHROMIUM, FILTERED				0.42 U			0.69 U			0.59 J	
COBALT, FILTERED				7.5 J			1.1 U			4.8 J	
COPPER, FILTERED				1.5 U			2.8 J			0.72 U	
MAGNESIUM, FILTERED				2850 J			3060 J			3500 J	
MANGANESE, FILTERED				194 J			17.7 J			57.9 J	
NICKEL, FILTERED				5.2 J			1.4 U			4.6 J	
POTASSIUM, FILTERED				3410 J			4660 J			5880 J	
SODIUM, FILTERED				77500 J			97300 J			218000 J	
TITANIUM, FILTERED				0.85 U			0.68 U			1.9 J	
VANADIUM, FILTERED				0.31 U			0.59 U			0.53 J	
ZINC, FILTERED				48.2 J			8.3 J			1.6 J	
Field Parameters (mg/L)											
ALKALINITY						250			500		
CARBON DIOXIDE						10 U			18		
DISSOLVED OXYGEN					0.87	3.5		1.77	4		3.31
DISSOLVED OXYGEN - METER	2.13		4.51			2.57			3.07		
HYDROGEN SULFIDE (H2S)						0					
IRON(+2)						0			0.12		
MANGANESE(+2)						0.3			0		
NITRITE-N						0.007			0.005		
OXIDATION REDUCTION POTENTIAL (MV)	64.3		188		95	174.100000		143.100000	-69		6.7
PH (S.U.)	7.16		7.35		5.47	7.99		6.15	7.23		6.58
SPECIFIC CONDUCTANCE (MS/cm)	0.257		0.256		1.004	0.392		0.411	0.65		1.043
SULFIDE						0.01			0.04		
TEMPERATURE (C)	11.9		7.29		24.93	12.78		15.85	14.18		23.89
TURBIDITY (NTU)	1000 >		650		4.7	22.5		2	1000 >		150
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
CHLORIDE						4			4		
SULFATE						8			6		
TOTAL ORGANIC CARBON						2.6					

TABLE 3-33

SUMMARY OF CHEMICALS DETECTED
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
WATER BEARING ZONE	**LOWER**	**VALLEY**	**VALLEY**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**03**	**03**	**03**	**01**	**01**	**02**	**03**
LOCATION	**16MWT21**	**16MWT19**	**16MWT20**	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**
SAMPLE NUMBER	**16GWT2101**	**16GWT1901**	**16GWT2001**	**16GW0201**	**16GW0202**	**16GW0203**	**16GW0204**
SAMPLE CODE	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**10/16/2004**	**8/29/2004**	**8/29/2004**	**4/24/2003**	**5/11/2003**	**10/26/2003**	**8/25/2004**
Volatile Organics (µg/L)							
ACETONE	7.4 J	0.5 UJ	0.5 UJ	0.5 UR		0.5 UJ	0.5 UJ
BENZENE	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
CHLOROFORM	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
ETHANE						0.062	
ETHENE						0.018	
ETHYLBENZENE	0.9 J	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
METHANE						15	
METHYLENE CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
PROPIONITRILE	20 U	20 U	20 U	20 U		20 U	20 U
TOLUENE	1.3	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
TOTAL XYLENES	2.2	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
Total Metals (µg/L)							
ALUMINUM	356 J	89.2 J	65.8 J	85.6	60.6 U	8.3 U	
ANTIMONY	0.56 U	0.09 U	0.42 U	0.1 U	0.03 U	0.02 U	
ARSENIC	1.9 J	0.13 U	0.32 U	0.16 U	0.33 U	0.66 J	
BARIUM	64.2 J	41.7 J	57.6 J	21.6 J	18 J	17.8 J	
BERYLLIUM	0.03 U	0.5 U	0.33 U	0.42 U	0.34 U	0.06 U	
CALCIUM	91800 J	38100 J	6800 J	99400 J	97300 J	212000 J	
CHROMIUM	24.5 J	1.1 U	0.69 U	0.43 U	0.29 U	0.17 U	
COBALT	0.3 J	6.4 J	4.1 J	12.9 J	9.2 J	18.7 J	
COPPER	2.5	0.47 U	0.4 U	0.87 J	0.15 U	0.12 U	
IRON	376	19.8 U	73.5 U	287 J	415 J	13700 J	
LEAD	0.2 U	0.07 U	0.3 U	0.21 U	0.28 U	0.18 U	
LITHIUM				32.7 J	33.6 J		
MAGNESIUM	108 J	39000 J	4520 J	6240 J	6480 J	35200 J	
MANGANESE	5.7	502 J	228 J	916 J	864 J	2440 J	
MERCURY	0.03 U	0.049 U	0.046 U	0.02 U	0.2 U	0.02 U	
NICKEL	1.6	82.1 J	7 J	34.2 J	27 J	36.7 J	
POTASSIUM	22200 J	1140 J	1410 J	738 J	3390 U	2640 J	
SELENIUM	2.1 J	0.1 U	0.19 U	0.05 U	0.06 U	0.04 U	
SODIUM	231000 J	12800 J	11100 J	18000 J	17900 J	20200 J	
STRONTIUM				88.4 J	98.4 J		
TIN	0.15 U	0.06 U	0.39 U	0.06 U	0.07 U	0.1 U	
TITANIUM				3.8 J	3 J	0.17 U	
VANADIUM	5.9	1.14 U	1.14 U	0.3 U	0.35 U	0.09 U	
ZINC	6.5 J	56 J	4.8 U	50 J	42.9 J	15.8 J	

TABLE 3-33

SUMMARY OF CHEMICALS DETECTED
LOWER AND VALLEY AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
WATER BEARING ZONE	**LOWER**	**VALLEY**	**VALLEY**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**03**	**03**	**03**	**01**	**01**	**02**	**03**
LOCATION	**16MWT21**	**16MWT19**	**16MWT20**	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**	**WES-14-02-83**
SAMPLE NUMBER	**16GWT2101**	**16GWT1901**	**16GWT2001**	**16GW0201**	**16GW0202**	**16GW0203**	**16GW0204**
SAMPLE CODE	**NORMAL**	**ORIG**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**10/16/2004**	**8/29/2004**	**8/29/2004**	**4/24/2003**	**5/11/2003**	**10/26/2003**	**8/25/2004**
Dissolved Metals (µg/L)							
ALUMINUM, FILTERED							
ANTIMONY, FILTERED							
ARSENIC, FILTERED							
BARIUM, FILTERED							
CALCIUM, FILTERED							
CHROMIUM, FILTERED							
COBALT, FILTERED							
COPPER, FILTERED							
MAGNESIUM, FILTERED							
MANGANESE, FILTERED							
NICKEL, FILTERED							
POTASSIUM, FILTERED							
SODIUM, FILTERED							
TITANIUM, FILTERED							
VANADIUM, FILTERED							
ZINC, FILTERED							
Field Parameters (mg/L)							
ALKALINITY						300	
CARBON DIOXIDE						105	
DISSOLVED OXYGEN	1.04	3.32	6.91			0.2	0.12
DISSOLVED OXYGEN - METER				0.64	1.18	6.3	
HYDROGEN SULFIDE (H2S)						0	
IRON(+2)						3.3 >	
MANGANESE(+2)						1.5	
NITRITE-N						0.003	
OXIDATION REDUCTION POTENTIAL (MV)	52.8	341.900000	84	7.1	-46.1	-0.8	124
PH (S.U.)	11.96	4.73	5.53	6.65	6.69	6.54	5.75
SPECIFIC CONDUCTANCE (MS/cm)	2.48	0.412	0.126	0.568	0.496	1.75	0.502
SULFIDE						0	
TEMPERATURE (C)	13.22	19.6	20.62	11.8	12.84	15.27	17.24
TURBIDITY (NTU)	21.8	2.91	5.6	2.2	0.4	0.8	0
Miscellaneous Parameters (mg/L)							
AMMONIA-N				0.04			
CHLORIDE						14	
SULFATE						270	
TOTAL ORGANIC CARBON						1.7	

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
C - Celsius
HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/L - milligram per liter
MS/cm - milliSiemen per centimeter
MV - milliVolt
NTU - nephelometric turbidity unit
QC - quality control
RDX - 1,3,5-hexahydro-1,3,5-trinitrotriazine
S.U. - standard unit
µg/L - microgram per liter

4.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

4.1 PHYSIOGRAPHY AND TOPOGRAPHY

NSWC Crane is located in the unglaciated area of the Crawford Uplands Physiographic Province. This province is a rugged, highly vegetated, dissected plateau bounded by the Mitchell Plain Physiographic Province to the east and the Wabash Lowland Physiographic Province to the west (Murphy and Wade, 1995). The Mitchell Plain is a low, dissected limestone plateau characterized by sinkholes and karst topographic features. The boundary between the Crawford Upland and the Mitchell Plain is marked by the highly irregular, eastern-facing Chester Escarpment. Springs, caverns, caves, and other solution weathering features can be found along this escarpment and on the eastern edge of the NSWC Crane facility. The boundary between the Crawford Upland and the Wabash Lowland near the western boundary of NSWC Crane is gradual (Murphy and Wade, 1995). The terrain is predominantly rolling with moderately incised stream valleys throughout and occasional flat areas in the central and northern portions of NSWC Crane. The elevations across NSWC Crane range from about 500 feet above mean sea level (amsl) to about 850 feet amsl. Topographic relief in the Crawford Upland generally ranges from 100 to 350 feet. Greater relief exists in the eastern part of NSWC Crane near the Chester Escarpment (Murphy and Wade, 1995).

The Cast High Explosives Fill/B146 Incinerator area (SWMU 16) is located in the north-central portion of NSWC Crane (Figure 1-1), on the southeast side of Highway 45, which is the main highway running through the facility. Highway 45 runs in a northeast-southwest direction along a ridgetop that is also a drainage divide. It separates the Greenwood Lake drainage that lies on the northwest side of the highway from Turkey Creek watershed that lies the southeast side (Figure 1-2). SWMU 16 lies on a flattened ridgetop that extends southward from the primary ridge along Highway 45, and has an elevation of approximately 765 feet amsl.

SWMU 16 is approximately 16 acres in size. B146, the largest building at SWMU 16, is located in the center of SWMU 16 and covers approximately two-thirds of an acre. A rail spur and gravel parking lot are located on the west side of B146 (Figure 1-3). An asphalt–paved parking lot and loading dock are located on the east side of the building. The incinerator bays are located on the south end of B146. In addition, an ash pile was located south of the building in the past. A chain-link fence surrounds the Cast High Explosives Fill area.

The elevations on top of the ridge range from about 760 to 766 feet amsl. The land surface slopes down to a low elevation of 577 feet amsl in the Turkey Creek streambed at staff gauge 16SG09 located about 300 feet south of the SWMU boundary. The total topographic relief is therefore about 190 feet (Figure 2-3). The land surface slopes downward at a relatively even slope from the ridgetop down to the main drainage gullies and Turkey Creek. This slope is about 18 to 20 percent.

4.2 METEOROLOGY

NSWC Crane is located in a warm, temperate climatic zone. In general, the summers are warm and humid, and winters are mild with occasional short cold periods. The temperature ranges from an average maximum July temperature of 89 degrees Fahrenheit (°F) to an average minimum January temperature of 26°F. Precipitation is fairly evenly distributed throughout the calendar year; the maximum precipitation occurs during the spring and early summer. The average annual precipitation at the facility is 44 inches and consists of 42 inches of rain and 15 inches of snow. The average humidity ranges from 40 to 90 percent in summer and 60 to 90 percent in winter. Long-term climatological records for the area indicate that the monthly prevailing wind direction is from the southwest from April through December and from the northwest during January through March [National Oceanic and Atmospheric Administration (NOAA), 1988]. The annual prevailing wind direction for the region is from the southwest, and the annual average wind speed for the area is about 9.6 miles per hour. Figure 4-1 is a wind rose summarizing the mean wind direction and wind speed distribution at the Indianapolis International Airport over a 5-year period (1985 to 1989).

4.3 SURFACE WATER HYDROLOGY

The topography at SWMU 16 ridgetop is relatively flat; however, the elevation decreases relatively steeply to the east, south, and west at a slope of about 18 to 20 percent. All surface drainage in the eastern portion of the Cast High Explosives Fill area drains eastward into two gullies that flow eastward and then southeastward and eventually drain into Turkey Creek near sampling points 16SW/SD15 and 16SW/SD16 (Figure 2-3). The western side of the area drains into three gullies that flow westward about 500 feet, where they coalesce and flow southward and then southeastward (Figure 2-3). This drainageway also empties into Turkey Creek (near sampling point 16SW/SD17).

Three rounds of surface water sampling have been performed at this SWMU and estimates of surface water flow have been made each time. During the first two rounds, conditions were relatively dry. No flow was observed in the gullies, but surface water was present in small pools in the drainageways (Table 4-1). Water samples were obtained from these pools. The pools represent the remnants of storm

runoff in the gullies that must have occurred a short time prior to the sampling events. Nine stream gauging stations were established on October 16, 2004, prior to the Round 2 sampling event, but flow rates were not measured at these stations during Rounds 2 or 3. Measurements at these gauging stations will begin during the Round 4 sampling event.

During the Round 3 sampling event (October 26 to November 11, 2004), surface water flow was observed and flow rates were estimated at all of the surface water sampling stations that were scheduled to get sampled. Drainage from the northwestern side of the site travels in two small gullies past sampling stations 16SW/SD01, 16SW/SD07, 16SW/SD08, 16SW/SD28, and 16SW/SD29, and coalesces just before it reaches sampling station 16SW/SD12 (Figure 2-3). Flow rates estimated in the small gullies ranged from about 15 to 100 gallons per minute (gpm). At 16SW/SD12, the combined flow of the two gullies was about 125 to 150 gpm (Table 4-1). Drainage from the southwestern side of the site flows past sampling stations 16SW/SD06 and 16SW/SD09 (Figure 2-3). During Round 3 sampling event, the estimated flow rates in this single gulley were relatively low (5 to 10 gpm). Drainage from the northeastern and southeastern gullies join together, and then flow past sampling stations 16SW/SD27, 16SW/SD13, and 16SW/SD17. During the Round 3 sampling event, flow rates in the western gulley were estimated to be 250 to 700 gpm. This drainage channel joins Turkey Creek about 250 feet downstream of sampling station 16SW/SD17 and staff gauge 16SG08.

Drainage from the northeastern side of the site passes through sampling stations 16SW/SD02, 16SW/SD11, 16 SW/SD22, and 16SW/SD30. At station 16SW/SD30, the drainage gulley from SWMU 16 joins another gulley flowing from the north (16SW/SD21), which drains the Mine Fill A area (SWMU 12). Flow in the gulley draining the northeastern corner of SWMU 16 was low (5 to 15 gpm) during Round 3. The eastern gulley (with combined flows from SWMUs 16 and 12) then proceeds southeastward past sampling points 16SW/SD26 and 16SW/SD15, before it enters Turkey Creek. Flows in the lower reaches of the eastern gulley during Round 3 were estimated to be about 20 to 25 gpm.

A small gulley drains water from the southeastern corner of SWMU 16 (Figure 2-3). Estimated flow rates at sampling stations 16SW/SD04, 16SW/SD05, and 16SW/SD10 at the top of the gulley were about 20 to 100 gpm during Round 3 (Table 4-1). This gulley runs downhill to the southeast and enters Turkey Creek near sampling station 16SW/SD16. During the Round 3 sampling event, flow near the bottom of this gulley was estimated to be about 200 to 250 gpm. Like the other two primary gullies, this gulley picks up surface flow from road ditches as it passes the road.

Turkey Creek flows past SWMU 16, flowing from northeast to the southwest. Sampling station 16SW/SD18 and staff gauge 16SG07 are located on the Creek a short distance upstream of where the

eastern gulley enters Turkey Creek (Figure 2-3). Sampling station 16SW/SD19 and staff gauge 16SG09 are located on the Creek a short distance downstream of where the western gulley enters Turkey Creek. These locations were established to quantify the effects that discharges from SWMU 16 might have on the water quality and sediments in Turkey Creek. During Rounds 1 and 2, flow in Turkey Creek was low or nonexistent. During Round 3 sampling event, however, flow at 16SW/SD19, the downstream station, was approximately 1700 to 1900 gpm.

All of the flow rates presented above are based on visual estimates and are only rough approximations. Based on the flow rates estimated during Round 3, the combined flow in the three gullies constituted approximately 40 to 50 percent of the total flow estimated for Turkey Creek.

4.4 GEOLOGY

Bedrock underlying NSWC Crane consists of sedimentary rocks from the Lower Pennsylvanian-age Mansfield Formation of the Raccoon Creek Group and the underlying Upper Mississippian-age Stephensport and West Baden Groups (Figure 4-2). The Pennsylvanian-age sandstones, siltstone, shales, coal beds, and thin limestone units of the Mansfield Formation can reach thicknesses of 250 to 300 feet at NSWC Crane in the central and western portions of the facility. Below the Pennsylvanian rock lies Mississippian-age limestone and sandstone formations of the Stephensport Group, including the Glen Dean, Golconda, and Beech Creek Limestones and the Big Clifty Sandstone (Figure 4-2).

NSWC Crane is located on the eastern edge of the Illinois Structural Basin, where the Pennsylvanian- and Mississippian-age bedrock dips to the west-southwest at approximately 30 to 35 feet per mile (USACE WES, 1982; Kvale, 1992). Locally however, the dip of the Mississippian bedrock can range from 0 to 15 feet per mile to as much as 100 feet per mile to the southwest (e.g., in Sulphur Creek valley) (Kvale, 1992). Because the pre-Pennsylvanian bedrock is dipping to the southwest toward the center of the Illinois structural basin, the Mississippian-age rocks are closer to the surface and crop out along the stream valleys and lower slopes on the eastern side of NSWC Crane (Figure 4-3). On the eastern side of NSWC Crane (e.g., near the Dye Burial Ground, Ammunition Burning Ground, and Rockeye), Pennsylvanian bedrock is confined to the uppermost portions of hills and ridges.

An erosional unconformity separates the Pennsylvanian strata above from the Stephensport strata below. Depending on the location at NSWC Crane, pre-Pennsylvanian erosion has removed a significant portion of the Stephensport strata. At these locations, the paleovalleys are filled with shales and sandstones of Pennsylvanian age (Figure 4-2). The Pennsylvanian/Mississippian unconformity at SWMU 16 is estimated to lie between 630 to 640 feet amsl (Barnhill, 1993), or roughly 126 to 136 feet below the top of

the ridge. This places the base of the Pennsylvanian rock above the elevation of Turkey Creek. According to the basewide geology map (Figure 4-3), Upper Mississippian rock units crop out in Turkey Creek valley directly southeast of SWMU 16. Therefore, it is expected that sandstones, shales, and limestones of the Hardinsburg, Haney, Indian Springs, and Big Clifty formations may be present at the base of the ridge and down near creek level.

The Cast High Explosives Fill/B146 Incinerator area (SWMU 16) is located on a flattened ridgetop with relatively steep slopes that lead down to stream channels on the western, southern, and eastern sides of the ridge. The geology and hydrogeology of SWMU 16 was first investigated in the early 1980s when the USACE installed five monitoring wells in the area (WES-14-01-83 through WES-14-05-83). The area has been investigated more recently for the RFI during three field efforts. In March through May 2003 (Round 1 field effort), six new monitoring wells were installed. In October through January 2004 (Round 2 field effort), 12 additional monitoring wells were installed; one of these wells (16MWT14) has subsequently been abandoned. In July through September 2004 (Round 3 field effort), 3 additional monitoring wells were installed (Table 2-2). A total of 23 monitoring wells currently exist on or near the top of the ridge and two monitoring wells (16MWT19 and 16MWT20) have been installed on the lower southeastern slope of the ridge. These two monitoring wells have been screened in unconsolidated valley deposits, which consist of a mixture of alluvium, colluvium, and/or residual soil overlying Mississippian-age shale (boring logs are presented in Appendix B). The shale is presumed to be part of the Hardinsburg Formation or the Indian Springs Shale (Figures 4-2 and 4-3).

The maximum depth of investigation to date for this SWMU was approximately 105 feet below the ridgetop (16MWT18). Figure 4-4 illustrates the locations of the hydrogeologic cross sections, including select borings, through SWMU 16. Figures 4-5 shows hydrogeologic cross sections A - A’ and B - B', and Figure 4-6 shows hydrogeologic cross section C - C'.

The bedrock found at the site consists of siltstones, sandstones, shales, and coal seams. The layers of siltstone and sandstone encountered are discontinuous. A number of shallow, discontinuous, and weathered sandstone layers (5 to 10 feet thick) were encountered near the top of the ridge at elevations of about 740 to 755 feet amsl (see Figures 4-5 and 4-6). The sandstones are presumably capping the ridge and are resistant to erosion. Groundwater was first encountered in these sandstones so they have been grouped together and are referred to as the Puz.

Shale layers are somewhat continuous and interlayered with the shallow sandstones. A continuous or nearly continuous layer of shale and siltstone, 5 to 10 feet thick, lies beneath the shallow sandstone lenses between elevations of 730 and 740 ft amsl (Figures 4-5 and 4-6). The shale and siltstone unit is

irregular in thickness, but appears to be an effective aquitard between the Puz and the sandstone lenses below.

Slightly deeper, intermediate-depth sandstone lenses are classified as the Pmz, as discussed below, and were encountered at elevations of approximately 720 to 735 feet amsl. The location where the thickest intermediate-depth sandstone unit was encountered was in well 16MW01 (see cross section B-B' of Figure 4-5), which is located on the southwestern side of SWMU 16. This sandstone unit extends east to west across the northern end of SWMU 16 (see cross section A-A' of Figure 4-5) and is interpreted to extend south to well 16MW01. However, this sandstone is also discontinuous, based on its absence in well 16MWT05.

About 35 to 50 feet of shale lies beneath the intermediate-depth sandstone lenses (Pmz) and is continuous across the site. The elevation of the shale ranges from about 675 to 720 or 725 feet amsl (Figures 4-5 and 4-6). Because of its thickness, this shale is acting as an aquitard beneath the intermediate-depth sandstone lenses described above (Pmz) and the underlying interlayered sandstone and siltstone described below.

The interlayered sandstone and siltstone unit, located beneath the thick shale, also contains a coal seam near the top (Figures 4-5 and 4-6). Four monitoring wells have penetrated into this sandstone/siltstone unit; however, none of them extend more than about 12 feet into it. Therefore, it is not possible to determine how thick this sandstone is and how its lithologic properties might change at greater depth. This interlayered sandstone and siltstone is considered to be the Plz.

The Pennsylvanian bedrock beneath SWMU 16 is estimated to be 122 to 134 feet in thickness. The Pennsylvanian/Mississippian unconformity at SWMU 16 is estimated to be at approximately 630 to 640 feet amsl, roughly 126 to 136 feet bgs (Barnhill, 1993). This would place the Mississippian rock formations about 20 to 30 feet below the deepest monitoring well located on the ridgetop (Figure 4-5 and 4-6).

Two monitoring wells were installed along the road near the base of the ridge on the southeast side of SWMU 16 (Figure 4-4 and 4-5). These monitoring wells were installed to access the potential for contaminated groundwater to be migrating downhill on top of the bedrock-soil interface. While drilling these boreholes, 1 to 2 feet of shale was encountered in the bottom of each boring. This shale may be part of the Hardinsburg Formation or it may be part of the Indian Springs Shale. In either case, the shale unit should act as an additional aquitard that prevents migration of groundwater and contaminants vertically downward through the core of the ridge.

Drilling has not been performed at lower elevations down near Turkey Creek because of accessibility problems (i.e., wet, swampy conditions), so it is not possible to estimate how thick the unconsolidated alluvium and colluvium might be near the center of the small valley.

4.5 SOILS

The geologic materials that underlie the SWMU 16 ridge include natural unconsolidated soil materials and bedrock (Lower Pennsylvanian and Mississippian). Natural unconsolidated materials on the ridgetop and sides of the ridge are residual soils formed as a result of weathering of the underlying Raccoon Creek Group. The residual soils consist predominantly of fine materials, including varying amounts of clay, silt, and sand. The maximum observed thickness of soils on top of the ridge was about 13 feet (e.g., 16MWT07, 16MWT08, and 16MWT10, Figure 4-5).

4.6 HYDROGEOLOGY

The maximum thickness of overburden (i.e., residual soils) encountered on the ridgetop at SWMU 16 was 13 feet. Elsewhere, the residual soils were generally 10 feet thick or less. While drilling through the overburden, no saturated conditions or flowing water was observed in the residual soils on top of the ridge. Therefore, it is concluded that very little if any groundwater is perching on top of the ridge at the interface between the bedrock and overburden. Water elevations measured at staff gauges located in the upper drainage gullies indicate that water in these gullies is not hydraulically connected to the bedrock groundwater, and these elevations were not considered during preparation of the potentiometric surface maps. The surface water at these locations is believed to be perched on top of the clayey residual soils or on the bedrock surface. This is not the case for the soils and saturated conditions in the overburden down near the base of the ridge.

The Pennsylvanian bedrock encountered during the field investigations was divided into three water-bearing zones (Puz, Pmz, and Plz) based on stratigraphy, differences in water-yielding properties, and differences in hydraulic potential that were encountered in each of the three zones. Shale units and occasional siltstone lenses separate the three water-bearing zones and appear to act as aquitards. The upper, middle, and lower groundwater potentiometric surfaces and flow patterns were determined based on water levels measured on January 24, 2004 (see Table 2-2).

There are 12 monitoring wells installed across the site that are screened in the shallow water-bearing zone (see Table 2-2 and Figure 4-7). Except for well WES-14-03-83, the Puz wells are all screened

above an elevation of 735 feet amsl. Well WES-14-03-83 actually penetrated through the uppermost sandstone and went down several feet through the underlying shale (see cross section B-B', Figure 4-5). The static depth to groundwater in the Puz wells ranged from 10.25 feet bgs at 16MWT02 to 22.05 feet bgs at 16MWT10 in January 2004 (Table 2-2). Groundwater elevations in the Puz monitoring wells ranged from 742.38 feet amsl at well 16MWT10 to 753.03 feet amsl at well 16MWT04, with an average groundwater elevation of 748.33 feet amsl. Monitoring wells 16MWT07 and 16MWT14 were installed in the same shallow depth interval as the other 10 wells. However, these two wells did not encounter any sandstone units and failed to produce water, demonstrating the discontinuous nature of the Puz. As a result, a kidney-shaped area in the center and southwest side of SWMU 16 is identified as an area where the Puz is absent or dry (Figure 4-7).

In general, the Puz potentiometric surface mimics the surface topography. The highest groundwater elevations in the northern portion of the site were measured in monitoring wells WES-14-02-83 and 16MWT17, which are located near the centerline of the ridge. Groundwater to the west of the divide flows to the west and southwest, ultimately discharging into gullies that drain surface water and groundwater westward towards a tributary of Turkey Creek. Shallow groundwater east of the divide flows to the east towards gullies on the eastern side of the site. Shallow groundwater is also present in the east-central portion of the site and flows in a southeasterly direction towards gullies on the southeastern side of the site that convey water eastward and southeastward towards Turkey Creek. As stated above, the shallow water-bearing zone appears to be absent or dry throughout most of the west-central and southern portions and in a small northeastern area of this SWMU (Figure 4-7).

Monitoring well 16MWT01 was not used in developing the SWMU 16 Puz potentiometric surface map because it is not representative of SWMU 16 groundwater elevations (see Figure 4-5). The potentiometric surface elevation for 16MWT01 was approximately 6.78 feet lower than 16MWT06 during the May 30, 2003 measurements, and the water level difference was 1.71 feet during the January 24, 2004 measurements. The groundwater in this well appears to have a restricted hydraulic connection to the shallow groundwater flow system at the site. An evaluation of fracturing during drilling activities showed that fewer fractures existed in 16MWT01 compared to 16MWT06 and other wells at the site. A lower groundwater yield was also noted during purging and development of 16MWT01, which may be related to the lower water level elevations in this well.

There are seven monitoring wells screened in the intermediate water-bearing zone (see Table 2-2 and Figure 4-8). The static depth to groundwater ranged from 20.13 feet bgs at 16MWT12 to 32.93 feet bgs at 16MWT16 in January 2004 (Table 2-2). Groundwater elevations in the Pmz ranged from 731.81 feet

amsl at well 16MWT16 to 736.07 feet amsl at well 16MWT03, with an average groundwater elevation of 734.74 feet amsl (see Figure 4-8).

Monitoring well 16MWT16 was not used in developing the SWMU 16 potentiometric surface map for the Pmz (Figure 4-8). The potentiometric surface elevation for 16MWT16 was approximately 3 feet lower than the average water level for other monitoring wells screened in the intermediate water-bearing zone. It is surmised that this well may not have a strong hydraulic connection to the remainder of the intermediate groundwater flow system at the site.

Groundwater elevations are highest near the central portion of this SWMU (near B146), and groundwater is flowing toward the southwestern, southern, and southeastern hillsides. When it reaches the hillsides, the groundwater is most likely discharging to the ground surface, primarily where gullies are deeply incised into the ground surface. These gullies convey water to the tributaries of Turkey Creek (Figure 2-3).

There are five monitoring wells screened in the Plz (see Table 2-2 and Figure 4-9). Monitoring well 16MWT15 was not used in developing the potentiometric surface map for the deep water-bearing zone, because the potentiometric elevation for 16MWT15 was approximately 40 feet higher than the average water level measured in the other wells screened in the Plz. This may indicate that the well is in an area of increased vertical fracturing and enhanced leakage from the overlying intermediate flow zone.

The static depth to Plz groundwater ranged from 53.23 feet bgs at 16MWT15 to 97.04 feet bgs at 16MWT08 in January 2004. Groundwater elevations in the Plz ranged from 664.53 at well 16MWT08 to 706.46 feet amsl at well 16MWT15 on January 24, 2004, with an average elevation of 676.93 feet amsl (Figure 1-15). Excluding the data for monitoring well 16MWT15, the deep groundwater elevations ranged from 664.53 to 668.94 feet amsl, and averaged about 667 feet amsl in January 2004. This groundwater elevation is about 68 feet and 81 feet deeper, respectively, than the average Pmz and Puz water levels. Thus, there is a very significant downward vertical gradient/hydraulic separation between the three water-bearing zones.

The potentiometric surface measured for the Plz on January 24, 2004 is presented in Figure 4-9. Groundwater flow direction on the eastern side of the site is towards the northeast. The groundwater is likely discharging to the ground surface on the northeastern side of the ridge. Most of this discharge is likely going into the deep gullies that have incised the hillsides. These gullies in turn are conveying water to tributaries of Turkey Creek. There is insufficient data to determine which direction groundwater in the Plz is flowing on the southern and western portions of SWMU 16.

As stated above, the average groundwater elevations in the Puz are significantly greater than the Pmz, which in turn are significantly greater than the groundwater elevations measured in the Plz. In Figure 4-10, the bottom elevation of each well screen versus the measured groundwater elevation measured in February 2005 is plotted for each well. It is readily apparent that the measured groundwater elevations in the wells decrease significantly and linearly as the elevations of the well screens decrease. There are two monitoring wells (16MWT15 and 16MWT21), both part of the Plz group, that have anomalously elevated groundwater elevations for the group (Plz) that they belong and they do not lie along the linear trend shown in Figure 4-10. In Figure 4-11, the February 2005 groundwater elevations for four sets of well pairs are plotted. This figure also shows that the wells screened at higher elevations have much higher groundwater elevations. These two figures are evidence that groundwater is perched in the upper monitoring zones and flow downward into the deeper sandstones is greatly impeded. In other words, the shales and siltstones that separate the three monitoring zones are very effective aquitards. This will be substantiated further in Section 6.0.

Two monitoring wells (16MWT19 and 16MWT20) are screened in the alluvium, colluvium, and residual soil overlying Mississippian shales near the base of the ridge. As shown on Figure 4-10, the bottom elevation of the screens in these two wells are about the same as the elevation of the water surface in Turkey Creek; however, the groundwater elevations measured in these two wells in February 2005 were nearly 15 feet higher than the creek level. Thus, the creek has the lowest hydraulic potential and should be receiving groundwater discharge from both sides of the valley.

The results of slug tests performed on select monitoring wells at SWMU 16 are presented in Table 4-2. Water level recovery plots and calculations based on the slug test data can be found in Appendix E.1. The average horizontal hydraulic conductivity (K_h) values for the Puz monitoring wells ranged from 0.267 to 27.3 feet per day [9.42E-5 to 9.62E-3 centimeters per second (cm/s)] (Table 4-2). The geometric mean K for the shallow water-bearing zone was approximately 1.83 feet per day (5.9×10^{-4} cm/s). The horizontal hydraulic gradient for the Puz was calculated graphically from groundwater elevations measured in the northern area on Figure 4-7. The calculated hydraulic gradient was estimated to be 0.0198. Assuming a fracture-related porosity of about 0.005 for the bedrock, the linear groundwater velocity was estimated to be 7.3 feet per day. Assumptions and calculations for figuring groundwater velocity are presented in Appendix E.2.

For the east-central area of SWMU 16, the average hydraulic gradient for the site was estimated to be 0.0727. The same horizontal hydraulic conductivity (1.83 feet per day) and porosity (0.005) were used to estimate the seepage velocity to be 26.6 feet per day.

A single horizontal hydraulic conductivity value (0.611 foot/day, 2.16E-4 cm/s) was measured for Pmz monitoring well 16MWT05 (Table 4-2). The horizontal hydraulic gradient for the Pmz was estimated to be 0.0048, based on groundwater potentials measured in the southern area of SWMU 16 (Figure 4-8). Assuming a fracture-related porosity of about 0.005 for the bedrock, the groundwater velocity was approximated to be 0.61 foot per day. This lateral flow velocity is significantly less than the velocities estimated for the Puz.

The average horizontal hydraulic conductivity (0.0022 foot per day, 7.76E-7 cm/s) was measured in two Plz monitoring wells (Table 4-2). The hydraulic gradient for the site was calculated graphically from groundwater elevations measured in the northeastern part of the site, as shown on Figure 4-9. The average hydraulic gradient for this area was estimated to be 0.02. Assuming a fracture-related porosity of about 0.005 for the bedrock, the groundwater velocity was approximated to be 0.009 foot per day. This is much lower velocity than the velocities estimated for the two monitoring zones above. The reduced lateral flow velocities in the deeper zones are due to the significant reduction of average hydraulic conductivity values with depth.

4.7 DEMOGRAPHY AND LAND USE

The economic base of communities surrounding NSWC Crane is in transition from agriculture, mining, and quarrying to manufacturing and service industries. The patterns of settlement, population statistics, and median income are similar throughout the region. Because most of the region is covered by vegetation, the area is classified as rural.

There is no state or local planning within the vicinity of NSWC Crane. The only zoning and land use regulations are in the municipalities in the region. None of the municipalities are close enough to impact NSWC Crane. None of the areas adjacent to NSWC Crane are zoned, and zoning is not anticipated in the near future. No known land use or community actions are being considered or proposed at this time.

4.8 ECOLOGY

NSWC Crane is a heavily forested facility situated within the Western Mesophytic Forest Region, Hill Section, and Beech-Maple Forest Region (Braun, 1950). Lindsey et al. (1970) further subdivided the area of the installation into the south-central Oak and Mixed Woods Division, including the Beech-Maple and the Beech-Oak-Maple-Hickory sub-elements. Deam (1940) classified the portion of Martin County in which the facility is located as consisting of the Chestnut Oak Upland based on the dominant floral

components at that time. More recently, Kuchler (1964) mapped this portion of Indiana and classified it as belonging to two distinct vegetation classes, the Oak-Hickory and the Beech-Maple forest components of the Broadleaf Forest Classification. This latter classification most closely resembles the current floristic components observed at the facility.

NSWC Crane contains old agricultural fields in various stages of biological succession. Openings on dry upland sites contain almost pure stands of grasses with some clumps of woody plants such as persimmon, sassafras, and sumac. Areas that tend to be wetter have river birch, willow, sycamore, and cottonwood. Hillside communities include hickory, white and black oak, red maple, sugar maple, tulip poplar, ash, and beech [Naval Energy and Environmental Support Activity (NEESA), 1983]. Cleared areas at the facility have various stages of grassland, oldfield, and scrub/shrub vegetational forms present. Dominant tree species include black oak, white oak, pignut hickory, and yellow poplar. These stands are relatively young, with the average tree diameter ranging from 6 to 12 inches. No scrubs or shrubs are present in these areas, and leaf litter, limbs, and fallen saplings cover the understory.

The wildlife habitats and vegetation types present at NSWC Crane (including many stages of forest succession, streams, ponds, Greenwood Lake, and grassy open spaces) support a diverse terrestrial and aquatic fauna. The abundance of wildlife is mainly due to the mixture of landforms and vegetation types that occur over the installation. In addition, the lack of agricultural pressures has enhanced wildlife abundance and served to provide an installation-wide "wildlife enclosure" condition. There is an adequate amount of forage materials, concealment opportunities, and shelter locations to support a highly diverse wildlife community at the site.

Terrestrial habitats (i.e., wooded and grassy areas) near the sites may provide shelter and food sources for various species of mammals such as white-tailed deer, coyote, red fox, rabbits, raccoons, and mice and for birds such as ducks, geese, wild turkey, bobwhite quail, red-tailed hawks, and American robins.

The white-tailed deer is the most conspicuous large, wild mammal at the installation. Other mammals include opossum, raccoon, rabbits, mice, bats, chipmunks, squirrels, beaver, groundhogs, gray fox, coyotes, and long-tailed weasel. Fox, coyotes, and hawks are carnivores whose presence indicates a healthy ecosystem with smaller mammals present to provide a food source (NEESA, 1983).

The birds at NSWC Crane are diverse. Previous studies identified over 100 species present at the facility during breeding seasons (Hengeveld, 1987). Because the facility is largely forested, the species found consist predominantly of those that frequent wooded habitat types. Species of waterfowl also use the facility, especially in the vicinity of Greenwood Lake (Figure 1-2). A large number of bird species frequent

the non-forested grassland, oldfield, and scrub/shrub vegetation present over portions of NSWC Crane. The bird population includes a number of threatened, endangered, or species of special concern that use NSWC Crane as their home range. These species include the bald eagle, osprey, sharp-shinned hawk, red-shouldered hawk, broad-winged hawk, black and white warbler, hooded warbler, and worm-eating warbler [Brown & Root (B&R) Environmental, 1997].

Previous studies conducted at NSWC Crane (Nelson et al., 1987) identified 21 amphibian species and 22 reptilian species including skinks, lizards, snakes, and turtles.

A total of 46 distinct fish species were collected from the installation during a 1987 inventory of fish fauna at NSWC Crane. Other than Greenwood Lake, the 1987 study observed that the greatest number of individual fish species were recorded from the largest stream, Boggs Creek, and that the smallest number of species were recorded from Turkey Creek. Boggs Creek contained 29 species, including eight species of fish characteristic of large river-type systems. This included long-nose gar, paddlefish, bowfin, gizzard shad, ribbon shiner, big mouth buffalo, channel catfish, and flathead catfish. By contrast, the Turkey Creek survey yielded 16 species of fish, none of which were unusual to the area.

TABLE 4-1

ESTIMATED FLOW RATES AT SURFACE WATER SAMPLING LOCATIONS AND STAFF GAUGES
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Monitoring Location	Estimated Flow Rate (gpm)		
	Round 1	Round 2	Round 3
	4/1/2003	10/25-12/06/2003	10/26-11/11/2004
Surface Water Sampling Station			
16SW/SD01	0, ponded	0, ponded	NM
16SW/SD02	0, ponded	0, ponded	NM
16SW/SD03	dry	NM	0, ponded
16SW/SD04	dry	NM	30 - 50
16SW/SD05	dry	NM	20 - 25
16SW/SD06	dry	NM	5
16SW/SD07	0, ponded	0, ponded	NM
16SW/SD08	NA	NM	15 - 20
16SW/SD09	NA	NM	5 - 10
16SW/SD10	NA	NM	80 - 100
16SW/SD11	NA	NM	10 - 15
16SW/SD12	NA	0, ponded	125 - 150
16SW/SD13	NA	0, ponded	600 -700
16SW/SD14	NA	0, ponded	NM
16SW/SD15	NA	0, ponded	NM
16SW/SD16	NA	dry	200 - 250
16SW/SD17	NA	0, ponded	NM
16SW/SD18	NA	50 - 70	NM
16SW/SD19	NA	dry	1700 - 1900
16SW/SD20	NA	0, ponded	NM
16SW/SD21	NA	0, ponded	NM
16SW/SD22	NA	dry	NM
16SW/SD23	NA	NA	5 - 10
16SW/SD24	NA	NA	0, ponded
16SW/SD25	NA	NA	0, ponded
16SW/SD26	NA	NA	20 - 25
16SW/SD27	NA	NA	250 - 290
16SW/SD28	NA	NA	100 - 120
16SW/SD29	NA	NA	20 -30
16SW/SD30	NA	NA	5 - 10
Staff Gauges			
16SG01	NA	NM	NM
16SG02	NA	NM	NM
16SG03	NA	NM	NM
16SG04	NA	NM	NM
16SG05	NA	NM	NM
16SG06	NA	NM	NM
16SG07	NA	NM	NM
16SG08	NA	NM	NM
16SG09	NA	NM	NM

NA = Not applicable; sampling or gauging station not yet established
NM = Not measured

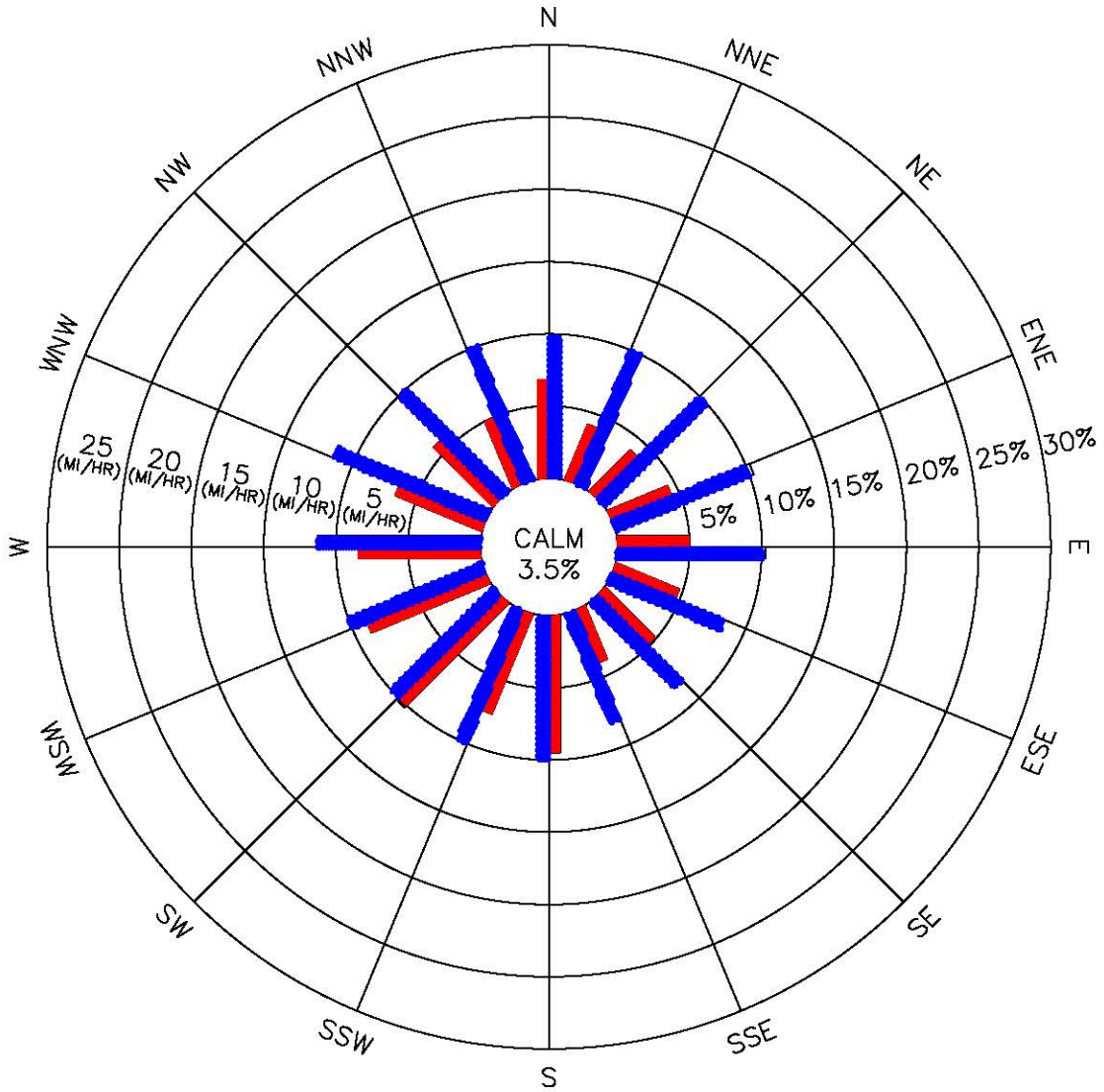
TABLE 4-2

HYDRAULIC CONDUCTIVITIES OF GEOLOGIC MATERIALS BASED ON SLUG TESTS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Monitoring Zone / Well No.	Screened Material	K (rising head, ft/day)	K (falling head, ft/day)
Upper Pennsylvanian Water-Bearing Zone (Puz)			
16MWT02	Silty sand, sand, and shale	3.37	5.09
16MWT04	3 ft of sandstone over 7 ft of shale	1.05	1.09
16MWT09	shale	0.413	0.267
16MWT10	fine-grained sandstone to sandy siltstone	27.3, 26.1	NM
16MWT17	6 ft of sandstone over 4 ft of shale	0.509	0.501
Middle Pennsylvanian Water-Bearing Zone (Pmz)			
16MWT05	Shale and thin coal	0.584	0.638
Lower Pennsylvanian Water-Bearing Zone (Plz)			
16MWT15	sandy siltstone to medium sandstone	NM	0.0039
16MWT21	gray shaley siltstone	NM	0.00044

NM = Not measured
K = hydrolic conductivity
ft = feet

ACAD:7448GD02.dwg 02/10/05 HJB PIT



LEGEND:

WIND DIRECTION FREQUENCY (PERCENT)
(DIRECTION FROM WHICH THE WIND IS BLOWING)

MEAN WIND SPEED (MI/HR)

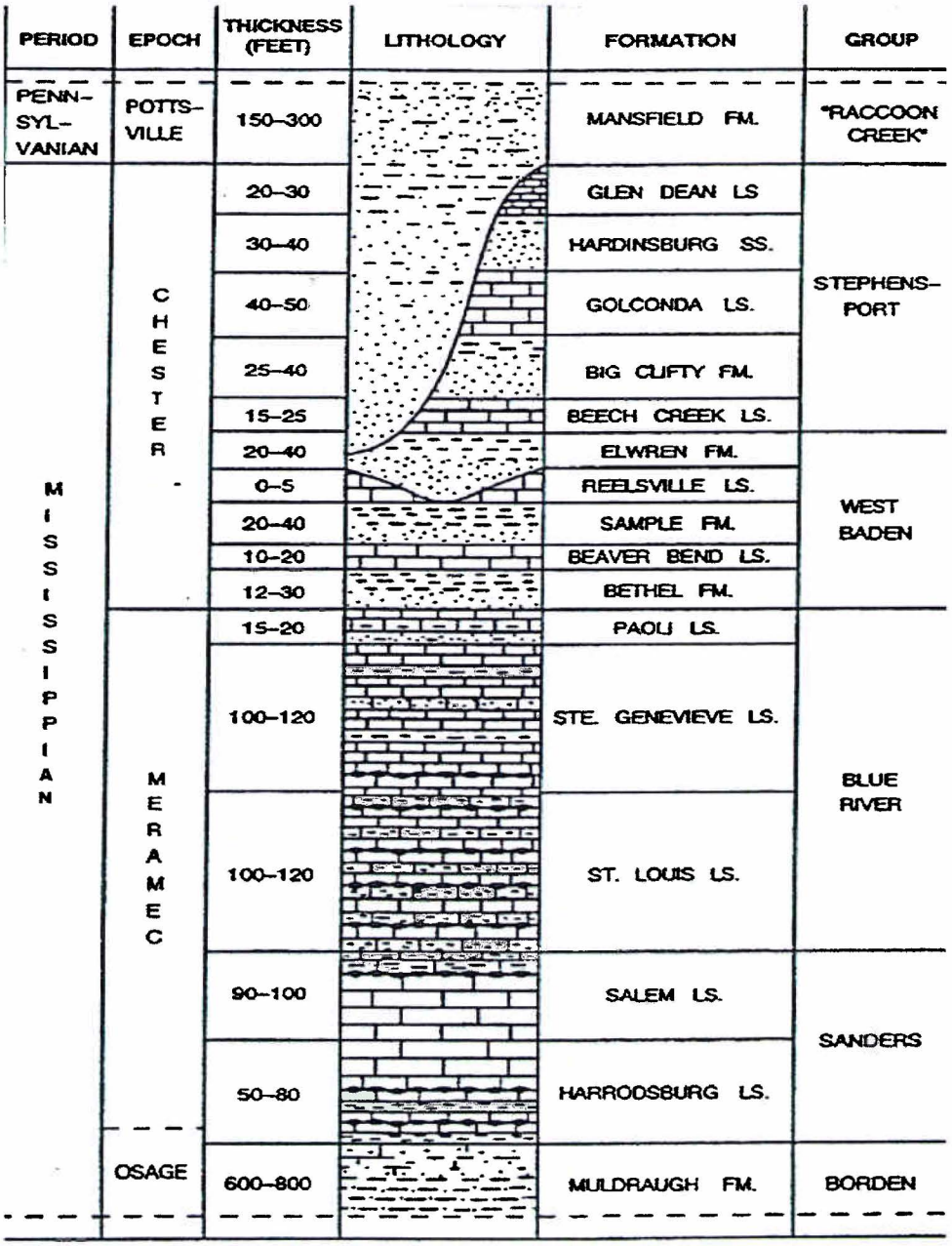
DATA SOURCE: INDIANAPOLIS, INDIANA AIRPORT

PERIOD OF RECORD: 1985–1989
43,824 OBSERVATIONS

DRAWN BY HJB	DATE 2/10/05	FIVE-YEAR WIND ROSE SUMMARY FOR INDIANAPOLIS, INDIANA SWMU 16-CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-1 / REV. 0

NAVFAC

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



Source: Draft Report, RCRA Facility Investigation
Phase II Groundwater Release Assessment, SWMU 06/09
Demolition Area and Phase III Release
Characterization SWMU 07/09 Old Rifle Range
November 1995 - Figure 13
by William L. Murphy and Roy Wade

DRAWN BY K. PEILA DATE 5/31/05	GENERALIZED STRATIGRAPHIC COLUMN SWMU 16 - CAST HIGH EXPLOSIVES FILL/ B146 INCINERATOR NAVAL SURFACE WARFARE CENTER CRANE, INDIANA	CONTRACT NUMBER 7448	OWNER NO. CTO 0279
CHECKED BY J. LUCAS DATE 5/31/05		APPROVED BY —	DATE —
COST/SCHEDULE AREA		APPROVED BY —	DATE —
SCALE AS NOTED	NAVFAC	DRAWING NO. FIGURE 4 - 2	REV 0

P:\GIS\CRANE_NSWC\MAPDOCS\APR\CRANE_REPORTFIGURES.APR STRATAGRAPHIC COLUMN SWMU16 SDIV 6/9/05 KMP

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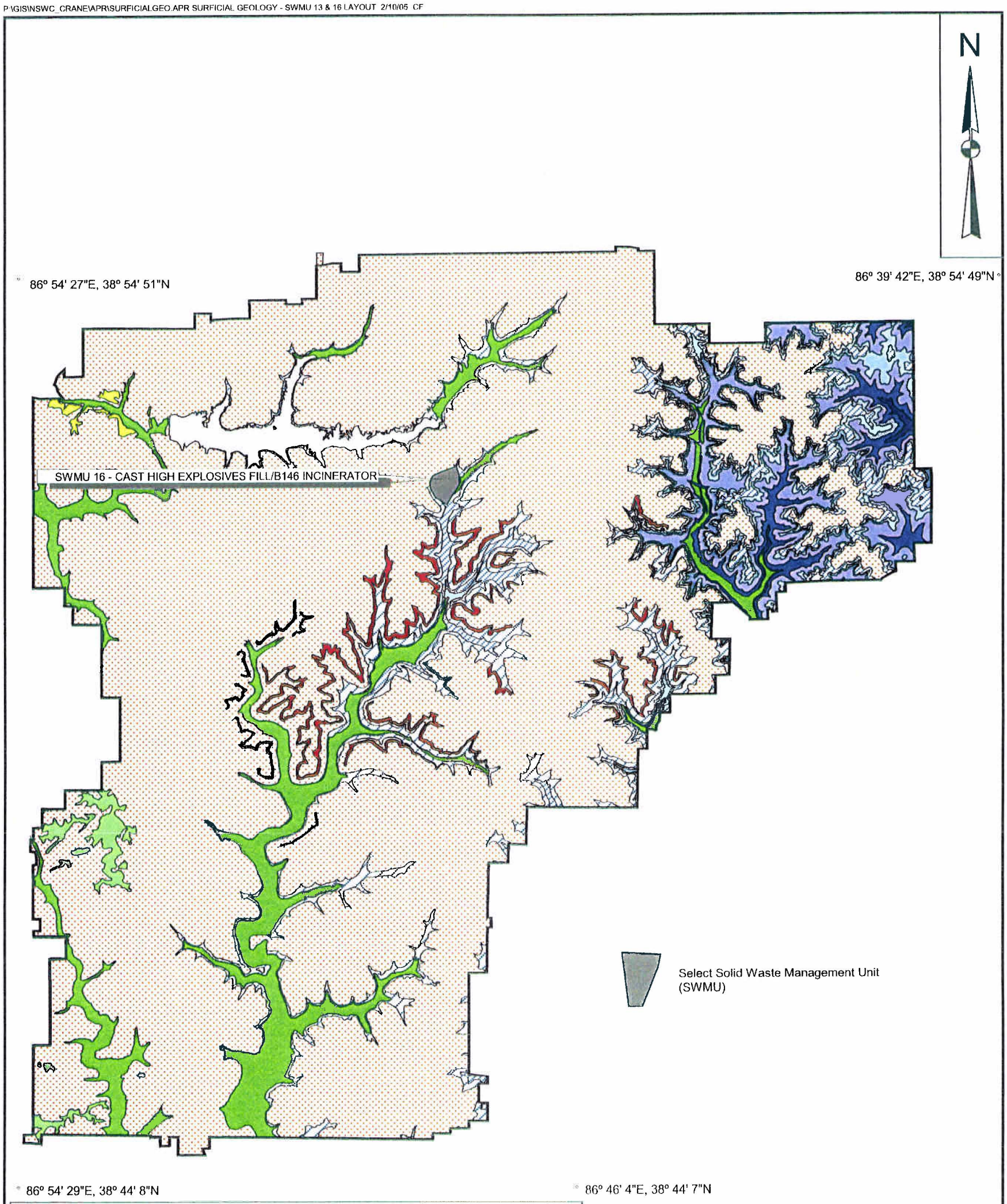

Inferred Depositional Environment	Explanation of Geology	
Alluvium	Qal	*Alluvium*
Loess/Glacial Outwash	Ql	*Loess*
	Qo	*Glacial Outwash*
Residual Soil derived from Pennsylvanian bedrock/colluvium	P	*Raccoon Creek Group and undifferentiated*
	Ps	*Sandstone-dominated horizon of Lower Pennsylvanian*
Residual soil derived from Mississippian bedrock/colluvium	Mg	*Glenn Dean Ls, Hardinsburg Fm, Haney Ls, Indian Springs Shale Mbr, and undifferentiated*
	Ms	*Sandstone member of the Big Clifty Fm*
	M4	*Beech Creek Ls*
	M3	*Elwren Fm, Reelsville Ls, upper Sample Fm, and undifferentiated*
	M2	*Lower part of Sample Fm, Beaver Bend Ls, Bethel Fm, and undifferentiated*
	M1	*Paoli Ls, Ste Genevieve Ls, and undifferentiated*

Source: Background Soils Report. TtNUS 2001. (Modified from Blunck, 1995).

1.5 0 1.5 Miles

DRAWN BY A. JANOCHA	DATE 7/09/03	SURFICIAL GEOLOGY MAP SWMU 16 - CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. LUCAS	DATE 4/20/04		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4 - 3 / REV 0

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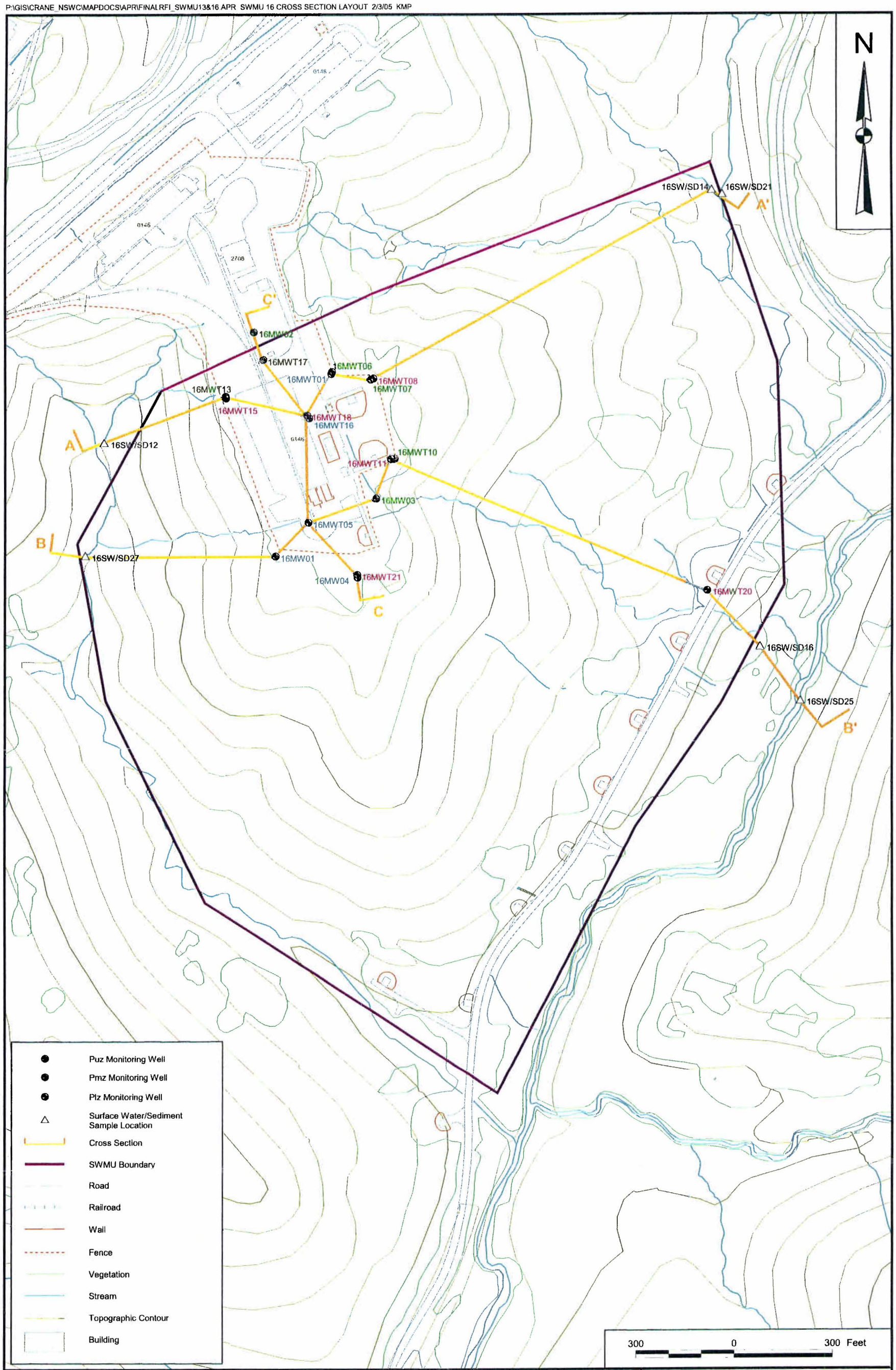


DRAWN BY	DATE	CONTRACT NUMBER
A. JANOCHA	3/10/04	7448
CHECKED BY	DATE	APPROVED BY / DATE
F. RAMSER	3/17/04	--- / ---
COST/SCHEDULE-AREA		APPROVED BY / DATE
		--- / ---
SCALE		DRAWING NO / REV
AS NOTED		FIGURE 4-4 / 0

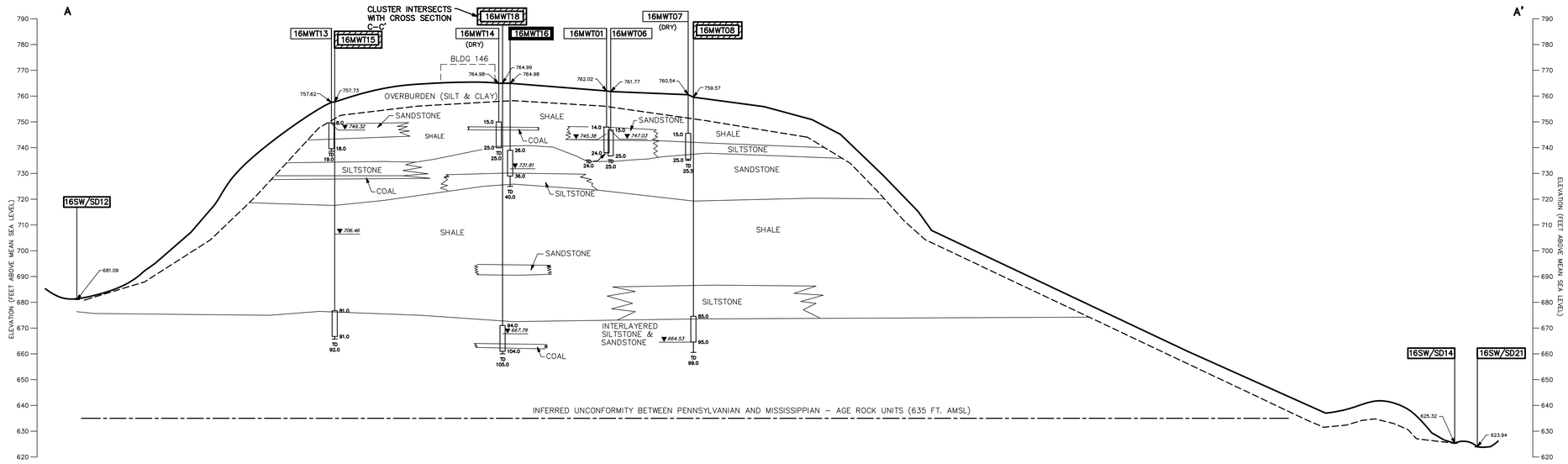
NAVFAC

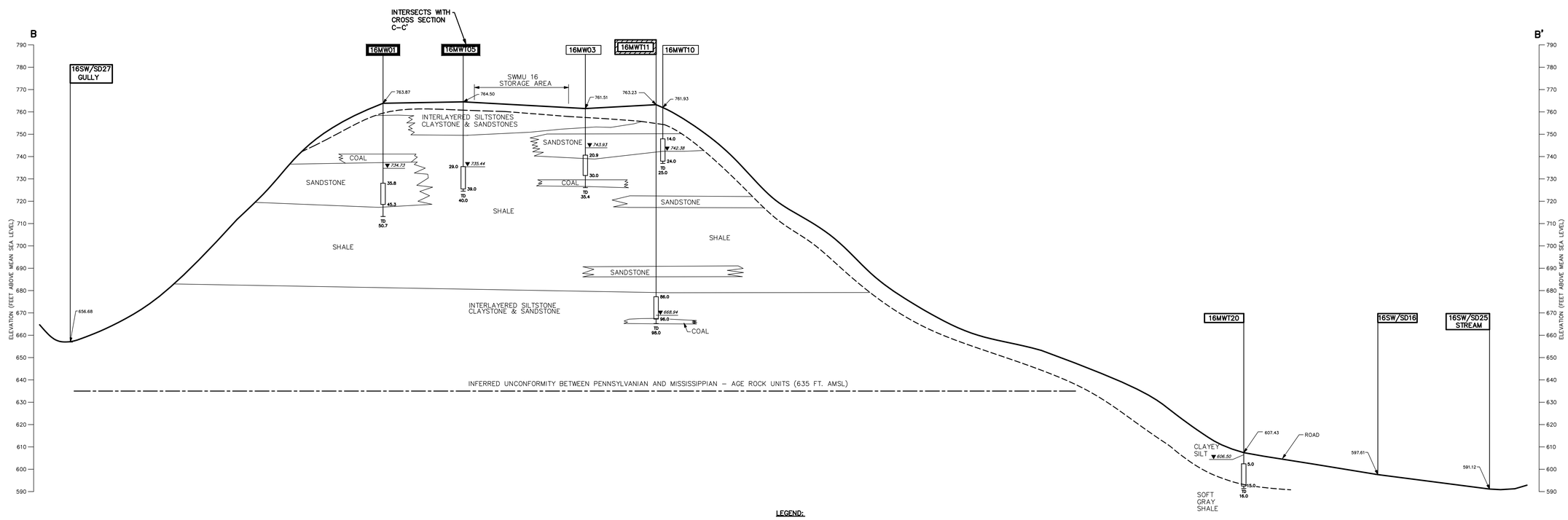
CROSS SECTION MAP

SWMU 16 - CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR

NSWC CRANE

CRANE, INDIANA





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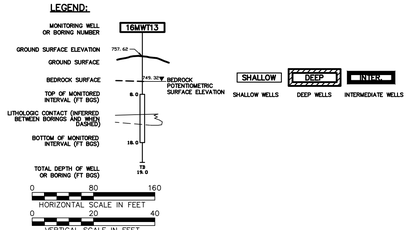

DRAWN BY HJB	DATE 2/9/05	GEOLOGICAL CROSS SECTIONS A–A' AND B–B' SWMU 16–CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4–5 / REV. 0

DRAWING NO. FIGURE 4–5 REV. 0

FORM CADD NO. SSIV-E-STD3VG – REV 8 – 9/4/98

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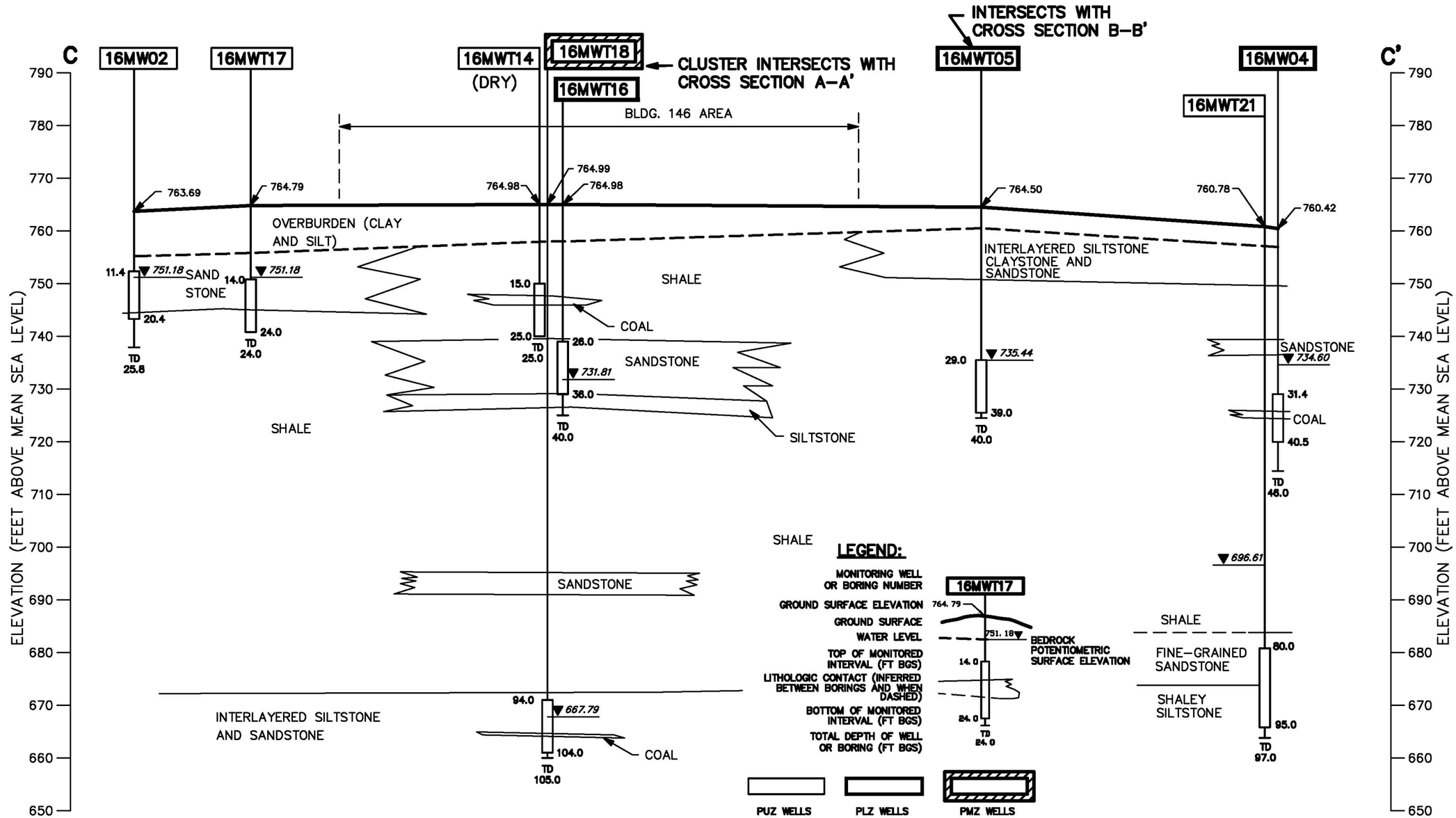

DRAWN BY HJB DATE 2/10/05	NAVFAC	GEOLOGICAL CROSS SECTION C–C' SWMU 16–CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY DATE			OWNER NO. 0000
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4–6 / REV. 0

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

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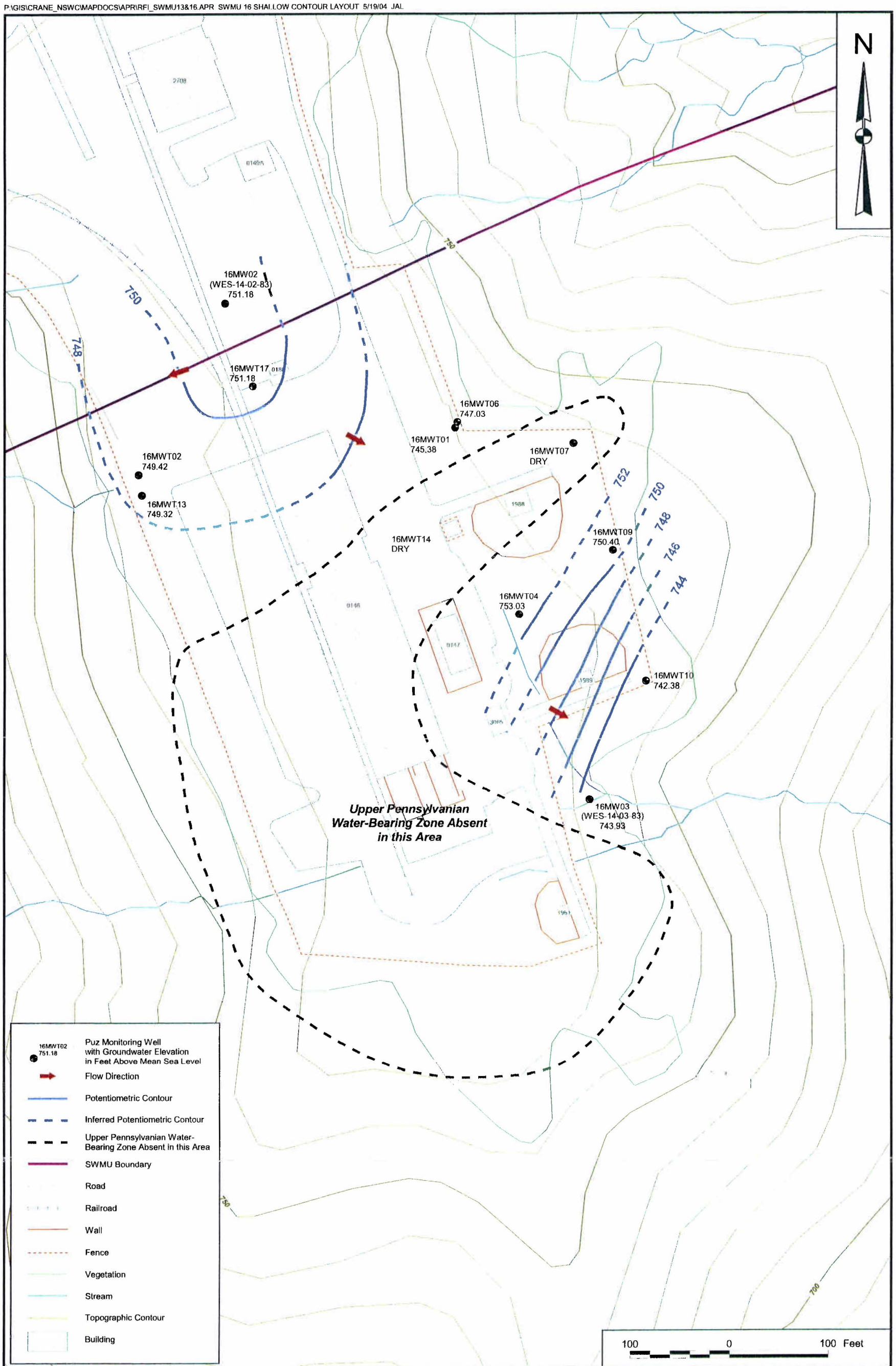

DRAWN BY A. JANOCHA	DATE 2/23/04	POTENTIOMETRIC SURFACE MAP FOR UPPER PENNSYLVANIAN WATER-BEARING ZONE - JANUARY 24, 2004 SWMU 16 - CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. LUCAS	DATE 5/13/04		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4 - 7 REV 0

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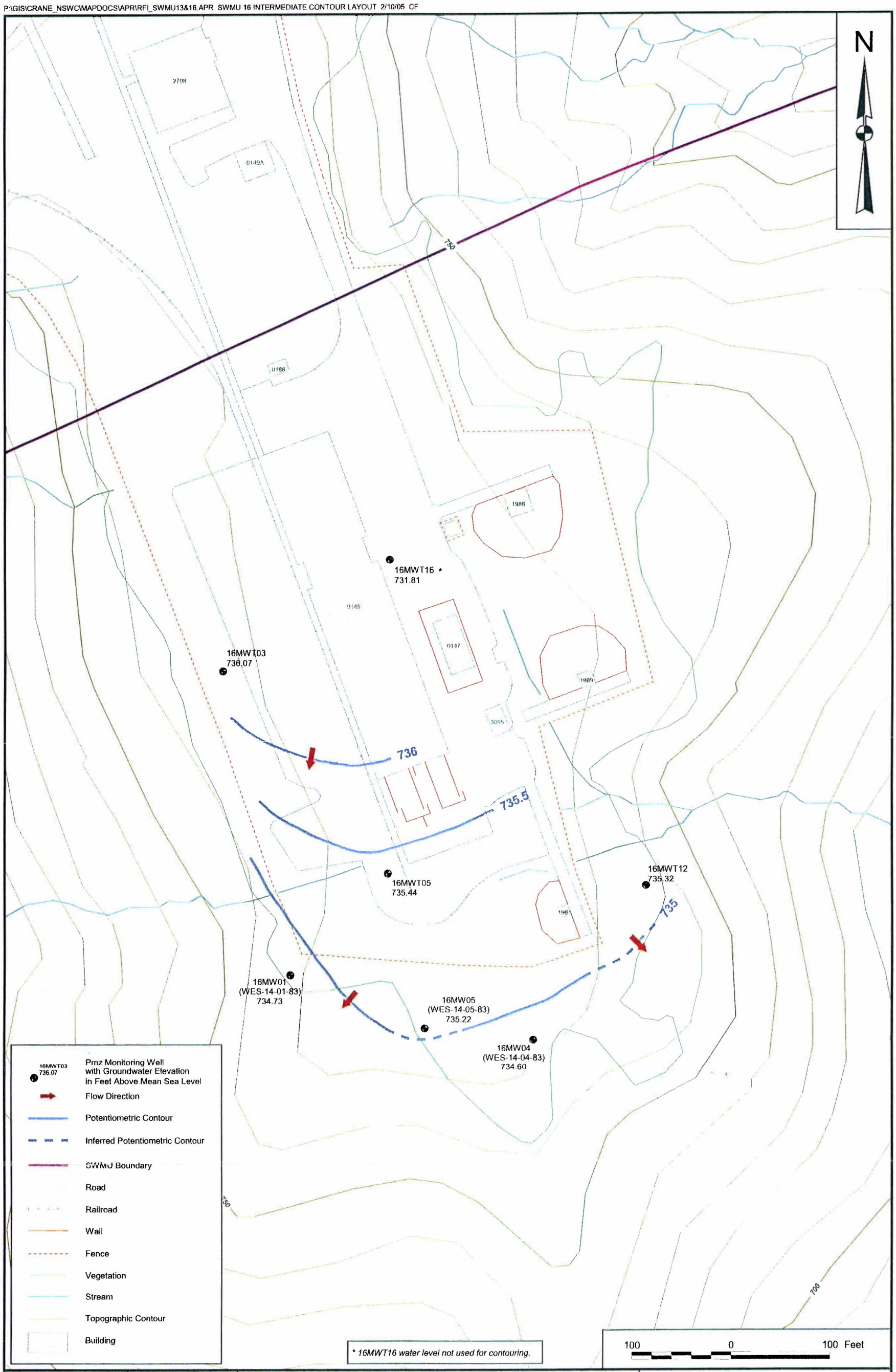
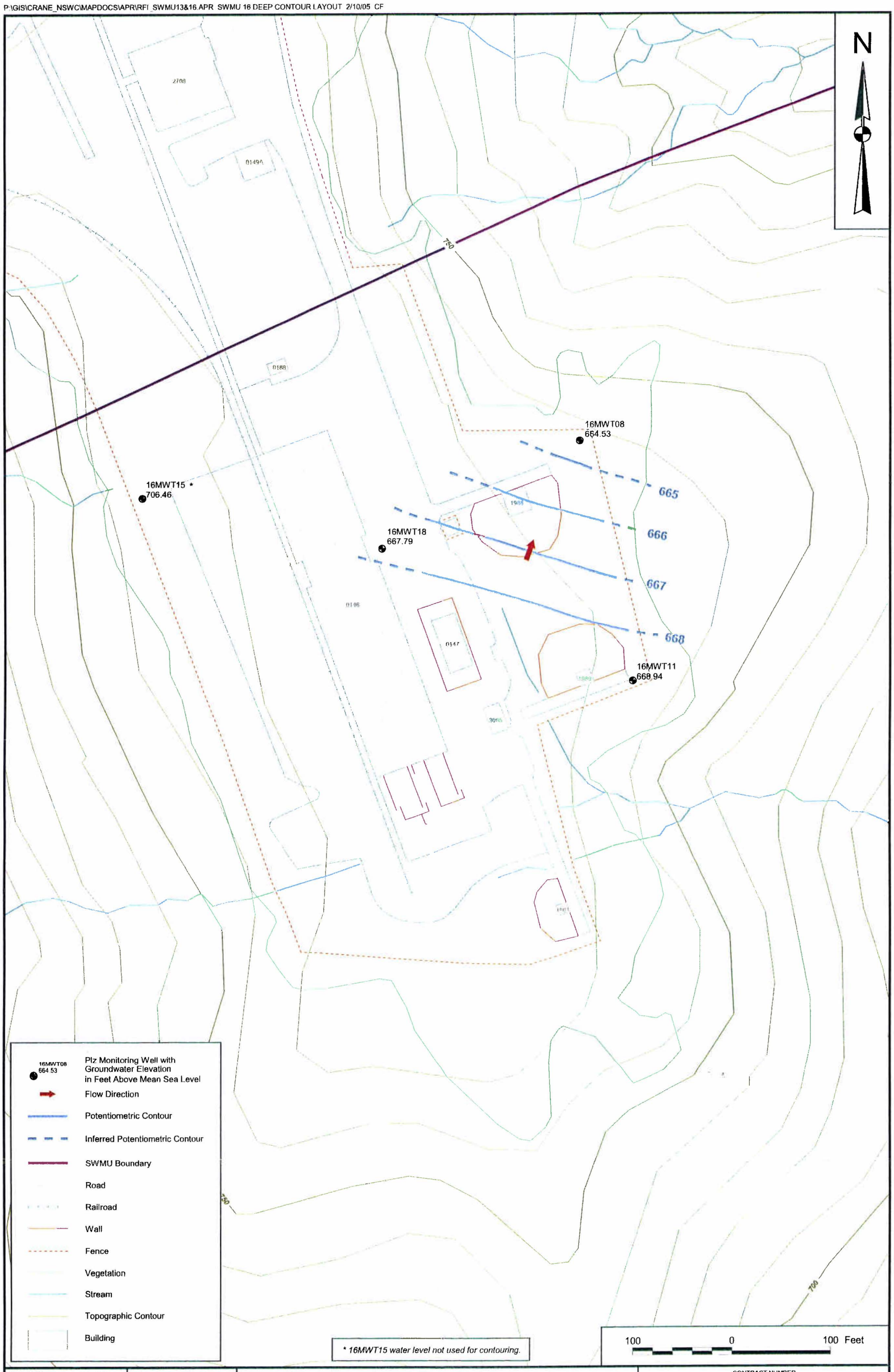


DRAWN BY A. JANOCHA	DATE 2/23/04	POTENTIOMETRIC SURFACE MAP FOR MIDDLE PENNSYLVANIAN WATER-BEARING ZONE - JANUARY 24, 2004 SWMU 16 - CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. LUCAS	DATE 5/13/04		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4 - 8 REV 0

P:\GIS\CRANE_NSWC\MAPDOCS\APR\RFI_SWMU13&16.APR SWMU 16 DEEP CONTOUR LAYOUT 2/10/05 CF



DRAWN BY A. JANOCHA	DATE 2/23/04	POTENTIOMETRIC SURFACE MAP FOR LOWER PENNSYLVANIAN WATER-BEARING UNIT - JANUARY 24, 2004 SWMU 16 - CAST HIGH EXPLOSIVES FILL/BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. LUCAS	DATE 3/17/04		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4 - 9 REV 0

FIGURE 4-10. GROUNDWATER ELEVATIONS IN MONITORING WELLS VERSUS WELL SCREEN DEPTH AT SWMU 16

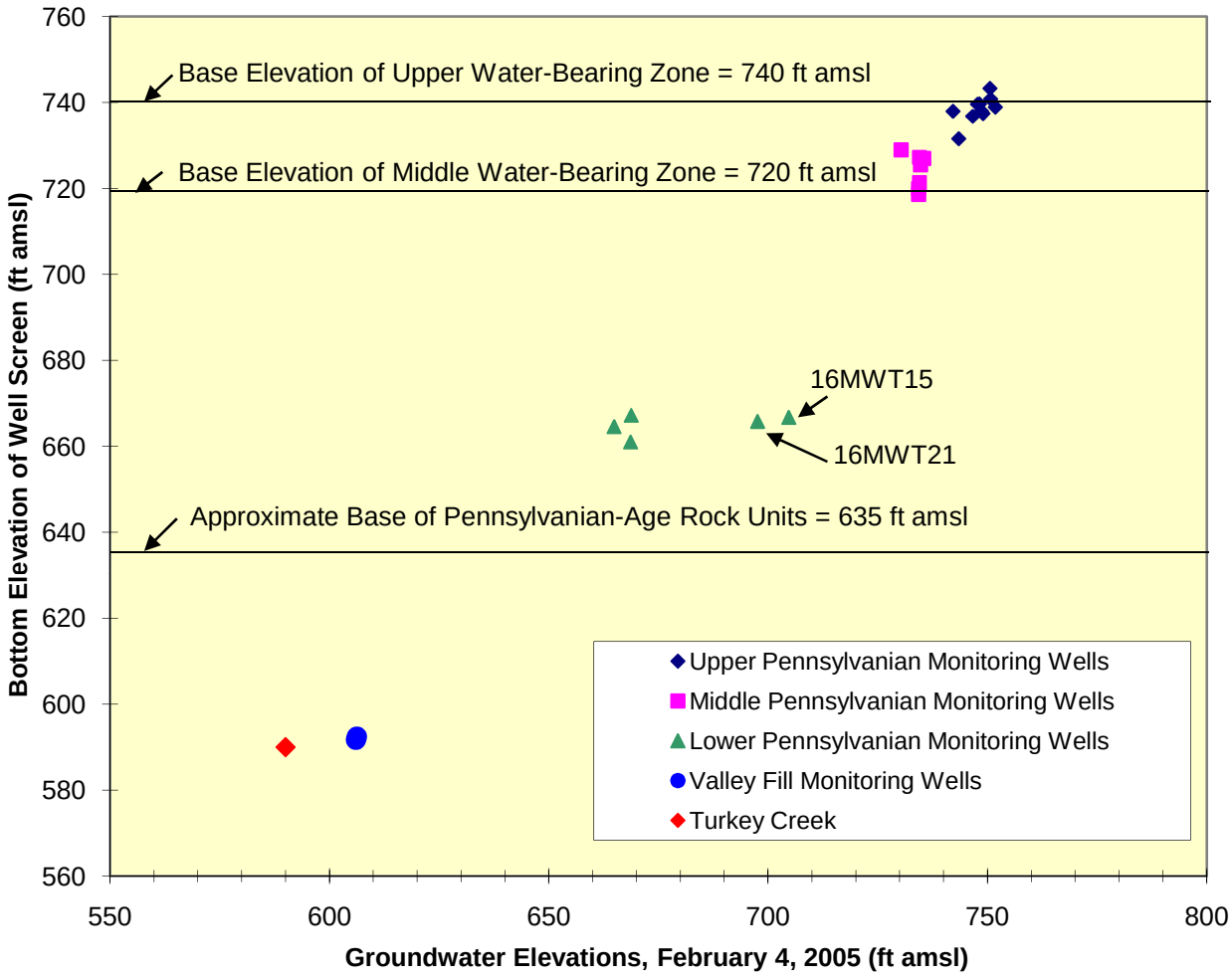
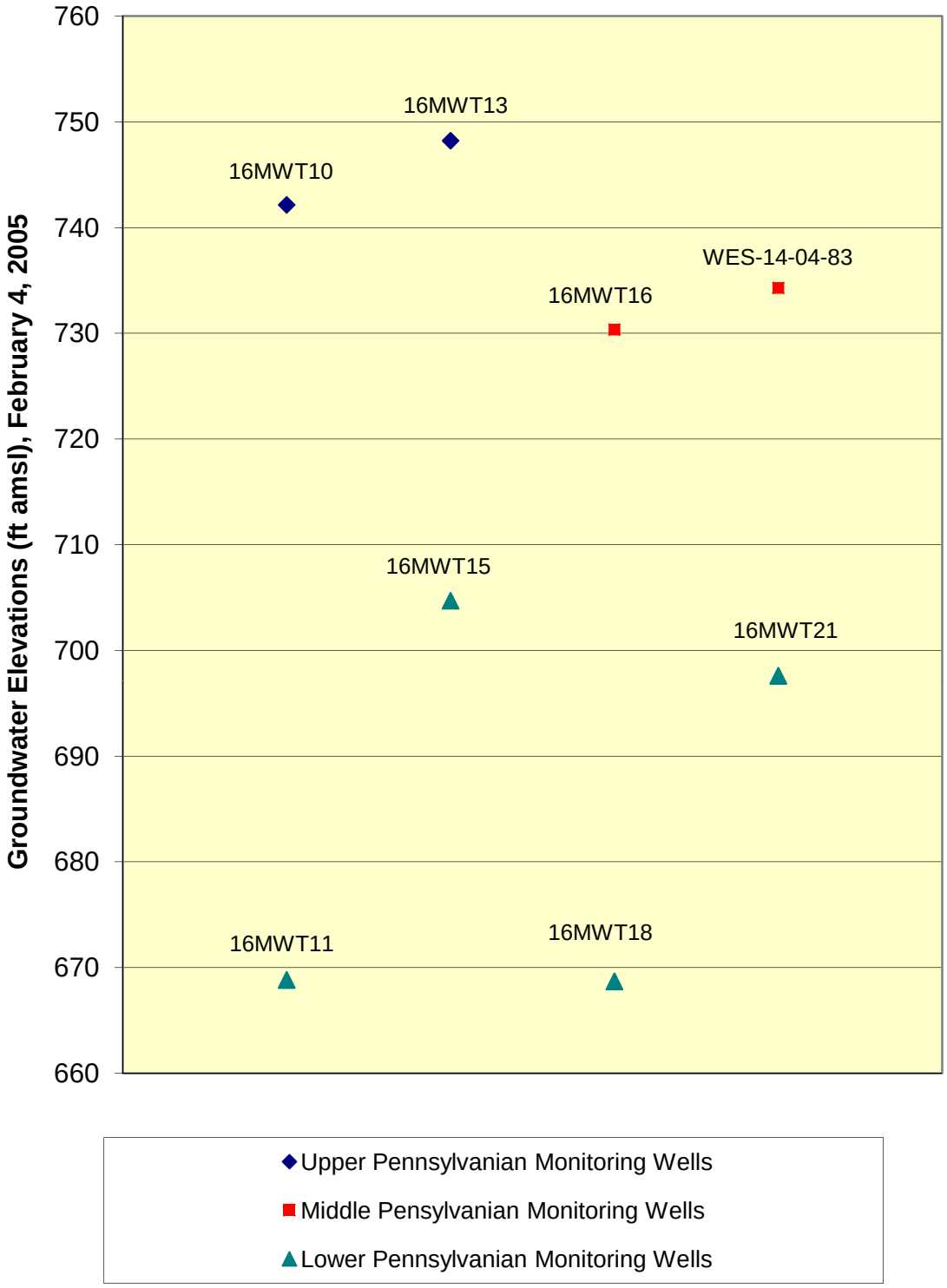


FIGURE 4-11. COMPARISON OF GROUNDWATER ELEVATIONS IN WELL PAIRS AT SWMU 16



5.0 NATURE AND EXTENT OF CONTAMINATION

This section describes the locations, spatial patterns, chemical forms, and concentrations of organic and inorganic chemical contaminants at SWMU 16. Where feasible to do so, an attempt is made to identify which chemicals appear to be site-related contaminants and which do not.

5.1 BACKGROUND

Organic chemical contamination is defined for this RFI as chemicals whose concentrations exceed human health or ecological SVs and therefore are considered to potentially result in unacceptable human health or ecological risks. A similar definition applies to metals, however, consideration is also given to the natural occurrence of metals in environmental media. Concentrations of metals that are within normal background levels are not considered to represent true contamination. Nevertheless, if site-related metals exceed chemical of potential concern (COPC) SVs, they are discussed in this section.

The range of analyses conducted during this RFI is documented in Section 2.0 and summarized in Table 2-3. Analytical data and data quality were presented in Section 3.0. The data show that multiple chemicals of environmental interest appear in multiple areas of SWMU 16 at concentrations greater than SVs. Comparisons to SVs are tabulated in Sections 7.0 and 8.0. These comparisons were used to focus the list of chemicals used to depict the nature and extent of contamination at SWMU 16. Details are provided below.

To facilitate succinct descriptions of the extent of contamination, representative chemicals are used here to depict the extent of contamination. These chemicals represent all chemicals that were detected at concentrations greater than applicable SVs and meet one or more of the following criteria:

- Exceeds COPC SVs (described and evaluated further in Sections 7.0 and 8.0).
- Representative (based on chemical and physical properties) of a particular group of chemicals (e.g., SVOCs, metals).
- Detected multiple times and generally pervasive, thus representing the greatest extent of contamination for similar chemicals.
- Detected infrequently but at environmentally significant concentrations.

- May be used to show a connection or no connection among various environmental media.

- May be significant daughter products that demonstrate changes in contaminant concentrations over time due to chemical or biochemical degradation.

- Ultimately, was judged to adequately represent contaminants at SWMU 16 in terms of nature and extent.

Concentrations of some of the representative chemicals are plotted to depict the spatial extent of contamination. For other representative chemicals whose extent can be easily described, only text is provided. All data can be viewed in Appendix G, Tables G-1 through G-4, therefore the concentration of any chemical that was analyzed, but not explicitly discussed in this section, is available for review.

No formal (e.g., statistical) comparisons of SWMU 16 RFI metals concentrations to background metals concentrations were conducted in this investigation. However, NSWC Crane background soil data extracted from TtNUS, 2001 may be used to gain perspective on the concentrations of chemicals observed in SWMU 16 soils and sediments. This is especially true of surface soils (Soil Group 3) that may have eroded into drainage channels such as the gullies on the hillsides of SWMU 16 that are typically dry and more akin to soil than sediments. Tables 3-1 through 3-4 present summary statistics for metal concentrations in the following soil categories that are germane to SWMU 16:

- All NSWC Crane soils (a composite of nine different soil groups)
- Soil Group 3 – Alluvial, Mississippian, and Pennsylvanian surface soil
- Soil Group 8 – Pennsylvanian Subsurface Clay and Silt
- Soil Group 9 – Pennsylvanian Subsurface Sand

In addition to these tables, box and whisker plots were prepared for select metals to show the data distributions for each metal relative to their data distributions in background soils. The plots are provided in Figures 5-1 through 5-9. In each figure, NSWC Crane background data and SWMU 16 RFI data are plotted side by side for easy comparison. The plots are in the form of pairs of box and whisker plots for each soil group, with three pairs of plots per figure. The vertically oriented rectangular boxes represent the lower 25 percent quantile to the upper 75 percent quantile of each data set. The bottom whisker represents the minimum detected concentration; the upper whisker represents the maximum detected concentration. Above each upper whisker is a number in the format of x/y, which indicates the number of

detections (x) out of number of results (y). The center horizontal line within each box represents the median (i.e., middle) value of the data set. The greater chance of obtaining a maximum or minimum value between two data sets resides with the data set that has the greater number of values. This characteristic is significant because there are generally more site data than background data for each metal and soil group pair. The medians of two similar data sets, however, should appear at approximately the same location on the concentration scale and the general shape of the box and whisker plots should be similar if a site data set is representative of background concentrations.

Complications may arise when one data set appears to be a subset of another. For example, a background data set may have a smaller data spread than the site data when there are fewer background values than site values. This could be an indication that the background data set is a subset of a larger set of background data that was not included in the background study. However, the background study included soil samples from a large coverage of NSWC Crane so the chance of this occurring is small. More likely is the case where a site data set is a subset of the overall Crane data background. This could occur because the site samples are collected from a relatively small area when compared to the breadth of spatial coverage of the background data. The background data set may therefore be a combination of smaller, more localized data subsets, each with its own median and data spread and these could cause one data set to appear shifted relative to background. In those cases, it is useful to compare the maximum values to determine whether the site maximum value appears to represent a value that is significantly greater than the background maximum value. What is considered to be significant is subjective and requires professional judgment. These issues are described on a case by case basis as necessary in the following text.

Concentrations of all organic compounds were assumed to be zero in each of the background soil groups. Therefore the detections of organic compounds at SWMU 16 are considered to be site-related, unless the site history and observed concentrations or concentration patterns indicate that the contaminants are from non-site related sources. For example, chemicals such as methylene chloride or acetone are often detectable and attributable to laboratory contamination.

Four upgradient locations were sampled for surface water and sediments. Three of these (16SW/SD14, 16SW/SD20, and 16SW/SD21) represent upgradient conditions for gullies; one (16SW/SD18) represents upgradient conditions for the Turkey Creek mainstream. The concentrations of metals representing the two different classes of drainage channel (gullies and Turkey Creek Mainstream), appear to be significantly different. Comparisons of site data to these upgradient values are discussed in the surface water and sediment section, as applicable (Section 5.3). There was a single upgradient well, 16MWT01.

This well, located in the Puz, is used to represent upgradient groundwater conditions for all other SWMU 16 wells.

Section 3.0 is a description of various data quality characteristics of the SWMU 16 data for all media. This section shows that sampling and analysis completeness goals for the project were generally met (Tables H-1 and H-2). Where they were not met, representative samples could not be obtained. This typically occurred when refusal was encountered during advancement of soil borings or when surface water was not present at or near a proposed sampling location. In each of these cases a data void exists where the samples could not be collected, however, the data voids have not impaired the ability to understand the nature and extent of contamination. Table 2-3 lists the various samples and the analyses that were conducted on the samples. Table 2-4 is a detailed list of the reasons why proposed samples were not collected and why extra samples were collected or extra analyses were performed.

5.2 SOIL CONTAMINATION

Table 2-3 indicates which soil samples were collected and the analyses conducted on the samples. Figures 5-10A and 10B are spatial depictions of representative organic chemical detections in surface and subsurface soil. Only two chlorinated organic chemicals are plotted because they represent the majority of organic chemical contamination in soils. If the concentration of a plotted organic chemical exceeds an ecological or human health SV, a flag (e.g., E, H, or EH) is shown on the tag at the affected sampling location on the figures. There are two sets of human health risk SVs used for selecting COPCs, one for direct contact with soil and the other for migration of contaminants from soil to groundwater. The lower of the values was used in the figures.

Each tag shows surface and subsurface soil concentrations so the vertical soil profile can be examined easily at each location. Select metal plots are also presented and are described with the individual metal discussions below.

5.2.1 Explosives

Tables 3-5 through 3-8 present descriptive statistics and data for chemicals detected in soils at least once during the RFI. Appendix Table G-1 is the entire RFI analytical database for SWMU 16 surface and subsurface soil. Picramic acid results were rejected (See Table H-3) because of non-compliant percent recoveries in MS. Although picramic acid results were rejected in just two samples, it is not clear that picramic acid could have been detected if it were present in any soil samples, except at moderate or higher concentrations (e.g., 20 times the reporting limit). RDX concentrations were biased slightly to

moderately low, but RDX should have been detectable at concentrations that were within 2 times the nominal detection limit, therefore this low bias is not considered to be significant. No other data deficiencies were noted. The only explosive compound detected in SWMU 16 soils was HMX, which was detected in a single sample (16SS0330002) at a concentration of 0.34 mg/kg. This is less than the human health SVs of 310 mg/kg. There is no ecological risk SV. The HMX contamination is well bounded in all directions and explosives contamination in soils is not discussed further. Overall, explosives contamination in SWMU 16 soils is minimal therefore the inability to detect picramic acid at moderate to low concentrations is not viewed to represent a significant data deficiency. Explosives contamination is considered to be completely bounded vertically and laterally in SWMU 16 soils.

5.2.2 Dioxins, Furans, PCBs, and SVOCs

Several dioxin and furan results were detected during Round 1 at near-SV levels with most results within a factor of two or three of the human health SV. The worst cases for this group of chemicals were 11,500 ng/kg of 1,2,3,4,6,7,8,9-OCDD in sample 16SS0330002 (SV = 2,800 ng/kg) and 1.5 ng/kg of 1,2,3,7,8-PECDD in sample 16SS0320002 (SV = 0.28 ng/kg). The exceedances of SVs are relatively minor. Nevertheless, dioxins were retained as COPCs and evaluated in the risk assessments. The risk assessments indicated that there is no significant risk associated with the low concentrations of detected dioxins. Therefore, the detected dioxin concentrations are satisfactorily bounded and are not discussed further because of their minor importance. No dioxins or furans were analyzed during Rounds 2 and 3 because of the minor importance of these chemicals. Although PCBs were analyzed in several surface and subsurface soil samples, there were no detections of these chemicals so PCBs are not discussed further.

Several SVOC compounds were detected in surface and subsurface soils. Of these, relatively few exceeded human health or ecological risk SVs. The exceedances were for 9,600 µg/kg benzo(a)anthracene, 8,400 µg/kg benzo(a)pyrene, 9,200 µg/kg benzo(b)fluoranthene, 5,000 µg/kg benzo(k)fluoranthene, 11,000 µg/kg chrysene, 1,600 dibenzo(a,h)anthracene, 4,400 µg/kg indeno(1,2,3-c,d)pyrene, and 180 µg/kg naphthalene, all of which exceeded one or the other of the human health or ecological SV in surface or subsurface soil at location 16SB003 only, with one minor exception. The exception is a detection of 94 µg/kg benzo(a)pyrene in surface soil at location 16SB001, which exceeded the 62 µg/kg human health SV by about 50 percent. SVs are provided in Sections 7.0 and 8.0. The exceedances are almost completely limited to surface soil, therefore, all of the PAH concentrations in excess of SVs are bounded vertically.

Laterally, the PAH exceedances of SVs at 16SB003 are bounded to the west by Building 146 and to the north and south by samples with no exceedances of PAHs. No samples were collected to the east for PAH analyses, however, based on the available data, it does not appear the PAH contamination is wide spread in this area and PAH contamination is confined to surface soils.

In addition to PAHs, there were a few other SVOC concentrations that exceeded SVs in soils. Specifically, 1,200 µg/kg bis(2-ethylhexyl)phthalate exceeded the ecological SV of 925 µg/kg at location 16SB036. Safrole exceeded its 404 µg/kg ecological SV at a few different locations (15,000 µg/kg at 16SB013, 1,200 µg/kg at 16SB023, 4,600 µg/kg at 16SB025, 1,500 µg/kg at 16SB029, and 67,000 µg/kg at 16SB041). There are no human health SVs for safrole, which is a common food additive (NJDEP, 2001). The highest observed safrole concentrations was in the 5 to 7 foot interval at 16SB041; however, there are no ecological SVs for that depth. Safrole is often found in association with sassafras plants (safrole is present in the roots) and sassafras plants are known to grow all over NSWC Crane, therefore it is not likely that this chemical is site related. This assertion is made in part because the observed SVOC exceedances of SVs are very limited and do not appear to represent a site-related source of these chemicals. The only safrole exceedances of SVs in the subsurface were limited to the 2 to 3 feet depth at location 16SB023; therefore, the safrole is bounded vertically. The detections of safrole were sparsely spaced in the lateral direction.

Hexachlorophene and pentachlorophenol, commonly regarded as SVOCs, were analyzed using an herbicide analysis method to achieve lower than normal detection limits because they have relatively high toxicities. The hexachlorophene results exhibited a severe low bias (approximately 20 percent mean recoveries in MS and MSD) and the pentachlorophenol results exhibit a moderately low to severe low bias (approximately 37 percent mean recoveries in MS/MSD) in solid samples. Therefore, it is possible that these compounds could not have been detected at concentrations that were greater than but within a factor of 3 to 5 of their respective detection limits. With a three-fold multiplier, the maximum non-detect value would represent a pentachlorophenol concentration potentially as high as 1.7 µg/kg, which is slightly greater than the 1.4 µg/kg human health SV for protection of groundwater from migration of soil contaminants. A five-fold multiplier of the maximum non-detect pentachlorophenol concentration would yield a possible maximum concentration of 2.9 µg/kg for pentachlorophenol. This is just two-times the lowest of the human health (1.4 µg/kg) and ecological (119 µg/kg) SVs. The next lowest of the pentachlorophenol and hexachlorophene SVs for human health and ecological risk assessment is 119 µg/kg (for pentachlorophenol). Therefore, the estimated 3- to 5-fold low biases for pentachlorophenol and hexcachlorophene represent a very slight potential for exceeding either the human health or ecological risk SVs. Despite this limitation, the infrequent detections of these compounds indicates that they are not significant site-related contaminants.

In summary, there was little soil dioxin/furan, PCB, and SVOC chemical contamination detected and the detected contamination appears to be well bounded with a few minor exceptions. Furthermore, the infrequent exceedances of applicable SVs and the sparse distribution of exceedances suggest that these chemical either are not site-related or that they are of little significance as contaminants.

5.2.3 VOCs

Several VOC results were rejected because of poor analytical performance but the rejections have no significant effect on the usability of the data. Although a few chlorinated VOC results were rejected, the rejections were generally for chemicals that are part of the analytical VOC fraction but are not of particular interest for SWMU 16 (See Section 3.0 and Table H-3).

Despite the rejected VOC results, it is clear that chlorinated organic solvents are site-related contaminants. The most frequently detected chemicals or chemicals with the greatest exceedances of SVs for surface and subsurface soils were TCE and its degradation product, cis-1,2-dichloroethene. The concentrations of these chemicals are shown on Figures 5-10A and 10B. A trace of vinyl chloride, a cis-1,2,-dichloroethene degradation product, was also detected at location 16SB065 (12 µg/kg in sample 16SB0650206 and 9 µg/kg in sample 16SB0650608). The VOC detections are limited almost completely to the area near the western sump and under Building 146 (See Figure 5-10A). The highest soil VOC concentrations (over 1,000 µg/kg) are generally in the shallowest sampling interval inside of Building 146 and in the intermediate sampling interval near borings 16SB053 and 16SB056 outside the building to the west. From there, the VOC concentrations decrease in a topographically downgradient direction toward the west to become less than 100 µg/kg at the westernmost sampled locations. Although there were a few minor detections of VOCs to the northeast of Building 146, they are of relatively little significance and are not discussed further.

VOC contamination in soils is bounded well enough to establish the areas that are most contaminated and likely to be targets for a remedial action. The contamination is greatest underneath Building 146 and extends primarily toward the west from the building. TCE concentrations are not less than the TCE human health SV (2.8 µg/kg) for surface and subsurface soil at the westernmost sampling locations, therefore TCE contamination is not completely bounded toward the west. In all other directions TCE contamination in soil is reasonably well bounded laterally and vertically, although the TCE concentrations are not less than 2.8 µg/kg in the deepest interval at a few locations: 28 µg/kg at 16SB058, 6 µg/kg at 16SB062, 14 µg/kg at 16SB061, 17 µg/kg at 16SB065, 11 µg/kg at 16SB072, and 360 µg/kg at 16SB093. Because bedrock was encountered in some of the deepest sampling depths, which prevented sample

collection at those depths (See Tables 2-3 and 2-4), there is little doubt that the soil VOC contamination has migrated into the bedrock, especially underneath and west of Building 146 where the reservoir of TCE is greatest. No evidence (e.g., TCE concentrations greater than 1,000,000 µg/kg) of free product TCE was detected.

From Tables 3-5 through 3-8 and Figure 5-10, it is evident that the predominant contaminant in surface and subsurface soil at SWMU 16 is TCE. Other VOCs were also detected, some related to the degradation of TCE. The majority of VOC contamination is situated under and to the west of Building 146 and the building operations appear to be the primary source of this contamination. The VOC contamination is well bounded in all directions except at the westernmost edge of the sampling pattern where TCE concentrations exceed soil SVs. Some of the VOC contaminants have presumably migrated into bedrock, especially underneath and to the west of Building 146. Therefore, VOC contamination in these areas is not well bounded in the vertical direction.

5.2.4 Metals

Metals were frequently detected in soils at concentrations in excess of SVs. These data were of generally acceptable quality with the potential for a slight high bias, although the bias is viewed to be insignificant. Some of the metals appear to be site-related contaminants and these metals are identified below. The presumed origin of the metals contamination is from the B146 incinerator where munitions were roasted to demilitarize them. Accordingly, metals that would be expected to be site-related are metals such as antimony, copper, lead, and zinc that are used in shell casings or bullets, or are components of alloys of such metals. Metal fragments were observed on the ground surface near the incinerator area, although no fragments were recorded in the soil boring logs, thus indicating that the metal fragments are limited in vertical extent to the surface soil.

Figures 5-11 through 5-19 are posting plots of various widely detected metals that appear to have a site-related origin or frequently exceed SVs. Tables 3-5 through 3-8 present detection statistics for metals in SWMU 16 soil. Some metals (e.g., arsenic) were included in the plots even though they appear to be representative of background concentrations because they have significant SV exceedances in other environmental media at SWMU 16.

Aluminum – Figure 5-11 displays aluminum concentrations in surface and subsurface soil. All of the concentrations except one (16SB003) are greater than the human health SV but they appear, as a group, to be comparable to background concentrations. This is made more evident by the background-to-site data comparisons of Figure 5-1 that show median and maximum values of the site data comparable to

background data for each of the three soil groups. The increased spread of the aluminum data relative to background data appears to be a result of having more samples in the SWMU 16 data set. Therefore, aluminum is not discussed further.

Antimony – This metal is a commonly used hardener for lead and is also chemically similar to lead. Therefore, it is found with lead in nature and frequently persists as a contaminant in lead products. The concentrations of this metal are elevated relative to background concentrations (See Figure 5-2) and the distribution is such that the highest antimony concentrations are found near the incinerator previously located outside the southern end of Building 146. Figure 5-12 shows the spatial distribution of this metal. Therefore, this metal is considered to be a site-related contaminant.

Arsenic - Figure 5-13 shows the arsenic concentrations in surface and subsurface soils. The distribution of this metal is similar to aluminum in that all reported soil concentrations exceed the human health SVs for surface and subsurface soils but the concentrations are comparable to background concentrations. Measured arsenic concentrations appear to represent background concentrations (See Figure 5-3) as indicated by the comparable mean values and spread of the various soil group data sets.

Chromium – Figure 5-14 shows the concentrations of chromium in surface and subsurface soils. The concentrations appear to be slightly elevated as compared to background concentrations (See Figure 5-4) but the elevated status is attributed to a few locations: 33.7 mg/kg at 16SB089 (surface), 36.3 at 16SB087 (subsurface), 38.2 mg/kg at 16SB088 (subsurface), 41.7 mg/kg at 16SB085 (subsurface), and 48.2 mg/kg at 16SB089 (subsurface). These locations are the easternmost and southernmost soil sampling locations and are the furthest sampling locations from the incinerator. Therefore, chromium contamination does not appear to be bounded relative to the 2.1 mg/kg human health SV and appears to be elevated compared to background concentrations in this direction. All other chromium concentrations are comparable to background concentrations.

Copper – The concentrations of this metal are plotted in Figure 5-15. This metal is a major component of brass used in making munitions shell casings. Not surprisingly, the copper concentrations around the southern end of SWMU 16 are elevated relative to background concentrations (See Figure 5-5). Most of the concentrations exceed the ecological surface soil SV (5.4 mg/kg) whereas two locations (413 mg/kg at 16SB015 and 391 mg/kg at 16SB021) exceed the human health surface soil SV (310 mg/kg). All subsurface copper concentrations are less than the subsurface human health SV (310 mg/kg); there is no ecological SV for subsurface soil. The elevated surface soil concentrations but background level subsurface soil concentrations are consistent with surficial deposition of copper. Therefore, SWMU 16

copper is considered to be a site-related contaminant. The copper contamination is completely bounded in the vertical direction but not in the lateral direction.

Lead – This metal is a major component of bullets and munitions shells. Figure 5-16 shows the spatial distribution of lead concentrations at SWMU 16. Many of the sampled locations exceed the 81 mg/kg human health surface soil SV and the 16 mg/kg ecological surface soil SV. Figure 5-6 shows that the surface soil lead data (Soil Group 3) are elevated compared to background data. The highest concentrations of lead in surface soil (e.g., 1,240 mg/kg at 16SS0140002) occur near the former incinerator and the concentrations show a general pattern of decrease along transects leading away from that location. There are no locations at which the subsurface lead concentrations exceeded the human health SV. There is no ecological SV for subsurface soil. Based on the available data, the lead contamination is completely bounded vertically relative to applicable SVs and the subsurface concentrations appear to reflect natural background levels. The lead contamination is not bounded laterally because, furthest from the former incinerator location, the lead concentrations in surface soil are elevated compared to background concentrations and SVs.

Nickel – Twenty (20) different surface soil samples exceeded the 14 mg/kg and the 13.6 mg/kg surface soil human health and ecological SVs, respectively (Figure 5-17). Nine subsurface samples exceed the human health SV (14 mg/kg); there is no ecological SV for subsurface soil. Just four of these (23.6 mg/kg at 16SB020, 24.8 mg/kg at 16SB026, 26.2 mg/kg at 16SB088, and 41.3 mg/kg at 16SS017) exceed the background surface soil 95/95 UTL of 22.1 mg/kg for nickel (See Table 3-2). The UTL is the concentration below which 95 percent of the data are expected to fall in 95 percent of the measurements. These data indicate that the SV is less than typical background concentrations and that the observed surface soil concentrations are comparable to background concentrations with perhaps one significant exception – 41.3 mg/kg at 16SB017. This location is within the distance from the former incinerator that other elevated metal contamination is observed. Figure 5-7 supports this interpretation because it shows that the median nickel concentrations for site and background data sets are very similar and the spread of the data sets are also similar, although having more samples in the site data sets tends to increase the chance of obtaining maximum and minimum values in those data sets. The locations furthest from the former incinerator location are not less than surface soil SVs, indicating that nickel contamination is not completely bounded laterally relative to these values, however, the nickel appears to be well bounded relative to background concentrations. Location 16SB017 also had the greatest subsurface nickel concentration. Otherwise, subsurface soil nickel concentrations also appear to reflect background conditions. Therefore, nickel is not completely bounded relative to SVs, but appears to be well bounded by natural background concentration values.

Vanadium – The concentrations of this metal are plotted in Figure 5-18. There are numerous exceedances of the vanadium surface soil human health (7.8 mg/kg) and ecological (1.59 mg/kg) SVs. Figure 5-8 supports this interpretation because it shows that the median vanadium concentrations for site and background data sets are very similar and the spread of the data sets are also similar. There are, however, just three exceedances of the surface soil background 95/95 UTL (See Table 3-2). Thus, similar to nickel, the SVs appear to be within the natural background concentration of vanadium. Therefore, while concentrations on the perimeter of the sampling pattern exceed SVs, vanadium appears to represent natural background and is well bounded in that regard.

Zinc – This metal is the second primary component (next to copper) of brass used to make military shell casings that were heated in the incinerator. Figure 5-19 shows the spatial distribution of zinc concentrations in surface and subsurface soil. Figure 5-9 presents background and site data sets side by side to show that SWMU 16 zinc concentrations are elevated relative to background concentrations. Zinc concentrations in surface soil widely exceed the 65.6 mg/kg surface soil 95/95UTL (Table 3-2). Six of the locations had exceedances of the human health SV for soil (680 mg/kg) and all locations had exceedances of the 6.62 mg/kg ecological SV. Surface soil zinc contamination is not bounded laterally with respect to the ecological SV but it is reasonably well bounded in all directions by the 680 mg/kg human health SV. Surface soil zinc contamination is not bounded laterally with respect to the 95.95 UTL for surface soil (65.6 mg/kg). Vertically, the bounding of zinc contamination is complete relative to the human health SV; there is no ecological SV for subsurface soil zinc.

In summary, surface soil metals contamination is not completely bounded laterally relative to SVs toward the southern and to some degree the eastern sides of SWMU 16. Bounding is nearly complete in the other directions. Metal contamination is essentially limited to the top 2 feet of soil in the southern and southeastern area of SWMU 16, plus visible metal fragments located sporadically throughout this area and west of Building 146. The primary contaminants that appear to be site-related are antimony, copper, lead, and zinc, although other metals (chromium and iron) may be minor contaminants. The presence of these site-related contaminants is consistent with site operations, especially the use of the incinerator to heat military munitions and drive metal fumes into the air after which they would deposit onto the ground surface, as well as metal-containing ash residue off the southern end of Building 146. Because these metals are not very mobile in soils, they have not migrated significantly into the subsurface. More detail on the fate and transport of environmental contaminants is provided in Section 6.0.

Some metals whose concentrations exceed SVs do not appear to be site-related contaminants based on comparability of observed concentrations to background concentrations. Those metals include:

aluminum, arsenic, barium, cadmium, cobalt, manganese, nickel, and vanadium. Barium, cadmium, cobalt and manganese were not discussed above.

Chromium and iron may be a site-related contaminants but neither of these metals appears to be significantly elevated relative to background concentrations except at a few isolated sampling locations. The elevated chromium concentrations were reported for sampling locations that are furthest from the former incinerator (locations 16SB088 and 16SB089). The isolated locations for iron exceed 40,000 µg/L, which is greater than the 95.905 UTL, at sampling locations 16SB020 and 16SB022, southwest of the former incinerator.

Several metals were not discussed in this section because they are represented by the metals that were discussed. None of the metals that were omitted from this discussion are believed to be significant site-related contaminants. The metals (i.e., calcium, magnesium, potassium, and sodium) are not significant environmental contaminants; or they were detected infrequently (in approximately 5 percent or less of samples) and at low concentrations compared to SVs (i.e., selenium, silver, and thallium), or they infrequently exceeded SVs (i.e., mercury) and therefore do not add significantly to an understanding of the extent of site-related contamination. Screening values and evaluations of adverse effects of all metals are provided in Sections 7.0 and 8.0. See Tables 3-5 through 3-8 for summaries of the frequencies of detection and results for metals detected in at least one surface soil sample or one subsurface soil sample.

5.3 SURFACE WATER AND SEDIMENT CONTAMINATION

Tables G-2 and G-3 of Appendix G are presentations of all surface water and sediment data, respectively, that were collected during RFI Rounds 1 through 3. Surface water and sediment samples were not analyzed for dioxins or PCBs because these compounds were not expected to be significant for SMWU 16 and because they generally are diluted to insignificant levels in these media. This was borne out by the soil analyses for these compounds. Furthermore, these chemicals preferentially adsorb to solid substrates such as soil and sediment rather than being dissolved in surface water, so the likelihood of detecting these chemicals was expected to be low. Comparisons of the chemical concentrations to SVs and selection of COPCs for risk assessment are made in Sections 7.0 and 8.0.

Tables 3-9 through 3-19 present summary statistics and results for all chemicals detected at least once in the respective medium for surface water and sediment samples. Tables 3-9 through 3-12 and 3-14 are for gully surface water samples where the sampling locations are on steep slopes and are often dry. Tables 3-13 and 3-16 are for mainstream surface water samples where the chance of finding water and

true, water-covered sediments is higher than in the gullies. Tables 3-16 through 3-19 are for gully and Turkey Creek mainstream sediment samples. Organic chemical concentrations are not plotted because the degree of organic chemical contamination is low. This is explained in the text below.

Three gully locations were designated as upgradient of SWMU 16 investigative surface water and sediment gully locations. They are: 16SW/SD14, 16SW/SD20, and 16SW/SD21. For mainstream sampling, one upgradient location, 16SW/SD18, was sampled.

Three sumps were sampled during Rounds 1 and 2 and those samples are numbered as surface water samples (i.e., the numbers include "SW"). The sample numbers are: 16SW0101; 16SW0102; 16SW0201; 16SW0202; 16SW0701; and 16SW0702. These samples represent the contents of the sumps and do not represent water that is available in surface drainage channels. Consequently, the samples are labeled as "SUMP" on the appropriate Section 3.0 and Appendix G tables and the data user should understand the difference between these samples and actual surface water samples when interpreting the data. Transport of contaminants from sumps and exposure to the water represented by these samples is likely to be much different than exposure to water found in surface drainage channels. This is addressed in more detail in Sections 6.0 through 8.0.

5.3.1 Explosives

The upgradient gully and Turkey Creek mainstream samples did not contain detectable levels of explosives. Although there were relatively few detections of explosives in surface water and sediment, RDX, was detected in downgradient gully surface water samples at a high enough concentration to cause it to be selected as a human health risk COPC for surface water. Similarly, RDX and 2,6-dinitrotoluene were selected as ecological risk COPCs in sediment and surface water. In addition HMX and the TNT degradation products 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene were selected as COPCs for ecological risk in surface water. COPC selection tables that indicate which chemicals were selected as COPCs are presented in Sections 7.0 and 8.0. Those tables indicate whether concentrations in gully or mainstream locations were the cause for their selections as COPCs. Immediately below is a matrix showing where the explosives compounds were detected and the observed concentration for each detection. The letters following numerical values are data validation qualifiers.

			Parameter					
Sample Type	**Sample No.**	**Units**	**TNT**	**2,6-DNT**	**2-Am-4,6-DNT**	**4-Am-2,6-DNT**	**HMX**	**RDX**
Sediment	16SD0301	mg/kg						0.27 J
	16SD1201	mg/kg		0.54 J				
	16SD1501	mg/kg		0.92 J				
Sumps	16SW0101	µg/L					29000	88000
	16SW0201	µg/L					1.5 J	9.2
	16SW0701	µg/L	2.1		0.89 J	2.2 J		2.9
Gullies or Turkey Creek Mainstream	16SW1201	µg/L					0.27 J	
	16SW1501	µg/L					0.51 J	0.29 J
	16SW2401	µg/L					0.32 J	
	16SW3001	µg/L			0.29 J	0.63	4.8	24
	16SW3002	µg/L				0.44 J	3.6	14

2,6-DNT = 2,6-dinitrotoluene
2-Am-4,6-DNT = 2-amino-4,6-dinitrotoluene
4-Am-2,6-DNT = 4-amino-2,6-dinitrotoluene
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
RDX = 1,3,5-hexahydro-1,3,5-trinitrotriazine
TNT = 2,4,6-trinitrotoluene

RDX and HMX were the most pervasively detected explosive compounds in SMWU 16 surface water. Each of these compounds was detected in five out of 15 samples over the course of three rounds of sampling and HMX was detected in a sixth sample. Except for HMX, RDX, and 2,6-dinitrotoluene, there were few exceedances of SVs and the exceedances were typically less than three times the SV. The 2,6-dinitrotoluene was detected in just two locations and is not discussed further because it is a minor contaminant of TNT or a degradation product of TNT (compare data from the matrix above to sampling locations shown in Figure 2-3). The maximum concentrations of RDX and HMX chemicals were detected in Round 1 at location 16SW01, which is a sump sample from the sump north of Building 146 (See Figure 2-3). This sample is not a true surface water sample, but it indicates that explosives are present in the northern sump at high concentrations. The next highest RDX concentration in any gully surface water sample was 24 µg/L at location 16SW/SD30. Upstream of this location RDX was detected at a concentration of 9.2 µg/L (location 16SW02). Location 16SW02 is at the eastern edge of SWMU 16 in the eastern sump and 16SW/SD30 is in a gully northeast and downgradient of SWMU 16. Location 16SW/SD15 is the most downgradient gully sampling location east of SWMU 16. There was no detectable RDX at that location thus bounding the surface water RDX contamination. Location 16SW/SD26 is situated between these latter two locations but location 16SW/SD26 was not sampled for explosives.

To the west and south of SWMU 16, there were no detections of explosives. The pattern described for RDX encompasses all other detected explosive compounds in SWMU 16 gullies, including the sumps (See Tables 3-9 and 3-14). The mainstream is the most downgradient receiving body for surface water contamination from SWMU 16, therefore the SWMU 16 surface water contamination is well bounded in all downgradient directions.

This is evident from the single low concentration of RDX in gully and mainstream sediments (single detection of 0.27 mg/kg RDX at sample 16SD0301), one detection of 0.54 mg/kg 2,6-dinitrotoluene (sample 16SD1201), and one detection of 0.92 mg/kg 2,6-dinitrotoluene (sample 16SD1501).

In summary, bounding of explosives contamination is complete for all explosives in surface water and sediment at SWMU 16. A small amount of explosives contamination was detected in the eastern half of the site in surface water and sediments, but the concentrations are less than detectable levels in the most downgradient locations that were sampled. The highest concentrations of explosives were observed in the sump sample collected from the northern sump.

5.3.2 Dioxins, Furans, and SVOCs

Dioxins and furans were not analyzed in surface water or sediment samples. SVOCs were analyzed only in Round 1; the sediments were sampled for SVOCs more extensively than the surface water (See Table 2-3). Upgradient locations were not sampled for SVOCs. Pentachlorophenol and hexachlorophene, which are SVOCs, were analyzed using an herbicide analytical method. Very few SVOCs were detected in the downgradient surface water and sediment. Of the detected SVOCs, few had concentrations high enough to cause them to be selected as COPCs. COPC screening tables are provided in Sections 7.0 and 8.0. All elevated detections in surface water were at location 16SW/SD01. The samples from this location are sump samples and are not true surface water samples. There were many more detections of SVOCs, primarily PAHs, in sediments than in surface water. However, the concentrations were generally less than human health and ecological SVs with few exceptions. Because the SVOC detections were so infrequent and of such low concentrations, these chemicals do not appear to be site-related contaminants and are not discussed further. No spatial plots of these chemicals were generated for this report.

5.3.3 Metals and Miscellaneous Parameters

Figures 5-20 through 5-30 show the concentrations of representative metals in surface water and sediments for SWMU 16. The tags display all rounds of data with (usually) two lines of values per tag.

The top line of values is the surface water data; the lower line is for sediment. If only one line of data is present, the data correspond to the type of sampling location (either surface water or sediment). Each round of data is separated from the others with a slash and the rounds are presented in sequential order reading from left to right. Exceedances of SVs are indicated by a filled black dot at each sampling location. The dot is filled if any one of the applicable SVs was exceeded in any round of sampling. For example, a filled dot at location 16SW/SD15 on Figure 5-20 indicates that the aluminum concentration in surface water exceeded the human health surface water SV of 3,600 µg/L. The SVs are shown on the Figures.

Unlike surface soil, no metal fragments were observed in sediments. The concentrations of several metals in surface water and sediment exceeded surface water or sediment SVs at numerous locations: aluminum (Figure 5-20), antimony (Figure 5-21), arsenic (Figure 5-22), cadmium (Figure 5-23), copper (Figure 5-25), iron (Figure 5-26), lead (Figure 5-27), nickel (Figure 5-28), vanadium (Figure 5-29), and zinc (Figure 5-30). Elevated concentrations of other metals were also detected at certain locations and are discussed below, as appropriate. The discussions of this section are focused on the general pattern of contamination with the intent of showing which metals exceed SVs and background levels most frequently and extensively. Metals for which concentrations are not plotted generally had a smaller difference between the measured SWMU 16 concentrations and the SVs, were detected less frequently than the plotted metals, or are less likely to be site-related than the plotted metals. While reviewing the data, it is important to keep in mind the nature of sampling locations 16SW/SD01, 16SW/SD02, and 16SW/SD07 as these locations were sumps rather than gullies. There were two rounds of surface water samples collected from those sumps.

Aluminum – Aluminum concentrations in surface water and sediment are plotted in Figure 5-20. The highest aluminum concentrations in surface water were generally associated with gully downgradient locations (9,510 µg/L at 16SW/SD15; and 8,790 µg/L at 16SW/SD28). All three upgradient surface water locations had aluminum concentrations less than 900 µg/L, indicating that the site concentrations, especially those greater than 2,000 µg/L, may represent contamination, but there are conflicting indications on this. All other SWMU 16 surface water samples had concentrations that were 2,080 µg/L or less. The most downgradient locations had aluminum concentrations less than human health SVs but exceeded ecological SVs. The more elevated aluminum concentrations are bounded in the downgradient directions for surface water; concentrations that exceed ecological SVs in the most downgradient directions are comparable to upgradient concentrations and do not appear to be contamination. Many sampled locations had sediment concentrations that exceeded the human health SV (7,600 mg/kg); there is no ecological SV. Overall, the SWMU 16 downgradient sediment concentrations (maximum value = 19,500 mg/kg) are slightly greater than upgradient concentrations (maximum value = 12,800 mg/kg)

across the SWMU gullies; the situation is similar for mainstream sediments. Because the concentrations are only slightly elevated and do not reveal clear concentration gradients, it appears the aluminum in sediment is mostly due to naturally occurring aluminum with a possible slight contribution from SWMU 16. The sediment concentrations are comparable to surface soil aluminum background concentrations (maximum value = 17,400 mg/kg), therefore aluminum is considered not to be a significant site-related contaminant in surface water or sediment.

Antimony - Antimony appears to be a site-related contaminant in soil. Based on Figure 5-21 (antimony concentrations in surface water and sediment) it also appears to be a contaminant in surface water and sediment. The highest observed sediment concentration (159 mg/kg at 16SW/SD04) is well in excess of typical sediment concentrations for this metal. This value is 20 times greater than the maximum value reported for surface soils (Table 3-2). Despite these elevated concentrations the antimony contamination in both surface water and sediment in gullies and mainstream channels is bounded by undetectable concentrations, or concentrations comparable to upgradient locations and SVs in the downgradient locations (16SW/SD19 and 16SW/SD25). Therefore, antimony contamination is completely bounded in the downgradient directions.

Arsenic - Arsenic concentration patterns (Figure 5-22) reveal a relatively uniform distribution of arsenic in surface water and sediments. Whereas the upgradient locations did not exhibit detectable levels of arsenic many downgradient locations did. Only the human health SVs were exceeded in any surface water sample; all sediment samples exceeded the human health SV and approximately half of the sediment samples exceeded the ecological SV. The sediment arsenic concentrations are greater than surface soil arsenic concentrations (Table 3-2) but the relatively uniform distribution casts doubt as to whether arsenic is a site-related contaminant. This is supported by the downgradient concentrations being very comparable to the upgradient concentrations in both gullies and mainstream samples. Arsenic is probably not a site-related contaminant in surface water or sediment at SWMU 16.

Cadmium - Figure 5-23 shows that there are few surface water exceedances of the 1.8 µg/L human health SVs, but there are numerous exceedances of the ecological SV (0.15 µg/L). Cadmium was not detectable in any upgradient surface water sample. The most downgradient mainstream location had 0.66 µg/L cadmium in surface water, which is greater than the 0.15 µg/L ecological SV but less than the 1.8 µg/L human health SV; otherwise, the most downgradient mainstream channel concentrations were less than detection limits and indicate that cadmium contamination is reasonably well bounded. Sediment concentrations also frequently exceeded human health or ecological SVs across the drainage channels, except in the most downgradient locations (16SW/SD25 and 16SW/SD19) of the mainstream channel. Therefore, cadmium contamination is bounded in the downgradient direction.

Chromium - Surface water chromium concentrations were less than human health and ecological SVs at all sampled locations except 16SW/SD15 where the 11.8 µg/L concentrations exceeded only the human health SV of 11 µg/L (See Figure 5-24). All sediment sample concentrations were less than the human health SV but several locations had samples with chromium concentrations greater than the 43.4 mg/kg ecological SV. The maximum concentration, 85.2 mg/kg at 16SW/SD10 is virtually the same as the upgradient concentration (85 mg/kg) at 16SW/SD20. In general, surface water chromium concentrations exceed the upgradient chromium concentrations but not the applicable SVs. All downgradient chromium concentrations in sediment are comparable to upgradient sediment chromium concentrations, although some SVs are exceeded. Chromium may be a minor site-related contaminant, but this is not clear.

Copper - Most of the sampled surface water and sediment locations (Shown in Figure 5-25) exhibited an exceedance of one or more SVs and many locations had concentrations in excess of the upgradient locations. The most downgradient mainstream location 16SW/SD19 (4.1 µg/L) exceeded the ecological SV (1.58 µg/L) in Round 1. The other surface water and sediment copper concentrations were less than the other applicable SVs at this location. Copper contamination patterns indicate that locations of highest copper concentrations were generally on the SWMU 16 ridge top and decrease in downgradient directions away from that area. However, copper is not completely bounded in the most downgradient direction based on the 4.1 µg/L surface water concentration at 16SW/SD19 in Round 1.

Iron - Iron concentrations in excess of surface water or sediment SVs occur in every sampled location (See Figure 5-26). Surface water iron concentrations consistently do not show a pattern of increase or decrease with distance from the SWMU; sediment concentrations generally increase from the ridge top to midway into the valley on each side (east and west) of the SWMU. Lower elevations also have significantly elevated iron concentrations. Surface water concentrations in the most downgradient locations are less than the SVs but not less than the upgradient concentrations, so surface water iron contamination is completely bounded. The sediment iron contamination is not bounded in the downgradient direction as compared to SVs or upgradient concentrations. The source of the iron contamination is unknown. Based on the spatial patterns (i.e., high concentrations of iron in samples near the ridge top), it appears that groundwater discharges from the hillside may be contributing to elevated iron concentrations midway down the ridge and toward the top of the ridge. It is not clear that iron is a site related contaminant.

Lead - The high lead concentration in surface water was 281 µg/L in sample 16SW0401; the high concentration in sediment was 15,200 mg/kg at location 16SW/SD06 (See Figure 5-27). The high surface water concentration exceeds the human health (15 µg/L) and ecological (1.17 µg/L) SVs for surface

water. The sediment concentrations exceed the human health (400 mg/kg) and ecological (35.8 mg/kg) sediment SVs (See Figure 5-11). Additionally, they exceed the mainstream and gully upgradient sediment concentrations, and they exceed typical surface soil background concentrations and UTLs (Tables 3-1 and 3-2). An UTL represents the concentration below which 95 percent of the concentrations values fall 95 percent of the time. An exceedance of a UTL is supposed to occur in less than five percent of the data with the chance for exceedance becoming less as the exceeding concentration increases. As expected, based on site history, the highest sediment and surface water lead concentrations are associated with the southern portion of the site near the former incinerator. Downgradient of this area, concentrations decrease, although the most downgradient sediment concentrations are not less than SVs nor are they less than the upgradient concentrations or typical surface soil concentrations. Lead contamination in sediments is unbounded in the downgradient direction relative to SVs, upgradient concentrations, and typical surface soil concentrations.

Nickel - Nickel concentrations do not exceed SVs in surface water, indicating that this metal is not an environmental concern in this medium. There were several exceedances of sediment ecological SVs and one exceedance of the human health SV for sediment. The maximum sediment concentration (804 mg/kg) was observed at location 16SW/SD06, southwest of the former incinerator. All other sediment nickel concentrations were less than 50 mg/kg, though many exceed the 22.1 mg/kg 95/95 UTL for Pennsylvanian surface soils. The most downgradient mainstream channel sediment concentrations were less than or slightly greater than SVs (See Figure 5-28). Therefore, nickel contamination is reasonably well bounded in the downgradient direction.

Vanadium - The concentrations of this metal in surface water and sediment are not distributed in any particular spatial pattern (See Figure 5-29). Few surface water samples had concentrations that were more than 50 percent greater than human health or ecological SVs. The exceptions were 16SW/SD15 (19 µg/L) and 16SW/SD28 (16.3 µg/L). The most downgradient sampling locations had vanadium surface water and sediment concentrations less than the SVs or slightly greater than the ecological SV, therefore elevated surface water vanadium concentrations are reasonably well bounded by lesser concentrations in downgradient directions. In addition, the SWMU 16 downgradient sediment concentrations, though exceeding upgradient locations slightly, appear similar to the upgradient concentrations after accounting for the greater number of site samples than upgradient samples. Therefore, it does not appear that vanadium is a site-related contaminant.

Zinc - The highest zinc concentrations in surface water and sediment are associated with sampling locations near the former incinerator located at the southern end of SWMU 16 (Figure 5-30). Concentrations of zinc generally decrease with distance from that area. There were numerous

exceedances of the surface water ecological SV for surface water but not in the most downgradient mainstream sampling locations. No surface water concentrations exceeded the human health SV. There were few exceedances of the human health sediment SV and the exceedances were less than a factor of two. Numerous sediment samples exceeded the ecological SV, but all of the most downgradient mainstream sediment samples were less than the human health and ecological SVs. This indicates that the zinc contamination is well bounded.

Nitrite/Nitrate - This analyte, measured in surface water but not in sediment, was detected in surface water at several locations and at elevated concentrations over the three sampling rounds (See Tables 3-16 and 3-17). This parameter exceeded the 1,000 µg/L human health SV for nitrate at three locations in one or more sampling rounds. Data for locations that exceeded this value are summarized below:

- Location 16SW/SD01: 3,300 µg/L in Round 1 (north sump)
- Location 16SW/SD07: 1,500 µg/L in Round 1 (west sump)
- Location 13SW/SD14: 3,200 µg/L in Round 2 (gully upgradient)

The second highest nitrite/nitrate concentration (3,200 µg/kg) was observed in an upgradient surface water location (16SW/SD14). Therefore, while this chemical may logically be considered to be a site-related contaminant because of its association in nitrated organic explosives, it is not clear that this classification is accurate.

The highest concentration of ammonia in surface water was observed in the north sump (location 16SW/SD01) in Round 1 (2,800 µg/L). No ammonia analyses were conducted in Rounds 2 and 3, and sediment samples were not analyzed for this parameter. The origin of this elevated concentration is unknown although chemical reduction of nitrate and nitrite to ammonia is a plausible explanation. All other ammonia concentrations were less than the detection limits.

In summary, the surface water and sediment total metals concentrations (i.e., antimony, copper, lead, zinc, and possibly nickel) associated with known site operations are generally found in higher concentrations on the ridge top than in the downgradient samples. Except for copper and lead, the contamination from these metals is well bounded by concentrations less than human health or ecological SVs, or concentrations comparable to upgradient concentrations or surface soil concentrations. The nitrate is presumed to derive from the explosives used at SWMU 16. It may be a breakdown product from the degradation of explosives or it may be a manifestation of the use of nitrate salts. Ammonia concentrations were elevated at one location and may indicate that reduction of nitrates has occurred.

All metals that were analyzed in surface water and sediment, but were not plotted in the figures described in this section, are believed not to fall into one or more categories: non-site-related contaminants (barium, beryllium, cadmium, cobalt, lithium, selenium, silver, thallium) or they are macronutrients (calcium, magnesium, potassium, and sodium) that are of little environmental significance, or they may be site-related contaminants (mercury, strontium, tin) but are represented by the discussions presented above.

The majority of the following metal concentrations, when detected in surface water, are consistently associated with the total metals analytical results but less so with dissolved metals (See Table G-5): aluminum, arsenic, beryllium, chromium, iron, lead, nickel, titanium, and vanadium. This indicates that filtration through a filter with 0.45 um pore size will generally remove most of the metal from the water because it is associated primarily with suspended matter in the water. The suspended matter may be colloidal or particles of larger size. Colloids are generally considered to range in size from 0.001 microns to 1 micron in size. These data are interpreted to mean that entrained soils or sediments are responsible for 50 percent or more of the reported total metals concentrations in surface water for these metals. Some other metals (i.e., mercury, selenium, silver, and thallium) may also fall into this category but there were not enough detections of those metals to obtain a clear picture of their distributions between dissolved and suspended phases.

5.4 GROUNDWATER CONTAMINATION

Table G-4 of Appendix G is a presentation of all groundwater data that were collected during RFI Rounds 1 through 3. Groundwater samples were not analyzed for dioxins or PCBs because these compounds were not expected to be significant for SWMU 16 and because they generally adsorb strongly to solid substrates such as soil and sediment rather than being dissolved in groundwater. Comparisons of the chemical concentrations to SVs and selection of COPCs for risk assessment are made in Sections 7.0 and 8.0.

Tables 3-20 through 3-33 present summary statistics for groundwater samples. Tables 3-20 through 3-27 are for Puz and Pmz groundwater samples, which represent shallow groundwater on the ridge of SWMU 16 and in water under the ridge but intermediate between shallow and deep well depths. Tables 3-28 through 3-30 are for Plz and Valley well samples, which represent deep groundwater underneath SWMU 16 and in the valley between ridges. Valley wells also represent groundwater in the vicinity where it may discharge to surface channels. More on this is presented in Section 6.0. Tables 3-31 through 3-33 present data for all parameters that were detected at least once in groundwater.

5.4.1 Pennsylvanian Upper Zone and Middle Zone Wells

Figures 5-31 through 5-40 depict representative organic and inorganic chemical concentrations in groundwater Puz and Pmz wells.

Figure 5-31 is a tag map of the concentrations of explosives RDX and its degradation products. This figure shows data from each round of sampling. The Rounds are indicated by “R-1”, “R-2”, and R-3” for Rounds 1, 2, and 3, respectively. RDX degradation products were only measured in Round 2, hence dashes (“---“) appear for the rounds where no data are available.

The following chemical concentrations were not plotted for reasons indicated in parentheses: dioxins (not analyzed), SVOCs (just one detection at about three times SV), PCBs (not analyzed). Table 2-3 indicates that herbicides were analyzed in groundwater but herbicides were not actually analyzed. An herbicide analytical method was used for SVOCs analysis to obtain lower-than-normal detection limits for the SVOCs. The only SVOCs detected in groundwater at a concentration greater than the SV was pyridine (9 µg/L in sample 16MWT0601). A small number of PAHs were also detected but at concentrations less than SVs. Therefore, SVOCs are not significant groundwater contaminants for SWMU 16 and are not discussed further.

RDX was the most widely detected explosive compound in groundwater (Figure 5-31), therefore it is necessary to plot only RDX concentrations to demonstrate the extent of explosives contamination at SWMU 16. RDX detections were limited to the upper and middle zone wells. The upgradient well, WES-14-02-83, had no detectable concentrations of explosives, including RDX. The maximum detected RDX concentration was 200 µg/L in Round 2 at well 16MWT04, located in the eastern portion of the SWMU. This same well had RDX concentrations of 77 and 70 µg/L in Rounds 1 and 3, respectively. Other upper and middle zone wells with RDX concentrations greater than 6.1 µg/L (10 times the human health SV) were:

- Well WES-14-03-83 (50 to 71 µg/L over 3 rounds), southeast of the former incinerator and Building 146.

- Well 16MWT09 (79 to 110 µg/L over the 2 most recent rounds), east and downgradient of Building 146 and well 16MWT04.

- Well 16MWT06 (1.8 to 8.8 µg/L over 3 rounds), northeast of Building 146.

- Well 16MWT13 (1.1 to 6.7 µg/L over the 2 most recent rounds), west and downgradient of Building 146, near the west sump.

- Well 16MWT10 (55 µg/L in Rounds 2 and 3), southeast and downgradient of Building 146 and well 16MWT04.

Ten (10) times the SV is a useful tool for describing the groundwater contamination because it ignores the less egregious concentrations that are closest to the SV. The RDX concentrations are greatest on the top of the ridge near well 16MWT04, within the SWMU 16 operational area. From there, the concentrations decrease in downgradient directions away from the ridge top and down the hillsides. Figure 4-7 of Section 4.0 shows the potentiometric groundwater surface for Puz and Pmz wells. RDX contamination, however, is not completely bounded laterally by wells that have RDX concentrations less than the 0.61 µg/L human health SV. For example, wells 16MWT09 and 16MWT17 had 110 µg/L and 5.2 µg/L RDX, respectively, in Round 3. The extent and magnitude of RDX contamination is greater for the eastern side of the SMWU than for the western side. RDX degradation products were consistently detected where RDX concentrations exceeded 50 µg/L. This demonstrates that some RDX degradation is occurring. Degradation of organic compounds is discussed in more detail in Section 6.0.

The groundwater contaminant movement is physically bounded to the east and west of SWMU 16 by the valley streams. Therefore, although RDX contamination moves from the ridge top in groundwater toward the streams, it cannot migrate beyond the streams from the direction of SWMU 16. More detail on the fate and transport of SWMU 16 contaminants is provided in Section 6.0.

Figures 5-32 and 5-33 are tag maps for VOCs (e.g., select chlorinated alkanes and alkenes) in SWMU 16 groundwater. Two different, related series of compounds are plotted: 1,1,2,2-tetrachloroethane (1,1,2,2-PCA) and its degradation products (e.g., select chlorinated alkanes) in Figure 5-32, and tetrachloroethene (PCE) and its degradation products (e.g., select chlorinated alkenes) in Figure 5-33.

Groundwater in several Puz and Pmz wells contained detectable concentrations of VOCs that were greater than the SVs for human health; there are no ecological SVs for groundwater. The alkanes and 1,1,-dichloroethene (Figure 5-32) had less severe SV exceedances than the alkenes (Figure 5-33). TCE, in particular, exhibited the highest concentrations of all VOCs and exceeded the SV in most wells in most sampling rounds. The TCE and other VOC concentrations are highest on the ridge top near the northern end of Building 146 and they decrease in the downgradient directions toward the valleys below. The highest VOC concentration (330,000 µg/L TCE in Round 3) is located in well 16MWT06 near the eastern

sump and near the high soil concentrations described in Section 5.2.3, however, there are slight differences in the soil and groundwater patterns. The highest soil concentrations appear to originate under Building 146, decrease most dramatically toward the east and decrease less dramatically toward the west. The highest groundwater TCE concentration is located east of the northern end of Building 146 and decrease toward the east and west. Very high concentrations of TCE (28,000 µg/L in Round 2 and 62,000 µg/L in Round 3) were also detected in well 16MWT13 located near the west sump. A small amount of TCE (6.2 µg/L), by comparison, was detected in nearby well 16MWT02. Based on the soil and groundwater patterns, it appears that soil contamination under Building 146 has leached to groundwater and has spread in two directions: toward the east and west in downgradient directions. Recall that RDX contamination is worst toward the east. Some VOC contamination appears to have migrated as far as the southern end of the SWMU, but the VOC concentrations there are much less than those at the northern end of the site. It is also possible that a minor VOC source exists closer to the southern wells and is the source of contamination in those wells. VOCs are not bounded laterally in all directions by wells with concentrations less than detection limits or SVs. However, the valleys form a physical barrier to groundwater migration laterally from SWMU 16 and those wells are described in the next section.

The high TCE concentrations (more than 1 percent of the 1,100,000 µg/L TCE solubility in water at 25°C) is indicative of the presence of a dense non-aqueous phase liquid (DNAPL) in contact with the groundwater. The well screen for well 16MWT06 is a short distance (approximately 5 feet) below and 10 feet to the south of the eastern sump and this well had TCE concentrations exceeding 300,000 µg/L. A similar but less pronounced situation exists for well 16MWT13 (approximately 50,000 µg/L TCE) located adjacent to the western sump, and to yet a lesser degree in well 16MWT17 (approximately 15,000 µg/L TCE) adjacent to the northern sump. The likely source of the high TCE concentrations in each case was the sump or associated piping near the well.

VOCs that were not plotted but are of potential significance include benzene, carbon tetrachloride, trans-1,2-dichloroethene, and chloroform. These chemicals are not as pervasive as the other VOCs or they were not detected at concentrations as high as those of the more important chlorinated VOCs, however, they do appear to be related to SWMU 16 and they contribute to the body of knowledge that indicates VOCs were used at SWMU 16 and are not bounded in lateral directions. Chlorinated VOC degradation products ethane, ethene, and methane were also detected in several wells. The organic chemical k degradation products are discussed in more detail in Section 6.0.

Groundwater metals data are plotted for Puz and Pmz wells in Figures 5-34 through 5-40 for the most significant metals in terms of potential site-related contaminants. An exceedance of the groundwater human health SV in one or more sampling rounds is represented by a filled black dot at the affected

sampling location. An open dot indicates that no exceedance occurred in any round. Ecological SVs do not apply to groundwater. Dashes are used to indicate where data are not available for a particular round; the rounds are Round 1, Round 2, and Round 3, reading from left to right. Each metal is discussed individually in the following text.

Aluminum – Figure 5-34 shows that there were numerous SV exceedances for aluminum in Puz and Pmz groundwater wells. The majority of these exeedances, which are indicated by filled black dots at the well locations, are situated in the northern portion of the site. The exceedances, however, are within two times the SV, therefore the exceedances do not appear to be very significant and aluminum is not discussed further for Puz and Pmz wells.

Arsenic - Figure 5-35 shows that groundwater arsenic concentrations exceed the 0.045 µg/L SV in many groundwater samples. The arsenic SV is so low that the analytical detection limit exceeds the SV and every detection of arsenic exceeds the SV. Wells with undetectable levels of arsenic are not identified as exceedances on Figure 5-35. The highest arsenic groundwater concentrations in Puz and Pmz wells were 16MWT01 and 16MWT16. These wells are well separated and the arsenic concentrations in groundwater reveal no pattern that would link them to site-related contamination, therefore arsenic is not discussed further for these wells.

Chromium - Figure 5-36 displays chromium concentrations in groundwater. The concentration was highest in well 16MWT15 (73.6 µg/L) in Round 2, but much closer to chromium concentrations in other wells in Round 3 (12.4 µg/L) and the 11 µg//L human health SV. In general, chromium contamination does not appear to be significant in groundwater and it is not clear that this metal is a site-related contaminant. Because it does not appear to be a site-related contaminant in any other medium (See discussions above), it is not believed to be a site-related contaminant for groundwater.

Iron - Figure 5-37 shows that iron concentrations are high in a few wells with many concentrations exceeding the 1,100 µg/L SV. The highest observed iron concentrations were consistently measured in well WES-14-01-83 and 16MWT16. Well WES-14-01-83 is southwest of the former incinerator and Building 146 whereas the other two wells are located east of Building 146. The available information does not allow for identifying the cause of the elevated iron concentrations. In particular, high iron concentrations do not appear to correlate to proximity from either the building or the former incinerator. The measured concentrations exceed the 1,100 µg/L SV across the SWMU in Puz and Pmz wells. In summary, it is not clear that iron is a site-related contaminant.

Lead - The highest concentration of lead was measured in well 16MWT16, which consistently exhibited elevated metal concentrations, including metals that are not plotted spatially for this report such as cobalt and copper. The concentrations for lead are plotted in Figure 5-38.

Nickel - Groundwater concentrations of this metal are shown in Figure 5-39. This metal does not often appear as a contaminant but many of the Puz and Pmz wells had exceedances of the 73 µg/L nickel human health SV. The highest nickel concentrations were observed in wells 16MWT05 (284 and 301 µg/L), 16MWT10 (219 µg/L), 16MWT12 (319 µg/L), 16MWT13 (212 µg/L), and 16MWT16 (714 and 808 µg/L). Once again, well 13MWT16 shows up as a consistently contaminated well and is located immediately east of Building 146. It is not clear, however, that the elevated nickel concentrations are linked to Building 146 or other site operations because the spatial patterns appear to be random. The elevated nickel concentrations are not bounded laterally.

Vanadium - Figure 5-40 displays groundwater vanadium concentrations in Puz and Pmz wells. Well 16MWT16 again emerges as a well with the highest metal concentration (64.8 µg/L in Round 2 and 14.8 µg/L in Round 3), in this case, vanadium. All other Puz and Pmz well vanadium concentrations are considerably less than 15 µg/L and the 3.6 µg/L SV except for a detection of 4.1 µg/L vanadium in well 16MWT13 (sample 16MWT1301).

When detected, the majority of the following metal concentrations in groundwater are consistently associated with the total metals but not with dissolved metals (See Table G-4): aluminum, arsenic, beryllium, chromium, copper, iron, lead, tin, titanium, and vanadium. This indicates that filtration through a filter with 0.45 um pore size will generally remove most of the metal from the groundwater because it is associated with suspended matter in the water. The suspended matter may be colloidal or particles of larger size. Colloids are generally considered to range in size from 0.001 micron to 1 micron in size.

The highest observed ammonia concentrations (not plotted) were in Puz and Pmz wells WES-14-01-83 (410 µg/L ammonia), 16MWT02 (530 µg/L ammonia), 16MWT03 (330 µg/L ammonia), 16MWT05 (320 µg/L ammonia), and 16MWT06 (570 µg/L ammonia). The highest observed nitrate/nitrite concentrations (not plotted) were observed in wells 16MWT03 (540 and 700 µg/L nitrate/nitrite), 16MWT04 (600 and 490 µg/L nitrate/nitrite), 16MWT10 (270 µg/L nitrate/nitrite), and 16MWT13 (190 µg/L nitrate/nitrite). All other detected concentrations of these chemicals were less than 100 µg/L. The highest observed concentrations of these chemicals were on the ridge top and decrease to lower levels in directions away from the ridge top. It is not clear that these chemicals are site-related, but if they are, they appear to represent organic nitrate explosives that are far along in the degradation process. More

on the degradation of chemicals is provided in Section 6.0. None of the observed nitrate/nitrite concentrations exceeded the SV; there is no ammonia SV for groundwater.

5.4.2 Pennsylvanian Lower Zone and Valley wells

There were no explosives detected in Plz or Valley wells, indicating that vertical bounding of explosives contamination in groundwater is complete.

Although high concentrations of VOCs were detected in some Puz and Pmz wells (See Section 5.4.1), little VOC contamination was detected in Plz or Valley wells. Chloroform and methylene chloride were the only chlorinated VOCs to be detected in these wells; all other detections were for acetone, benzene, ethylbenzene, propionitrile, toluene, and total xylenes. Acetone and methylene chloride are common laboratory contaminants and may not be related to SWMU 16; benzene, ethylbenzene and xylenes are commonly associated with gasoline and may reflect a gasoline spill unrelated to SWMU 16. In addition, none of these detected concentrations exceeded groundwater SVs except the chloroform and benzene. The chloroform exceeded the groundwater SV (0.17 µg/L) in wells 16MWT08 (15 µg/L), 16MWT11 (16 µg/L), 16MWT15 (0.8 µg/L), and 16MWT18 (1 µg/L), but it did not exceed the chloroform maximum contaminant level for total trihalomethanes in drinking water (80 µg/L) in any of these wells. There were several detections of benzene in wells 16MWT06 (0.9 to 3.5 µg/L), 16MWT13 (1.1 µg/L), 16MWT15 (0.7 µg/L), and 16MWT17 (1.1 µg/L) but this chemical was not detected in any other media that were sampled. Therefore, this chemical does not appear to be site related. While the chloroform contamination that may be related to site operations was detected in Plz wells, it does not appear to be a serious concern. Neither of the valley wells (16MWT19 and 16MWT20) were contaminated with VOCs. This is significant because the valley wells represent groundwater concentrations near the bounding eastern valley stream. If the groundwater concentrations are low, any groundwater discharges to the stream will be low. This topic is discussed further in Section 6.0. No Plz or Valley well data are plotted for this report.

The matrix below indicates the maximum concentrations of total metals that exceeded their respective human health groundwater SV, and in which wells the concentrations exceed those values in Plz or Valley wells. Cells containing “NE” indicate that the metal did not exceed its SV in that well.

Parameter	Screening Value, µg/L	Location						
		16MWT08	16MWT11	16MWT15	16MWT18	16MWT19	16MWT20	16MWT21
Aluminum	3,600	296,000	77,200	NE	10,700	NE	NE	NE
Antimony	1.5	NE	6.3	NE	2.1	NE	NE	NE
Arsenic	0.045	29.2	11.8	NE	2.2	NE	NE	1.9

Parameter	Screening Value, µg/L	Location						
		16MWT08	16MWT11	16MWT15	16MWT18	16MWT19	16MWT20	16MWT21
Barium	260	1700	1250	262	444	NE	NE	NE
Beryllium	4	15.1	4.8	NE	NE	NE	NE	NE
Chromium	11	452	84.9	NE	14.8	NE	NE	24.5
Cobalt	73	95.7	NE	NE	NE	NE	NE	NE
Iron	1,100	241,000	46,200	1,110	3,520	NE	NE	NE
Lead	15	127	34.2	NE	NE	NE	NE	NE
Manganese	88	3800	991	NE	93.7	502	228	5.7
Nickel	73	338	84.7	NE	NE	84.1	NE	NE
Vanadium	3.6	410	80.9	4.4	NE	NE	NE	5.9

Wells 16MWT15, 16MWT19, 16MWT20, and 16MWT21 had the least number of SV exceedances. Antimony, beryllium, cobalt, and lead generally exhibited few exceedances, whereas aluminum, arsenic, barium, chromium, iron, manganese, nickel, and vanadium had four or more exceedances. The most dramatic exceedances were for aluminum (296,000 and 77,200 µg/L in 16MWT08 and 16MWT11, respectively), arsenic (29.2 and 11.8 µg/L in 16MWT08 and 16MWT11), iron (241,000 and 46,200 µg/L in 16MWT08 and 16MWT11), manganese (3,800 µg/L in 16MWT08), and vanadium (410 µg/L in 16MWT08 and 80.9 µg/L in 16MWT15). Two wells dominate the Plz and Valley well exceedances: 16MWT08 and 16MWT11. These wells are on the same (east) side of the SWMU and therefore appear to represent similar conditions. However, the area near well 16MWT08 generally exhibited high VOC concentrations in soil whereas the area near 16MWT11 exhibited neither high metal concentrations nor high VOC concentrations in soil. These observations raise questions concerning whether these groundwater metals are related to SWMU operations. Furthermore, if SWMU 16 were the source of the contamination, it does not seem likely that contamination of this magnitude could exist in the Plz wells located underneath the Puz and Pmz wells when the Puz and Pmz wells are not as contaminated. Thus, the elevated metals concentrations appear to be related to natural conditions that are conducive to dissolution of metals from geologic formations, however, there is not enough information available to demonstrate this. More on the fate and transport of metals in the environment is presented in Section 6.0.

Not enough data are available for the lower zone and valley wells to determine whether the detected metals are associated predominantly with suspended or dissolved phases of the surface water, however it does appear that the same metals that are predominantly associated with solids for Plz and Pmz wells are also predominantly associated with solids in Plz and Valley wells.

Concentrations of ammonia and nitrate/nitrite were much less in the Plz and Valley wells than in Puz and Pmz wells. This indicates that the elevated concentrations of these chemicals in groundwater are well bounded vertically and laterally. Wells 16MWT15 and 16MWT18 were the only wells to exhibit detectable levels of these chemicals (50 µg/L nitrate/nitrite in each well in Round 2).

5.4.3 Summary of Upper and Lower Well Contamination

In summary, the primary groundwater contaminants are VOCs and RDX with minor contributions from other explosives and explosives degradation products. The VOCs can be clearly linked to VOC contamination in soils at the northern end of B146. VOC concentrations decrease away from the site, although concentrations of these contaminants are well above human health SVs at the perimeter of the SWMU. Organic chemical contamination is confined almost completely to the shallow zone wells. The sumps and perhaps the associated piping were apparently sources of the high VOC concentrations. The concentration levels are indicative of the presence of a DNAPL in the sumps or surrounding soils, especially near well 16MWT06 adjacent to the eastern sump.

Some metal contamination seems to be present but it is not clear that the metal contamination is associated with SWMU 16 operations. For the plotted metals, if one assumes that there is symmetry in the groundwater flow to the east and west of the SWMU 16 ridge top and, consequently, in the degree of dilution of metals in groundwater as it flows away from the SWMU, metals are bounded in all directions by the time they reach the valley streams located east and south of the SWMU.

The concentrations of several metals were not plotted for groundwater. These metals are: antimony, barium, cadmium, calcium, copper, lithium, magnesium, mercury, potassium, selenium, silver, sodium, strontium, thallium, tin, titanium, and zinc. These metals either exhibited no exceedances of the human health SV for groundwater, the exceedances were slight, or the exceedances were bounded by downgradient wells with concentrations less than the SV. Therefore, a discussion of those metals would add no new knowledge to the extent of groundwater metal contamination at SWMU 16.

Elevated concentrations of nitrate/nitrite and ammonia in groundwater are well bounded vertically and laterally. These chemicals may be indications of explosives degradation. This topic is discussed in more detail in Section 6.0.

FIGURE 5-1
BACKGROUND AND SITE DATA COMPARISONS - ALUMINUM
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

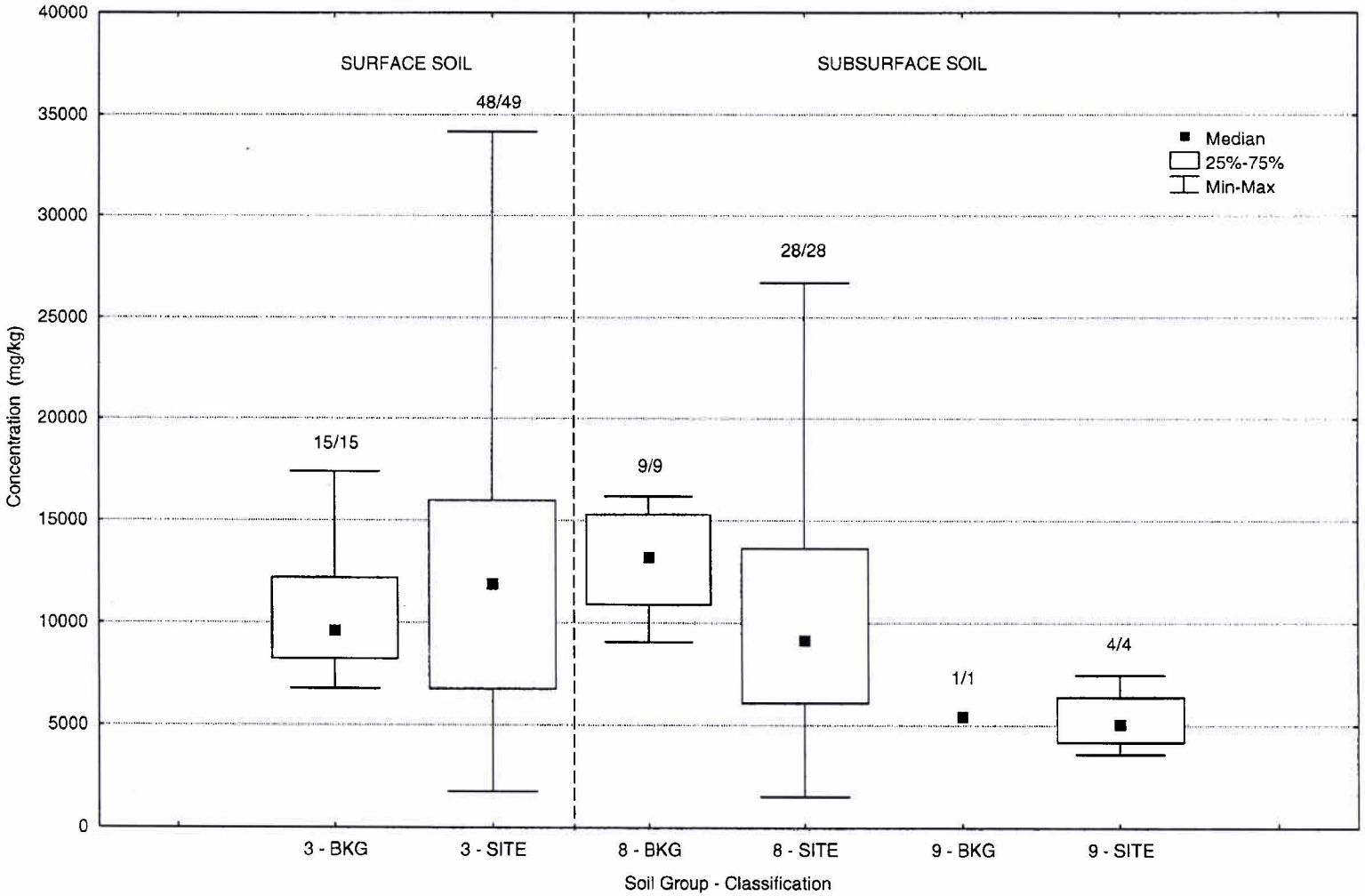


FIGURE 5-2
BACKGROUND AND SITE DATA COMPARISONS - ANTIMONY
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

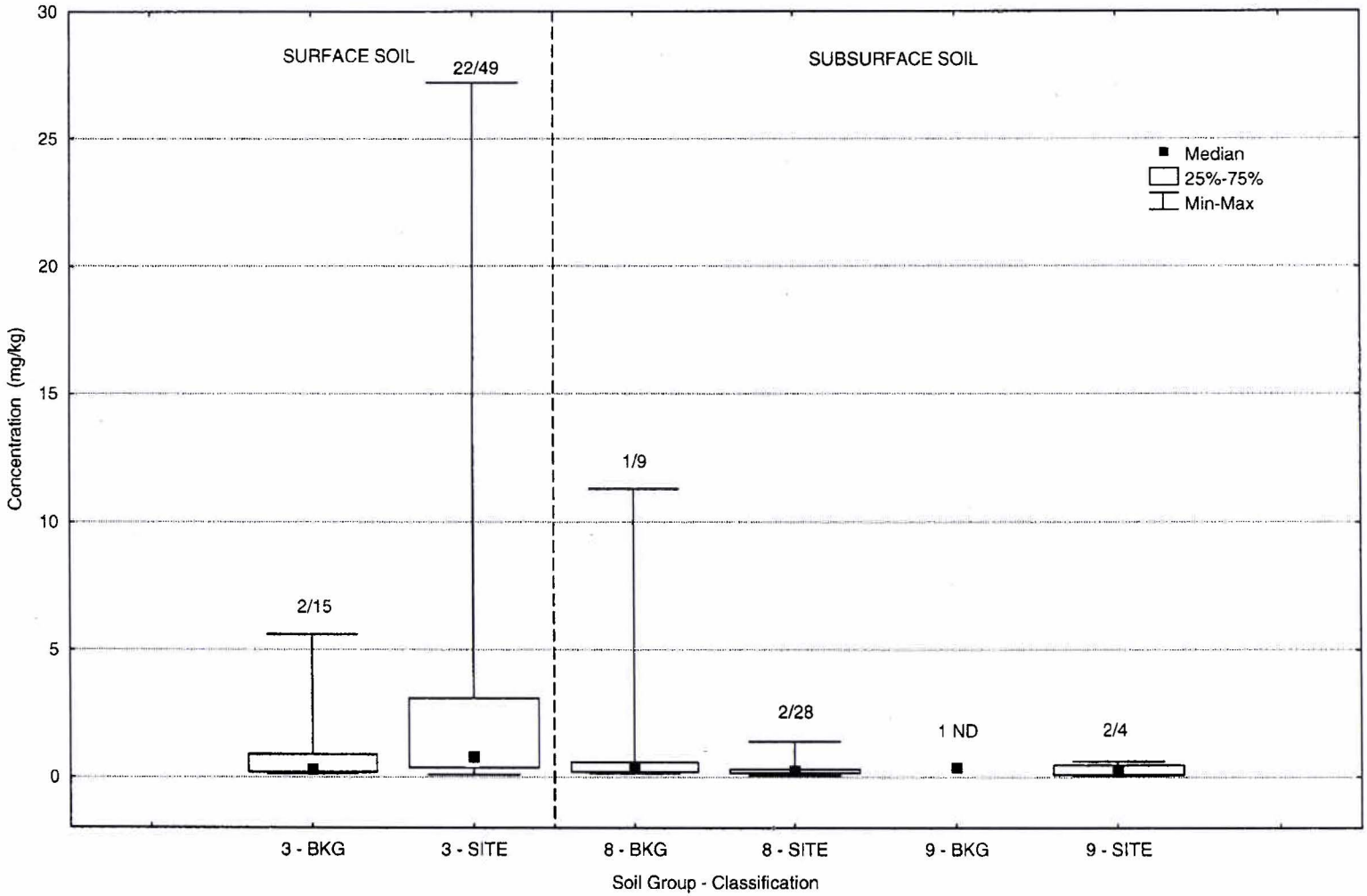


FIGURE 5-3
BACKGROUND AND SITE DATA COMPARISONS - ARSENIC
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

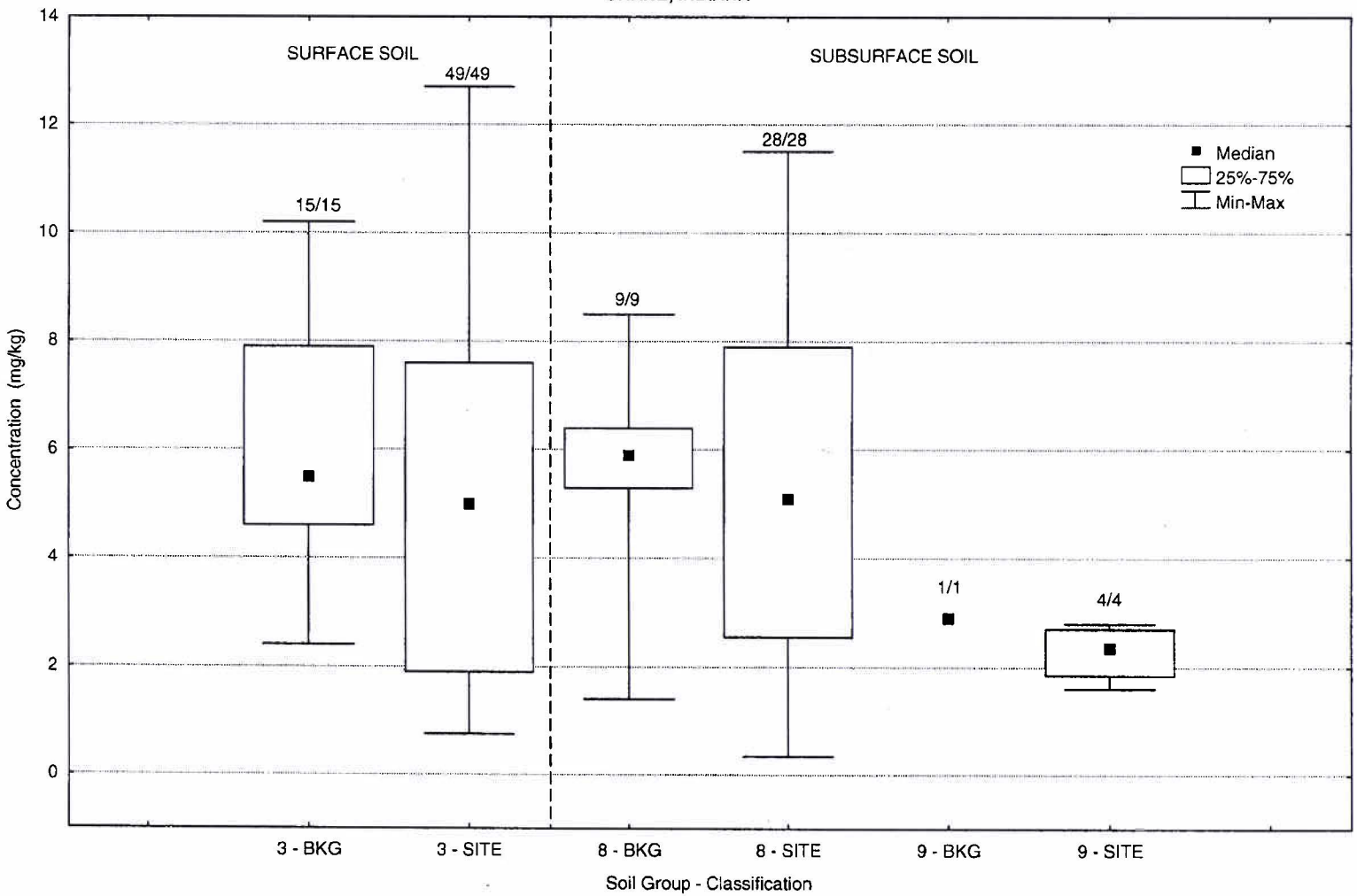


FIGURE 5-4
BACKGROUND AND SITE DATA COMPARISONS - CHROMIUM
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

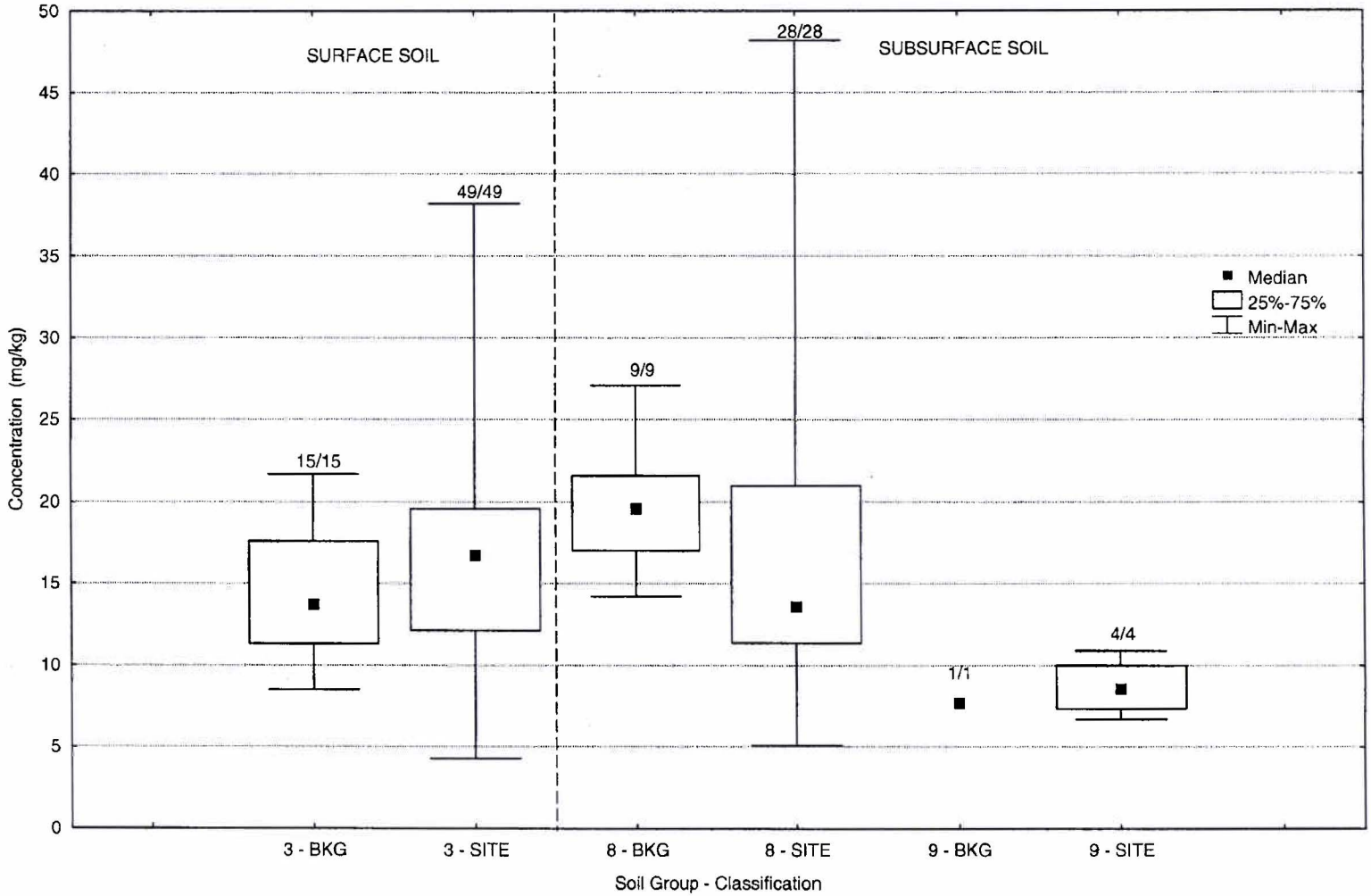


FIGURE 5-5
BACKGROUND AND SITE DATA COMPARISONS - COPPER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

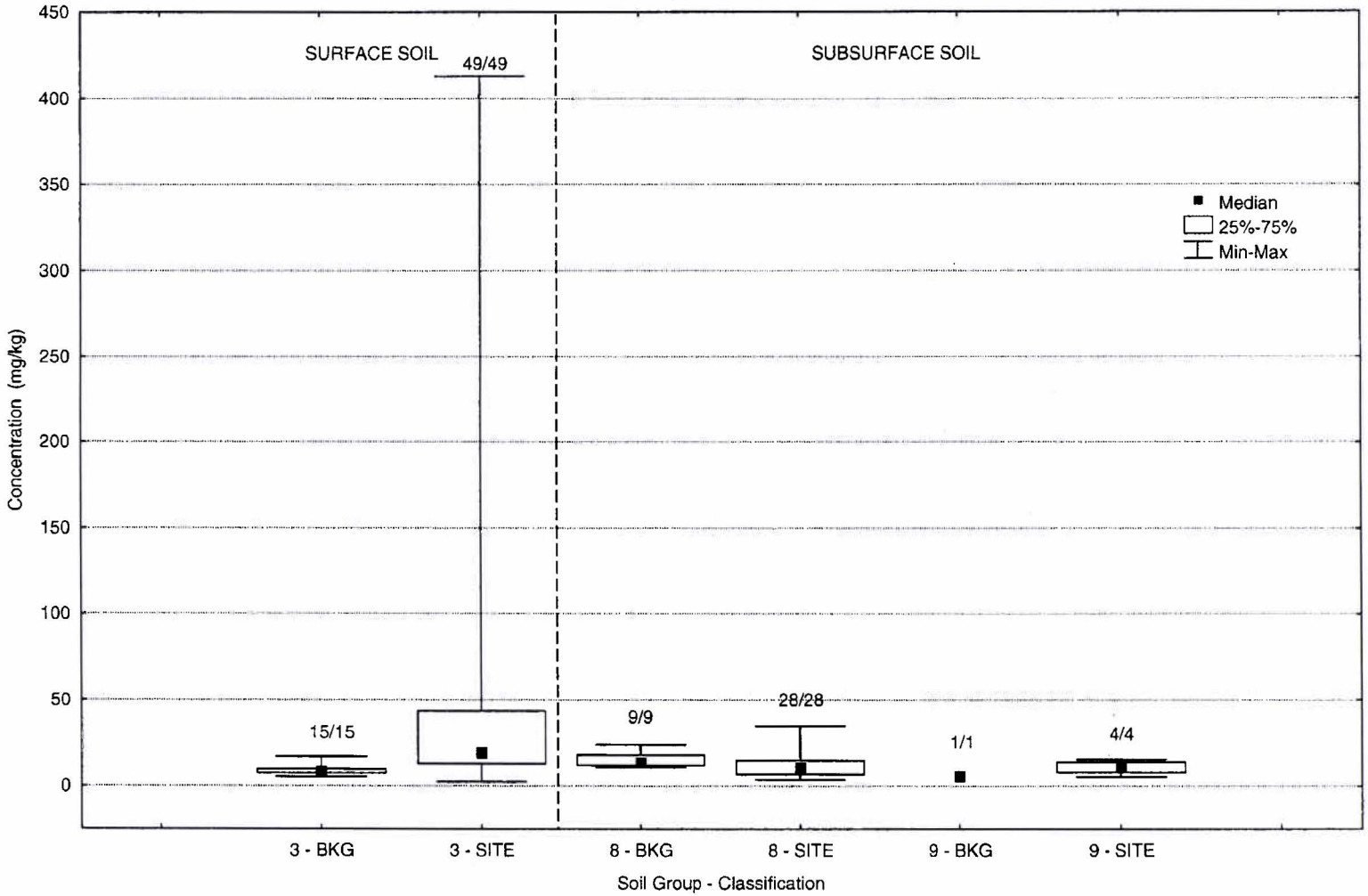


FIGURE 5-6
BACKGROUND AND SITE DATA COMPARISONS - LEAD
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

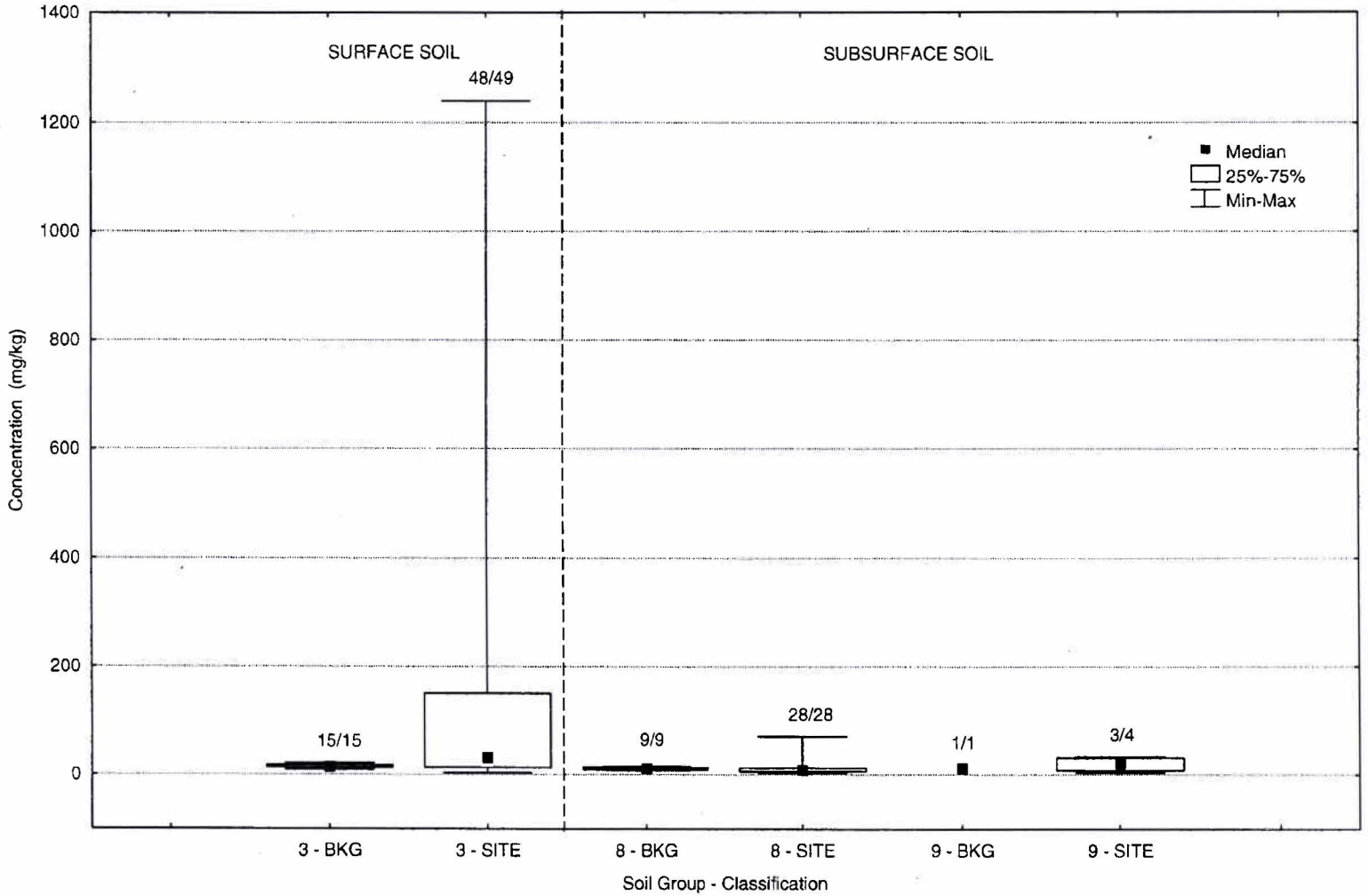


FIGURE 5-7
BACKGROUND AND SITE DATA COMPARISONS - NICKEL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

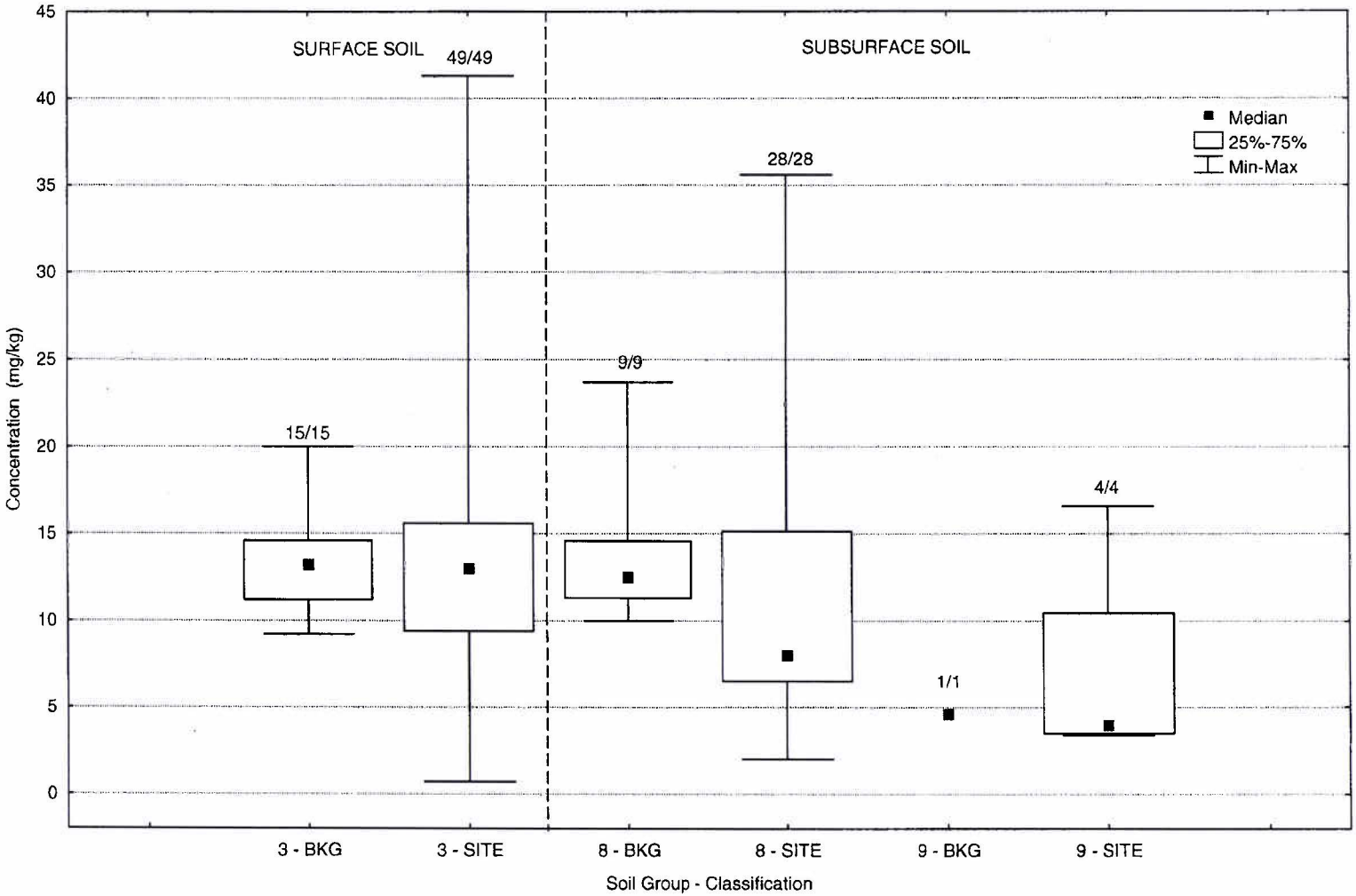


FIGURE 5-8
BACKGROUND AND SITE DATA COMPARISONS - VANADIUM
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

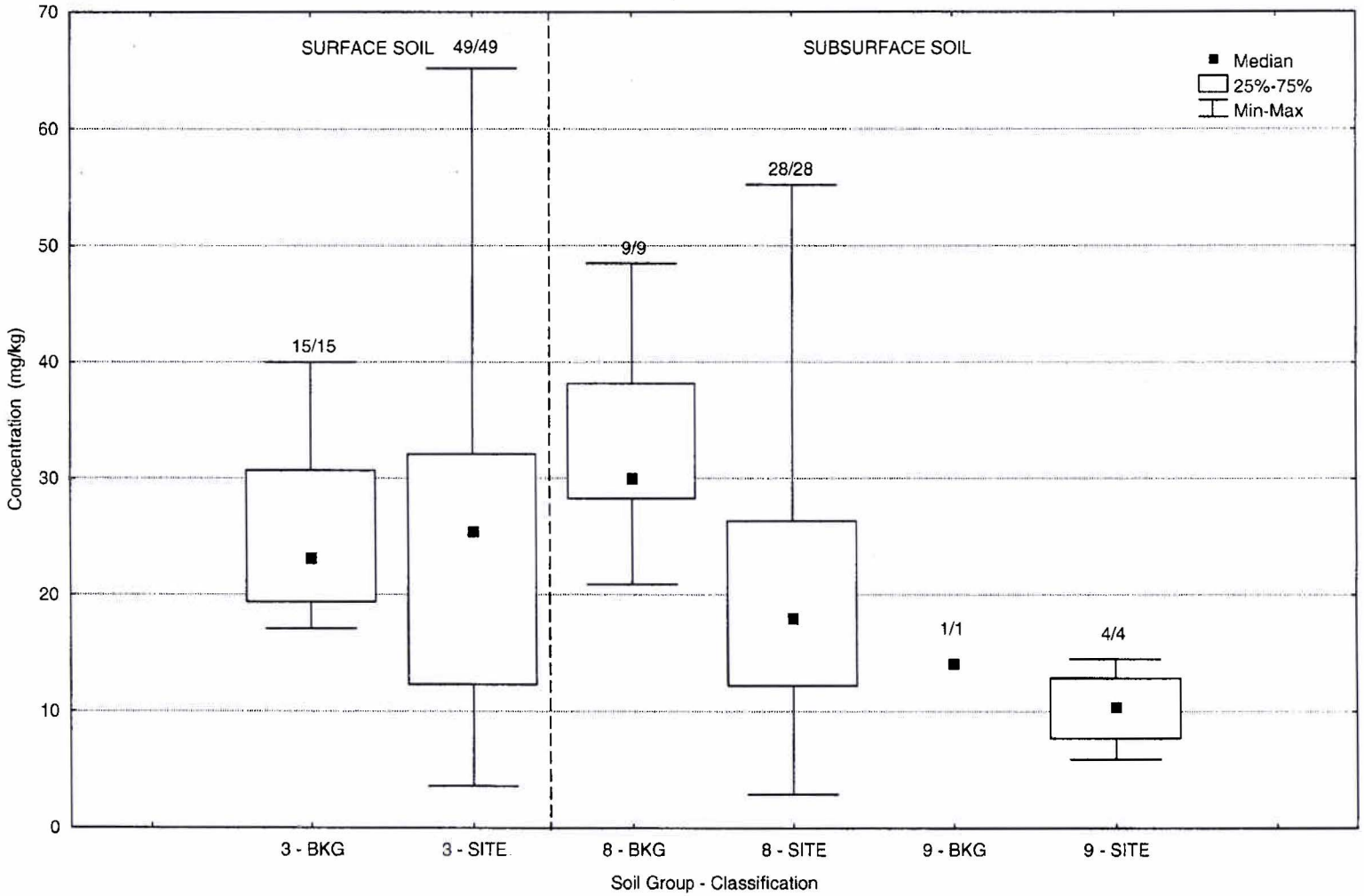
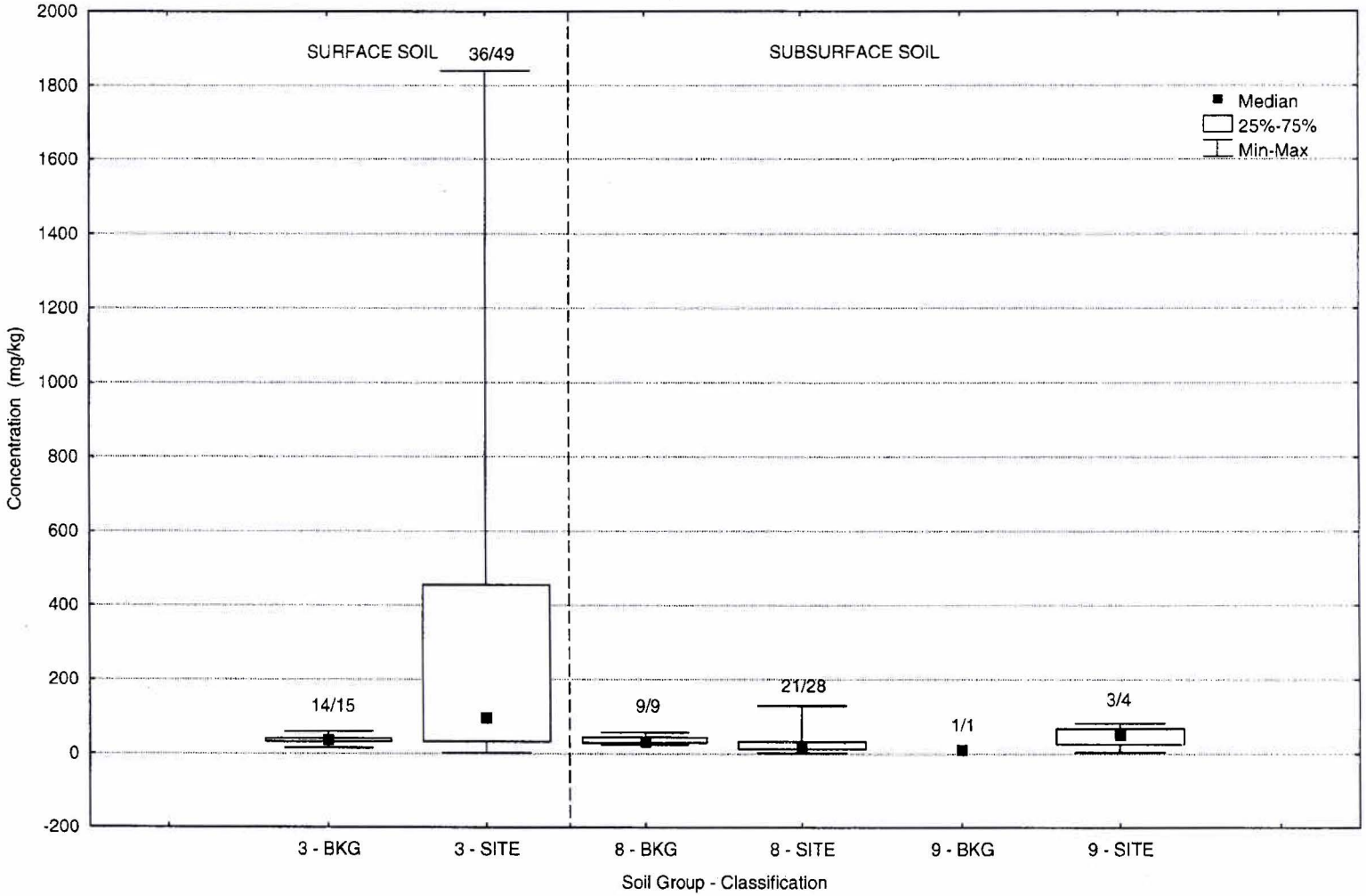


FIGURE 5-9
BACKGROUND AND SITE DATA COMPARISONS - ZINC
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA



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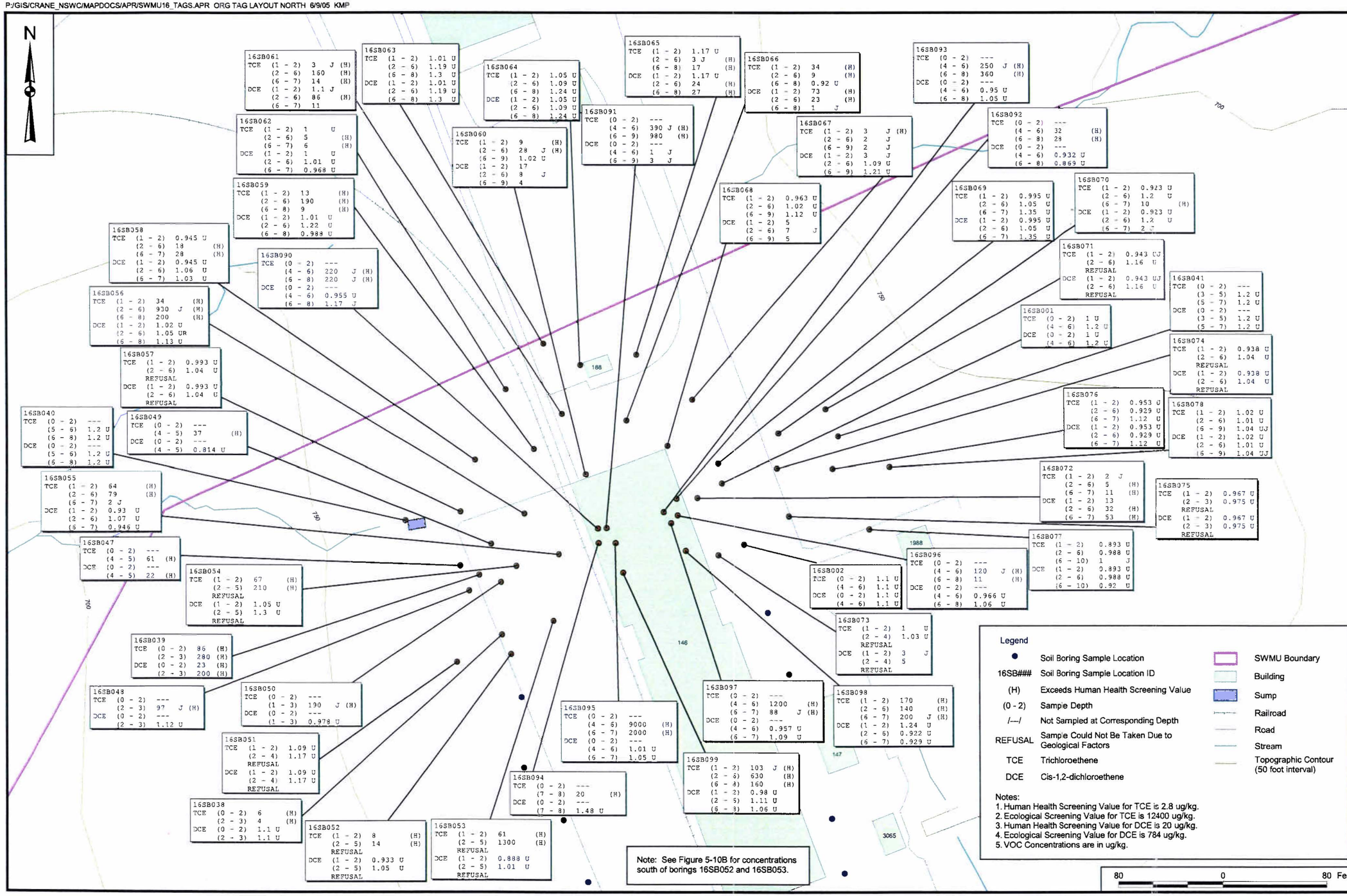


CONTRACT NO. 7448

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 5 - 10A

REV 0

TCE/DCE CONCENTRATIONS IN SOIL (ug/kg), ROUNDS 1 THROUGH 3
SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

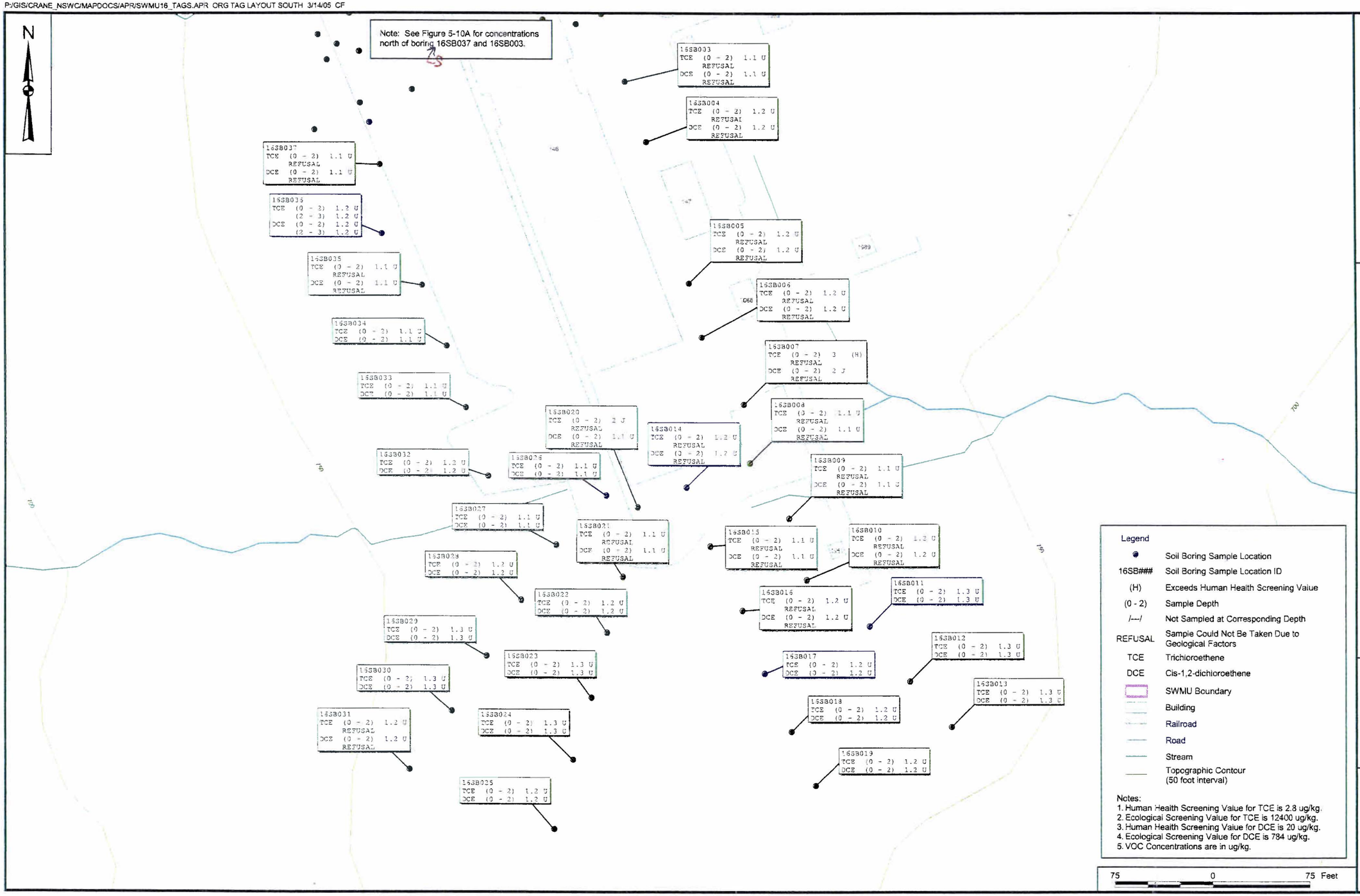
DRAWN BY C. FOSTER DATE 3/14/05

CHECKED BY T. JOHNSTON DATE 3/14/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR ORG TAG LAYOUT SOUTH 3/14/05 CF



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 10B

REV 0

TCE/DCE CONCENTRATIONS IN SOIL (ug/kg), ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

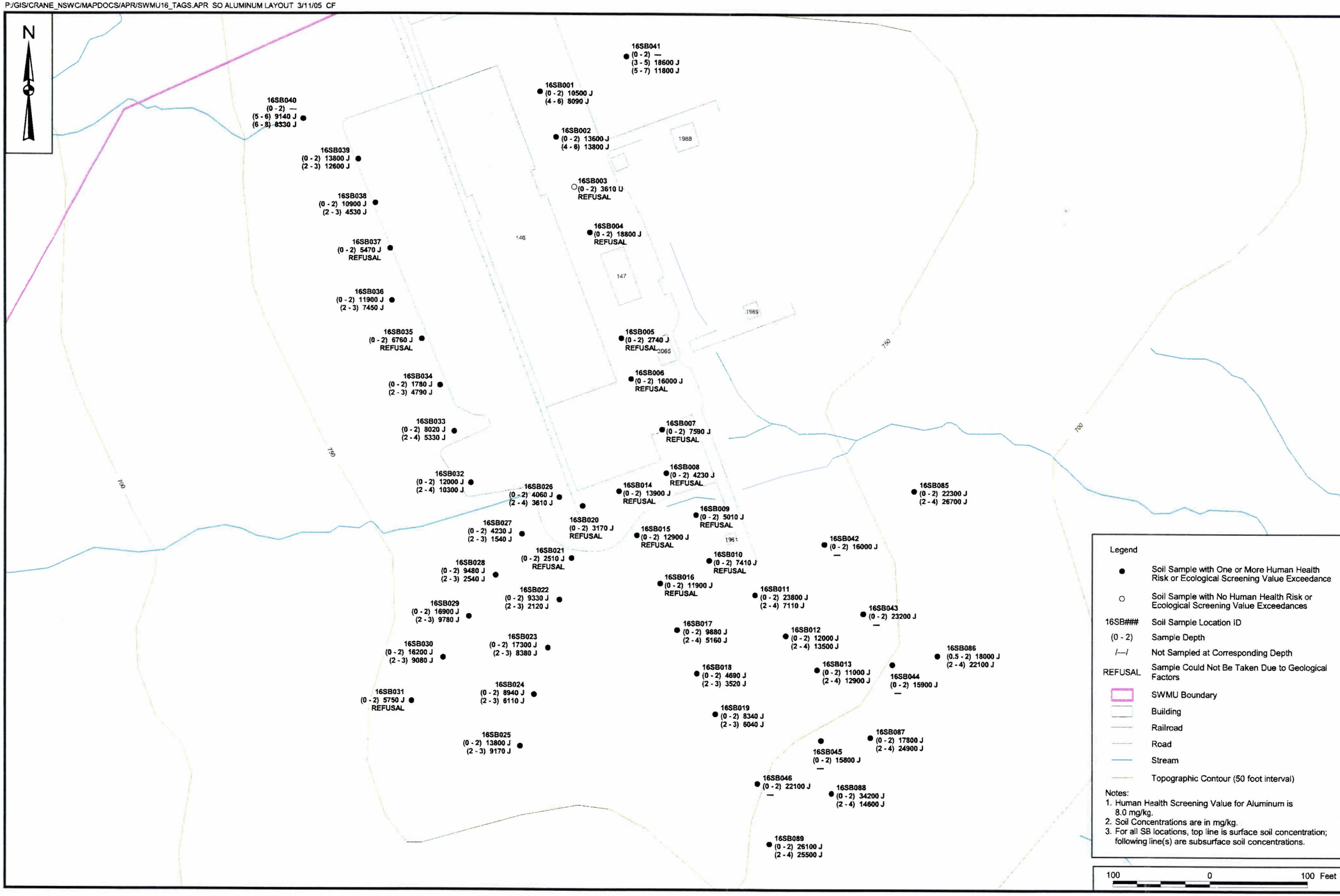
DRAWN BY C. FOSTER DATE 3/14/05

CHECKED BY T. JOHNSTON DATE 3/14/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SO ALUMINUM LAYOUT 3/11/05 CF



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 11

REV 0

ALUMINUM CONCENTRATIONS IN SOIL (mg/kg).
ROUNDS 1 THROUGH 3
SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

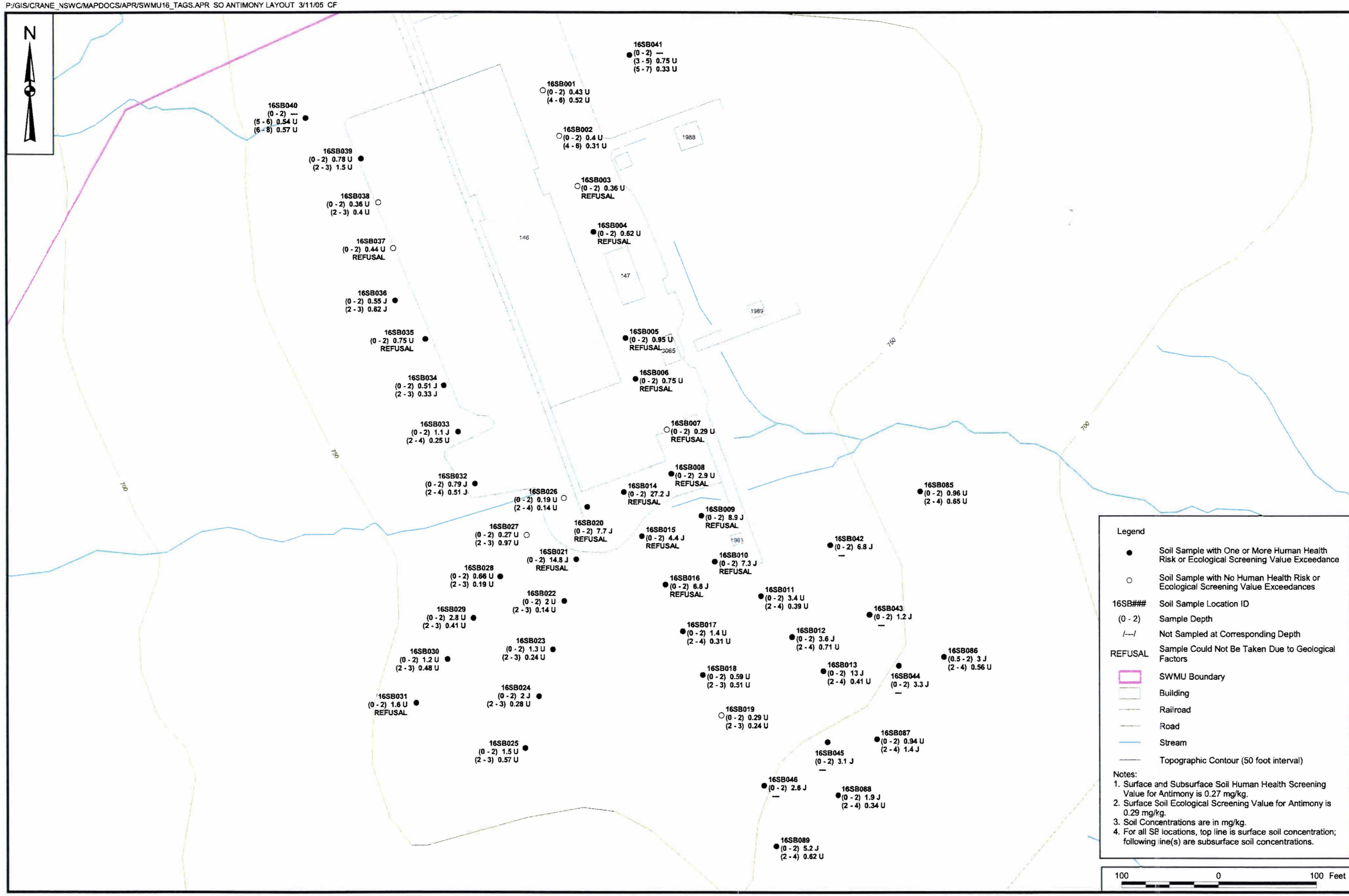
DRAWN BY C. FOSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SO ANTIMONY LAYOUT 3/11/05 CF



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 12

REV 0

ANTIMONY CONCENTRATIONS IN SOIL (mg/kg), ROUNDS 1 THROUGH 3
SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

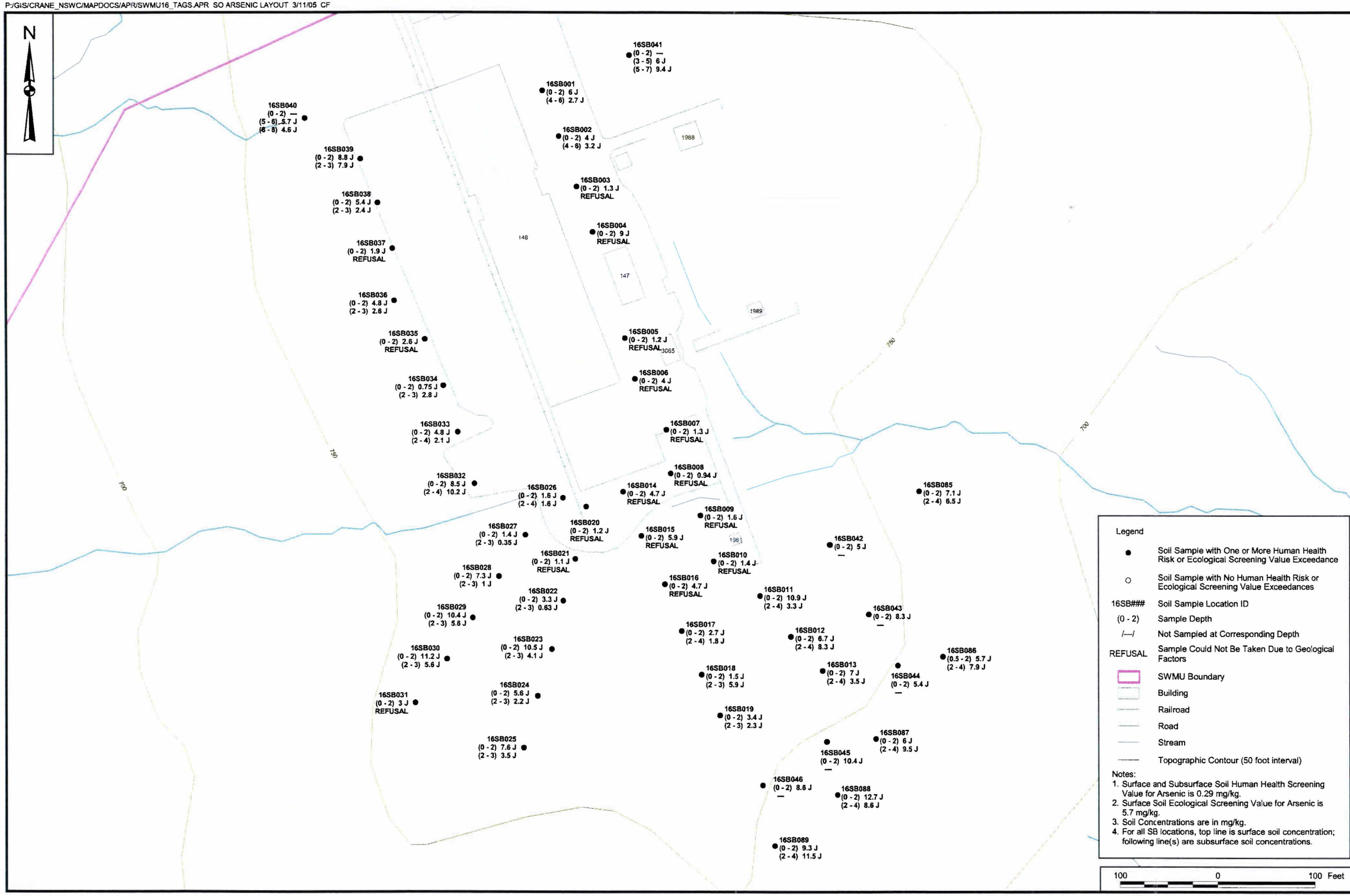
DRAWN BY C. FOSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SO ARSENIC LAYOUT 3/11/05 CF



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 13

REV 0

ARSENIC CONCENTRATIONS IN SOIL (mg/kg), ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

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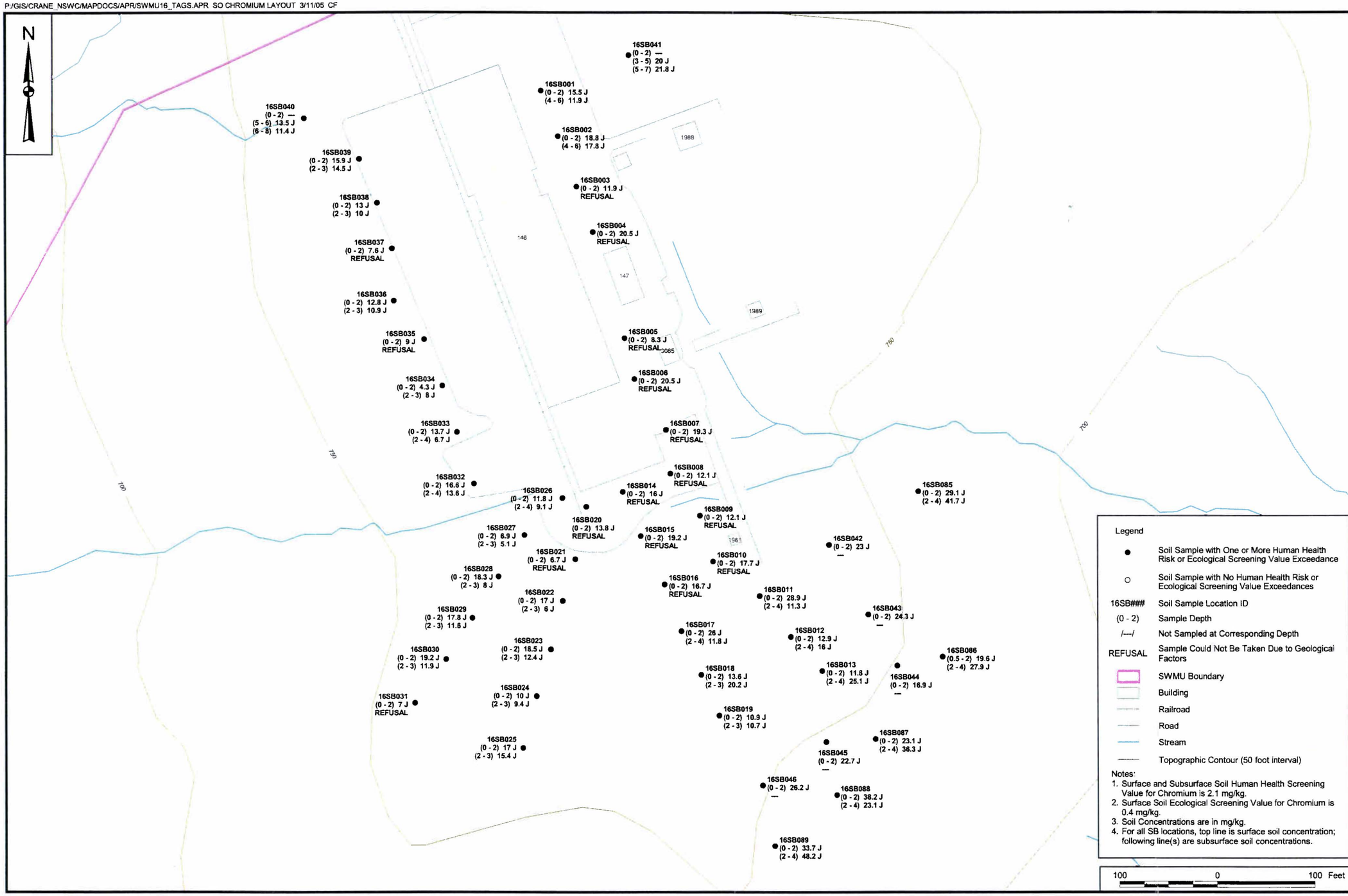


CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 14

REV 0

CHROMIUM CONCENTRATIONS IN SOIL (mg/kg), ROUNDS 1 THROUGH 3
SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

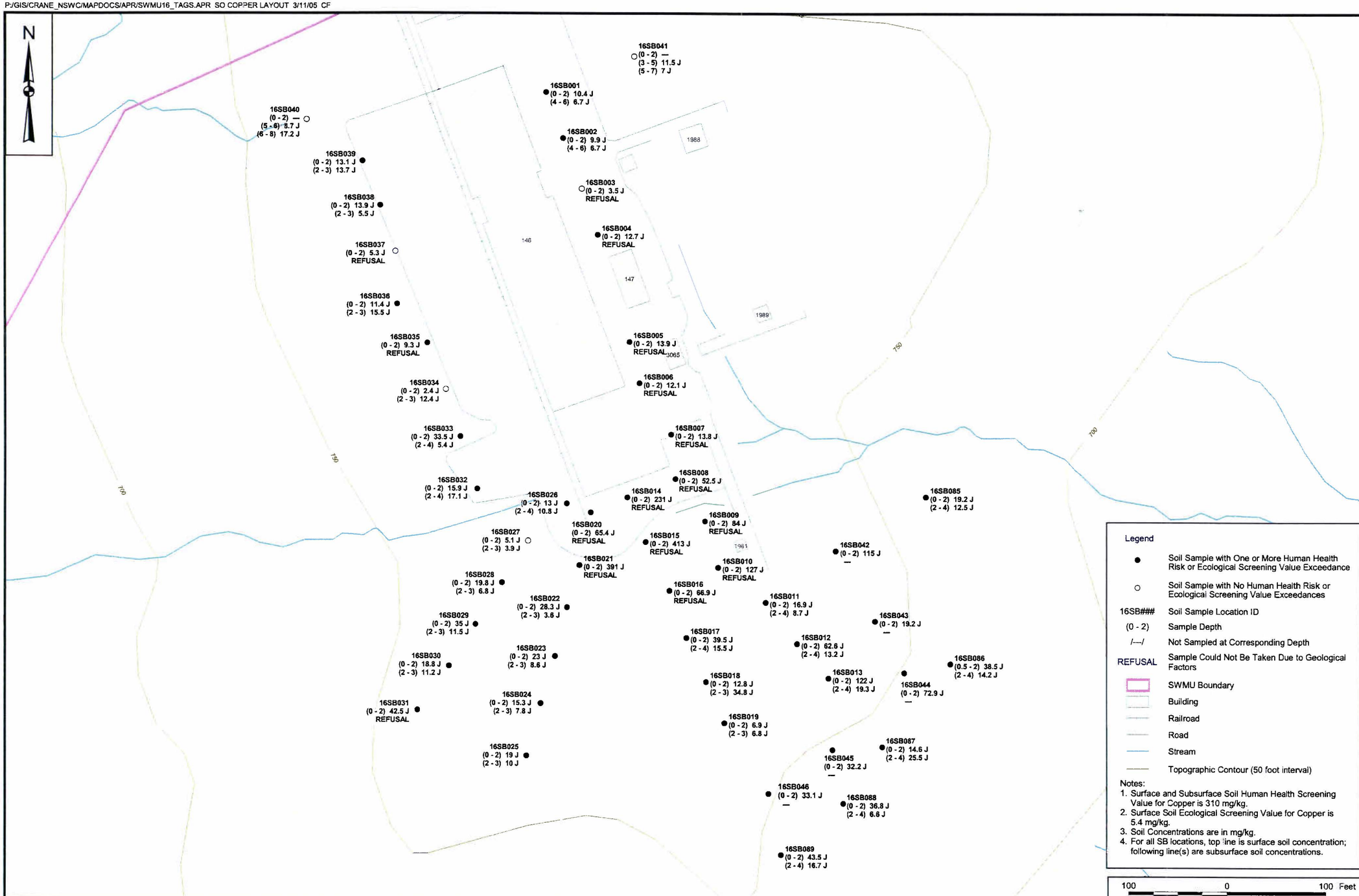
DRAWN BY C. FOSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SO COPPER LAYOUT 3/11/05 CF



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 15

REV 0

COPPER CONCENTRATIONS IN SOIL (mg/kg), ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

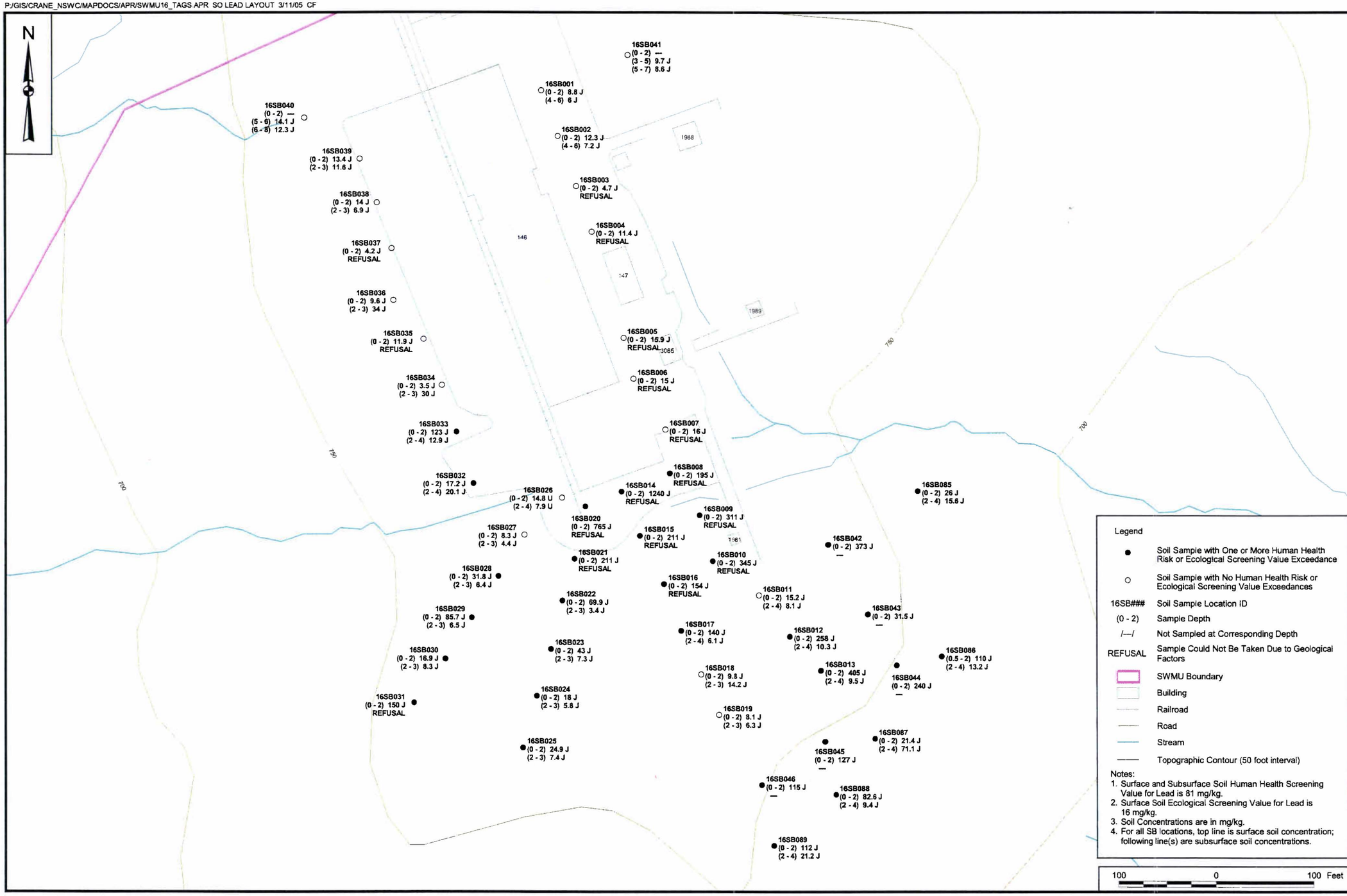
DRAWN BY C. FOSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SO LEAD LAYOUT 3/11/05 CF



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 16

REV 0

LEAD CONCENTRATIONS IN SOIL (mg/kg), ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

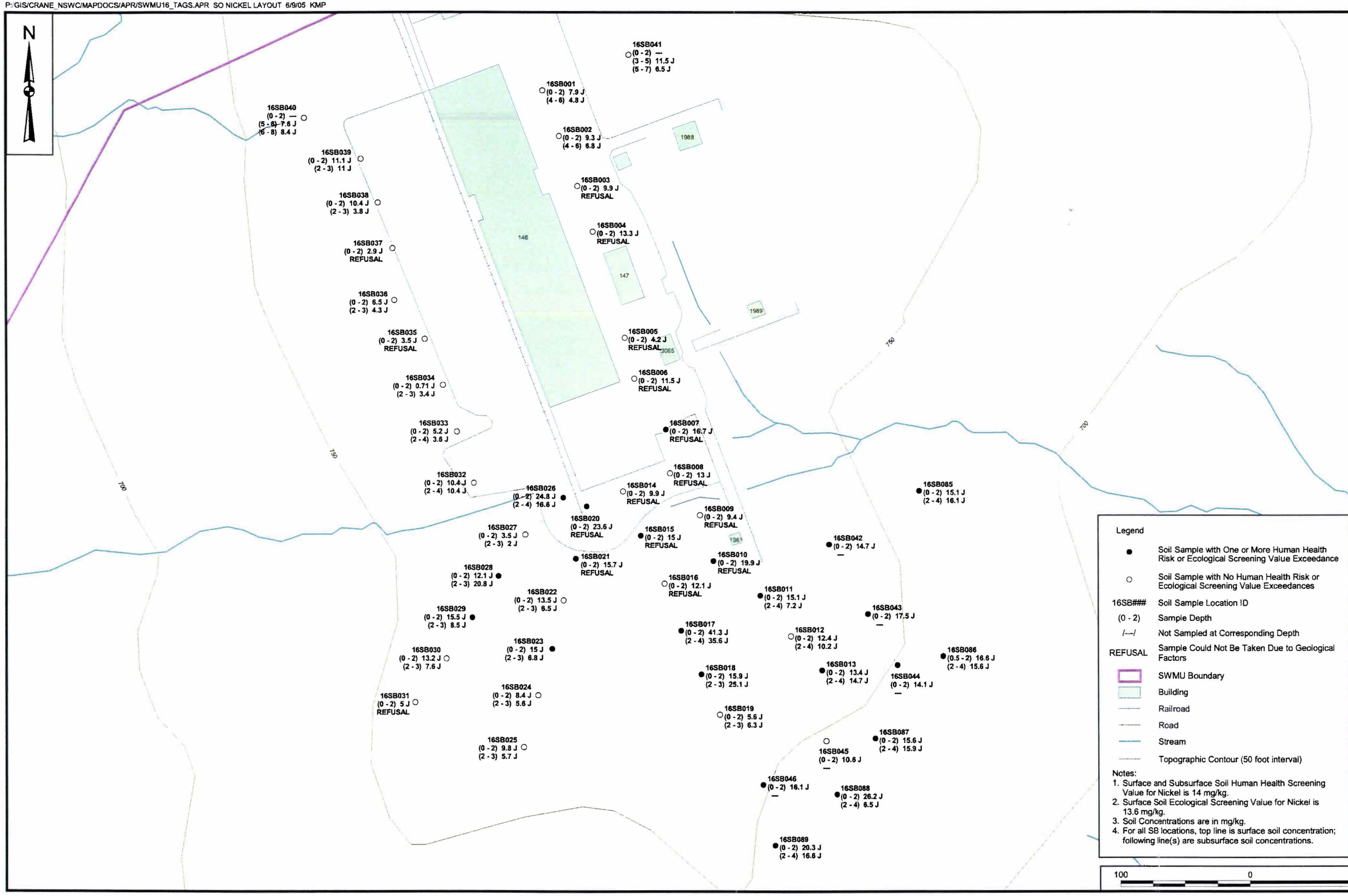
DRAWN BY C. FOSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SO NICKEL LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 17

REV 0

NICKEL CONCENTRATIONS IN SOIL (mg/kg), ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

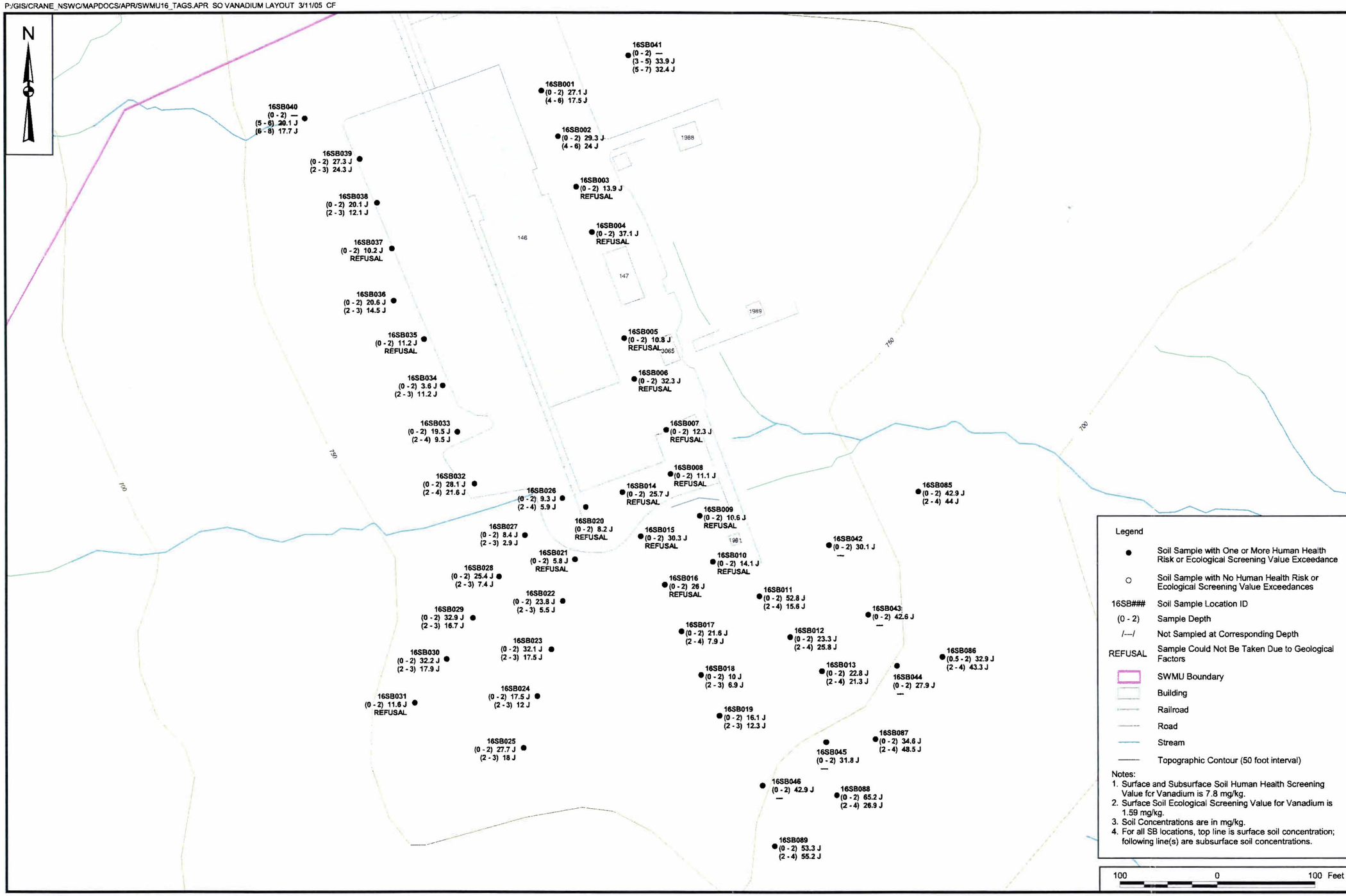
DRAWN BY J. OSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SO VANADIUM LAYOUT 3/11/05 CF



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 18

REV 0

VANADIUM CONCENTRATIONS IN SOIL (mg/kg), ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

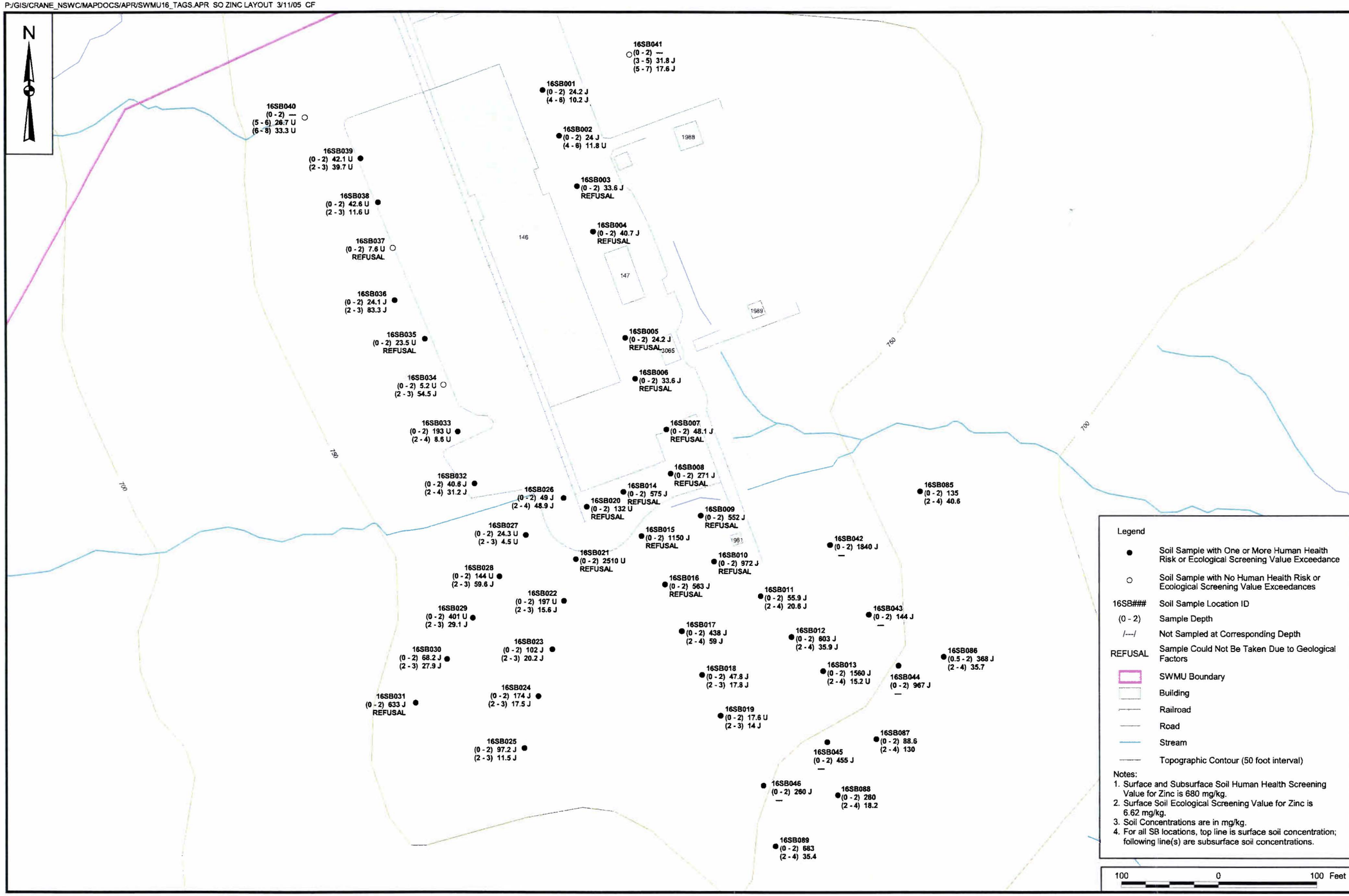
DRAWN BY C. FOSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SO ZINC LAYOUT 3/11/05 CF



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 19

REV 0

ZINC CONCENTRATIONS IN SOIL (mg/kg),
ROUNDS 1 THROUGH 3
SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

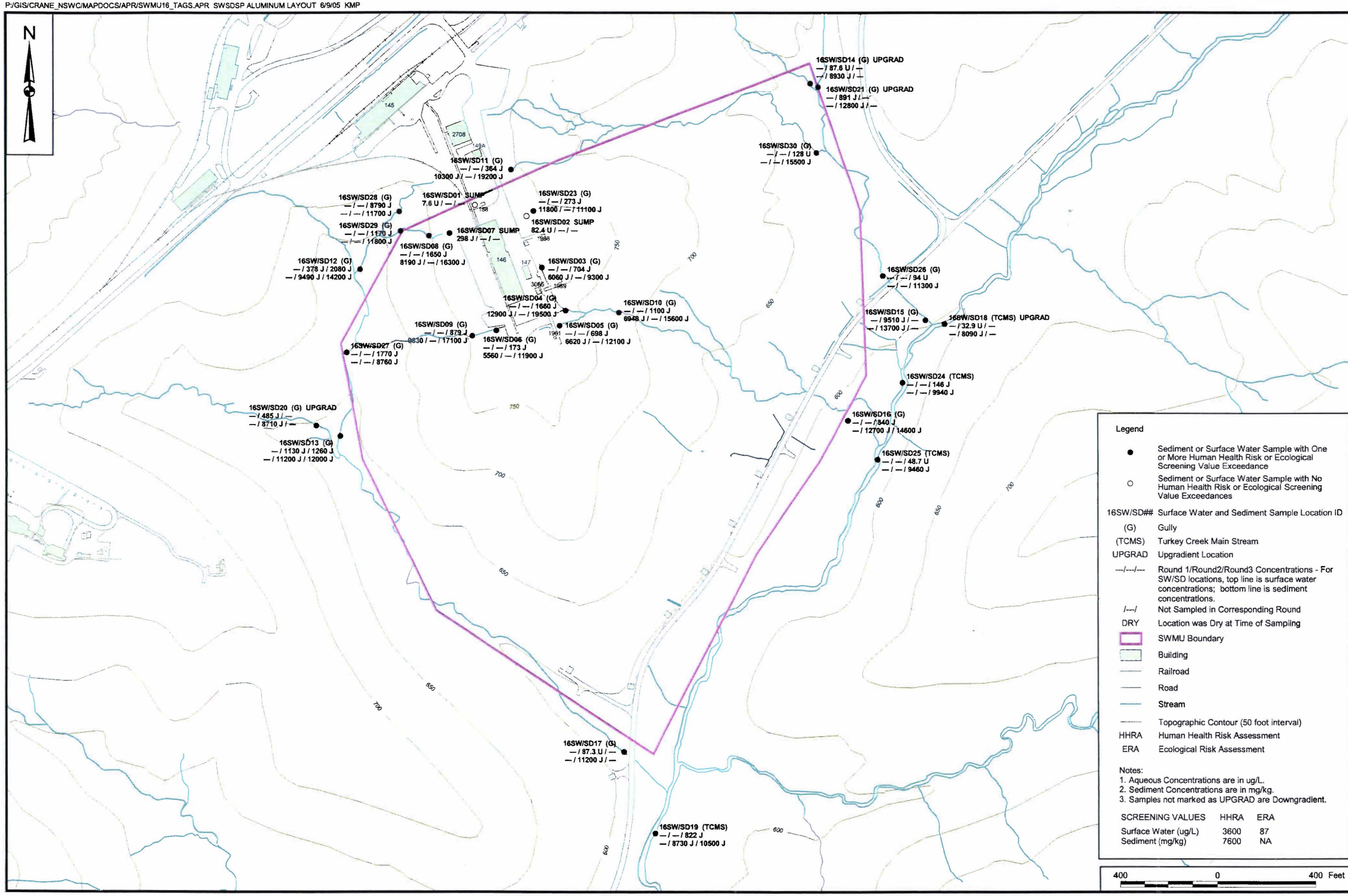
DRAWN BY C. FOSTER DATE 3/11/05

CHECKED BY T. JOHNSTON DATE 3/11/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP ALUMINUM LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 20

REV 0

ALUMINUM CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

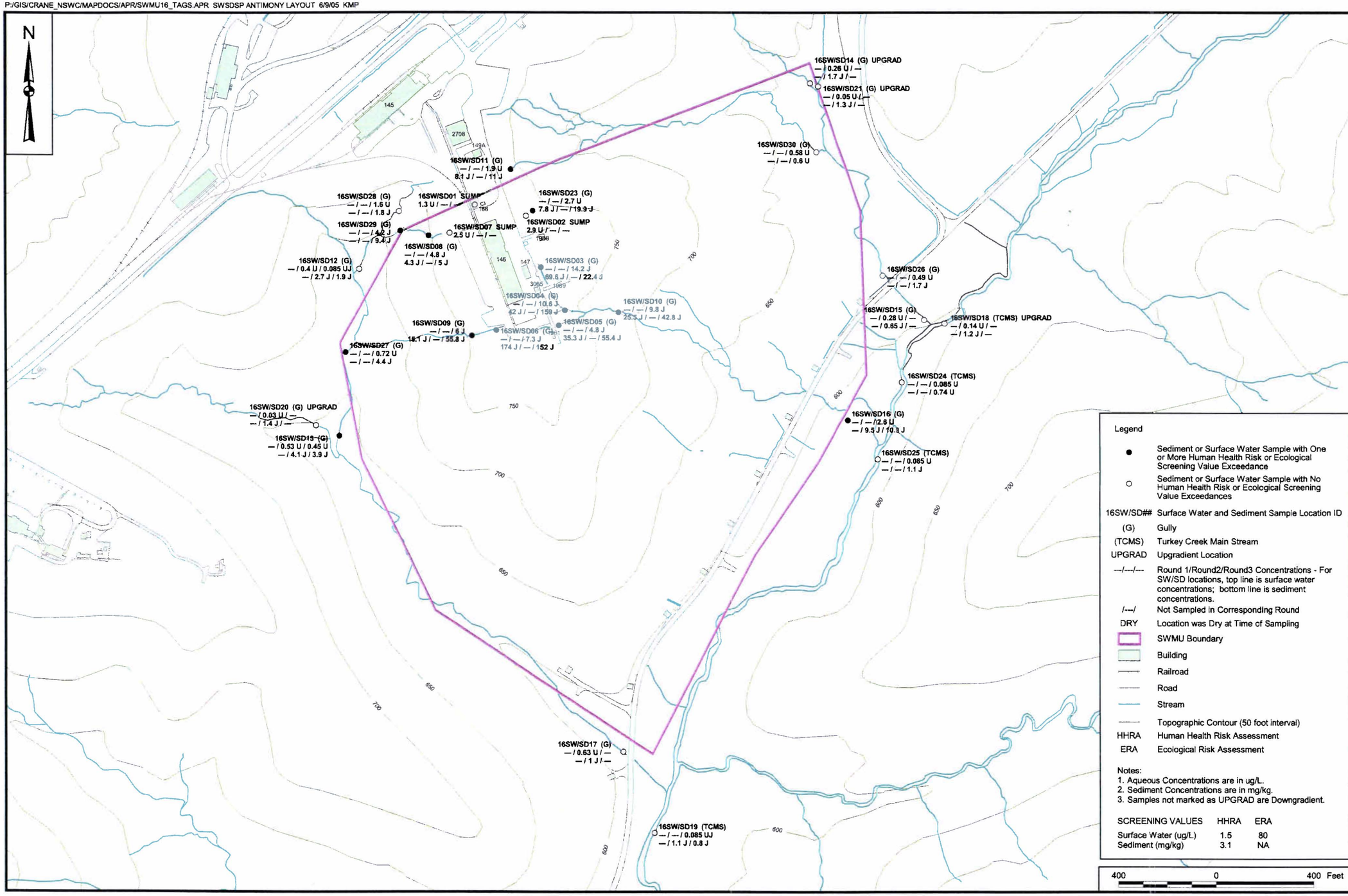
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP ANTIMONY LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 21

REV 0

ANTIMONY CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

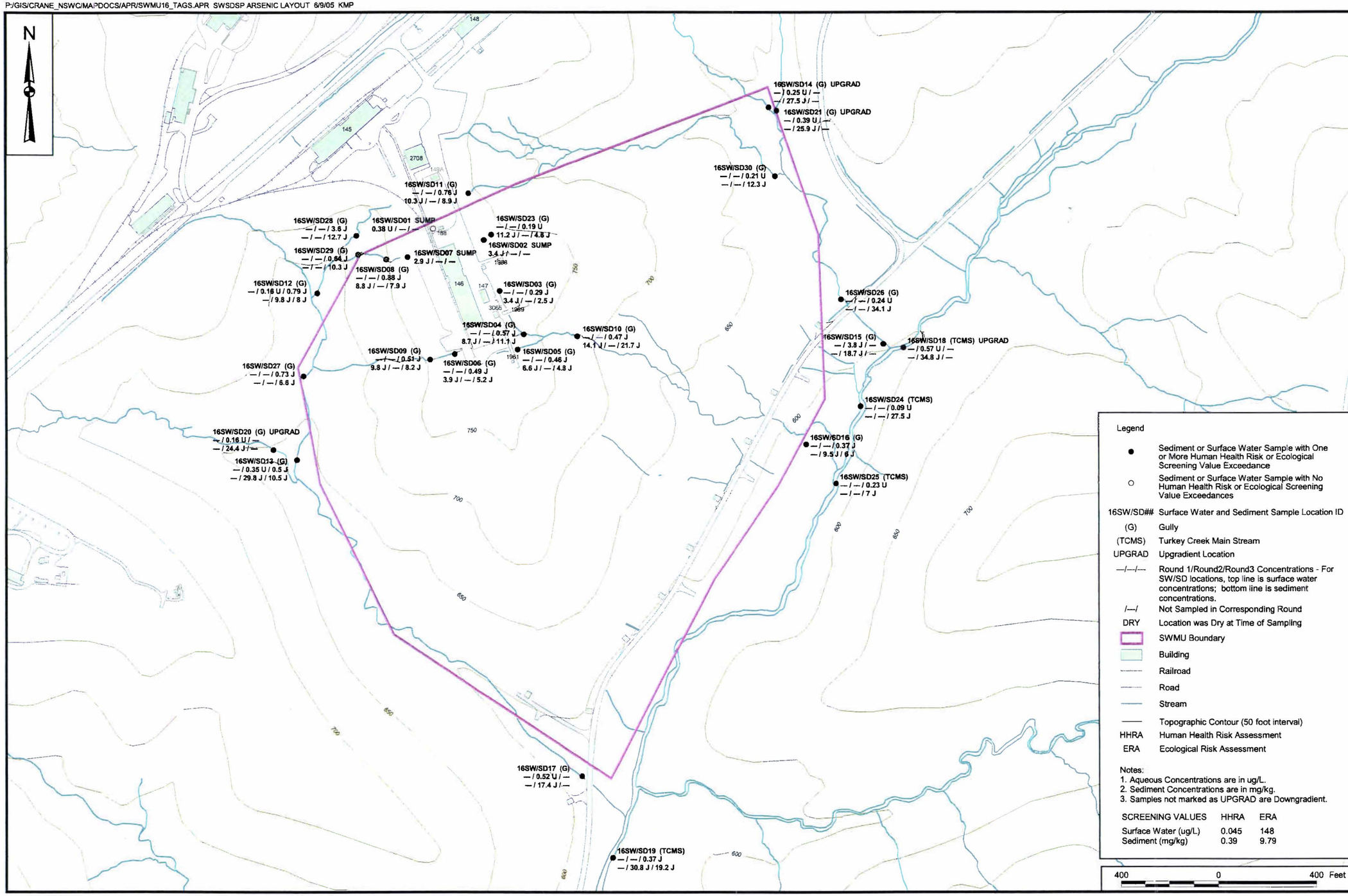
CRANE, INDIANA

NAVFAC

	DATE
DRAWN BY C. FOSTER	3/9/05
CHECKED BY T. JOHNSTON	3/9/05
COST/SCHED-AREA	

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP ARSENIC LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 5 - 22

REV 0

ARSENIC CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

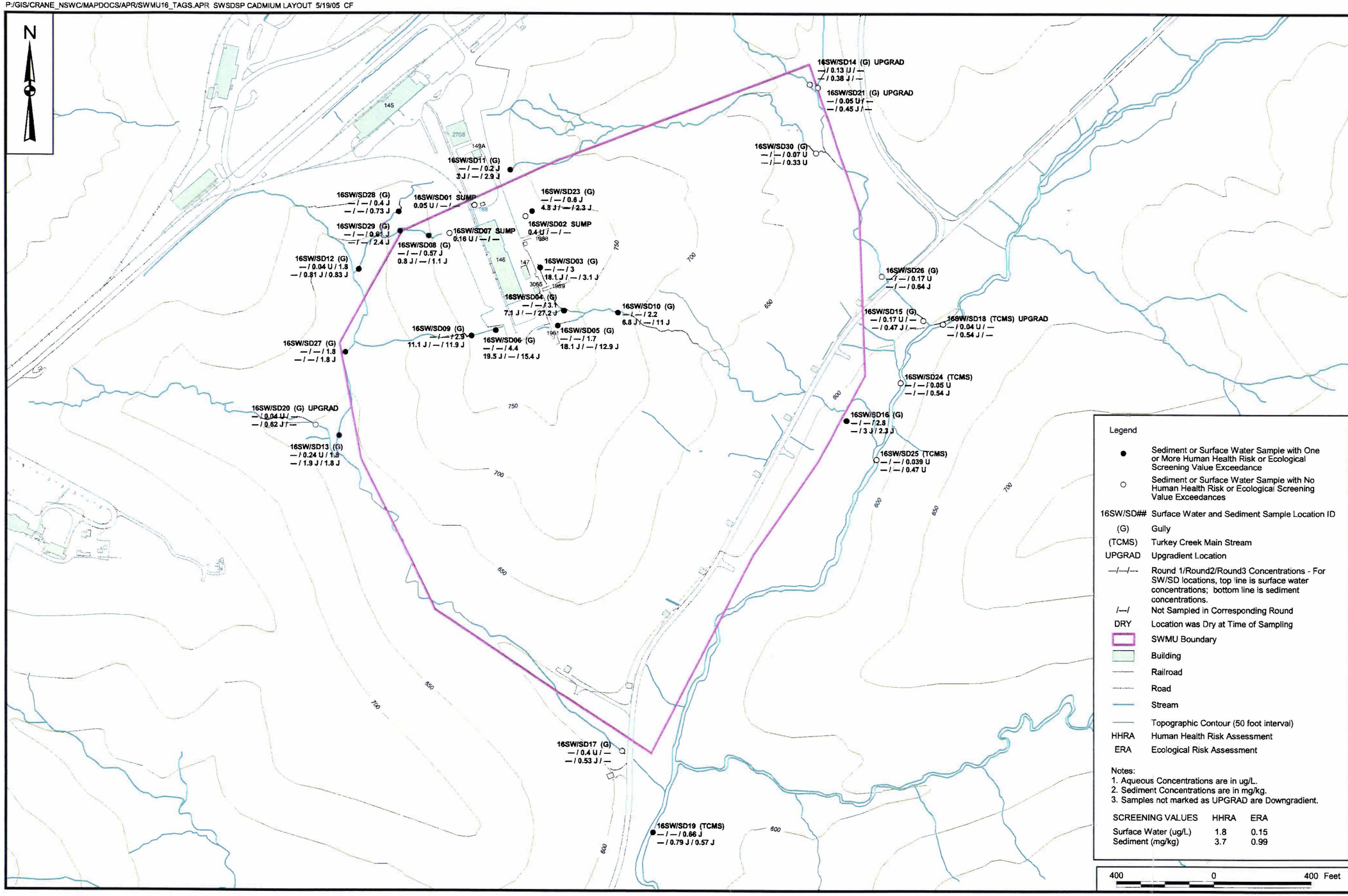
NSWC CRANE

CRANE, INDIANA

NAVFAC

DRAWN BY	DATE	CHECKED BY	DATE	COST/SCHED-AREA	SCALE
C. FOSTER	3/9/05	T. JOHNSTON	3/9/05		AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP CADMIUM LAYOUT 5/19/05 CF



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 23

REV 0

CADMIUM CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

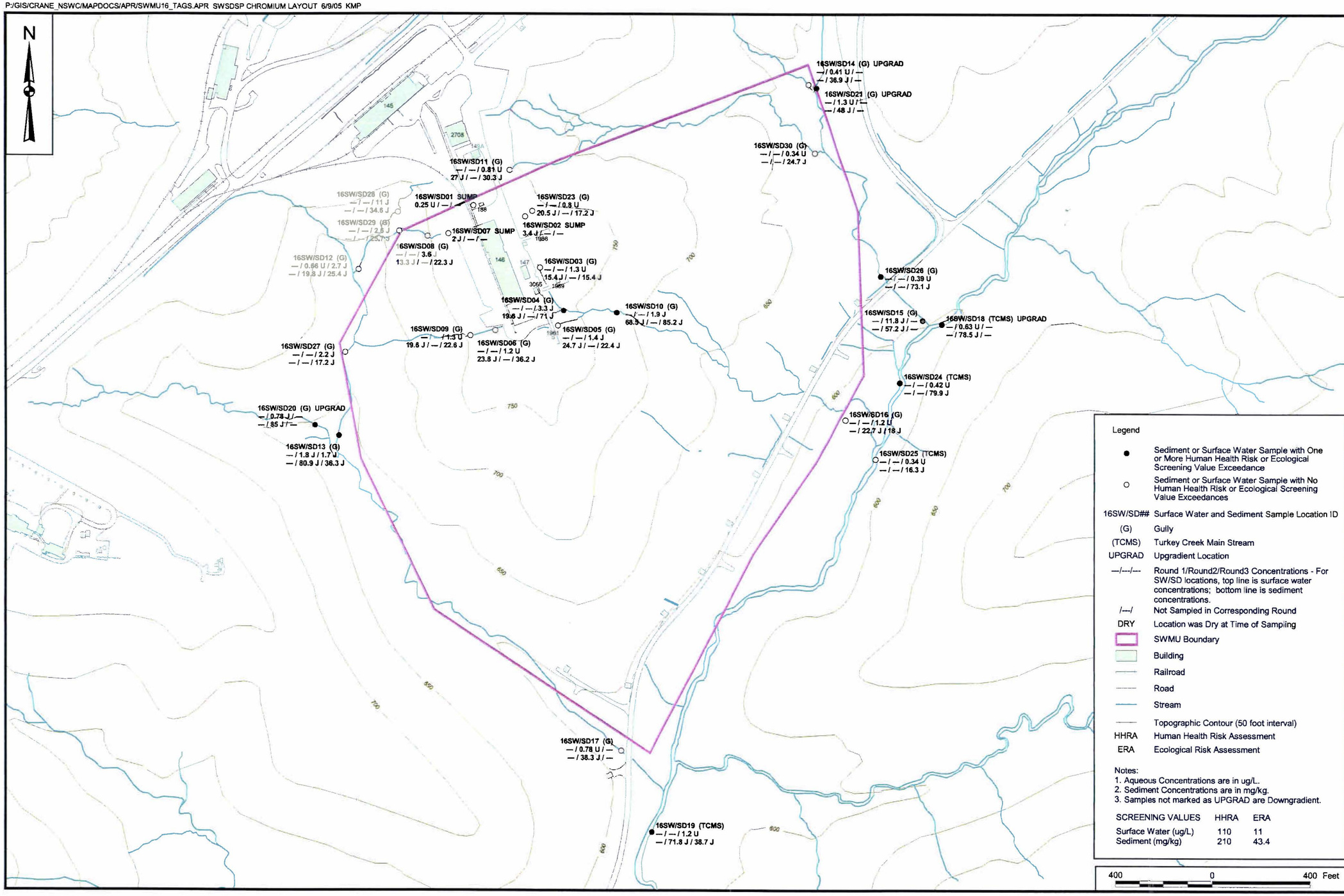
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP CHROMIUM LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 24

REV 0

CHROMIUM CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

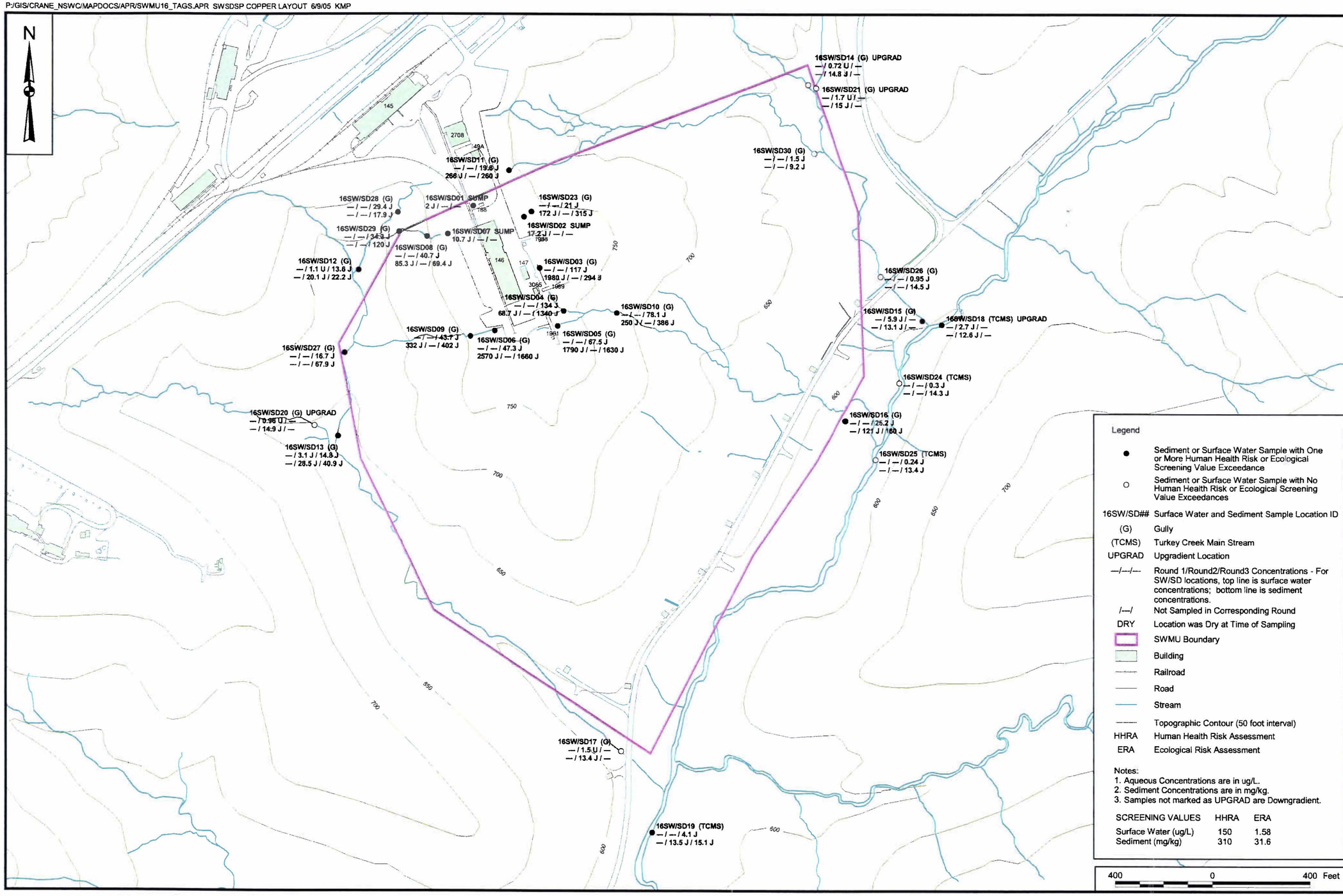
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP COPPER LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 25

REV 0

COPPER CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

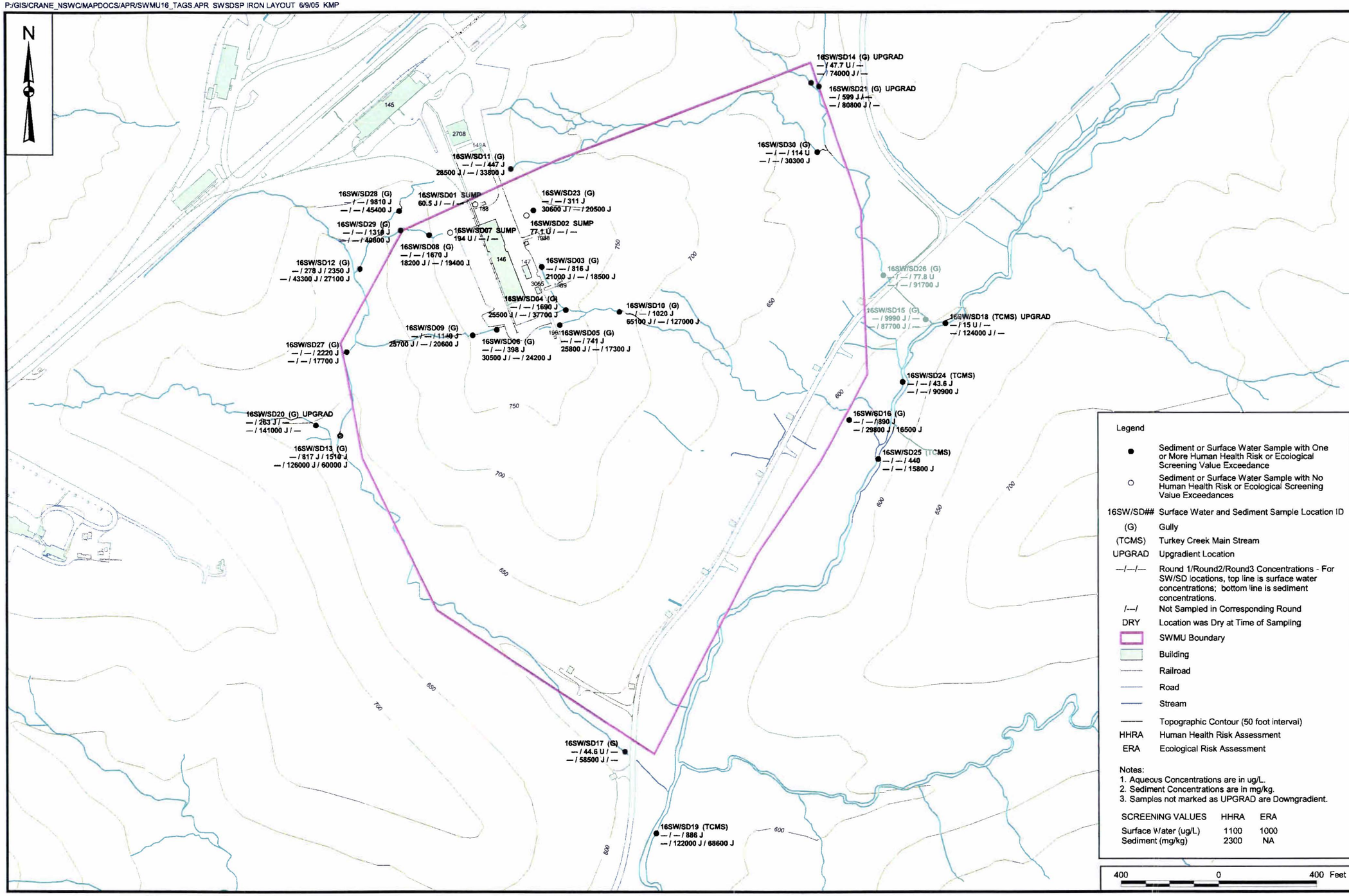
NSWC CRANE

CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER	DATE 3/9/05	CHECKED BY T. JOHNSTON	DATE 3/9/05
COST/SCHED-AREA		SCALE AS NOTED	

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP IRON LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 26

REV 0

IRON CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

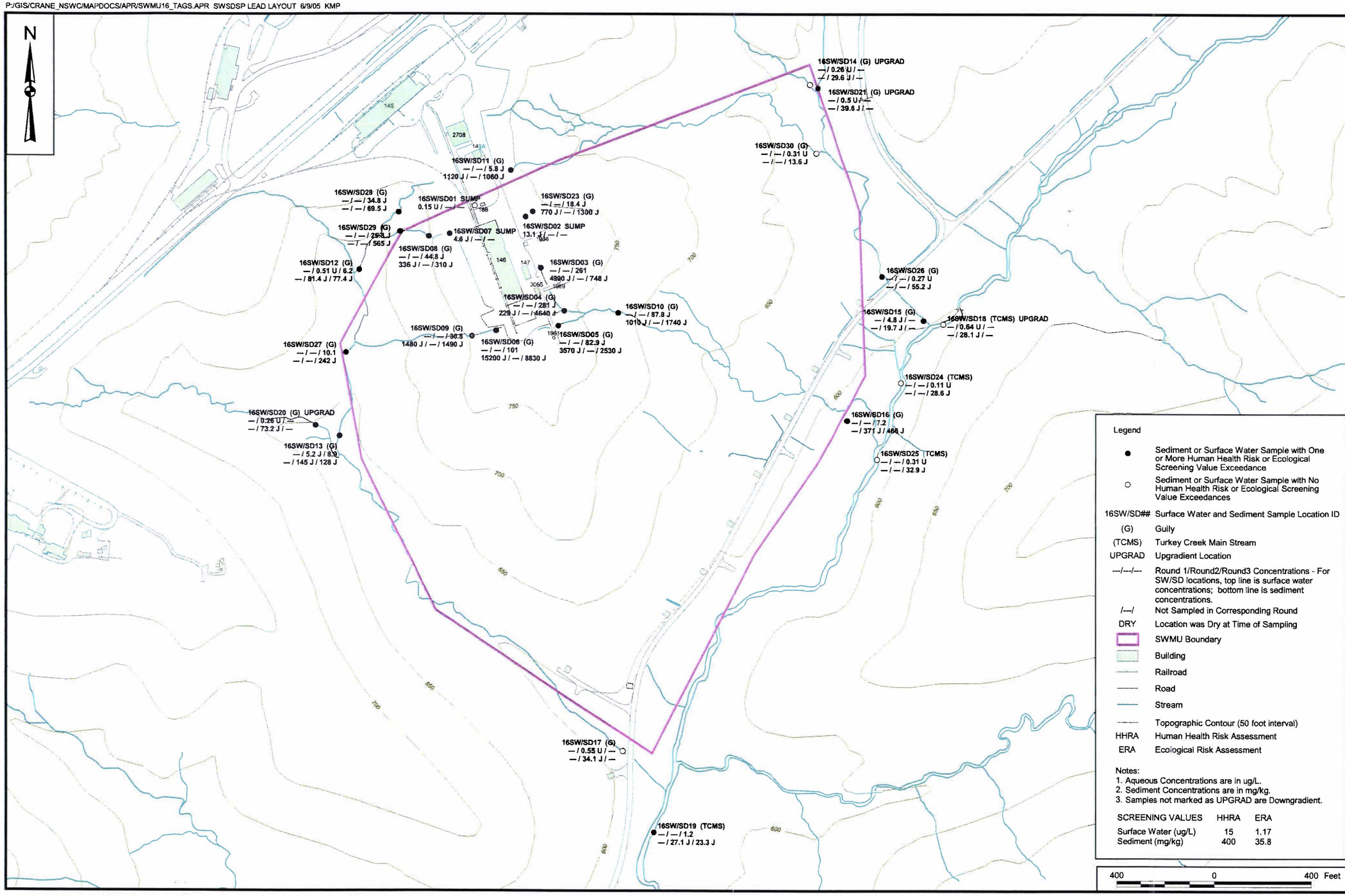
NAVFAC

DRAWN BY	DATE
C. FOSTER	3/9/05
CHECKED BY	DATE
T. JOHNSTON	3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP LEAD LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 27

REV 0

LEAD CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

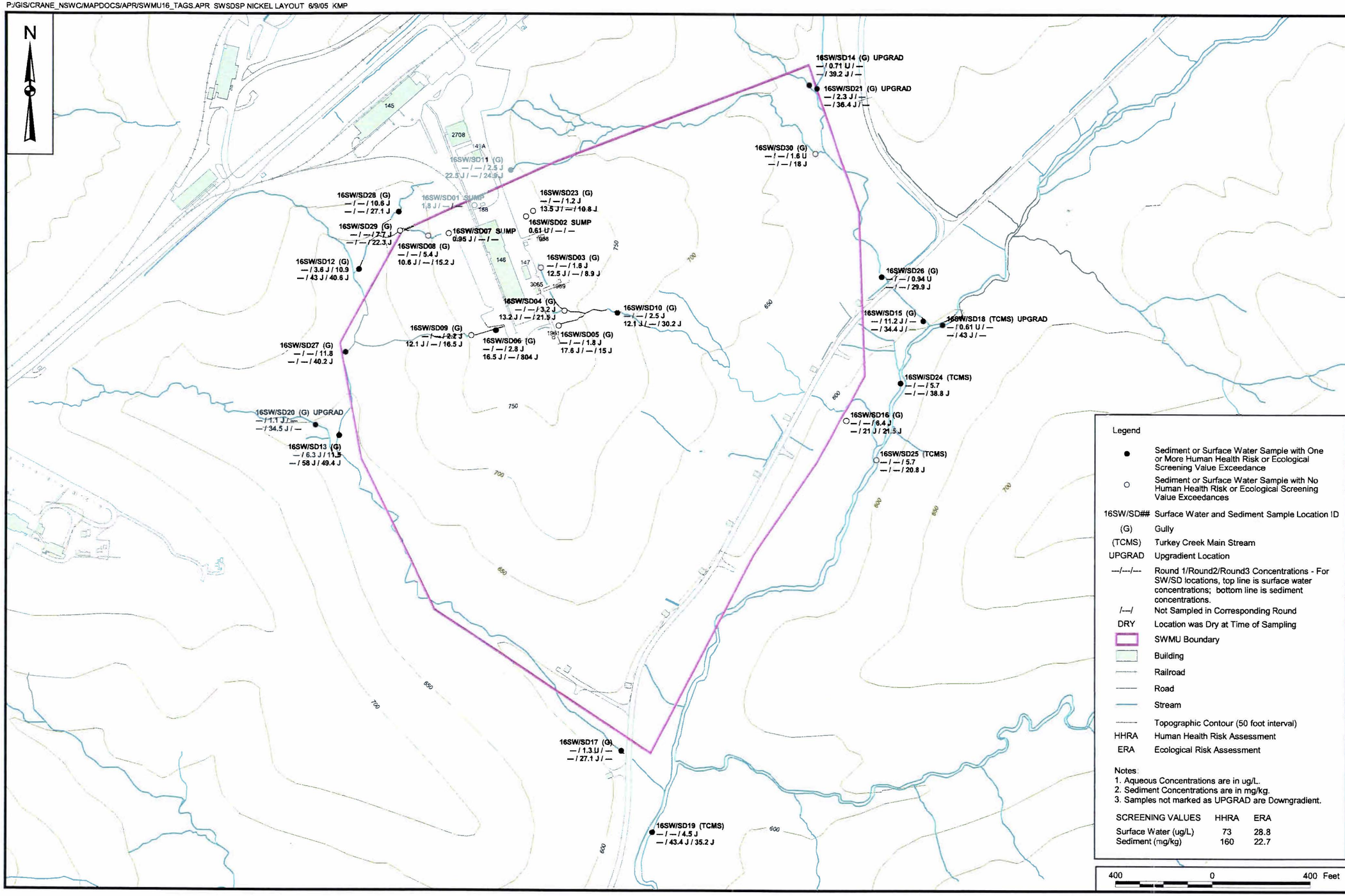
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP NICKEL LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 28

REV 0

NICKEL CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

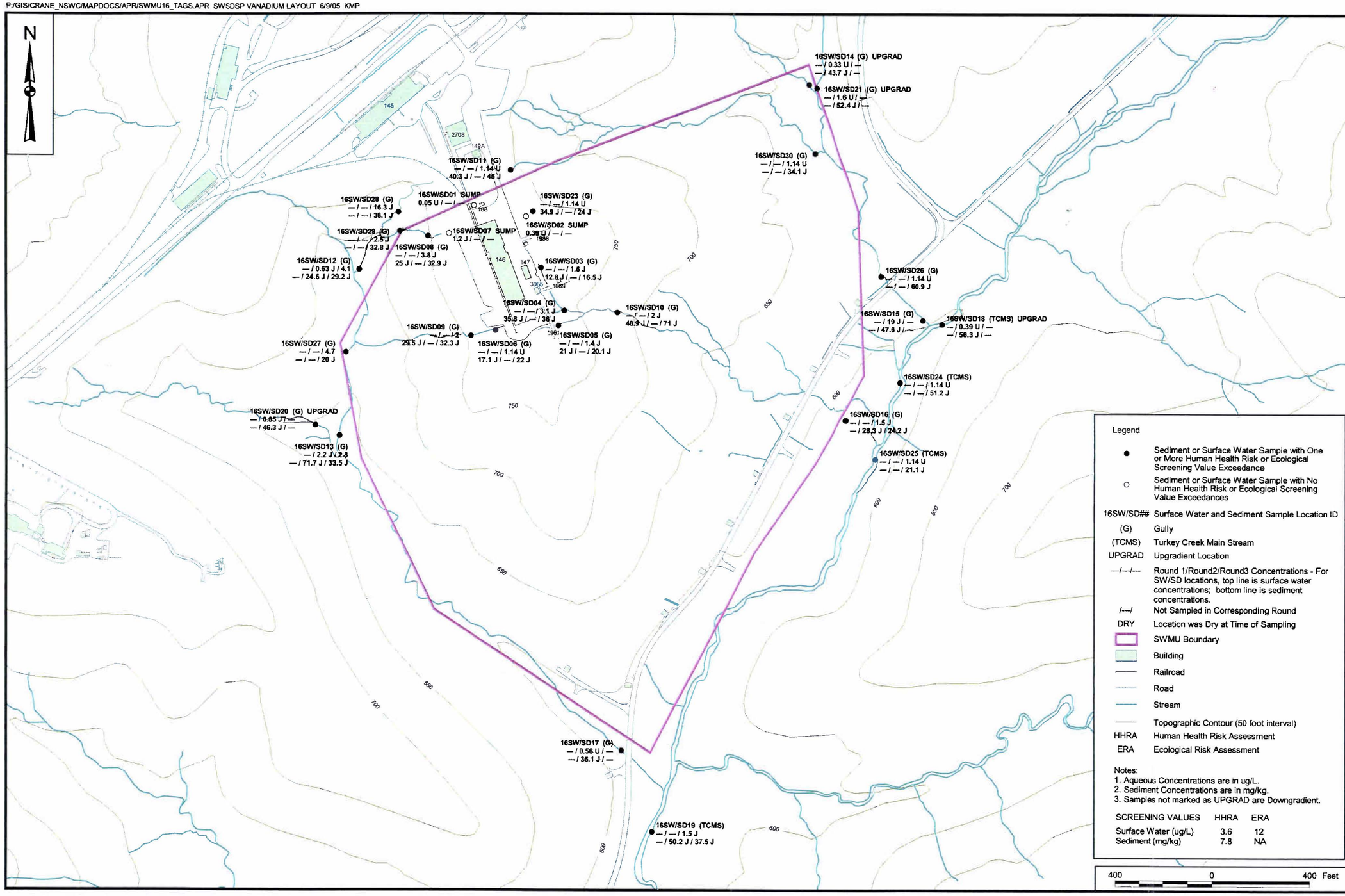
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP VANADIUM LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 29

REV 0

VANADIUM CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

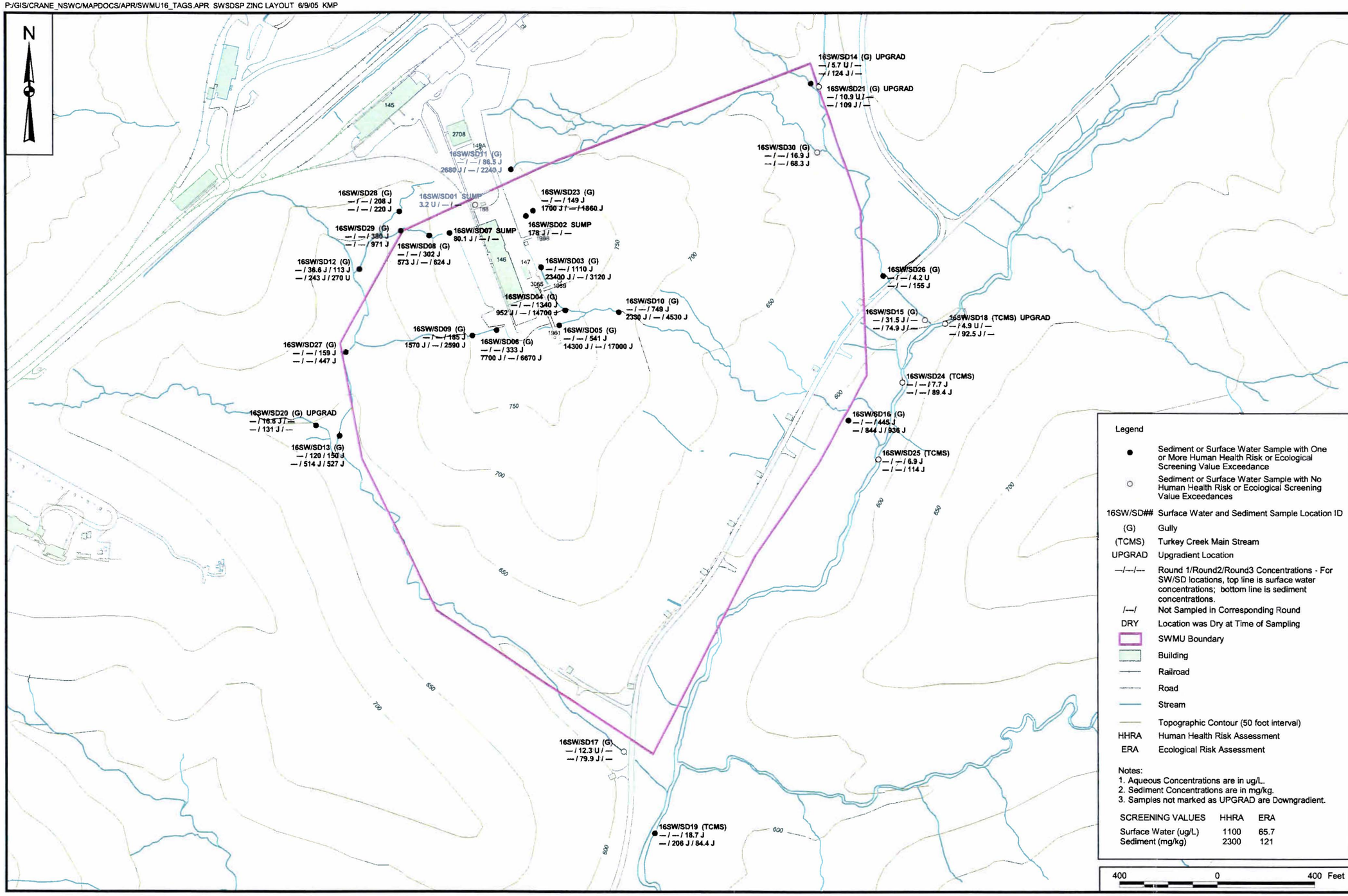
CRANE, INDIANA

NAVFAC

DRAWN BY	DATE
C. FOSTER	3/9/05
CHECKED BY	DATE
T. JOHNSTON	3/9/05
COST/SCHED-AREA	

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR SWSDSP ZINC LAYOUT 6/9/05 KMP



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 30

REV 0

ZINC CONCENTRATIONS IN SURFACE WATER (ug/L) AND SEDIMENT (mg/kg) FOR GULLIES AND MAINSTREAM, ROUNDS 1 THROUGH 3

SWMU 16 HIGH CAST EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

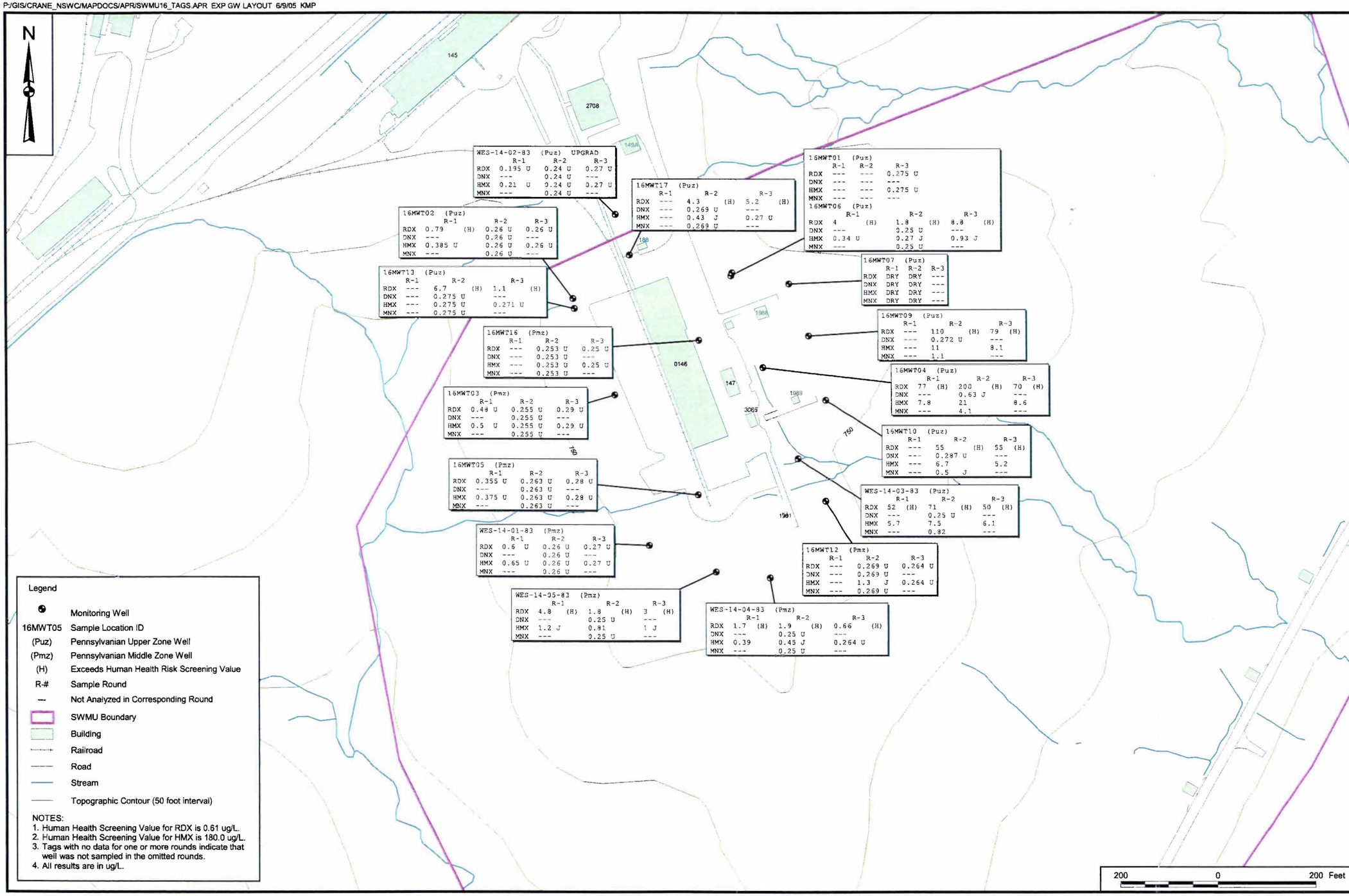
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR EXP GW LAYOUT 6/9/05 KMP



Legend

- Monitoring Well
- 16MWT05 Sample Location ID
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- (H) Exceeds Human Health Risk Screening Value
- R-# Sample Round
- --- Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

NOTES:
1. Human Health Screening Value for RDX is 0.61 ug/L.
2. Human Health Screening Value for HMX is 180.0 ug/L.
3. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.
4. All results are in ug/L.

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 31

REV 0

RDX AND DEGRADATION PRODUCT CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS

SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

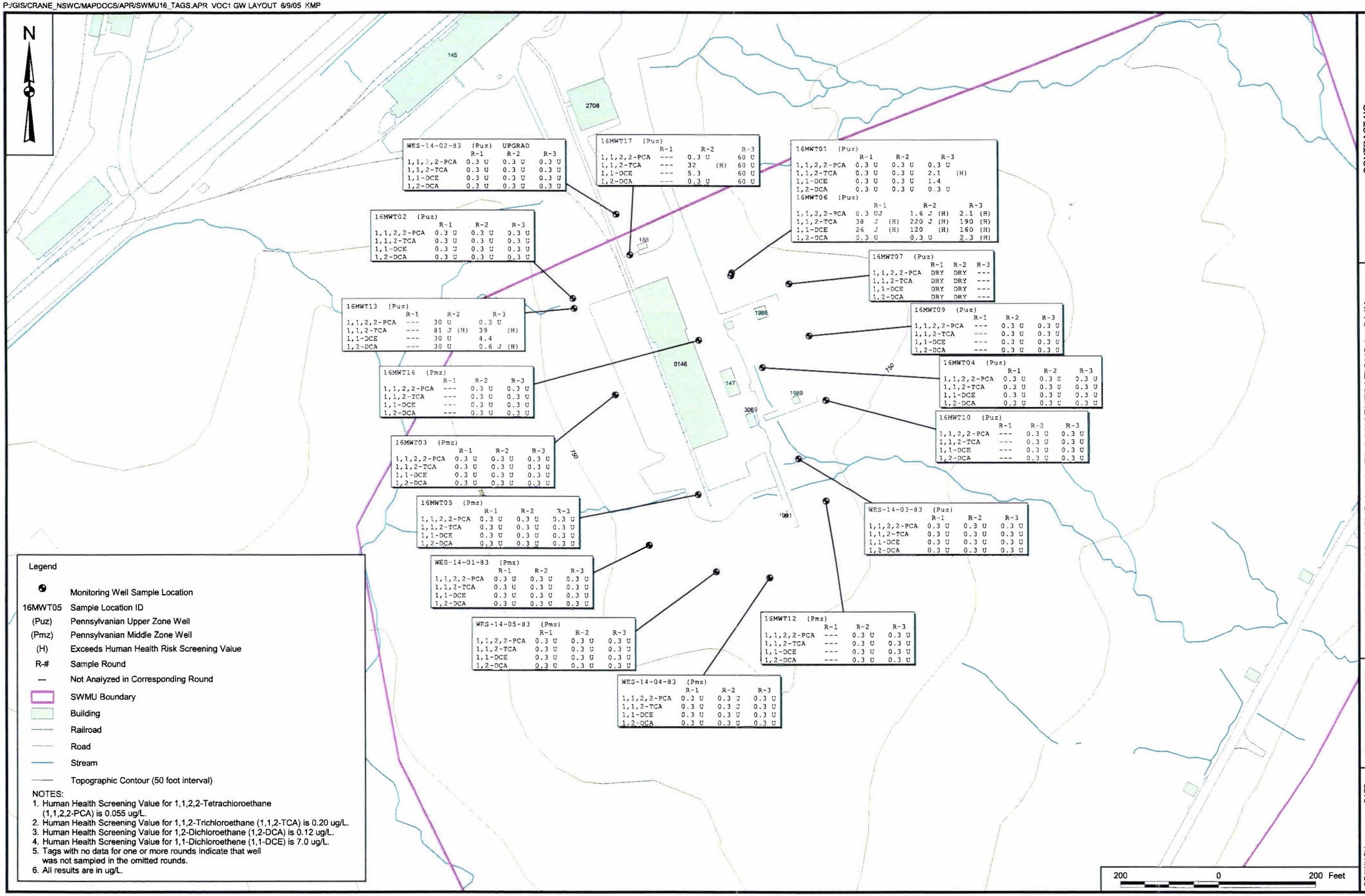
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR VOC1 GW LAYOUT 6/9/05 KMP



Legend

- Monitoring Well Sample Location
- 16MWT05 Sample Location ID
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- (H) Exceeds Human Health Risk Screening Value
- R-# Sample Round
- --- Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

NOTES:

1. Human Health Screening Value for 1,1,2,2-Tetrachloroethane (1,1,2,2-PCA) is 0.055 ug/L.
2. Human Health Screening Value for 1,1,2-Trichloroethane (1,1,2-TCA) is 0.20 ug/L.
3. Human Health Screening Value for 1,2-Dichloroethane (1,2-DCA) is 0.12 ug/L.
4. Human Health Screening Value for 1,1-Dichloroethene (1,1-DCE) is 7.0 ug/L.
5. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.
6. All results are in ug/L.

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 32

REV 0

SELECT CHLORINATED ALKANES CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS

SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

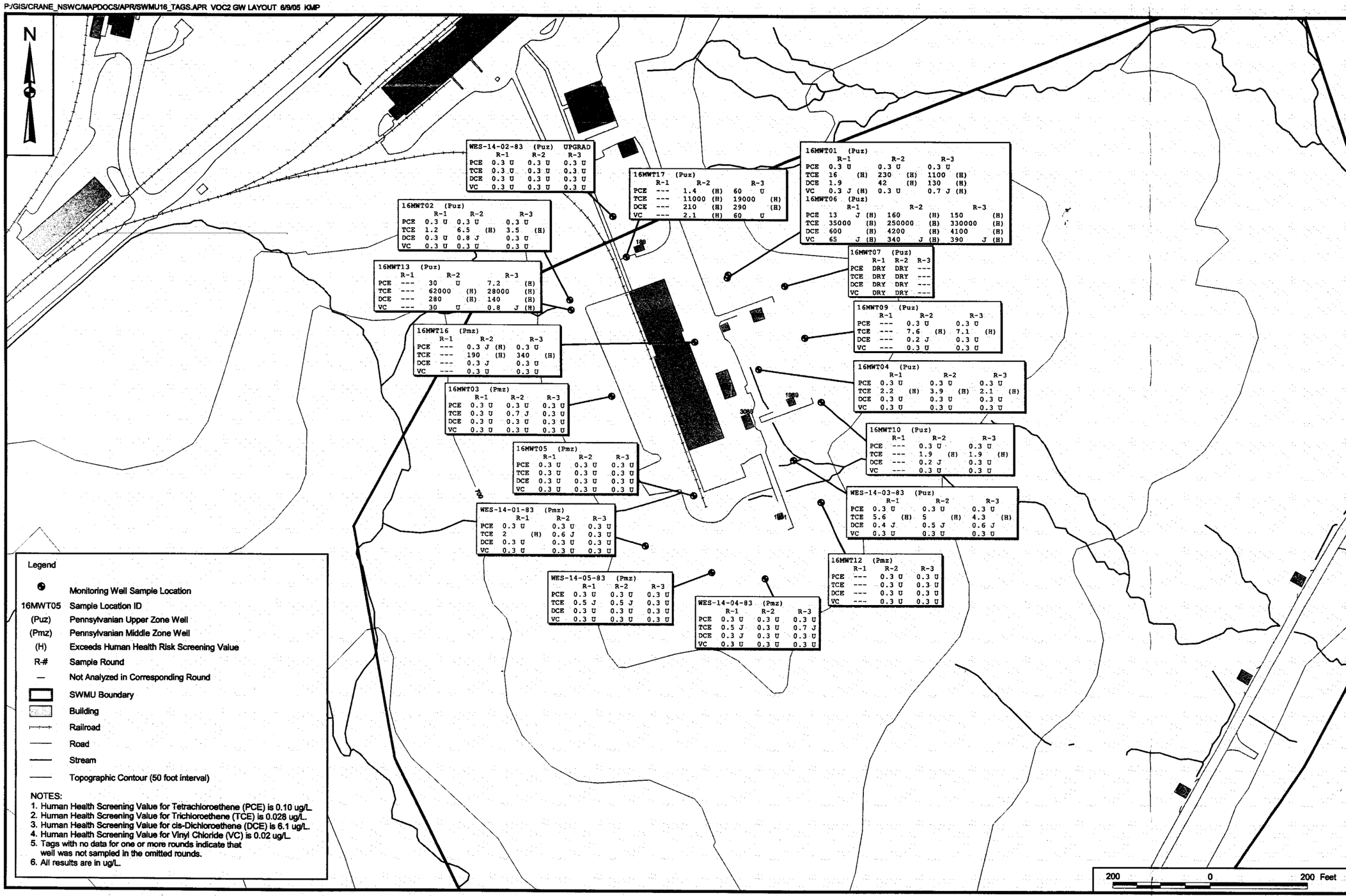
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR VOC2 GW LAYOUT 6/9/05 KMP



Legend

- Monitoring Well Sample Location
- 16MWT05 Sample Location ID
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- (H) Exceeds Human Health Risk Screening Value
- R-# Sample Round
- — Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

NOTES:
1. Human Health Screening Value for Tetrachloroethene (PCE) is 0.10 ug/L.
2. Human Health Screening Value for Trichloroethene (TCE) is 0.028 ug/L.
3. Human Health Screening Value for cis-Dichloroethene (DCE) is 6.1 ug/L.
4. Human Health Screening Value for Vinyl Chloride (VC) is 0.02 ug/L.
5. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.
6. All results are in ug/L.

CONTRACT NO. 7448

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 5 - 33 REV 0

SELECT CHLORINATED ALKENES CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS

SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

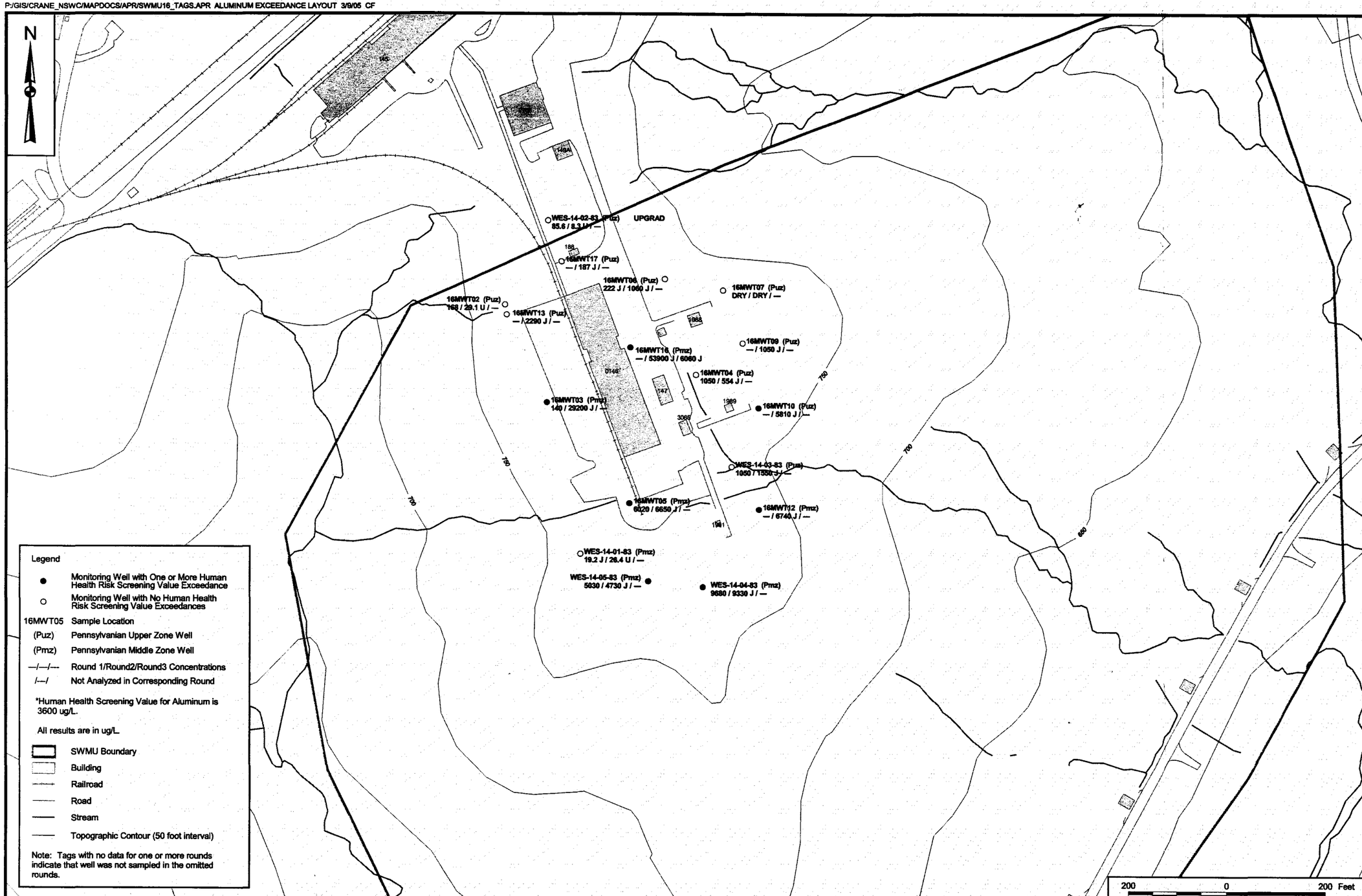
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR ALUMINUM EXCEEDANCE LAYOUT 3/9/05 CF



Legend

- ● Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- ○ Monitoring Well with No Human Health Risk Screening Value Exceedances
- 16MWT05 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- —/—/— Round 1/Round2/Round3 Concentrations
- /—/ Not Analyzed in Corresponding Round

*Human Health Screening Value for Aluminum is 3600 ug/L.

All results are in ug/L.

- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note: Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 34

REV 0

ALUMINUM CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS

SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE

CRANE, INDIANA

NAVFAC

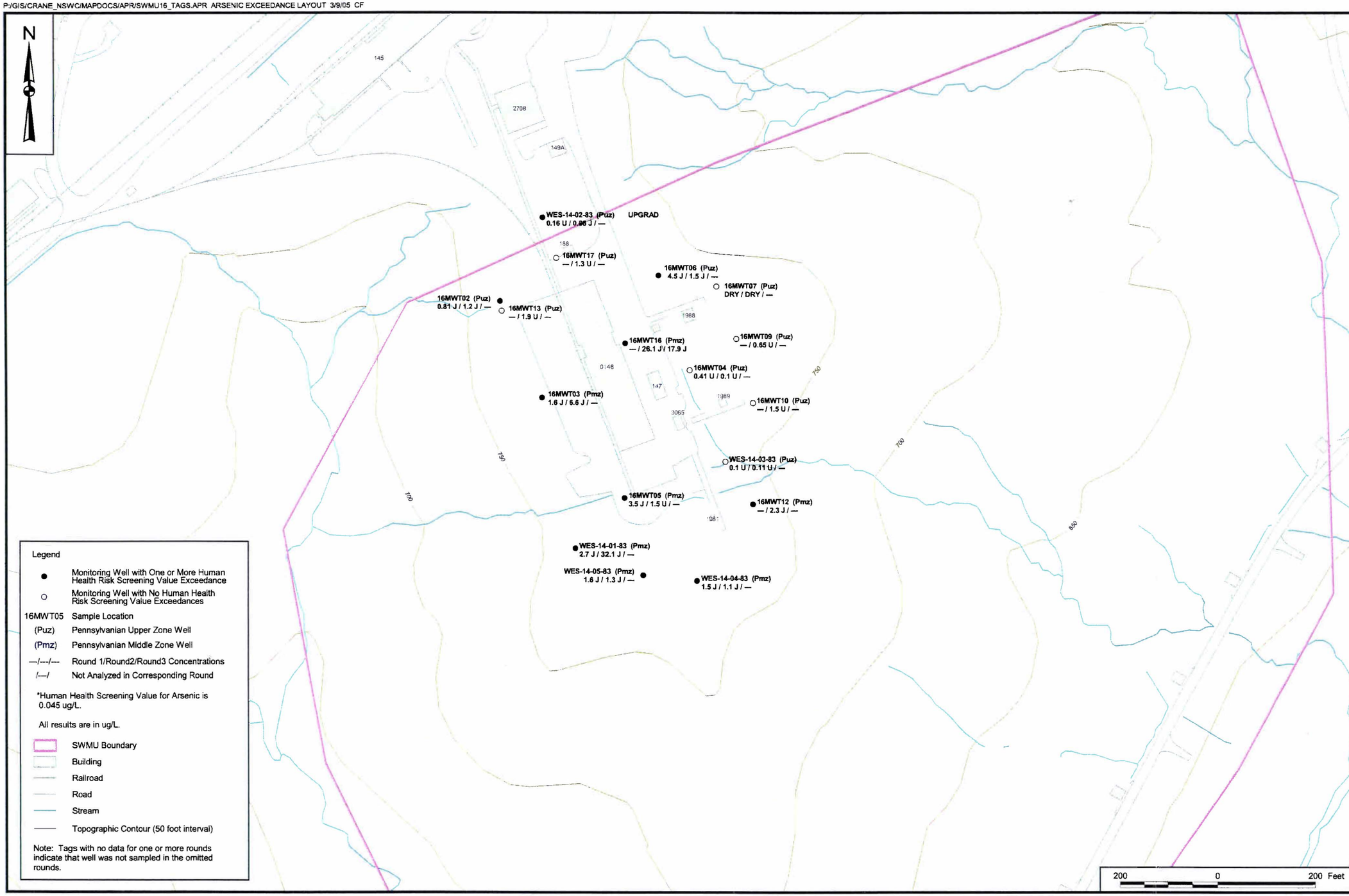
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR ARSENIC EXCEEDANCE LAYOUT 3/9/05 CF



Legend

- ● Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- ○ Monitoring Well with No Human Health Risk Screening Value Exceedances
- 16MWT05 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- —/---/--- Round 1/Round2/Round3 Concentrations
- /—/ Not Analyzed in Corresponding Round

*Human Health Screening Value for Arsenic is 0.045 ug/L.

All results are in ug/L.

- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note: Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 35

REV 0

ARSENIC CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS
SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

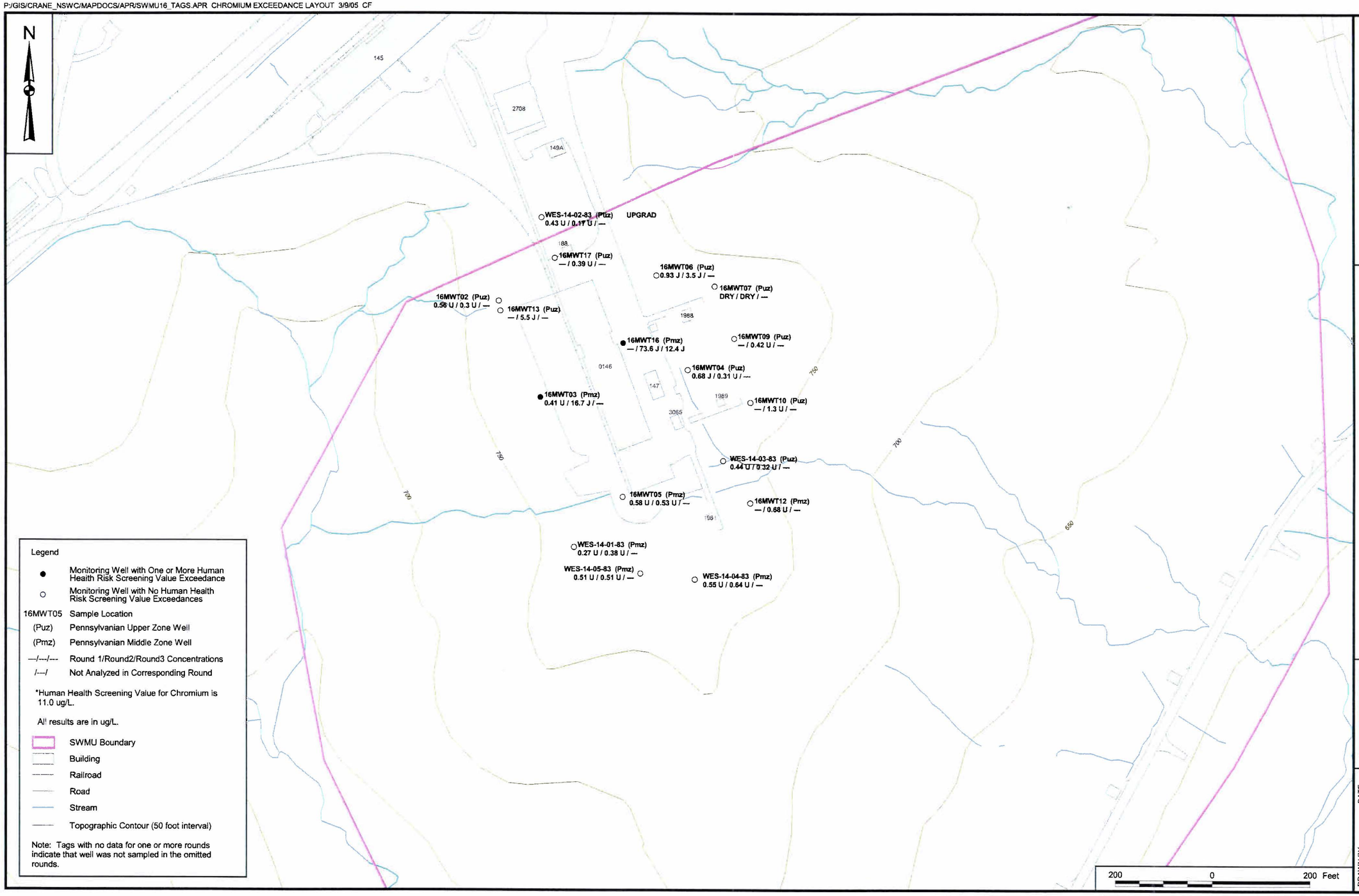
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR CHROMIUM EXCEEDANCE LAYOUT 3/9/05 CF



Legend

- ● Monitoring Well with One or More Human Heaith Risk Screening Value Exceedance
- ○ Monitoring Well with No Human Health Risk Screening Value Exceedances
- 16MWT05 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- —/---/--- Round 1/Round2/Round3 Concentrations
- /—/ Not Analyzed in Corresponding Round

*Human Health Screening Value for Chromium is 11.0 ug/L.

All results are in ug/L.

- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note: Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 36

REV 0

CHROMIUM CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS
SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

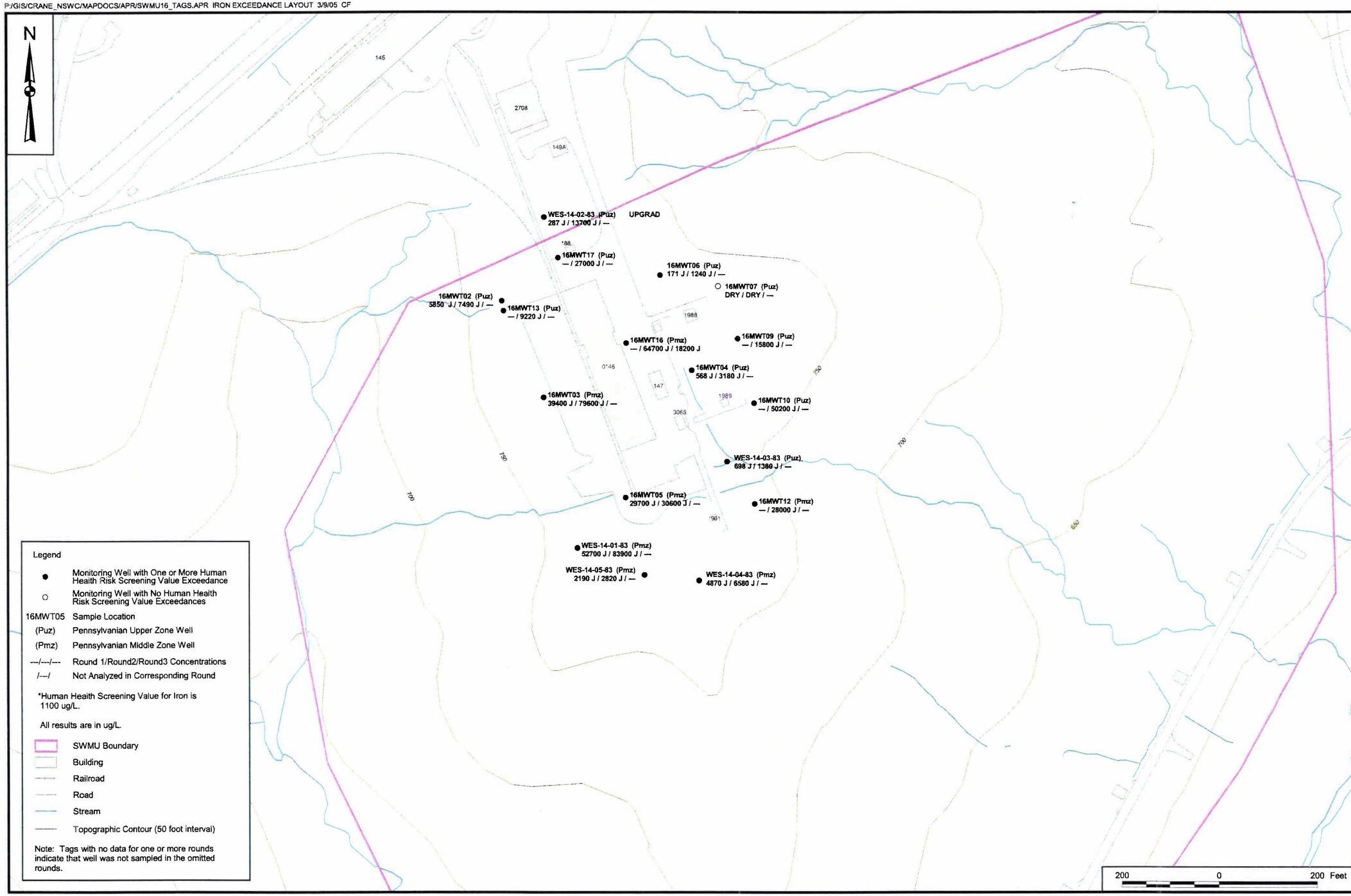
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR IRON EXCEEDANCE LAYOUT 3/9/05 CF



Legend

- ● Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- ○ Monitoring Well with No Human Health Risk Screening Value Exceedances
- 16MWT05 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- ---/---/--- Round 1/Round2/Round3 Concentrations
- /---/ Not Analyzed in Corresponding Round

*Human Health Screening Value for Iron is 1100 ug/L.

All results are in ug/L.

- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note: Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 37

REV 0

IRON CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS
SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

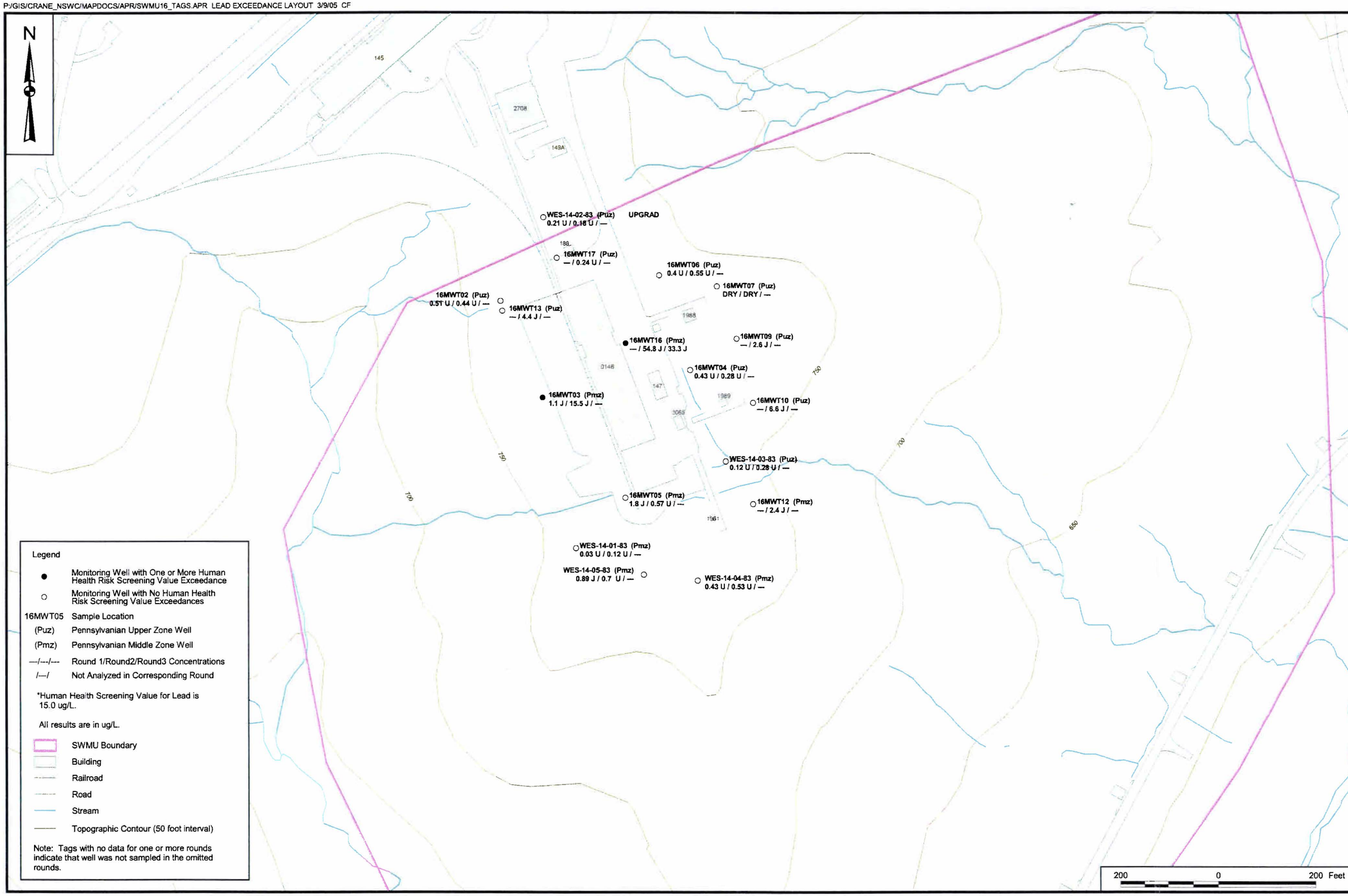
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR LEAD EXCEEDANCE LAYOUT 3/9/05 CF



Legend

- ● Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- ○ Monitoring Well with No Human Health Risk Screening Value Exceedances
- 16MWT05 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- —/---/--- Round 1/Round2/Round3 Concentrations
- /—/ Not Analyzed in Corresponding Round

*Human Health Screening Value for Lead is 15.0 ug/L.

All results are in ug/L.

- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note: Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 38

REV 0

LEAD CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS
SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

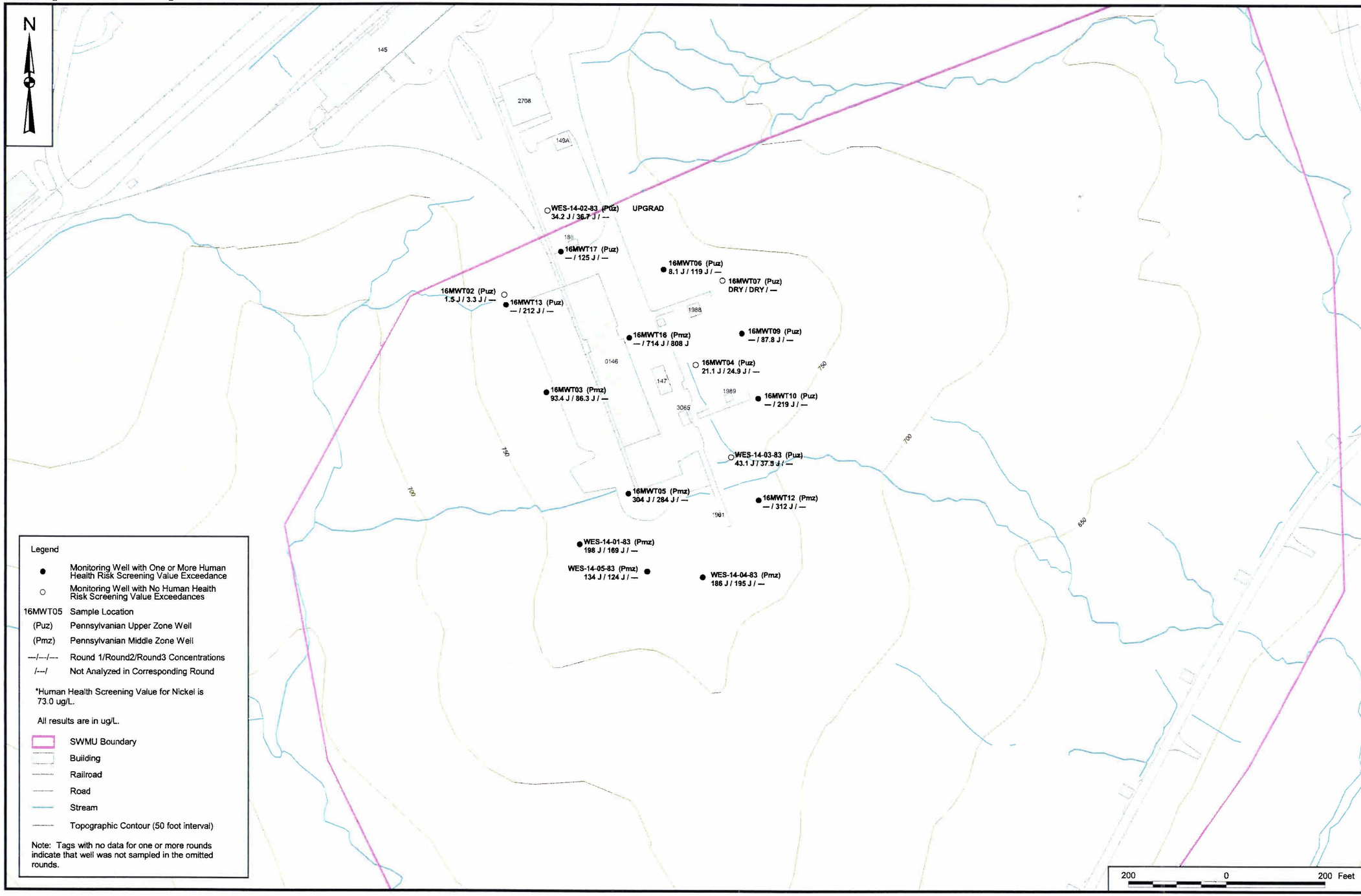
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR NICKEL EXCEEDANCE LAYOUT 3/9/05 CF



Legend

- ● Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- ○ Monitoring Well with No Human Health Risk Screening Value Exceedances
- 16MWT05 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- ---/---/--- Round 1/Round2/Round3 Concentrations
- /---/ Not Analyzed in Corresponding Round

*Human Health Screening Value for Nickel is 73.0 ug/L.

All results are in ug/L.

- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note: Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 39

REV 0

NICKEL CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR

NSWC CRANE
CRANE, INDIANA

NAVFAC

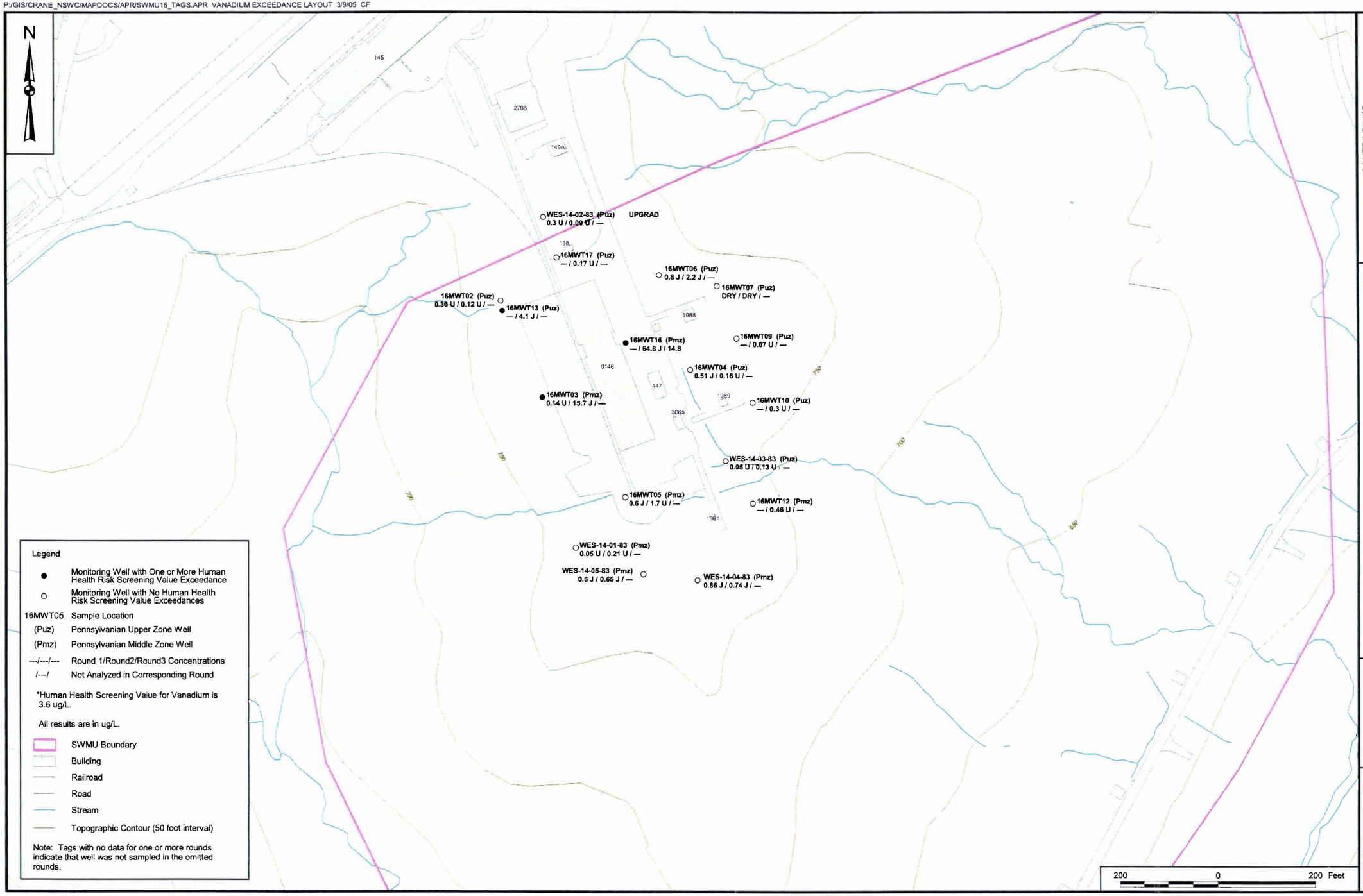
DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU16_TAGS.APR VANADIUM EXCEEDANCE LAYOUT 3/9/05 CF



Legend

- ● Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- ○ Monitoring Well with No Human Health Risk Screening Value Exceedances
- 16MWT05 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (Pmz) Pennsylvanian Middle Zone Well
- ---/---/--- Round 1/Round2/Round3 Concentrations
- /---/ Not Analyzed in Corresponding Round

*Human Health Screening Value for Vanadium is 3.6 ug/L.

All results are in ug/L.

- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note: Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 40

REV 0

VANADIUM CONCENTRATIONS (ug/L) IN GROUNDWATER, ROUNDS 1 THROUGH 3, FOR UPPER ZONE AND MIDDLE ZONE WELLS
SWMU 16 CAST HIGH EXPLOSIVES FILL / B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 3/9/05

CHECKED BY T. JOHNSTON DATE 3/9/05

COST/SCHED-AREA

SCALE AS NOTED

6.0 CONCEPTUAL SITE MODEL, CONTAMINANT TRANSPORT, AND ATTENUATION

This section presents an overview of the movement of contaminants at SWMU 16 among the environmental media. The focus is placed on four major contaminant groups (explosives, VOCs, metals, and inorganic nitrogen compounds), which can be attributed to historical site operations or that have been detected in environmental media at SWMU 16. The information presented in this section is to be used to:

- Provide information on the chemical and physical properties, which affect the mobility, migration, biodegradation, and persistence of the principal COPCs at SWMU 16.
- Assist in health and ecological risks presented in Sections 7.0 and 8.0.
- Assist in risk management decisions.
- Assess whether movement of contaminants among environmental media will result in significant future changes to exposure point concentrations to receptors or significant exposure to receptors not currently exposed or at locations not currently exposed.
- Assess whether the potential exists for contaminant concentrations to decrease over time in various media.
- Present a conceptual site model which identifies contamination sources, contaminant migration pathways, and potential receptors.

6.1 PROPERTIES AFFECTING MOBILITY, ATTENUATION, AND PERSISTENCE

COPCs present at SWMU 16 belong to four primary groups: energetic compounds, PAHs, metals, and inorganic nitrogen compounds. Numerous COPCs identified in Sections 7 and 8 (e.g., dioxin congeners, several SVOCs, and several VOCs) were detected very infrequently and/or detected at low concentrations, and were determined not to pose a significant risk (please see Sections 7 and 8 for chemicals dismissed as COPCs); therefore, these chemicals are not discussed in Section 6. Section 6 concentrates on the COPCs that are considered to be the primary contaminants of concern. The primary chemical and biological factors which affect the mobility, migration, biodegradation, and persistence of these chemicals are solubility,

adsorprtion/desorption, biodegradation, photolysis, and plant uptake. These processes and their effects on fate and transport will be discussed in this section.

6.1.1 Solubilities and Adsorption/Desorption Properties

Literature values and regulatory guidance values for solubilities, organic matter-water partition coefficients (K_{oc}), soil-water partition coefficients (K_d), and biodegradation rates are summarized in Tables 6-1 through 6-3. These values are based on field investigations, laboratory experiments, and theoretical calculations that are described in scientific literature. In most instances, the values found for each parameter for each chemical has a wide range. Thus, the parameter values listed in Tables 6-1 through 6-3 may not be accurate or entirely applicable to the SWMU 16 setting, but they are useful for comparative purposes to rank COPCs against each other in terms of their relative mobilities and biodegradation potential.

As shown in Table 6-1, most of the COPCs have moderate to high solubilities and generally have low to moderate affinities for sorbing to organic carbon and soil. However, some of the metals do have high affinities for sorbing to soil (e.g., aluminum, beryllium, chromium, lead, and vanadium). For these COPCs, the concentrations dissolved in groundwater are low and the rates of migration through surface water, soil, and groundwater systems in the dissolved phase should be very slow or insignificant.

The remaining metals (antimony, arsenic, cadmium, cobalt, copper, iron, manganese, nickel, and zinc), most of the energetic compounds, some of the VOCs [1,1,2,2-PCA, 1,1,2-trichloroethane (1,1,2-TCA), and PCE], and ammonia have moderate affinities for sorption to soil and can therefore move through the environment more quickly than the COPCs listed above. However, their mobility and migration rates are still impeded by sorption and in some cases solubility constraints.

The COPCs with the lowest affinities for sorption (i.e., lowest K_{oc} and K_d values) are RDX, 2-amino-4,6-dinitrotoluene (2ADNT), 4-amino-2,6-dinitrotoluene (4ADNT), 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethene (1,1-DCE), TCE, cis-1,2-DCE, vinyl chloride, and nitrate. These compounds have the greatest mobilities and should migrate quickly through soil, groundwater, and surface water systems. As discussed in Section 5.0, TCE and RDX have migrated into more media and have been detected in more samples than any other organic COPC.

The K_ds of the metals are intermediate to high in value and indicate that the metals should be relatively immobile. However, the natural soils and groundwater associated with the Pennsylvanian-age rocks in southern Indiana are slightly too strongly acidic because:

- The Pennsylvanian shales, coals, and sandstone units typically contain pyrite, which forms sulfuric acid when oxidized.

- The near-surface rocks have undergone chemical and physical weathering through a very long period of geologic time, which has allowed the oxidation of pyrite and the leaching and removal of any carbonate minerals that may have once been present in the rocks.

- The residual soils and near-surface rock units have been subjected to acid rain in recent decades.

Because of lower pH values in the soils, bedrock, and groundwater, the solubilities of most metals are generally higher than would be expected at near-neutral pH values. In addition, the K_d values of most of the metals are depressed. Therefore, the higher concentrations of metals causing screening level exceedances, as described in Section 5.0, may be due in large part to the lower pH values that are naturally prevalent.

Another factor which greatly affects the solubilities and mobilities of iron, manganese, chromium, and arsenic are their valence states. Each of these metals has more than one valence state that is stable in nature. The oxidation-reduction conditions of the soil, bedrock, groundwater, or surface water systems where these metals reside will control the valence states of the metals in each specific environment and location. Iron and manganese are much more soluble and mobile under reduction conditions, where the reduced forms of these metals (Fe^{+2}, Mn^{+2}) are most prevalent. Chromium is more soluble and mobile under oxidizing conditions (i.e., surface soils and surface waters), where the oxidized ionic species (Cr^{+6}) should be most prevalent.

Even though many of the energetic compounds, several VOCs, and many of the metals have relatively high affinities for adsorption to soil and sediment, they can still move through the environment away from a source area via erosion and sediment transport (i.e., surface water pathway) or via wind erosion and transport.

6.1.2 Biodegradation

As shown in Tables 6-1 and 6-3, HMX, RDX, and many of the VOCs biodegrade relatively slowly (e.g., 3-30 year half-lives) in groundwater. Some of the VOCs and TNT degrade more quickly (e.g., 0.5-3.0 year half-lives). Metals do not degrade at all. Hence, it is probable that the total mass of the VOCs and energetic compounds at SWMU 16 will decrease slowly over time as a result of degradation (chemical and biological). An exception to this is TNT, which appears to have degraded very quickly. TNT was not detected in any soil or sediment samples and was detected in only one groundwater sample. However, its degradation products (2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, 2-nitrotoluene, and 3-nitrotoluene) are present in several groundwater samples (Tables 3-9 and 3-20).

Numerous laboratory studies and past site investigations at Department of Defense facilities have yielded information on the biodegradation of energetic compounds (see Table 6-3). TNT in soils, groundwater, and surface water can degrade biotically or abiotically and can degrade under a fairly wide range of pH and Eh conditions (Price et al., 1997; Brannon et al., 1998; Talmage et al., 1999). The two most common degradation products of TNT found in soils and groundwater have been 2ADNT and 4ADNT (Li et al., 1981; Daun et al., 1998; Pennington et al., 1999a,b,c). These compounds subsequently degrade to diaminonitrotoluene compounds and other less reactive compounds. As mentioned above, 2ADNT and 4ADNT have been found in gully waters (Table 3-9) and the uppermost groundwaters (Table 3-20) collected at SWMU 16, where TNT was not detected. Thus, there is ample evidence that TNT has almost completely degraded at SWMU 16.

Scientific studies have shown that HMX and RDX are also biodegraded in soils and groundwater (Tables 6-1 and 6-3). However, the half-lives of HMX and RDX are thought by most researchers to be relatively long (e.g., 20-40 years), especially in soils. DNX, MNX, and TNX are typically cited as the most prevalent daughter products of RDX biodegradation. DNX and MNX have been detected in numerous groundwater samples collected from the upper monitoring zone (Tables 3-20 and 3-29).

HMX is the energetic compound detected at SWMU 16 that is theoretically most resistant to biodegradation. Although HMX degradation is most likely occurring at a slow rate at SWMU 16, there are no known compounds which can be identified at SWMU 16 that are explicitly attributable to HMX degradation.

PCE and TCE are chlorinated ethene compounds with four and three chlorine atoms, respectively. Since PCE has not been detected in any surface or subsurface soils and has been detected at much lower concentrations than TCE in surface water and groundwater samples collected at SWMU 16, it is assumed that PCE was not a primary solvent used at SWMU 16, but was a trace constituent of TCE solvents that were used.

At sites contaminated with chlorinated solvents, most of the solvent degradation occurs by reductive (anaerobic) dechlorination (RD) (U.S. EPA, 1998), although aerobic processes can also biodegrade the less-chlorinated ethenes. RD is a microbially-mediated reaction whereby a chlorine atom on a chlorinated solvent is replaced by a hydrogen atom (Vogel and McCarty, 1987). In aerobic bioremediation processes, an organic contaminant, such as benzene, acts as an electron donor and another compound (e.g., oxygen, nitrate, and sulfate) acts as the electron acceptor. However, during RD, hydrogen acts as the electron donor and the halogenated aliphatics act as the electron acceptors and thus become reduced, as shown in the following half-reaction (Aziz et al., 2000):

$$R\text{-}Cl + H^{+} + 2e^{-} \rightarrow R\text{-}H + Cl^{-}$$

During RD, hydrogen atoms are consumed (i.e., alkalinity is produced) and chloride ions are produced.

PCE and TCE are part of a biodegradation chain that involves the sequential dechlorination of ethene compounds:

PCE → TCE → cis-1,2-DCE → vinyl chloride → ethene

One molecule of cis-1,2-DCE is created for each molecule of TCE degraded and so on down the chain. Other DCE isomers (trans-1,2-DCE and 1,1-DCE) can also be produced in minor amounts during the dechlorination of TCE (Vogel and McCarty, 1985; Vogel and McCarty, 1987; Aziz et al., 2000).

As stated above, TCE is likely the primary chlorinated ethene solvent released at SWMU 16. The other ethene compounds detected in groundwater (i.e., cis-1,2-DCE, vinyl chloride, and ethene) are most likely degradation products resulting from RD and/or aerobic biodegradation processes. 1,1-DCE has also been detected in several Puz monitoring wells. It is unclear if this compound was used at SWMU 16, is a degradation product of TCE, or is a trace constituent of another solvent.

1,1,2,2-PCA and 1,1,2-TCA are chlorinated solvents that are commonly used at industrial or paint-related operations. At SWMU 16, very minor concentrations of 1,1,2,2-PCA were detected in groundwater (Table 6-4). However, 1,1,2-TCA was detected in a few subsurface soil samples and several Puz monitoring wells (Tables 3-29 through 3-32, and 6-4). 1,2-DCA is usually considered to be the main biodegradation product of 1,1,2-TCA (Lorah et al., 1997; Lorah and Olsen, 1999); 1,2-DCA has been detected infrequently and at low concentrations in SWMU 16 Puz groundwaters, which implies that 1,1,2-TCA is probably being degraded to 1,2-DCA at a slow rate.

6.1.3 Plant Uptake

Recent research by the USACE (May et al., 2003) suggests that plant uptake and phytoremediation may also be removing, degrading, and volatilizing RDX and TNT from the soils at the Ammunition Burning Grounds (SWMU 3) at NSWC Crane. During the SWMU 13 RFI, vegetation samples were collected from trees and shrubs located on the northwest side of the ridge containing SWMU 13. Results of the leaf analyses showed a relatively high frequency of detections of RDX, HMX, TNT, and degradation products in the 16 vegetation samples that were analyzed. Similar uptake of contaminated groundwater may be occurring at SWMU 16.

6.2 CONCEPTUAL SITE MODEL AND MIGRATION OF CONTAMINANTS

Figure 6-1 presents a schematic diagram of pathways that contaminants may take as migration routes from the site. Table 6-4 presents an overall summary of chemical analyses performed on the samples collected from SWMU 16. For each medium or subset of medium, the average and maximum COPC concentrations are presented. This summary is intended to present the overall picture of which chemicals are migrating, which ones are the most widespread, and which ones have the potential to migrate further.

6.2.1 Historical Operations and Releases

B146 was an explosives fill and pressure washout facility with two large and one prototype, oil-fed rotary kiln incinerators. Ash and slag residues from the incinerators were piled on the ground outside the building. The incinerators were closed in the early 1990s. The incinerators and ash piles were removed along with some obviously contaminated soil.

Site operations also included cast loading (melt pouring of TNT, RDX, and HBX into projectiles), demilitarization and high-pressure washout. Prior to 1978, the generated wastewater was discharged through a storm drain to a ditch, with ultimate transport to Boggs Creek. After 1978, wastewaters generated at Building 146 were transported to the Rockeye Treatment Facility for treatment.

Two sumps, which are located on the eastern and western sides of B146, received discharges from floor drains in B146. These sumps discharged through terra cotta tile pipes into ditches in the woods. Terra cotta drains are known for leakage potential. Both sumps were expected to contain explosive-contaminated water and sludges. However, when sampled, it was determined that the sumps also contained significant quantities of TCE, with the west sump having the highest concentrations. The east sump was piped to the west sump and an air stripper was installed to remediate TCE contamination during 1995 and 1996. The clay tile discharge lines leading away from the sumps were plugged when the stripper was installed. Shortly after the air stripper was installed, it was found that storm water draining from the roof of B146 was flowing into the sumps and causing them to overflow. The roof drains were rerouted to separate discharge lines that discharge into ditches. The air stripper was operated until TCE levels were low enough to allow direct discharge of the sumps into the sanitary sewer system. The discharges from the sumps were then rerouted to the sanitary sewer system.

Major contaminants from Building 146 loading and washout activities were TNT, RDX, HBX (mixture of RDX, TNT, aluminum, and wax) , Composition A (RDX and beeswax), Composition B (RDX, TNT, and wax), and ammonium picrate. The primary metals of concern associated with the incinerator operations are the heavy

metals lead, barium, cadmium, chromium, and mercury. PAHs and undetonated explosives have also been detected in ash from the APE-1236 incinerators.

Potential historical contaminant migration pathways at Building 146 include air, surface water, and groundwater. Air should no longer be a migration pathway of significance because the furnaces and ash piles have been removed. Release of contaminants from surface and subsurface soils to surface water and groundwater is still a possibility.

6.2.2 Conceptual Physical Model and Hydrology

For SWMU 16, the building drain lines, the three sumps, the incinerator, and the ash pile were all potentially sources of site-related contaminants. The original sources of contaminants have been removed or remediated. However, surface and subsurface soils are contaminated and there still exists potential for COPCs to leach out of the soils and enter the surface water or groundwater transport systems. There is also potential for the soils to erode and be transported by surface runoff and effect surface waters and sediment in drainageways downhill from SWMU 16. Figure 6-1 presents a schematic diagram of pathways that contaminants may take as migration routes from the site. The contaminants originate in the overburden soil and sumps at SWMU 16 (Location A, Figure 6-1). The contaminants that are leached and/or eroded from the soils may enter the gullies that drain the site and transport surface water down the sideslopes of the ridge on which SWMU 16 is located (Pathway D).

Contaminants have been migrating downward and entering the shallow groundwater flow system (Pathway B), probably since the beginning of SWMU 16 operations in the 1940s. The majority of groundwater in the shallow sandstone (Puz, Upper Pennsylvanian water-bearing zone) and the intermediate zone (Pmz) is moving southeastward or southwestward (Figures 4-7 and 4-8). This Puz and Pmz intercept the land surface (i.e., crop out) along the upper portions of the ridge between elevations of 730 and 760 feet above msl. The groundwater in the Puz and Pmz that reaches the outcrop area will theoretically travel in one of three pathways; the groundwater will either be taken up by vegetation and transpired (Pathway B1), seep into gullies at the ground surface and join surface water in the gullies traveling downhill (Pathway B2), or will migrate down the side of the hill along the bedrock/soil interface which lies one to three feet bgs (Pathway B3).

A small portion of the groundwater in the Pmz is migrating downward through a shale and siltstone aquitard and enters the deeper groundwater flow system in the Lower Pennsylvanian water-bearing zone (Plz). This deeper groundwater (Pathway C) is flowing primarily toward the nearest streams (Figure 4-9). However, the primary and secondary permeability of this water-bearing zone is less than the Puz and Pmz and the groundwater flow velocities are consequently lower in the deeper groundwater system.

During storms and high flow events, most of the surface water flowing down the hillside (Pathway D) probably enters Turkey Creek as overland flow in the drainageways (Pathway D1). As the surface water reaches the valley bottom it slows down and some of the surface water will infiltrate into the soils and alluvial deposits (Pathway D2) and continue to flow toward the creek as subsurface flow. This D2 groundwater will mix with the deep groundwater migrating from within the ridge (Pathway C) and groundwater moving downhill along the bedrock/soil interface and into surface fractures (Pathway B3). This mixing will likely occur in the valley bottom sediments and the creek channel.

Ultimately the creek, when flowing, will have water in it from several different sources: surface water from upvalley (i.e., upstream of sampling location 16SW/SD18), surface water discharge from the gullies (D1), and groundwater emanating from the valley floor deposits. This section of Turkey Creek is dry for a good portion of the year, but groundwater may still be traveling down the valley as underflow in the valley bottom deposits even when the creek bed is dry.

6.2.3 Energetic Compounds

As shown in Table 6-1, the energetic compounds are virtually absent in the SWMU 16 soils, gulley sediments, and Turkey Creek sediments. These data provide evidence that energetic compounds are not reaching the gullies or Turkey Creek in solid form (i.e., sorbed to sediment) in sufficient quantities to cause measurable effects to the creek sediments.

A comparison between RDX and HMX detected in the surface water and sump samples clearly shows that energetic compounds were found at highest concentrations in the north sump and at relatively low concentrations (RDX < 10 µg/L) in the other two sumps (Table 6-4). RDX and HMX were detected in three out of seven gully water samples analyzed for energetic compounds. Concentrations of HMX and RDX at 16SW/SD30 on the east side of SWMU 16 were moderate (4.8 and 24 µg/L, respectively), but concentrations of HMX and RDX were very low ($\leq$ 0.51 µg/L) at sampling site 16SW/SD15, which is located at the most downstream end of the eastern gully system. This information suggests that some energetic compounds are migrating southeastward through the eastern drainage system, but the concentrations are low by the time the gully drains into Turkey Creek. A very low concentration of HMX (0.32 µg/L) was detected in Turkey Creek at site 16SW/SD24. Thus, there is a very minor impact to Turkey Creek as a result of HMX migration. Note that no energetic compound was detected in the single upstream (background) sample (16SW/SD18) collected from the creek (Table 3-15). This corroborates the assertion that SWMU 16 is a source of energetic compound contamination in Turkey Creek and gullies.

In groundwater, the energetic compounds and degradation products are present in over half of the Puz samples and about a third of the Pmz samples, but are completely absent in the five Plz and two valley bottom monitoring wells. The concentrations of all energetic compounds are much higher in the Puz when compared against the Pmz monitoring wells (Table 6-1), even though there is less than 10 feet of vertical distance separating these two sets of monitoring wells. The complete absence of energetic compounds from the lower groundwater zone (Plz) is very strong evidence that the aquitard separating the Puz and Pmz from the underlying Plz is an effective aquitard, and is causing nearly all of the shallow groundwater in the ridgetop to flow laterally to the edge of the hillside. The fact that the concentrations of energetic compounds (averages and maxima) found in the Puz groundwaters are much higher than the concentrations detected in the Pmz groundwaters is further evidence that most contaminants leaching from SWMU 16 soils and sumps are confined to the uppermost groundwaters in the ridge and are not migrating downward through the core of the ridge (Pathway C, Figure 6-1).

Overall, the energetic compounds RDX and HMX are the most widespread energetic contaminants that can be attributed to SWMU 16; however, these explosives are not migrating downward through the groundwater system and are migrating through the surface water system in a very minor way. A very low concentration of HMX was detected in Turkey Creek on a single occasion. Thus, the impacts to the creek are minor and the export of energetic compounds down the Creek is barely detectable on some occasions and perhaps not detectable at all other times of the year (i.e., Pathway E, Figure 6-1).

6.2.4 Volatile Organic Compounds

Chlorinated VOCs of two different degradation chains (1,1,2,2-PCA and PCE) were detected in SWMU 16 surface soils and subsurface soils (see Section 5.0). Spills and/or leaks of these solvents occurred beneath Building 146, in subsurface drain lines, and/or the three sumps. These VOCs were detected in higher concentrations and more frequently in the subsurface soils than in the surface soils. This is probably due to the fact that most of the VOCs were originally released in the subsurface (i.e., sumps, buried drain lines, beneath the building) and partially due to the fact that over the years since release, the VOCs in surface soils may have volatilized and escaped to the atmosphere, thus reducing surface soil concentrations.

Only moderate concentrations ($\leq$ 8.8 µg/L) of TCE and cis-1,2-DCE have been detected in water samples from the three sumps. PCE, vinyl chloride, 1,1,2,2-PCA, and 1,1,2-TCA and degradation products have not been detected in these sumps. This suggests that the sumps are not presently a significant source of VOCs, but were likely sources in the past, as discussed below. Distributions of VOCs in soil suggest that leaks beneath Building 146 were a significant source of VOCs in soil (see Section 5.0).

There was a slight presence of TCE and cis-1,2-DCE detected in two gully sediment samples, but none of the chlorinated VOCs listed in Table 6-1 was detected in the Turkey Creek sediment samples. Thus, surface transport of sorbed VOCs is not a significant transport pathway for the VOCs.

Very large concentrations of 1,1,2-TCA, TCE, cis-1,2-DCE, and vinyl chloride have been detected in the uppermost groundwater monitoring zone (Puz), particularly in wells 16MWT06, 16MWT13, and 16MWT17, which are located immediately downgradient of the east, west, and north sumps, respectively (see Figure 5-32 and 5-33). Most other Puz monitoring wells either have not shown any presence of VOCs or had very low concentrations detected. This is strong evidence that the east and west sumps are locations of where VOCs have historically been released, but these are not current sources of VOC contamination. VOCs were also detected in monitoring well 16MWT16 (see Figures 5-32 and 5-33), thereby suggesting that leaks beneath Building 146 might also have been a source of VOCs entering the subsurface media. Because TCE and several other VOCs have reached the outermost edge of the Puz, there is a strong likelihood that these contaminants are seeping into the surface soils, discharging to the gullies on the hillside (Pathway B2), or evaporated or transpired by vegetation (Pathway B3). Any VOCs entering the gullies are probably evaporating to a significant extent since they are being detected in gully waters very infrequently and at concentrations that are orders of magnitude less than concentrations detected in the Puz groundwater.

The frequency and the concentrations of VOCs detected in the Pmz groundwater samples were far less than maximum and average concentrations detected in the Puz groundwaters (see Table 6-1). For example, the maximum and average TCE concentrations in the Pmz were about three orders of magnitude less than the Puz groundwaters. In addition, none of the VOCs listed in Table 6-1 were detected in the Plz or the valley bottom wells. Thus, there is very strong evidence that the contaminated shallow groundwater is not migrating downward and is not affecting deeper groundwaters beneath the ridge.

The spatial distribution of RDX and TCE in the Puz aquifer are very similar (see Figures 5-31 and 5-33), suggesting that they have a relatively similar locations and timing history of release. Because RDX and TCE are both found at concentrations in the Pmz that are two to three orders of magnitude less than concentrations found in the Puz (see Table 6-4), it is evident that the downward migration of RDX and TCE are greatly inhibited. It is not so much the lack of migration time that has prevented significant downward movement of TCE, but rather the low permeability of the shales and siltstone below the Puz that has inhibited downward movement. The large drop in hydraulic heads between the Puz and the Pmz wells supports the conclusion that downward flow is inhibited. Thus, there are strong lines of evidence (both physical and chemical) that the contaminated shallow groundwater in the Puz is migrating very slowly down to the Pmz, and has not reached the Plz at all.

In summary, VOCs have apparently been released from the sumps in the past and from beneath Building 146. These releases have impacted the surface and subsurface soils and the shallow groundwater at the site. However, the VOC contaminants are not significantly affecting surface water quality and have had not migrated at all to deeper groundwater.

6.2.5 Metals

The average and maximum concentrations of 14 metals in media sampled at SWMU 16 are listed in Table 6-1. As stated in Section 5.0, metals are naturally occurring and it is often difficult to discern what concentrations are the result of natural occurrence and what concentrations are indicative of site-related contamination.

Metal concentrations (e.g., aluminum, antimony, chromium, copper, lead, and zinc) are elevated in the SWMU 16 surface soils relative to background soils (see Figures 5-1 through 5-9). The elevated metals in the surface soil may have resulted from the operation of two kilns, located at the south end of Building 146, which were used in the past for the incineration of munitions. The incinerators have not been used since the early 1990s. Waste residues and ash from the incinerators were removed from the site prior to the RFI activities. However, small amounts of ash, bullet fragments, and metal fragments can still be found in the soil around the southern and western sides of Building 146.

Several metals, notably copper, lead, and zinc, are elevated in gully sediments, collected from the southern and southwestern sides of the ridge top (sampling locations 16SW/SD03 through 16SW/SD06, 16SW/SD09, and 16SW/SD10; see Figures 5-25, 5-27, and 5-30). As shown in Figures 5-15, 5-16, 5-19, 5-25, 5-27, and 5--30, the concentrations of copper, lead, and zinc in surface soils and sediments decrease rapidly down the hillside, so the area affected is limited to the upper part of the ridge. There are no noticeable impacts to the metal concentrations in sediments in Turkey Creek (the metal concentrations detected at the upstream sampling station; 15SW/SD18, are very similar to concentrations detected at the downstream sampling station, 15SW/SD19). Overall, the distribution of copper, lead, and zinc in soils and sediment suggest that SWMU 16 is a source of these three metals, and that concentrations in both media (surface soil and sediment) decrease rapidly down the hillside.

For surface waters, the maximum and mean concentrations of total metals in the gullies, in general, were greater than the concentrations detected in Turkey Creek (Table 6-1). Because Turkey Creek receives all water from these gullies, this suggests that Turkey Creek is being impacted to a minor extent.

In groundwaters, the highest average and maximum concentrations of arsenic, cadmium, cobalt, manganese, nickel, and zinc (six metals) were detected in the Pmz. Whereas, the highest concentrations of the other eight metals listed in Table 6-1 were detected in the Plz (the lowermost groundwater samples). The upper monitoring wells (i.e., Puz) contained the lowest concentrations of all 14 metals. Thus, there is strong evidence that SWMU 16 is not a contributor to metal contamination in groundwater. The source of elevated metal concentrations in the deeper groundwater may be due to a combination of factors, including pyritic bedrock units, acidic groundwater, and natural leaching of shales and siltstones that are rich in these metals.

6.2.6 Inorganic Nitrogen Compounds

Soils and sediment samples have not been analyzed for nitrate and ammonia. Analyses of surface waters, groundwaters, and sump waters have shown that the sump waters do contain moderate concentrations of nitrate and ammonia (up to 3.3 mg/L), but concentrations in all groundwaters and surface waters are relatively low (<1.0 mg/L), so it does not appear that SWMU 16 has been a significant source of nitrate and ammonia entering the surrounding environment (Table 6-1).

6.3 SUMMARY OF CONCEPTUAL SITE MODEL

Figure 6-1 is a schematic diagram of the conceptual flow and transport model for SWMU 16. Past operations at the site resulted in the release of explosives residue (primarily RDX and HMX) and chlorinated VOCs to surface and subsurface soils surrounding B146 and the three sumps located north, east, and west of B146. Current releases of contaminants are limited or nonexistent at the SWMU 16, because operations have changed and/or control measures have been instituted to eliminate releases. However, it is unclear whether release of RDX from the north sump is continuing to occur. The following is a summary of the conceptualized aspects of contaminant migration, fate, and persistence at SWMU 16:

- Explosives, primarily RDX, and to lesser extent HMX and TNT were released to soils and sumps.
- Chlorinated solvents, primarily TCE, have been released to soils and sumps.
- Interim remedial actions were taken to plug off the east and west sumps, clean out the east and west sumps, and divert all flow from the Building 146 floor drains into the sanitary sewer..
- The upper zone of groundwater has been contaminated with explosives (primarily RDX, and to a lesser extent HMX and TNT degradation products) and chlorinated VOCs (primarily TCE and 1,1,2-TCA, and their degradation products).

- Nearly all of the groundwater in the uppermost bedrock (i.e., the Puz) is flowing laterally toward the upper slopes of the ridge. Some of this groundwater seeps into the gullies on the side of the ridge, and some of the contaminated groundwater may be taken up by trees and other vegetation and transpired. Thus, natural phytoremediation may be playing a part in controlling and reducing the rate of contaminants reaching the base of the ridge and entering the tributary stream.

- Chlorinated solvents (TCE) in groundwater are degrading as evidenced by the presence of degradation products.

- Some of the explosives contaminants (mainly RDX and HMX), TCE, and cis-1,2-DCE are reaching the gullies on the northwest side of the site, which is a tributary of Turkey Creek.

- Low to moderate concentrations of RDX, HMX, and TCE have reached the middle groundwater monitoring wells (i.e., Pmz). The siltstone and shale layers between the upper and middle water-bearing zones are a partially effective aquitard and prevent much of the shallow groundwater and contaminants from reaching the intermediate groundwater system in the ridge.

- No explosive compounds and minor concentrations of VOCs have been detected in the lower Pennsylvanian water-bearing zone or the valley bottom wells. The siltstone and shale layers between the middle and lower water-bearing zones are an effective aquitard and prevent most shallow groundwater and contaminants from reaching the deeper groundwater system beneath the ridge.

- Contaminants continue to leach from the surface and near-surface soils and migrate downhill in steep gullies on the northwestern and southeastern sides of the ridge. Low to moderate concentrations of explosives and VOCs were detected primarily in the gullies leading down the northwest side of the ridge.

- Turkey Creek is the recipient of all waters (surface or subsurface) that flow away from SWMU 16 and the ridge containing SWMU 16. Metals and HMX contained in runoff water from SWMU 16 are causing minor impacts to Turkey Creek.

- The overall concentrations of metals in groundwater appear to be higher in the middle (Pmz) and lower (Plz) water-bearing zones, and much lower in the upper water-bearing zone, which is the opposite of the site-related organic contaminants. Thus, the evidence suggests that the elevated metal concentrations in groundwater are not site-related, but are due to the natural oxidation, weathering, and leaching of the Pennsylvanian rock units.

TABLE 6-1

CHEMICAL AND DEGRADATION CHARACTERISTICS OF SITE CONTAMINANTS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Chemical	Solubility (mg/L)	K_{oc} (L/kg)	K_d (L/kg)	Biodegradation Half-Life (years)
Energetic Compounds				
HMX	5.0 [4], 6.6 [7], 2,556 [1]	631 [7], 1,853 [1]	0.505 - 14.8 [10]	39 [6]
RDX	38.4 [7], 42.0 [4], 59.7 [1]	7.6 - 251 [7], 195.4 [1]	0.1 - 7.8 [8]	0.88 - 36 [9]
DNX	N/A	N/A	N/A	N/A
MNX	N/A	N/A	N/A	N/A
2,4,6-trinitrotoluene	130 [1,4]	1,585 [7], 1,834 [1]	0.08 - 22.2 [8]	0.1 - 10.7 [9]
2-amino-4,6-dinitrotoluene	1,223 [1], 2,800 [4,7]	100.5 [1]	4 [7]	< 0.05 [9]
4-amino-2,6-dinitrotoluene	1,223 [1], 2,800 [4,7]	100.5 [1]	4 [7]	< 0.05 [9]
VOCs				
1,1,2,2-tetrachloroethane	2,870 [1], 2,970 [2]	93.3 [2], 106.8 [1]	0.07464 - 0.08544 [10]	0.02 - 0.5 [5]
1,1,2-trichloroethane	1,100 [1], 4,420 [2]	50.1 [2], 67.7 [1]	0.04 - 0.05416 [10]	0.22 - 0.43 [11]
1,2-dichloroethane	5,100 [1], 8,520 [2]	17.4 [2], 43.79 [1]	0.01392 - 0.035 [10]	0.58 - 3.47 [11]
1,1-dichloroethene	2,250 [2], 2,420 [1]	35.04 [1], 58.9 [2]	0.028 - 0.047 [10]	0.08 - 0.5 [5]
tetrachloroethene	200 [2], 206 [1]	106.8 [1], 155 [2]	0.0854 - 0.124 [10]	0.29 - 0.87 [11]
trichloroethene	1,100 [2], 1,280 [1]	67.7 [1], 166 [2]	0.054 - 0.133 [10]	0.22 - 2.31 [11]
cis-1,2-dichloroethene	3,500 [1,2]	35.5 [2], 43.79 [1]	0.0284 - 0.035 [10]	0.03 - 6.93 [11]
vinyl chloride	2,760 [2], 8,800 [1]	18.6 [2], 23.74 [1]	0.015 - 0.019 [10]	0.06 - 1.73 [11]
Metals				
aluminum	WR	NA	1500 [1]	0
antimony	WR	NA	45 [1,3]	0
arsenic	WR	NA	29 [1,2], 200 [3]	0
cadmium	WR	NA	6.4 [3], 75 [1,2]	0
chromium, total	WR	NA	850 [1,3]	0
cobalt	WR	NA	45 [1]	0
copper	WR	NA	35 [1]	0
iron	WR	NA	25 [1]	0
lead	WR	NA	900 [1]	0
manganese	WR	NA	65 [1]	0
nickel	WR	NA	65 [1,2], 150 [3]	0
vanadium	WR	NA	1000 [1,3]	0
zinc	WR	NA	38 [3], 62 [1,2]	0
Nitrogen Compounds				
ammonia-N	3740 [1]	NA	NA	N/A
nitrate/nitrite-N	90900 [1]	NA	NA	N/A

N/A = Not Available
NA = Not Applicable
WR = Wide Range is possible, depending on pH, groundwater composition, and other geochemical conditions.
L/kg = Liters per kilogram

References:

1 Oak Ridge National Laboratory (2005)
2 U.S. EPA (2002, Tables C-1 and C-4, pH = 6.8)
3 Baes and Sharp (1983) and Baes et al. (1984)
4 U.S.EPA (2005)
5 Howard et al. (1991)
6 Tomkins (2000)
7 Talmage et al. (1999)
8 See Table 6-2
9 See Table 6-3
10 K_d calculated by multiplying K_{oc} times f_{oc} value of 0.0008 (average measurement of two SWMU 13 soil samples)
11 Aziz et al., 2002

TABLE 6-2

PARTITION COEFFICIENTS OF ENERGETIC COMPOUNDS
SWMU 16 – CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

COMPOUND	Kd (1) (L/kg)	REFERENCE
RDX	0.21 - 0.33 (0.30)	Pennington et al., 1999c
	0.80 - 4.15 (2.67)	Sikka et al., 1980
	1.4, 4.2 (2.8)	Spanggord et al., 1980b
	0.2 - 7.8 (4.05)	Hale et al., 1979
	(2.17)	Layton et al., 1987
	0.101, 0.284 (0.19)	AMEC, 2001
	1.57, 1.59 (1.58)	Xue, Iskandar, and Selim, 1995
	0.12 - 2.37 (0.89)	Ainsworth et al., 1993
	0.95, 0.97 (0.96)	Singh et al., 1998
	0.2 - 7.8	Townsend and Meyers, 1996
	6.38	Sheremata et al., 2001
	0.29	Price et al., 2000
	0.42	May et al., 2003
TNT	2.0 - 11.0 (4.0)	Pennington and Patrick, 1990
	5.5 - 22.2 (14.6)	Sikka et al., 1980
	5.5 - 19.3	Spanggord et al., 1980a
	1.1, 2.5 (1.8)	AMEC, 2001
	0.08 - 0.33 (0.23)	Pennington et al., 1999c
	2.58	May et al., 2003
2ADNT	3.7, 4.9 (4.3)	Pennington and Patrick, 1990
	2.42	May et al., 2003
4ADNT	2.42	May et al., 2003

1 Individual values or range of values listed in column; average value shown in parentheses.

TABLE 6-3

BIODEGRADATION CHARACTERISTICS OF ENERGETIC COMPOUNDS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

COMPOUND	Half-Life[1] (years)	Reference
RDX	36 0.88 - 10.7+ (10.6)	DuBois and Baytos, 1991 Pennington et al., 1999c
TNT	1.0 0.1 0.88 - 10.7+ (4.1) 1.11	DuBois and Baytos, 1991 Cataldo et al., 1989 Pennington et al., 1999c May et al., 2003
2ADNT	< 0.05 < 0.05	Funk et al., 1993 Alvarez et al., 1995
4ADNT	-	-

1 Individual values or range of values listed in column; average value shown in parenthese

TABLE 6-4

GENERAL LEVELS OF CONTAMINANT CONCENTRATIONS IN EACH ENVIRONMENTAL MEDIUM[1]
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Contaminant	mg/kg								µg/L											
	Surface Soil		Subsurface Soil		Gully Sediment		Mainstream Sediment		Sump Waters		Gully Surface Waters		Mainstream Surface Waters		Puz Groundwaters		Pmz Groundwaters		Plz and Valley Groundwaters	
	mean[2]	maximum	mean[2]	maximum	mean[2]	maximum	mean[2]	maximum	mean[2]	maximum	mean[2]	maximum	mean[2]	maximum	mean[2]	maximum	mean[2]	maximum	mean[2]	maximum
Energetic Compounds																				
HMX	0.000131	0.00034	ND	ND	ND	ND	ND	ND	9667	29000	0.869	4.8	0.32	0.32	4.31	21	0.381	1.3	ND	ND
RDX	ND	ND	ND	ND	0.135	0.27	ND	ND	29337	88000	3.56	24	ND	ND	40.6	200	0.837	4.8	ND	ND
DNX	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.195	0.63	ND	ND	ND	ND
MNX	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.881	4.1	ND	ND	ND	ND
TNT	ND	ND	ND	ND	ND	ND	ND	ND	0.909	2.1	ND	ND	ND	ND	0.371	4.8	ND	ND	ND	ND
2ADNT	ND	ND	ND	ND	ND	ND	ND	ND	0.506	0.89	0.149	0.29	ND	ND	1.81	29	ND	ND	ND	ND
4ADNT	ND	ND	ND	ND	ND	ND	ND	ND	0.943	2.2	0.198	0.63	ND	ND	1.08	14	ND	ND	ND	ND
2,4-DNT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.18	0.8	ND	ND	ND	ND
3-nitrotoluene	ND	ND	ND	ND	0.211	0.92	ND	ND	ND	ND	ND	ND	ND	ND	0.307	2.1	ND	ND	ND	ND
VOCs																				
1,1,2,2-tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.24	2.1	ND	ND	ND	ND
1,1,2-trichloroethane	ND	ND	0.00068	0.008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	27.6	220	ND	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.21	2.3	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15.8	160	ND	ND	ND	ND
tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16.5	160	0.158	0.3	ND	ND
trichloroethene	0.00101	0.170	0.253	9.00	0.00261	0.019	ND	ND	6.23	8.8	4.510	26.0	ND	ND	32,017	330,000	28.3	340	ND	ND
cis-1,2-dichloroethene	0.00251	0.073	0.007	0.20	0.000877	0.003	ND	ND	3.38	7.1	0.559	3.4	ND	ND	435	4,200	0.166	0.3	ND	ND
vinyl chloride	ND	ND	0.000753	0.012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36.8	390	ND	ND	ND	ND
Metals (total)																				
aluminum	12,037	34,200	10,285	26,700	11,885	19,500	9,658	10,500	114	298	1,647	9,510	331	822	1,250	5,810	10,578	53,900	48,418	296,000
antimony	2.85	27.2	0.298	1.4	30.9	174	0.843	1.1	ND	ND	3.25	14.2	ND	ND	ND	ND	ND	ND	1.34	6.30
arsenic	5.28	12.7	4.79	11.5	10.9	34.1	21.1	30.8	2.16	3.4	0.747	3.8	0.177	0.37	0.92	4.5	7.62	32.1	6.23	29.2
beryllium	0.409	1.4	0.396	2.4	0.802	2.3	1.55	2.4	ND	ND	0.115	0.5	0.0383	0.09	0.353	1.9	2.53	8.3	2.58	15.1
cadmium	0.506	2.8	0.163	0.74	6.27	27.2	0.534	0.79	ND	ND	1.35	4.4	0.235	0.66	ND	ND	0.818	4.0	ND	ND
chromium	16.9	38.2	16.3	48.2	33.2	85.2	51.7	79.9	1.84	3.4	2.3	11.8	ND	ND	1.05	5.5	8.09	73.6	72.8	452
cobalt	6.66	25.9	4.32	15.7	16.2	41.2	22.0	26.9	ND	ND	1.1	4.6	0.433	0.72	34.2	131	147	563	18.1	95.7
copper	51.4	413	11.7	34.8	468	2,570	14.1	15.1	9.97	17.2	34.1	134	1.55	4.1	3.31	12.4	8.29	51.5	16.2	86.1
iron	19,814	43,000	17,559	34,500	40,797	127,000	74,325	122,000	65	61	1,787	9,990	457	886	10,233	50,200	34,097	83,900	36,700	241,000
lead	127	1,240	12.9	71.1	1,730	15,200	28.0	32.9	5.93	13.1	48.4	281	0.47	1.2	1.27	6.6	8.54	54.8	20.7	127
manganese	275	1,040	104	415	1,005	2,510	1,337	1,900	20	44	71	443	200	476	4,670	24,600	9,178	29,300	735	3,800
nickel	12.9	41.3	10.4	35.6	48.7	804	34.6	43.4	1.02	1.8	5.01	11.8	5.3	5.7	75.2	219	278	808	66.6	338
vanadium	24.6	65.2	20.3	55.2	33.7	71.7	40.0	51.2	0.473	1.2	3.37	19	0.88	1.5	0.691	4.1	7.69	64.8	64.8	410
zinc	312	1,840	29.4	130	3,669	23,400	123	206	86.6	178	308	1,340	11.1	18.7	97.7	443	297	791	85.6	454
Miscellaneous																				
ammonia-N	NA	NA	NA	NA	NA	NA	NA	NA	937	2,800	ND	ND	ND	ND	288	570	234	410	ND	ND
nitrate/nitrite-N	NA	NA	NA	NA	NA	NA	NA	NA	1,670	3,300	203	560	50	50	284	700	18.9	70	ND	ND

µg/kg = microgram per kilogram
mg/kg = milligram per kilogram
NA = Not Analyzed
ND = Not Detected
Plz = Lower Pennsylvania zone
Pmz = Middle Pennsylvania zone
Puz = Upper Pennsylvania zone
VOC = Volatile organic compound

(1) - Background samples are not included in sample populations used to calculate means or maximum concentrations.
(2) - Mean value uses TV/2 for ND values (TV = threshold value, ND = analyte was not detected). All data are presented in Appencix G and statistical summaries of data are presented in Section 3.0.

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LEGEND:

PATHWAY DISCRIPTIONS:

A – CONTAMINANT SOURCE AREAS (OVERBURDEN SOIL AND SUMPS)

B – SHALLOW GROUNDWATER SYSTEM

B1 – GROUNDWATER TAKEN UP BY VEGETATION AND TRANSPIRED

B2 – SEEP INTO GUILLIES AT THE SURFACE AND JOIN SURFACE WATERS

B3 – MIGRATION ALONG BEDROCK/SOIL INTERFACE (1–3" bgs) AND INTO SURFACE FRACTURES

C – DEEP GROUNDWATER

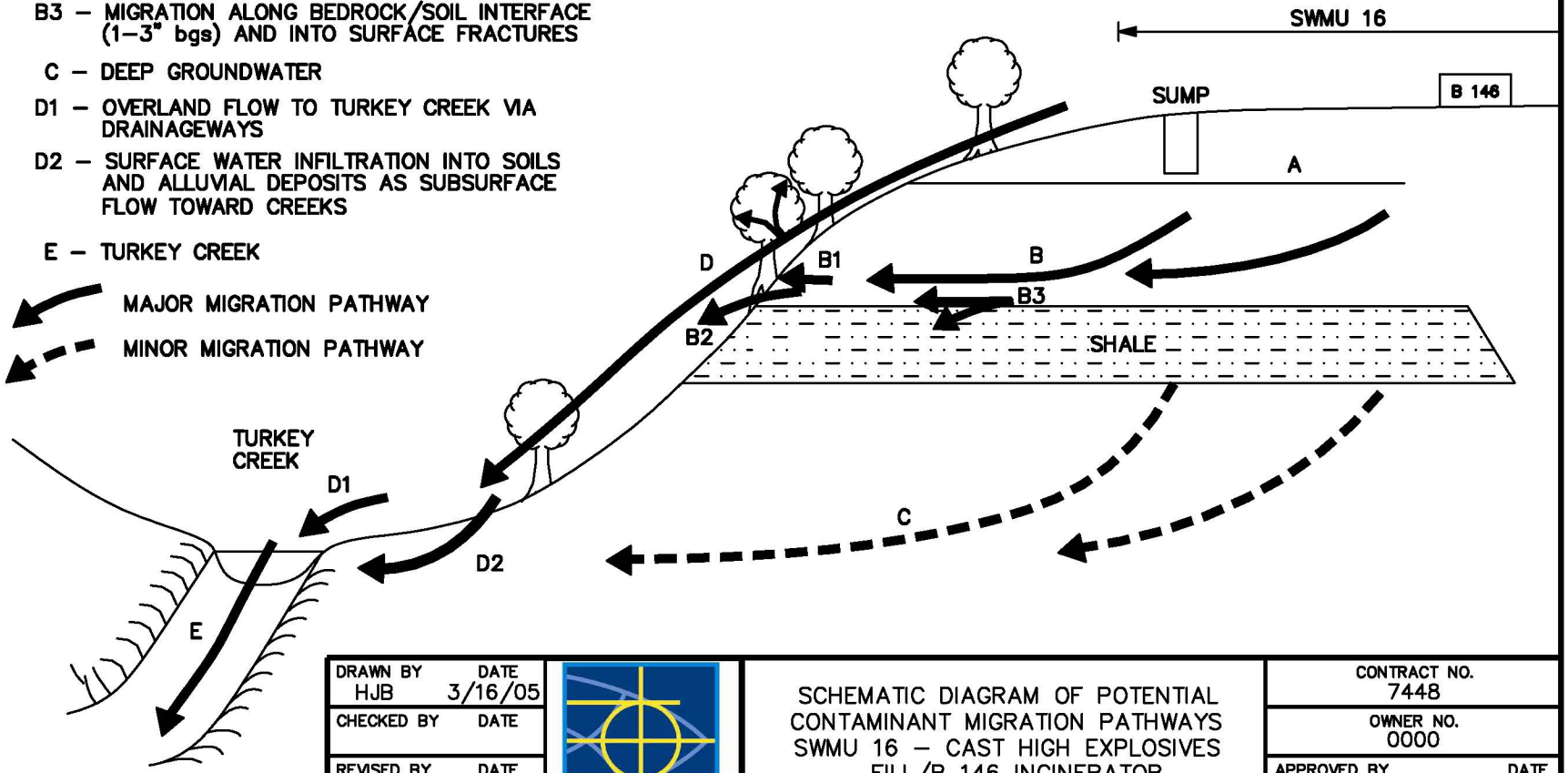
D1 – OVERLAND FLOW TO TURKEY CREEK VIA DRAINAGEWAYS

D2 – SURFACE WATER INFILTRATION INTO SOILS AND ALLUVIAL DEPOSITS AS SUBSURFACE FLOW TOWARD CREEKS

E – TURKEY CREEK

MAJOR MIGRATION PATHWAY

MINOR MIGRATION PATHWAY



DRAWN BY HJB	DATE 3/16/05	SCHEMATIC DIAGRAM OF POTENTIAL CONTAMINANT MIGRATION PATHWAYS SWMU 16 – CAST HIGH EXPLOSIVES FILL/B 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 6–1 / REV. 0

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

7.0 HUMAN HEALTH RISK ASSESSMENT

This section presents the HHRA for the Cast High Explosive Fill/B146 Incinerator (SWMU 16) at NSWC Crane. The objective of the HHRA is to determine whether detected concentrations of chemicals within the study areas pose a significant threat to potential human receptors under current and/or future land use. The potential risks to human receptors were estimated based on the assumption that no actions were taken to control contaminant releases.

7.1 INTRODUCTION

The following current U.S. EPA, the State of IDEM, and United States Navy risk assessment guidance documents were used to develop the framework for the baseline HHRA:

- Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (Part A) (U.S. EPA, 1989).
- Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (U.S. EPA, 1991).
- Distribution of Preliminary Review Draft: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure (U.S. EPA, 1993).
- Soil Screening Guidance: Technical Background Document (U.S. EPA, 1996).
- Exposure Factors Handbook. Office of Health and Environmental Assessment (U.S. EPA, 1997a).
- Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments) (U.S. EPA, 2001a).
- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final Guidance (U.S. EPA, 2004a).

- Supplemental Guidance for Developing Soil Screening Levels for Superfund Site. (U.S. EPA 2002a).

- Risk Integrated System of Closure. User's Guide and Technical Resource Guidance Document (IDEM, 2004).

This HHRA was prepared using essentially the same methodology used to prepare the HHRAs for SWMUs 4, 5, 9, and 10 (TtNUS, 2003c) and SWMU 3 (TtNUS, 2003d).

A HHRA consists of five components: data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Sections 7.2 through 7.6 contain detailed discussions of the five components of the HHRA. A schematic diagram of the general risk assessment process is provided as Figure 7-1.

Three major aspects of chemical contamination and environmental fate and transport must be considered to evaluate potential risks: (1) contaminants with toxic characteristics must be found in environmental media and must be released by either natural processes or by human action; (2) potential exposure points must exist; and (3) human receptors must be present at the point of exposure. Risk is a function of both toxicity and exposure. If any one of these factors is absent for a site, the exposure route is regarded as incomplete, and no potential risks are considered to exist for human receptors.

7.2 DATA EVALUATION

Data evaluation, the first component of a baseline HHRA, is a medium-specific task involving the compilation and evaluation of analytical data. The main objective of the data evaluation is to develop a medium-specific list of COPCs that will be used to quantitatively determine potential human health risks for site media.

7.2.1 Data Usability

Data from samples collected for the field investigations was used to assess risks to potential human receptors. A discussion of data validation protocol is provided in Section 3.1 of this report. A data quality report is included in Section 3.0 that provides information on precision, accuracy, representativeness, completeness, and comparability of the analytical data.

Fixed-based analytical results only for the Target Analyte Lists for the field investigation were used in the quantitative risk evaluation. Unfiltered results for groundwater and surface water were used to assess

risks associated with these media. Field measurements and data regarded as unreliable (i.e., qualified as "R" during the data validation process) were not used in the quantitative risk assessment.

7.2.2 Selection of COPCs

The selection of COPCs is a qualitative screening process used to limit the number of chemicals and exposure routes quantitatively evaluated in the baseline HHRA to those site-related constituents that dominate overall potential risks. Screening by risk-based concentrations was used to focus the risk assessment on meaningful chemicals and exposure routes.

In general, a chemical was selected as a COPC and retained for further quantitative risk evaluation if the maximum concentration detected in a sampled medium exceeds a conservative concentration(s). Chemicals eliminated from further evaluation during this evaluation are assumed to present minimal risks to potential human receptors.

7.2.2.1 Derivation of Screening Criteria

Several types of screening levels were used to identify COPCs for SWMU 16. Screening concentrations based on U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) (U.S. EPA, Region 9, 2004b) and IDEM Risk Integrated System Closure (RISC) default closure levels were used, as well as other U.S. EPA criteria. The risk-based U.S. EPA Region 9 screening concentrations correspond to a Hazard Quotient (HQ) of 0.1 (for noncarcinogens) or an Incremental Lifetime Cancer Risk (ILCR) of 1×10^{-6} (for carcinogens). It should be noted that the U.S. EPA Region 9 PRGs for non-carcinogens are based on a Hazardous Index (HI) of 1. The Region 9 PRG values for non-carcinogens were multiplied by 0.1 to account for potential cumulative effects of several chemicals affecting the same target area or producing the same adverse non-carcinogenic health effect.

The IDEM default closure levels for soil are based on the lower of the risk based direct contact criteria, soil attenuation capacity, soil saturation concentration, and migration from soil to groundwater criteria. The IDEM default closure level for groundwater is based on the U.S. EPA maximum contaminant level (MCL) if available; if not the default closure level is the lower of the risk-based criteria and solubility limit. The IDEM risk-based default closure levels correspond to systemic HQ of 0.1 (for noncarcinogens) or an ILCR of 1×10^{-5} (for carcinogens). The screening levels to be used for each medium in the risk assessments are briefly discussed below.

Soil

Screening concentrations based on the following criteria were used to select COPCs for surface and subsurface soil:

- U.S. EPA Region 9 PRGs for Residential Soil (U.S. EPA, 2004b).
- IDEM residential default closure levels for direct contact (IDEM, 2004)
- U.S. EPA generic SSLs for the inhalation of volatiles and fugitive dusts published online at http://risk.lsd.ornl.gov/calc_start.shtml based on methodology from the U.S. EPA's Soil Screening Guidance (U.S. EPA, July 1996).
- U.S. EPA generic soil screening levels (SSLs) for migration from soil to groundwater published online at http://risk.lsd.ornl.gov/calc_start.shtml based on methodology from the U.S. EPA's Soil Screening Guidance (U.S. EPA, 1996).
- IDEM residential default closure levels for migration from soils to groundwater (IDEM, 2004)

Because of the different exposure scenarios for potential human receptors, COPCs were identified for surface and subsurface soil. Surface soil was defined as soil collected from 0 to 2 feet bgs. Subsurface soil was defined as soil collected from depths greater than 2 feet bgs.

The comparison of site soil data to U.S. EPA generic SSLs for transfers from soil to air was used to identify whether a quantitative analysis of the inhalation of particulates or vapors from the soil exposure pathway was warranted. If the maximum soil concentration of a chemical exceeded the SSL, a quantitative evaluation of potential risks from inhalation was performed, as described in Section 7.3.4. Otherwise, the risks associated with the inhalation pathway are considered insignificant, and the exposure pathway was eliminated from further evaluation.

Chemicals selected as COPCs based on a comparison of site concentrations to SSLs for migration from soil to groundwater only (i.e., not selected based on other toxicity screening levels recommended in this section) will not be evaluated quantitatively in the HHRA. Chemicals with concentrations exceeding the SSLs and IDEM default closure levels may potentially migrate from the soil to groundwater in sufficient quantities to pose concerns about groundwater quality.

Sediment

No specific screening levels exist for human exposure to sediment. COPCs were selected for sediment by comparing detected site concentrations to screening levels based on the following:

- U.S. EPA Region 9 PRGs for residential soil (U.S. EPA, 2004b)
- IDEM residential default closure levels for direct contact (IDEM, 2004)

A chemical detected in sediments was selected as a COPC for sediments if the maximum detected concentration exceeded screening levels based on these values. The use of soil screening criteria for sediment COPC identification is regarded as a conservative approach because exposure to sediment is anticipated to be less intensive than exposure to soil. U.S. EPA generic soil screening levels (SSLs) for transfers from soil to air and for migration to groundwater are not considered to be appropriate for sediment screening because of the high moisture content associated with sediment matrices.

The risk-based screening levels and health-based standards used in the COPC selection for soil and sediment are presented in Table 7-1.

Groundwater/Surface Water

The same screening levels were used to select COPCs for groundwater and surface water. The following criteria were used as the basis of the screening criteria:

- U.S. EPA Region 9 PRGs for tap water (U.S. EPA, 2004b)
- U.S. EPA Maximum Contaminant Levels (MCLs) (U.S. EPA, 2004c)
- IDEM residential default closure levels for groundwater (IDEM, 2004)
- U.S. EPA Groundwater Screening Levels for Evaluating the Vapor Intrusion to Indoor Air (U.S. EPA, 2002e)

Risk-based COPC screening levels for tap water ingestion, which are based on daily, residential exposure assumptions, were used to select COPCs for groundwater and surface water. In general, the use of tap water screening levels is regarded as a highly conservative approach to COPC selection at SWMU 16, because groundwater at the site is not used as a potable drinking water source. Potential human exposure to the surface water in intermittent ditches, streams, and ponds located within SWMU 16

is expected to be limited to incidental exposures such as that which occurs during trespassing, which is anticipated to be significantly less than the daily exposure assumed for the tap water ingestion scenario.

The groundwater screening levels for Evaluating the Vapor Intrusion to Indoor Air are published in Table 2c of the recent draft U.S. EPA guidance titled: Evaluating the Vapor Intrusion into Indoor Air, EPA530-F-02-052 (USEPA, 2002e). These SSLs were derived to identify chemical concentrations in groundwater that may adversely affect the indoor air quality of a building overlying subsurface VOC contamination.

Federal Ambient Water Quality Criteria (AWQC) were not used to select COPCs for surface water. AWQC applicable to the protection of human health assuming routine consumption of water were not used because the conservative U.S. EPA Region 9 PRGs for tap water, U.S. EPA MCLs, and IDEM residential closure levels for residential groundwater were used to select COPCs for groundwater and surface water. In addition, the surface water bodies present within and downgradient of the sites do not support game fish populations because of their size and intermittent nature.

The risk-based screening levels and health-based standards used in the COPC selection for groundwater and surface water are presented in Table 7-2.

Lead as a COPC

Limited criteria are available to evaluate the potential risks associated with lead. There are no risk-based concentrations for this chemical because the U.S. EPA has not derived toxicity values [i.e., cancer slope factors (CSFs), reference doses] for lead. However, recommended screening levels are available for lead in soil that are used to indicate the need for response activities.

Guidance from both the Office of Prevention, Pesticides, and Toxic Substances (OPPTS) and the Office of Solid Waste and Emergency Response (OSWER) recommend 400 mg/kg as the lowest screening level for lead-contaminated soil in a residential setting where children are frequently present (U.S. EPA, 1994a). The IDEM default closure level for residential exposures to soil is also 400 mg/kg. OPPTS identifies 2,000 to 5,000 mg/kg as an appropriate range for areas where contact with soil by children in a residential setting is less frequent. A value of 400 mg/kg will be used as the screening level for soil and sediment in the HHRA for SWMU 16.

The Safe Drinking Water Act Action Level and IDEM default closure level of 15 µg/L was used as the screening level for lead in groundwater and surface water.

Essential Nutrients and Chemicals without Toxicity Criteria

The essential nutrients calcium, magnesium, potassium, and sodium were not identified as COPCs because these inorganic chemicals are naturally abundant in environmental matrices and are only toxic at high doses. In addition, because of the lack of toxicity criteria, risk-based COPC screening levels are not available for some chemicals [e.g., acenaphthylene, 2-methylnaphthalene, benzo(g,h,i)perylene, phenanthrene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene]. In the COPC screening, acenaphthene was used as a surrogate for acenaphthylene, naphthalene was used as a surrogate for 2-methylnaphthalene, pyrene was selected as a surrogate for benzo(g,h,i)perylene and phenanthrene, and aminodinitrotoluene was used as a surrogate for 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene.

Determination of Site-Related Chemicals

The evaluation of chemical concentrations detected in SWMU 16 media in relation to background levels follows guidance presented in the U.S. EPA's Role of Background in the CERCLA Cleanup Program (U.S. EPA, 2002b). This guidance document recommends that all chemicals which exceed risk-based screening concentrations be evaluated in the quantitative risk assessment. Therefore, if the maximum concentration of any chemical exceeded screening levels (i.e., was selected as a COPC), risks were calculated for that chemical and are presented in Section 7.5. Potential risks attributed to background levels are discussed in the risk characterization section (Section 7.5).

7.2.2.2 Decision Rules for Establishing COPCs

The following decision rules were used to select initial lists of COPCs for SWMU 16:

- A chemical detected in soil was selected as a COPC for soil if any detected chemical concentration exceeded the screening levels for soils.

- A chemical detected in groundwater was selected as a COPC for groundwater if the maximum detected concentration in any downgradient well exceeded screening levels.

- A chemical detected in surface water or sediment was selected as a COPC for surface water or sediment if the maximum detected concentration in a potentially impacted surface water body exceeded the screening level for surface water or sediment.

- If a chemical was not detected in any of the samples in a particular medium, and the detection limit exceeded the risk-based screening levels, the chemical was not selected as a COPC but will be qualitatively discussed in the uncertainty analysis section.

- Chemicals that exceeded toxicity screening concentrations but were within background levels were selected as COPCs and carried through the risk assessment. The potential risks associated with chemicals present at naturally occurring levels are discussed in Section 7.5.

7.2.3 COPCs Selected for HHRA

COPCs at SWMU 16 were selected for surface soil, subsurface soil, groundwater, surface water, and sediment using the risk-based COPC screening levels described in Section 7.2.2. A discussion of the chemicals identified as COPCs and the rationale for COPC selection are provided in the following subsections. The following subsections do not discuss the nature and extent of the chemicals detected in site media. The discussion of nature and extent is presented in Section 5. COPC selection tables for each medium are presented in Tables 7-3 through 7-16. Chemicals retained as COPCs for SWMU 16 are presented in Table 7-17. The Risk Assessment Guidance for Superfund (RAGS) Part D tables for COPC selection is included in Appendix I.

7.2.3.1 Surface Soil (0 to 2 feet)

Fourteen (14) dioxin/furans congeners, 16 VOCs, 20 SVOCs, HMX, 2 herbicides, and 27 inorganics were detected in surface soil samples collected at SWMU 16. A comparison of the maximum detected surface soil concentrations to screening levels based on the U.S. EPA Region 9 PRGs for residential exposures and IDEM residential default closure levels for direct contact is presented in Table 7-3. The following chemicals were detected in surface soils at maximum concentrations exceeding the direct contact risk-based COPC screening levels and were retained as COPCs for surface soil at SWMU 16.

- VOCs [TCE]
- PAHs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene]
- Inorganics [aluminum, antimony, arsenic, copper, lead, iron, manganese, and vanadium]

The maximum detected concentrations of aluminum, antimony, copper, manganese, and vanadium exceeded the screening levels (set at an HI of 0.1); however they do not exceed the U.S. EPA Region 9

PRGs and IDEM default closure levels for soil. Concentrations of TCE, indeno(1,2,3-cd)pyrene, antimony and copper exceeded the screening levels based on U.S. EPA Region 9 PRGs, but were less than the IDEM default closure levels. Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene only exceeded the screening levels in one sample (16SB003). Concentrations of benzo(a)pyrene only exceeded the screening levels in two samples (16SB003 and 16SB001). It should be noted that these samples are located under asphalt; therefore it is unlikely that a receptor would be exposed to soil at these locations under current conditions.

Concentrations of TCE exceeded the U.S. EPA Region 9 PRG based on the draft CSF but were less than the CAL-Modified PRG. As discussed in Section 5.2, concentrations of aluminum, arsenic, manganese, and vanadium appear to be within site background levels and are not considered to be site-related. There are no human health screening levels for safrole, which is a common food additive (NJDEP, 2001). Safrole is often found in association with sassafras plants (safrole is present in the roots) and sassafras plants are known to grow all over NSWC Crane, therefore it is not likely that this chemical is site related.

A comparison of the maximum detected surface soil concentrations to U.S. EPA SSLs for chemical migration from soil to air is presented in Table 7-4. Concentrations reported for all chemicals were less than the U.S. EPA SSLs for soil to air with the exception of TCE. Concentrations of TCE exceeded the screening criteria in three surface soil samples. The U.S. EPA SSL for TCE is based on the draft CSF. If the SSL was based on the CAL-Modified CSF, then concentrations of TCE in surface soil would be below the SSL. Since the maximum detected concentration of the TCE exceeded its SSLs for soil to air, TCE was evaluated for exposures through inhalation of fugitive dust and volatile emissions from surface soil at SWMU 16.

A comparison of the maximum detected surface soil concentrations to U.S. EPA SSLs for chemical migration from soil to groundwater and IDEM residential default closure levels for migration to groundwater is presented in Table 7-4. The following chemicals were detected at maximum concentrations in surface soil that exceeded the COPC screening levels for migration from soil to groundwater and were retained as COPCs for surface soil at SWMU 16.

- Dioxins/furans [1,2,3,4,6,7,8,9-OCDD, 1,2,3,4,6,7,8-HPCDD, 1,2,3,7,8,9-HXCDD, and 1,2,3,7,8-PECDD]

- VOCs [cis-1,2-DCE, methylene chloride, and TCE]

- PAHs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene]

- Herbicides [pentachlorophenol]

- Metals [aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium, thallium, and zinc]

Concentrations of methylene chloride, cis-1,2-DCE, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, pentachlorophenol, aluminum, arsenic, barium, cadmium, chromium, cobalt, manganese, mercury, nickel, selenium, thallium, and zinc exceeded the U.S. EPA SSL but not the IDEM default closure level for migration from soil to groundwater. As discussed in Section 5.2, concentrations of aluminum, arsenic, barium, cadmium, cobalt, manganese, mercury, and selenium appear to be within site background levels and are not considered to be site related. Also it should be noted that benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene and pentachlorophenol were not detected in groundwater at SWMU 16 indicating migration from soil to groundwater is not occurring for these chemicals.

7.2.3.2 Subsurface Soil (Greater then 2 feet)

Fourteen (14) VOCs, 15 SVOCs, 2 herbicides, and 26 inorganics were detected in subsurface soil samples collected at the SWMU 16. A comparison of the maximum detected subsurface soil concentrations to U.S. EPA Region 9 PRGs for residential exposures and IDEM residential default closure levels for direct contact is presented in Table 7-5. The following chemicals were detected in the subsurface soils at maximum concentrations exceeding the direct contact risk-based COPC screening levels and were retained as COPCs for subsurface soil at SWMU 16.

- VOCs [TCE]
- Inorganics [aluminum, arsenic, iron, manganese, and vanadium]

The maximum detected concentrations of aluminum, manganese, and vanadium exceeded the screening levels (set at an HI of 0.1); however, they do not exceed the U.S. EPA Region 9 PRGs and IDEM default closure levels for soil. As discussed in Section 5.2, concentrations of aluminum, arsenic, manganese, and vanadium appear to be within site background levels and are not considered to be site-related. Also as discussed in Section 5.2, iron may be site-related but concentrations of iron appears to be significantly

elevated relative to background concentrations except at a few isolated sampling locations. The detected concentrations of TCE exceeded the U.S. EPA screening level based on the draft CSF and also exceed the CAL-modified PRG. As discussed above, there are no human health screening levels for safrole, which is a common food additive (NJDEP, 2001). Safrole is often found in association with sassafras plants (safrole is present in the roots) and sassafras plants are known to grow all over NSWC Crane, therefore it is not likely that this chemical is site related.

A comparison of the maximum detected subsurface soil concentrations to U.S. EPA SSLs for chemical migration from soil to air is presented in Table 7-6. Concentrations reported for all chemicals were less than the U.S. EPA SSLs for soil to air with the exception of TCE. As noted above, the U.S. EPA SSL for TCE is based on the draft CSF. Concentrations of TCE would also exceed the SSL if the SSL was based on the CAL-Modified CSF. Since the maximum detected concentration of the TCE exceeded its SSLs for soil to air, TCE was evaluated for exposures through inhalation of fugitive dust and volatile emissions from subsurface soil at SWMU 16.

A comparison of the maximum detected subsurface soil concentrations to U.S. EPA SSLs for chemical migration from soil to groundwater and IDEM residential default closure levels for migration to groundwater is presented in Table 7-6. The following chemicals were detected in subsurface soil at maximum concentrations exceeding the COPC screening levels for migration from soil to groundwater and were retained as COPCs for surface soil at SWMU 16.

- VOCs [1,1,2-TCA, cis-1,2-DCE, TCE, and vinyl chloride]
- Herbicides [pentachlorophenol]
- Metals [aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, manganese, nickel, and selenium]

Concentrations of TCE exceeded both the U.S. EPA SSL and IDEM default closure level for migration from soil to groundwater. Concentrations of the remaining chemicals only exceeded the U.S. EPA SSL for migration from soil to groundwater. As discussed in Section 5.2, concentrations of aluminum, arsenic, barium, cadmium, chromium, cobalt, manganese, nickel, and selenium appear to be within site background levels and are not considered to be site-related. Pentachlorophenol was only detected in 1 of 27 subsurface soil samples and was not detected in groundwater samples at SWMU 16 indicating that migration of pentachlorophenol is not occurring.

7.2.3.3 Groundwater

Upper Zone

Twenty-five (25) VOCs, 10 SVOCs, 11 energetics, and 21 inorganics were detected in groundwater samples collected in the upper zone at SWMU 16. A comparison of the maximum detected groundwater concentrations to U.S. EPA Region 9 PRGs for ingestion of tap water, EPA MCLs, and IDEM groundwater closure levels is presented in Table 7-7. The following chemicals were detected in groundwater at maximum concentrations exceeding the COPC screening levels and were retained as COPCs for groundwater at SWMU 16.

- VOCs [1,1,2,2-PCA, 1,1,2-TCA, 1,1-DCE, 1,2,3-trichloropropane, 1,2-DCA, benzene, bromodichloromethane, carbon tetrachloride, chloroform, cis-1,2-DCE, methylene chloride, PCE, toluene, trans-1,2-DCE, TCE, and vinyl chloride]
- SVOCs [pyridine]
- Energetics [2,4,6-trinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and RDX]
- Inorganics [aluminum, arsenic, cobalt, iron, manganese, nickel, and vanadium]

Concentrations of benzene, bromodichloromethane, chloroform, toluene, trans-1,2-DCE, and arsenic exceeded the screening criteria based on U.S. EPA Region 9 PRGs, but were less than the U.S. EPA MCLs and IDEM default closure levels. As discussed in Section 5.4, concentrations of aluminum, arsenic, cobalt, and manganese appear to be within site background levels and are not considered to be site-related.

A comparison of the maximum detected groundwater VOC concentrations to U.S. EPA SSLs for chemical migration from groundwater through building foundations and into indoor air is presented in Table 7-8. The following VOCs were detected in groundwater at maximum concentrations exceeding the COPC screening levels for migration from groundwater to indoor air and were retained as COPCs at SWMU 16.

- 1,1,2-TCA, carbon tetrachloride, cis-1,2-DCE, methylene chloride, PCE, TCE, and vinyl chloride

Middle Zone

Ten (10) VOCs, 3 energetics, and 23 inorganics were detected in groundwater samples collected in the middle groundwater zone at SWMU 16. A comparison of the maximum detected groundwater concentrations to U.S. EPA Region 9 PRGs for ingestion of tap water, EPA MCLs, and IDEM

groundwater closure levels is presented in Table 7-9. The following chemicals were detected at maximum concentrations in groundwater that exceeded the COPC screening levels and were retained as COPCs for groundwater at SWMU 16.

- VOCs [PCE and TCE]
- Energetics [2-nitrotoluene and RDX]
- Inorganics [aluminum, arsenic, barium, beryllium, cadmium, chromium, cobalt, iron, lead, lithium, manganese, nickel, and vanadium].

Concentrations of PCE, barium, cadmium, and chromium exceeded the screening criteria based on U.S. EPA Region 9 PRGs but were less than the U.S. EPA MCLs and IDEM default closure levels. As discussed in Section 5.4, concentrations of aluminum, arsenic, barium, beryllium, cadmium, cobalt, lead, lithium, and manganese appear to be within site background levels and are not considered to be site-related.

A comparison of the maximum detected groundwater VOC concentrations to U.S. EPA SSLs for chemical migration from groundwater through building foundations and into indoor air is presented in Table 7-10. TCE was the only VOC detected in groundwater samples collected from the middle groundwater zone at concentrations exceeding the screening criteria for migration from groundwater into indoor air.

Lower Zone and Valley Wells

Eleven (11) VOCs and 22 inorganics were detected in groundwater samples collected from the lower groundwater zone and Valley Wells at SWMU 16. A comparison of the maximum detected groundwater concentrations to U.S. EPA Region 9 PRGs for ingestion of tap water, EPA MCLs, and IDEM groundwater closure levels is presented in Table 7-11. The following chemicals were detected in groundwater at maximum concentrations exceeding the COPC screening levels and were retained as COPCs for groundwater at SWMU 16.

- VOCs [benzene and chloroform]
- Inorganics [aluminum, antimony, arsenic, barium, beryllium, chromium, cobalt, iron, lead, manganese, nickel, and vanadium].

Concentrations of benzene, chloroform, and barium exceeded the screening criteria based on U.S. EPA Region 9 PRGs but were less than the U.S. EPA MCLs and IDEM default closure levels. As discussed in

Section 5.4, concentrations of aluminum, arsenic, barium, beryllium, cobalt, lead, and manganese appear to be within site background levels and are not considered to be site-related.

A comparison of the maximum detected groundwater VOC concentrations to U.S. EPA SSLs for chemical migration from groundwater through building foundations and into indoor air is presented in Table 7-12. The concentrations of all VOCs detected in groundwater samples collected from the lower groundwater zone and Valley Wells were less than the screening criteria for migration from groundwater into indoor air.

7.2.3.4 Surface Water

Surface water and sediment samples were collected from gullies located throughout the site and Turkey Creek which is located on the southeastern boundary of the site. The gully samples were collected on the steeper hillsides and generally represent drainage channels that are typically dry, except for storm events. Samples from Turkey Creek were collected from locations with more frequent occurrences of flowing water where the chance of finding water and true, water-covered sediments was higher than in the gullies. It is possible that surface water and sediment from gullies on the eastern side of the site could impact surface water in Turkey Creek.

Gullies

Three (3) VOCs, 4 energetics, and 22 inorganics were detected in surface water samples collected from the gullies at SWMU 16. A comparison of the maximum detected surface water concentrations to U.S. EPA Region 9 PRGs for ingestion of tap water, EPA MCLs, and IDEM groundwater closure levels is presented in Table 7-13. The following chemicals were detected in the surface water at maximum concentrations exceeding the COPC screening levels and were retained as COPCs for surface water at SWMU 16.

- VOCs [TCE]
- Energetics [RDX]
- Inorganics [aluminum, antimony, arsenic, barium, cadmium, chromium, iron, lead, manganese, vanadium, and zinc].

Concentrations of arsenic exceeded the U.S. EPA Region 9 PRG but were less than the U.S. EPA MCL and IDEM default closure level for groundwater. Concentrations of aluminum, antimony, barium, cadmium, chromium, iron, manganese, vanadium, and zinc exceeded the screening levels (set at an HI of

0.1) but were less than the U.S. EPA Region 9 PRG. Concentrations of all inorganics with the exception of antimony and lead were below the IDEM default closure levels for groundwater.

Turkey Creek

HMX and 17 inorganics were detected in surface water samples collected from the Turkey Creek at SWMU 16. A comparison of the maximum detected surface water concentrations to U.S. EPA Region 9 PRGs for ingestion of tap water, EPA MCLs, and IDEM groundwater closure levels is presented in Table 7-14. The following chemicals were detected in surface water at maximum concentrations exceeding the COPC screening levels and were retained as COPCs for surface water at SWMU 16.

- Inorganics [arsenic and manganese]

Concentrations of arsenic exceeded the U.S. EPA Region 9 PRG but were less than the U.S. EPA MCL and IDEM default closure level for groundwater. The maximum detected concentration of manganese exceeded the screening level (set at an HI of 0.1) but was less than the U.S. EPA Region 9 PRG.

7.2.3.5 Sediment

Gullies

Four (4) VOCs, 19 SVOCs, 2 energetics, pentachlorophenol, and 26 inorganics were detected in sediment samples collected from the gullies at SWMU 16. A comparison of the maximum detected sediment concentrations to U.S. EPA Region 9 PRGs for residential exposures and IDEM residential default closure levels for direct contact to soil is presented in Table 7-15. The following chemicals were detected in sediment at maximum concentrations exceeding the direct contact risk-based COPC screening levels and were retained as COPCs for sediment at SWMU 16.

- PAHs [benzo(a)pyrene]
- Inorganics [aluminum, antimony, arsenic, barium, cadmium, copper, iron, lead, manganese, mercury, nickel, vanadium, and zinc]

The maximum detected concentrations of aluminum, barium, cadmium, copper, mercury, nickel, and vanadium exceeded the screening levels (set at an HI of 0.1); however, they do not exceed the U.S. EPA Region 9 PRGs and IDEM default closure levels for soil. Concentrations of benzo(a)pyrene, barium, copper, mercury, nickel, vanadium, and zinc exceeded the screening levels based on U.S. EPA Region 9

PRGs, but were less than the IDEM default closure levels for soil. As discussed in Section 5.3, concentrations of aluminum, arsenic, and vanadium appear to be within site background levels and are not considered to be site-related.

Turkey Creek

Two (2) VOCs and 21 inorganics were detected in sediment samples collected from Turkey Creek at SWMU 16. A comparison of the maximum detected sediment concentrations to U.S. EPA Region 9 PRGs for residential exposures and IDEM residential default closure levels for direct contact to soil is presented in Table 7-16. The following chemicals were detected at maximum concentrations in sediment that exceeded the direct contact risk-based COPC screening levels and were retained as COPCs for sediment at SWMU 16.

- Inorganics [aluminum, arsenic, iron, manganese, and vanadium]

The maximum detected concentrations of aluminum and vanadium exceeded the screening levels (set at an HI of 0.1); however, they do not exceed the U.S. EPA Region 9 PRGs and IDEM default closure levels for soil. As discussed in Section 5.3, concentrations of aluminum, arsenic, and vanadium appear to be within site background levels and are not considered to be site-related.

7.2.3.6 Building 146 Indoor Air

Due to the presence of crawl spaces beneath Building 146 and the presence of fractured bedrock in the area, the draft U.S. EPA screening criteria for vapor intrusion (U.S. EPA, 2002e) are not appropriate for evaluating the potential for adverse health effects resulting from the migration of VOCs from groundwater through building foundations and into indoor air at Building 146. Consequently, 10 indoor air samples were collected at Building 146 to determine if VOCs in groundwater were migrating through the building foundation and into indoor air. The air samples were collected on June 27, 2008 and the results were presented in the SWMU 16 - Building 146 Indoor Air Quality Sampling Report (TtNUS, 2008). Table 7-17 presents a comparison of the maximum detected indoor air concentrations measured at Building 146 to screening criteria for residential exposures to air. TCE was the only chemical detected in air and the detected concentrations exceeded the screening levels. Therefore TCE was retained as a COPC for exposures to indoor air at Building 146.

7.2.4 Summary

Table 7-17 summarizes the chemicals retained as COPCs for soil, groundwater, surface water, and sediment at the SWMU 16. RAGS Part D tables for COPC selection are included in Appendix I.

7.3 EXPOSURE ASSESSMENT

This portion of the risk assessment defines and evaluates, quantitatively or qualitatively, the type and magnitude of human exposure to the chemicals present at or migrating from a site. The exposure assessment is designed to depict the physical setting of the site, to identify potentially exposed populations and applicable exposure pathways, to calculate concentrations of COPCs to which receptors might be exposed, and to estimate chemical intakes under the identified exposure scenarios.

Actual or potential exposures at SWMU 16 were determined based on the most likely pathways of contaminant release and transport, as well as human activity patterns. A complete exposure pathway has three components: a source of chemicals that can be released to the environment, a route of contaminant transport through an environmental medium, and an exposure or contact point for a human receptor.

7.3.1 Conceptual Site Model

This section discusses the conceptual site model (CSM) for SWMU 16. A CSM facilitates consistent and comprehensive evaluation of the potential risks to human health by creating a framework for identifying the pathways by which human receptors may come in contact with contaminated media resulting from the source area. A CSM depicts the relationships among the following elements, which are necessary for defining complete exposure pathways:

- Site sources of contamination
- Contaminant release mechanisms and transport/migration pathways
- Exposure routes
- Potential receptors

Section 6.0 presented a detailed CSM for SWMU 16. This section summarizes the CSM as it applies to the HHRA. Figure 7-2 illustrates the CSM for SWMU 16.

The elements of the CSM (contaminant source, release mechanisms, transport/migration pathways, exposure routes, and potential receptors) establish the manner and degree to which a potential receptor may be exposed to chemicals present at the site. The degree of risk incurred by a potential receptor varies according to the means of exposure, the duration of exposure, and the specific chemical to which the receptor is exposed. An exposure, however long in duration, does not necessarily result in an "unacceptable" health or environmental risk, although risks generally increase with increased frequency and/or duration of exposure.

The elements of the CSM, including how they pertain to SWMU 16 are discussed below. Sources of contamination, contaminant release mechanisms, transport and migration pathways, exposure routes, and potential receptors are defined. Table 7-19 provides a site-specific summary of the potential receptors to be evaluated for SWMU 16. A summary of the exposure routes that will be addressed quantitatively for each human receptor is provided in Table 7-20.

Site Sources of Environmental Contamination

Based on historical site data and sampling, the following parameters are among the site-related chemical contaminants known to be present or potentially present in environmental media at SWMU 16:

<u>SWMU 16</u>

- VOCs (e.g., TCE)
- Explosives (e.g., TNT and HMX) and their degradation products (e.g., 2-amino-4,6-dinitrotoluene)
- Metals (e.g., lead)
- Petroleum hydrocarbons (from waste oils and fuels)

Potential Contaminant Release Mechanisms and Transport/Migration Pathways

Media of concern at Incinerator B146 have historically included air, surface water, soil, and groundwater (Halliburton NUS, 1993). The sources of contamination at SWMU 16 were the washdown and wastewater discharged through floor drains to sumps that emptied into the Boggs Creek watershed, particulate and gaseous emissions from the deactivation furnaces prior to baghouse installation, and incinerator ash stored in piles near B146. Air was considered as a migration pathway because particulates had been released from furnaces and ash piles. However, air is no longer considered a major pathway because the furnaces and ash piles have been removed. Surface water was considered a migration pathway because explosive powders and particulates were discharged from the floor drains of

B146 and may have eventually entered off-site surface water. Based on the historical information, plausible contaminant release and migration mechanisms for SWMU 16 include the following:

- Transport of surface soil contaminants to the subsurface soils and groundwater via infiltration, percolation, and migration within the groundwater aquifer.

- Overland runoff of surface waters, sediments, surface soil, and ash via drainageways to the Boggs Creek watershed.

- Migration of contaminants in groundwater (i.e., lateral migration) to potential receptor locations downgradient of SWMU 16 source areas and beyond the NSWC Crane boundary.

- Migration of fugitive dusts and VOCs from surface soils (and subsurface soils if construction/excavation activities occur).

Potential Current and Future Receptors of Concern and Exposure Pathways

NSWC Crane is an active naval base and will remain active for the foreseeable future. SWMU 16 is an active facility, and operations at this facility are expected to continue in the foreseeable future. SMWU 16 is used for renovation and rework and breakdown of munitions. It is sometimes used for ammunition demilitarization operations. However, for purposes of completeness, the baseline risk assessment will consider receptor exposure under residential, industrial, and recreational land use scenarios. Based on current and potential future land use, the following potential receptors may be exposed to contaminated environmental media within the study area:

- **Maintenance Workers** – A plausible receptor under current and future land use. This includes adult military or civilian personnel assigned duties on an infrequent basis within the study areas (e.g., groundskeeping activities, storm sewer and drainage maintenance). This receptor could be exposed to surface soils (incidental ingestion; dermal contact), surface water (dermal contact), sediments (incidental ingestion; dermal contact), and air (inhalation). Direct contact with groundwater or subsurface soils is not anticipated for this receptor.

- **Occupational Worker** – A plausible receptor under current and future land use. This includes adult military or civilian personnel assigned to routine daily work tasks. This receptor could be exposed to surface soil (incidental ingestion; dermal contact) and air (inhalation). In addition, it will be

conservatively assumed that the occupational worker may be exposed to groundwater (ingestion; dermal contact). (It should be noted that a public water supply is not currently available within the study areas.) It is anticipated that this receptor would not be routinely exposed to subsurface soils, surface waters, or sediments. This receptor is expected to be exposed on a more frequent basis than the maintenance or construction worker. Indoor full-time occupational workers may also be exposed to COPCs that have volatilized from groundwater and have migrated through building foundations into indoor air.

- **Trespassers** – A plausible receptor under current or future land use. Although access to the base is controlled, once inside the base, access to the study areas is not limited by any physical constraints. In addition, hunting activities are permitted at the base. Because the study areas are relatively remote and surrounded by forested areas, individuals (particularly adolescents) may trespass within the study areas. This receptor may be exposed to potentially contaminated surface soil (0 to 2 feet bgs) (incidental ingestion; dermal contact), air (inhalation), and surface water (incidental ingestion; dermal contact) and sediments (incidental ingestion; dermal contact) in the intermittent streams. However, exposure to surface water is likely to be limited in some areas because of the intermittent nature of the surface water in the gullies and Turkey Creek. Also potential exposures to surface water will be limited to wading because the streams at the sites are not deep enough for swimming. Direct contact with groundwater or subsurface soils is not anticipated for this receptor.

- **Construction Workers** – A plausible receptor under future land use. No construction activities are currently planned for the study area. However, this receptor could be exposed to surface and subsurface soils (incidental ingestion; dermal contact), groundwater (dermal contact), and air (inhalation) if excavation activities were to occur in the future. Routine exposure to surface water and sediments is not expected for the construction worker. It should be noted that significant exposures by a construction worker to groundwater are unlikely because if a construction worker were to have prolonged contact with groundwater, he/she would most likely wear protective clothing such as rubber boots and/or hip waders, which would limit receptor exposure. In addition, most excavation activities would utilize construction equipment such as a back hoe, which would limit a construction worker's exposure. Also, if significant groundwater was encountered during an excavation of a trench or foundation, groundwater would most likely be pumped out of the excavation so that the construction activities could be completed.

- **Recreational Users** – A plausible receptor under future land use. If NSWC Crane were to close, the most likely scenario is that the property would be converted to a park. A recreational user may be

exposed to potentially contaminated surface soil (0 to 2 feet bgs) (incidental ingestion; dermal contact), air (inhalation), surface water (incidental ingestion; dermal contact), and sediments (incidental ingestion; dermal contact). Exposures to surface water will be limited to wading because the streams at the sites are not deep enough for swimming. In addition, it will be conservatively assumed that the recreational user may be exposed to groundwater (ingestion; dermal contact) while cleaning up (e.g., washing hands, face, and legs) after visiting a recreational area. (A public water supply is not currently available within the study area.) Direct contact with subsurface soils is not anticipated for this receptor. NSWC Crane is not expected to close because principal base operations, the demilitarization of munitions, are critical to the support of the United States Naval fleet.

- **On-Base Residents** – An unlikely receptor under future land use. Although this scenario is highly unlikely, a future residential scenario is typically evaluated in a risk assessment for decision-making purposes. For example, the need for deed restrictions at a site may be eliminated prior to site closure if minimal risks are estimated for residential receptors. It is assumed that a hypothetical resident may be exposed to surface soils (incidental ingestion; dermal contract), groundwater (ingestion, dermal contact), surface water (ingestion; dermal contact), air (inhalation), and sediment (incidental ingestion; dermal contact). Potential exposures to surface water will be limited to wading because the streams at the sites are not deep enough for swimming. Residents may also be exposed to COPCs that have volatilized from groundwater and have migrated through building foundations into indoor air.

VOCs were identified in groundwater at concentrations exceeding the draft U.S. EPA screening criteria for vapor intrusion. Also TCE in indoor air samples was identified as exceeding screening levels. U.S. EPA's Johnson and Ettinger model is not suitable for evaluating exposures resulting from vapor intrusion due to the presence of fracture bedrock at SWMU 16 and the existence of crawl spaces underneath Building 146. Therefore, potential exposures to occupational workers to COPCs that have volatilized from groundwater and migrated through building foundations into indoor air were evaluated using the indoor air samples collected at Building 146 and the methodology presented in Section 7.3.4.

Details regarding the assumed receptor characteristics (e.g., intake rate, frequency, duration of exposure) are defined in Section 7.3.4.

Current/future occupational workers and future hypothetical residents are not assumed to be exposed to subsurface soil, although exposures to subsurface soil might occur if subsurface soil is brought to the surface as a result of excavation activities. A quantitative analysis of exposures to subsurface soils by occupational workers and hypothetic residents will be included in the uncertainty analysis to assist the

risk managers tasked with making remedial decisions for SWMU 16. This analysis will use a simple "risk ratio" technique that involves the comparison of a chemical's exposure point concentration (EPC) to its U.S. EPA Region 9 PRG to calculate cancer and noncancer risks using the following equation:

$$\frac{EPC}{PRG} = \frac{HI}{HI\ of\ 1} \text{ or } \frac{ILCR}{ILCR\ of\ 1 \times 10^{-6}}$$

This is a valid technique for estimating risk because all of the intake equations and risk characterization equations used to develop the risk-based concentrations are linear.

7.3.2 Central Tendency Exposure vs. Reasonable Maximum Exposure

Traditionally, exposures evaluated in the HHRA were based on the concept of a reasonable maximum exposure (RME) only, which is defined as "the maximum exposure that is reasonably expected to occur at a site" (U.S. EPA, 1989). However, subsequent risk assessment guidance (U.S. EPA, 1992) indicates the need to address an average case or central tendency exposure (CTE).

To provide a full characterization of potential exposure, both RME and CTE scenarios were evaluated in the HHRA for SWMU 16. The available guidance (U.S. EPA, 1993a) concerning the evaluation of CTE is limited and at times vague. Therefore, professional judgment was exercised when defining CTE conditions for a particular receptor at a site.

7.3.3 Exposure Point Concentrations

The EPC, which is calculated for COPCs only, is an estimate of the chemical concentration within an exposure unit (EU) likely to be contacted over time by a receptor and is used to estimate exposure intakes. An exposure unit is defined as the area typically encountered/traversed by a receptor under a particular land use scenario. For example, a residential lot size of ¼ acre to 2 acres is often used for the evaluation of a hypothetical future resident. However, the size of an EU is typically based on the distribution of the chemical concentrations in a medium as well as on presumed receptor activity patterns.

SWMU 16 is an active facility, and operations at this facility are expected to continue in the foreseeable future. Under current conditions an occupational worker can be exposed to soil anywhere within the SWMU 16 boundaries during their normal work activities. As discussed in Section 5.2, while concentrations of some chemicals are higher in some portions of the site as compared to other portions of the site, there are no distinct source areas/hotspots of contamination in soils across SWMU 16. Therefore,

the EU evaluated for receptors potentially exposed to surface soil and surface/subsurface soil at SWMU 16 included all sampled locations within the study area.

It would be possible to install a groundwater well in any of the groundwater zones at SWMU 16. In addition the groundwater zones are interconnected; therefore groundwater was evaluated as one EU in the HHRA.

Turkey Creek and the gullies are two distinct and separate areas; therefore, surface water and sediment from the gullies and Turkey Creek were evaluated as two separate EUs.

The following guidelines were used to calculate the EPCs:

- For soil, gully surface water, and gully sediment, the 95-percent upper confidence limit (UCL) on the arithmetic mean, which was based on the distribution of the data set, was selected as the EPC for the RME and CTE case. EPCs were calculated following U.S. EPA's Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (U.S. EPA, 2002c).

- There were less than 10 samples for Turkey Creek surface water and sediment; therefore, the EPC for the RME and CTE cases was defined as the maximum detected concentration.

- The EPC for a groundwater receptor was the arithmetic average of wells in the highly concentrated area of the plume (16MWT01, 16MWT02, 16MWT03, 16MWT04, 16MWT06, 16MWT07, 16MWT08, 16MWT09, 16MWT10, 16MWT11, 16MWT13, 16MWT15, 16MWT16, 16MWT17, 16MWT18, WES-14-03-83).

Data values less than sample-specific detection limits were substituted with one-half the detection limit. Table 7-21 summarizes the EPCs used in this HHRA. RAGS Part D Tables for the EPCs are presented in Appendix I.

7.3.4 Chemical Intake Estimation

The methodologies and techniques used to estimate exposure intakes are presented in this section. Intakes for the identified potential receptor groups were calculated using current U.S. EPA risk assessment guidance (e.g., U.S. EPA, 1991, 1997a, and 2004a) and presented in the risk assessment spreadsheets. All quantitative risk assessment results are presented in RAGS Part D format tables (Appendix I).

Non-carcinogenic intakes were estimated using the concept of an average annual exposure. Carcinogenic intakes were calculated as an incremental lifetime exposure, which assumed a life expectancy of 70 years. Assumptions regarding exposure are presented in Tables 7-22 and 7-23 for the RME and CTE scenarios, respectively.

7.3.4.1 Inhalation of Air and Fugitive Dust/Volatile Emissions from Soils

The amount of a chemical that a receptor takes in as a result of respiration was determined using the concentration of the contaminant in air. Intakes of both particulates and vapors and gases from soil were calculated using the same equation, as follows (U.S. EPA, 1989):

$$\text{Intake}_{ai} = \frac{(C_{ai})(IR_a)(ET)(EF)(ED)}{(BW)(AT)}$$

where:

Intake_{ai}	=	intake of chemical "i" from air via inhalation (mg/kg/day)
C_{ai}	=	concentration of chemical "i" in air (mg/m^3)
IR_a	=	inhalation rate (m^3/hour)
ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
BW	=	body weight (kg)
AT	=	averaging time (days);
		for noncarcinogens, AT = ED x 365 days/year;
		for carcinogens, AT = 70 years x 365 days/year

The concentrations of chemicals in air resulting from emissions from soil were developed following procedures presented in U.S. EPA Soil Screening Guidance (U.S. EPA, 1996). The chemical concentration in air was calculated as follows:

$$C_{air} = C_{soil} \times \left[\frac{1}{PEF} + \frac{1}{VF}\right]$$

where:

C_a	=	chemical concentration in air, mg/m^3
C_s	=	chemical concentration in soil, mg/kg
PEF	=	particulate emission factor, m^3/kg
VF	=	volatilization factor, m^3/kg

The particulate emissions factor (PEF) relates the concentration of the chemical in soil with the concentration of dust particles in air. A PEF value of 1.316 x 10^{+9} was used for SWMU 16 (IDEM, 2004). This value is based on fugitive dust emissions from the site. Because air emissions resulting from fugitive dust emissions settings will be different than dust emissions generated during construction activities, a separate PEF was used for construction activities. The PEF for construction workers (1.49 x 10^{+6} m^3/kg) was calculated using the equations presented in the supplemental SSL guidance document (U.S. EPA, 2002a).

Ambient air concentrations resulting from the volatilization of COPCs from soil are chemical dependent and were calculated using the following equation from U.S. EPA's Soil Screening Guidance:

$$VF = \frac{Q/C \times (3.14 \times D_a \times T)^{0.5} \times 10^{-4} \ (m^2 / cm^2)}{(2 \times \rho_b \times D_a)}$$

and

$$D_a = \frac{[(\theta_a^{10/3} \times D_i \times H' + \theta_w^{10/3} \times D_w)/n^2]}{\rho_b \times K_d + \theta_w + \theta_a \times H'}$$

where:

VF	=	volatilization factor (m^3-air/kg-soil)
Q/C	=	inverse of the mean concentration at the center of source (gm/m^2-sec per kg/m^3)
D_a	=	apparent diffusivity, chemical specific, (cm^2/sec)
T	=	exposure interval, exposure specific, (sec)
ρ_b	=	dry bulk soil particle density (g/cm^3)
θ_a	=	air-filled soil porosity (L_{air}/L_{soil})
D_i	=	diffusivity in air, chemical specific, (cm^2/sec)
n	=	total soil porosity (L_{pore}/L_{soil})
θ_w	=	water-filled soil porosity (L_{air}/L_{soil})
D_w	=	diffusivity in water, chemical specific, (cm^2/sec)
K_d	=	soil-water partition coefficient, chemical specific
H'	=	dimensionless Henry's law constant, chemical specific

Chemical properties were obtained from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (U.S. EPA, 2002a) and are presented in Table 7-24. Input assumptions for the calculation of VF are presented in Table 7-25.

7.3.4.2 Dermal Contact with Soil/Sediment

Direct physical contact with soil and sediment may result in the dermal absorption of chemicals. Exposures associated with the dermal route are estimated in the following manner (U.S. EPA 2004a):

$$Intake_{si} = \frac{(C_{si})(SA)(AF)(ABS)(CF)(EF)(ED)}{(BW)(AT)}$$

where:

$Intake_{si}$	=	amount of chemical "i" absorbed during contact with soil/sediment (mg/kg/day)
C_{si}	=	concentration of chemical "i" in soil/sediment (mg/kg)
SA	=	skin surface area available for contact (cm^2/day)
AF	=	skin adherence factor (mg/cm^2)
ABS	=	absorption factor (dimensionless)
CF	=	conversion factor (1×10^{-6} kg/mg)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
BW	=	body weight (kg)
AT	=	averaging time (days);
		for noncarcinogens, AT = ED x 365 days/year;
		for carcinogens, AT = 70 years x 365 days/year

Exposed surface areas of body available for dermal contact are determined on a receptor-specific basis because they correspond with assumed human activities and clothing worn during exposure events. Current guidance documents (U.S. EPA, 1997b and 2004a) were used to develop the default assumptions concerning the amount of skin surface area available for contact for a receptor. To maintain consistency from project to project, input parameters previously used for other NSWC Crane risk assessments (e.g., TtNUS, 2003c, 2003d) were reviewed when developing the exposed surface areas. The rationales used to select the skin areas were as follows:

- For construction workers, maintenance workers, and occupational workers exposed to surface soil or sediment, the surface area available for soil contact was assumed to be the head, hands, and forearms. The skin surface area is 3,300 cm^2 for the CTE and RME scenarios. These values represent the 50th-percentile areas for the head, hands, and forearms (U.S. EPA, 2004a).

- For adolescent trespassers, 25 percent of the total body surface area for an adolescent (aged 6 to 16) was assumed to be available for surface soil and/or sediment contact. The RME value (3,820 cm^2) was derived from the 95th-percentile surface area data, and the CTE value (3,100 cm^2) was derived from the 50th-percentile data, as provided in Table 6-6 of the Exposure Factors Handbook (U.S. EPA, 1997a).

- For adult recreational users assumed to be exposed to soil/sediment, the exposed surface area available for contact was the sum of the head, arms, hands, lower legs, and feet of an adult male. This skin surface area is 9,070 cm^2 for the RME and CTE scenarios. This value represents the 50th-percentile areas for the arms, hands, lower legs, and feet (U.S. EPA, 1997b). For a small child recreational user (0 to 6 years old), it was assumed that 50 percent of the body surface area was exposed to surface soil and sediment (i.e., 3,300 cm^2). This value represents the 50th-percentile areas presented in Table 6-6 of the Exposure Factors Handbook (U.S. EPA, 1997a).

- For adult residents exposed to surface soil/sediment, the exposed surface area available for contact will be the U.S. EPA recommended value of 5,700 cm^2 for the RME and CTE scenarios (U.S. EPA, 2004a). This value assumes that the adult resident is wearing a short-sleeved shirt, shorts, and shoes; therefore, the exposed skin surface is limited to the head, hands, forearms, and lower legs. For a child resident, the recommended value of 2,800 cm^2 was used as the exposed skin surface area for the RME and CTE scenarios (U.S. EPA, 2004a). This value assumes that the child resident is wearing a short-sleeved shirt, shorts, and no shoes; therefore, the exposed skin surface area is limited to the head, hands, forearms, lower legs, and feet.

The following values of soil adherence factors provided in RAGS Part E (U.S. EPA, 2004a) were used to evaluate risks from exposure to soil and sediment:

- Construction workers - 0.3 mg/cm^2 for the RME and 0.1 mg/cm^2 for the CTE. These values are the 95th-percentile and geometric mean values for construction workers, respectively (U.S. EPA, 2004a and 2002a).

- Maintenance workers and occupational workers - 0.2 mg/cm^2 for the RME and 0.02 mg/cm^2 for the CTE (U.S. EPA, 2004a).

- Adolescent trespassers, child recreational users, and child residents - 0.2 mg/cm^2 for the RME and 0.04 mg/cm^2 for the CTE. These values are the 95th-percentile and geometric mean values presented for soccer players (teens) playing in moist conditions (U.S. EPA, 2004a).

- Adult recreational users and adult residents - 0.07 mg/cm^2 for the RME and 0.01 mg/cm^2 for the CTE (U.S. EPA, 2004a).

For the constituents identified as COPCs in soil, the following absorption factors were used (U.S. EPA, 2004a):

- PAHs - 0.13
- Arsenic - 0.03
- Cadmium - 0.001
- Semivolatile organics - 0.1

As indicated in RAGS Part E, absorption factors for other metals have not been developed due to insufficient data to support a default value. Therefore, risks from dermal absorption of metals (other than arsenic and cadmium) from soil were not quantified in this risk assessment. The uncertainty associated with the omission of these constituents is discussed in the uncertainty analysis.

7.3.4.3 Incidental Ingestion of Soil and Sediment

Incidental ingestion of soil (and sediment) by potential receptors coincides with dermal exposure. Exposures associated with incidental ingestion were estimated in the following manner (U.S. EPA, 1989):

$$\text{Intake}_{si} = \frac{(C_{si})(IR_s)(FI)(EF)(ED)(CF)}{(BW)(AT)}$$

where:

Intake_{si}	=	intake of contaminant "i" from soil or sediment (mg/kg/day)
C_{si}	=	concentration of contaminant "i" in soil or sediment (mg/kg)
IR_s	=	ingestion rate (mg/day)
FI	=	fraction ingested from contaminated source (dimensionless)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
CF	=	conversion factor (1 x 10^{-6} kg/mg)

BW	=	body weight (kg)
AT	=	averaging time (days);
		for noncarcinogens, AT = ED x 365 days/year;
		for carcinogens, AT = 70 years x 365 days/year

The same exposure frequencies and durations used in the estimation of dermal intakes for a receptor were also used to estimate exposure via incidental ingestion for that same receptor. Default values of 1.0 were used for the fraction of soil ingested from the source for both the RME and CTE scenarios. Sediment ingestion rates were the same as those assumed for soil ingestion except that, for recreational users, the fraction ingested is assumed to be 0.5 for both the RME and CTE scenarios.

7.3.4.4 Dermal Contact with Groundwater and Surface Water

The same equation was used to estimate intakes for dermal contact with groundwater and surface water. Direct contact with groundwater at SWMU 16 is limited to exposure that would occur under residential, recreational, typical industrial (occupational), and construction scenarios. Hypothetical future on-base residential receptors were assumed to use groundwater for domestic purposes (i.e., bathing, showering, and dish washing) that can result in dermal exposure. Short-term dermal exposure was assumed to occur for the construction worker during excavation activities and for the hypothetical recreational user or occupational worker receptors that may occasionally use restroom facilities (supplied by groundwater pumped from the underlying aquifer) while working or recreating. (It should be noted that neither restroom facilities nor groundwater supply wells exist at SWMU 16 at this time). Dermal contact with surface water may also occur while receptors are involved in certain activities such as landscaping (maintenance worker), trespassing, or recreational sports (e.g., hiking, wading, etc.).

The following equation was used to assess exposures resulting from dermal contact with water (U.S. EPA, 2004a):

$$DAD_{wi} = \frac{(DA_{event})(EV)(ED)(EF)(A)}{(BW)(AT)}$$

where:

DAD_{wi}	=	dermally absorbed dose of chemical "i" from water (mg/kg/day)
DA_{event}	=	absorbed dose per event (mg/cm^2-event)
EV	=	event frequency (events/day)
ED	=	exposure duration (year)
EF	=	exposure frequency (days/year)

A	=	skin surface area available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days);
		for noncarcinogens, AT = ED x 365 days/year;
		for carcinogens, AT = 70 years x 365 days/year

Groundwater exposure for hypothetical future on-base residential receptors using the groundwater as a domestic water supply was assumed to occur on a daily basis. Exposure to groundwater for construction workers, recreational users, or typical occupational workers and exposure to surface water for maintenance workers, trespassers, and recreational users were also assumed to occur each day the receptor visits the study area. Dermal intakes for residents assumed total body exposure. For construction workers, trespassers, occupational workers, maintenance workers, and recreational users, the exposed surface area of the body available for contact was based on assumed activities and was similar to the assumptions outlined for dermal contact with soil and sediment. Tables 7-21 and 7-22 summarize recommendations for exposure parameters that were evaluated in the baseline risk assessment.

The absorbed dose per event (DA_{event}) was estimated using a non-steady-state approach for organic compounds and a traditional steady-state approach for inorganics. For organics, the following equations apply:

$$\text{If } t_{event} < t^*, \text{ then: } DA_{event} = (2)(K_p)(FA)(C_{wi})(CF)\left(\sqrt{\frac{6\,\tau\, t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then: } DA_{event} = (K_p)(FA)(C_w)(CF)\left(\frac{t_{event}}{1+B} + 2\,\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

where:

t_{event}	=	duration of event (hour/event)
t^*	=	time it takes to reach steady-state conditions (hour)
K_p	=	permeability coefficient from water through skin (cm/hour)
FA	=	Chemical-specific fraction absorbed (dimensionless)
C_{wi}	=	concentration of chemical "i" in water (mg/L)
τ	=	lag time (hour)
π	=	Pi (dimensionless; equal to 3.1416)
CF	=	conversion factor (0.001 L/cm^3)
B	=	Dimensionless ratio of the permeability of the stratum corneum relative to the permeability across the viable epidermis.

Values for the chemical-specific parameters (t^*, K_p, τ, FA, and B) were obtained from RAGS Part E the current dermal guidance (U.S. EPA, 2004a) and are presented in Table 7-25. If no published values were available for a particular compound, they were calculated using equations provided in the cited guidance.

The following non-steady-state equation will be used to estimate DA_{event} for inorganics:

$$DA_{event} = (K_p)(C_{wi})(t_{event})$$

In general, the recommended default value of 0.001 was used for the dermal permeability of inorganic constituents. For most metals, dermal absorption is not a significant pathway because penetration through the skin is minimal.

7.3.4.5 Direct Ingestion of Groundwater and Incidental Ingestion of Surface Water

Residents may be exposed to groundwater via direct ingestion. In addition, maintenance workers, trespassers, recreational users, and residents may incidentally ingest surface water while at the site. Intakes associated with ingestion of water were evaluated using the following equation (U.S. EPA, 1989):

$$Intake_{wi} = \frac{(C_{wi})(IR_w)(EF)(ED)}{(BW)(AT)}$$

where:

$Intake_{wi}$	=	intake of chemical "i" from water (mg/kg/day)
C_{wi}	=	concentration of chemical "i" in water (mg/L)
IR_w	=	ingestion rate for groundwater (L/day)
IR_w	=	ingestion rate for surface water (L/day) = (CR)(ET)
CR	=	contact rate for surface water (L/hour)
ET	=	exposure time for surface water (hour/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
BW	=	body weight (kg)
AT	=	averaging time (days);
		for noncarcinogens, AT = ED x 365 days/year;
		for carcinogens, AT = 70 years x 365 days/year

The same exposure times, frequencies, and durations used to assess dermal exposure to water for a receptor were also used to estimate intakes for incidental ingestion of water for that same receptor.

7.3.4.6 Inhalation of Volatiles in Groundwater

Groundwater exposure may also result in an inhalation exposure if the water resource is used as a domestic water supply. This exposure route was evaluated for residential receptors only who may be exposed while showering, bathing, washing dishes, etc. Inhalation exposures were estimated using a mass transfer model developed specifically for this exposure route, in combination with an air intake estimation model. The mass transfer model accounts for inhalation that occurs during a shower and after a shower while the receptor remains in the closed bathroom. The method that was employed is as follows (U.S. EPA, 1989 and Foster and Chrostowski, 1987):

$$\text{Intake}_{si} = \frac{(S)(IR_{sh})(K)(EF)(ED)}{(BW)(AT)(R_a)(CF)}$$

$$K = D_s + \frac{\exp(-R_a \times D_t)}{R_a} - \frac{\exp[R_a \times (D_s - D_t)]}{R_a}$$

where:

Intake_{wi}	=	intake of chemical "i" from water via inhalation (mg/kg/day)
S	=	volatile chemical generation rate (µg/m^3-min-shower)
IR_{sh}	=	inhalation rate (L/min)
K	=	mass transfer coefficient (min)
EF	=	exposure frequency (showers/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time or period of exposure (days)
R_a	=	air exchange rate (min^{-1})
CF	=	conversion factor (1 x 10^{-6} µg-L/mg-m^3)
D_s	=	shower duration (min)
D_t	=	total time in bathroom (min)

The volatile chemical generation rate was estimated using the Foster and Chrostowski mass transfer model, which is based on two-phase film theory. The model employs contaminant-specific mass transfer coefficients, Henry's Law constants, droplet diameter, drop time, viscosity, temperature, etc. For most

metals anticipated at the SWMU 16, volatilization is not a significant pathway because these substances do not vaporize at room temperature.

Construction workers may be exposed to COPCs that have volatilized from groundwater when excavation exposes the shallow water table. Exposures for construction workers associated with the inhalation route were estimated in the following manner (U.S. EPA, 1989):

$$\text{Intake}_{ai} = \frac{(C_{ai})(IR_a)(ET)(EF)(ED)}{(BW)(AT)}$$

where:

Intake_{ai}	=	intake of chemical "i" from air via inhalation (mg/kg/day)
C_{ai}	=	concentration of chemical "i" in air (mg/m^3)
IR_a	=	inhalation rate (m^3/hr)
ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
BW	=	body weight (kg)
AT	=	averaging time (days);
		for noncarcinogens, AT = ED x 365 days/year;
		for carcinogens, AT = 70 year x 365 days/year

The same exposure frequency and exposure time used to estimate intake from dermal contact with groundwater was used to evaluate intake from inhalation of VOCs from groundwater during construction activities.

There are no well-established models available for estimating migration of volatiles from groundwater into a construction/utility trench. To estimate the EPC for air in a construction trench, the HHRAs used an approach suggested by the Virginia Department of Environmental Quality (VDEQ, 2004), which is based on a combination of a vadose zone model (to estimate volatilization of gases from contaminated groundwater into a trench) and a box model (to estimate dispersion of the contaminants from the air inside the trench into the above-ground atmosphere). The VDEQ methodology is described in the following paragraphs.

The airborne concentration of a contaminant in a trench can be estimated using the following equation:

$$C_{air} = C_{GW} \times VF$$

where:

C_{air} = air concentration of contaminant in the trench µg/m^3

C_{GW} = concentration of contaminant in groundwater µg/L

VF = volatilization factor L/m^3

It is assumed that a construction project could result in an excavation of 15 feet bgs or less. If the depth to groundwater at a site is less than 15 feet, the VDEQ model assumes that a worker would encounter groundwater when digging an excavation or a trench. The worker would then have direct exposure to the groundwater. The worker would also be exposed to contaminants in the air inside the trench that would result from volatilization from the groundwater pooling at the bottom of the trench.

The following equation is used to calculate the volatilization factor (VF) for a trench less than 15 feet deep:

$$VF = (K_i \times A \times F \times 10^{-3} \times 10^{4} \times 3{,}600) / (ACH \times V)$$

where:

K_i	=	overall mass transfer coefficient of contaminant (cm/s)
A	=	area of the trench (m^2)
F	=	fraction of floor through which contaminant can enter (unitless)
ACH	=	air changes per hour (h^{-1}) = 360 h^{-1}
V	=	volume of trench (m^3)
10^{-3}	=	conversion factor (L/cm^3)
10^4	=	conversion factor (cm^2/m^2)
3,600	=	conversion factor (seconds/hour)

Studies of urban canyons suggest that if the ratio of trench width, relative to wind direction, relative to trench depth is less than or equal to 1, a circulation cell or cells will be set up within the trench that limits the degree of gas exchange with the atmosphere and, based upon measured ventilation rates of buildings, the air changes per hour (ACH) is assumed to be 2. Based upon the ratio of trench depth to the average wind speed, if the ratio of trench width to trench depth is greater than 1, the air exchange between the trench and above-ground atmosphere is not restricted, and the ACH is assumed to be 360.

The exposure assessment performed for these HHRAs will assume the width-to-trench depth ratio is greater than 1; therefore, the ACH is set at 360.

K_i is calculated using the following equation:

$$K_i = 1 / \{(1/k_iL) + [(RT) / (H_i\ k_iG)]\}$$

where:

K_i	=	overall mass transfer coefficient of containment (cm/s)
k_iL	=	liquid-phase mass transfer coefficient of i (cm/s)
R	=	ideal gas constant (atm-m^3/mole-°K) = 8.2×10^{-5}
T	=	average system absolute temperature (°K) (Default = 298°K)
H_i	=	Henry's Law constant of i (atm-m^3/mole)
k_iG	=	gas-phase mass transfer coefficient of i (cm/s)

The formulas for calculating k_iL and k_iG are as follows:

$$k_iL = (MWO_2/MW_i)^{0.5} \times (T/298) \times kL,O_2$$

where:

k_iL	=	liquid-phase mass transfer coefficient of component i (cm/s)
MWO_2	=	molecular weight of oxygen (g/mole)
MW_i	=	molecular weight of component i (g/mole)
kL,O_2	=	liquid-phase mass transfer coefficient of oxygen at 25°C (cm/s) = 0002 cm/s

$$k_iG = (MWH_2O/MW_i)^{0.335} \times (T/298)^{1.005} \times kG,H_2O$$

where:

k_iG	=	gas-phase mass transfer coefficient of component i (cm/s)
MWH_2O	=	molecular weight of water (g/mole)
kG,H_2O	=	gas-phase mass transfer coefficient of water vapor at 25°C (cm/s)= 0.833 cm/s (Superfund Exposure Assessment Manual, U.S. EPA, 1988).

Chemical properties were obtained from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (U.S. EPA, 2002a) and are presented in Table 7-24.

7.3.4.7 Summary of Exposure Parameters

A summary of the exposure input parameters for all exposure pathways are presented in Tables 7-21 and 7-22 for the identified potential receptor groups at SWMU 16. In general, standard default parameters (e.g., U.S. EPA, 1991; Exposure Factors Handbook, U.S. EPA 1997a), which combine mid-range and upper-end exposure factors, were used to assess RME conditions. CTE was assessed primarily by the use of mid-range exposure factors presented in current risk assessment guidance (U.S. EPA, 1989 and 1993a).

7.3.5 Exposure to Lead

The equations and methodology presented in the previous section cannot be used to evaluate exposure to lead because of the absence of published dose-response parameters. Exposure to lead was assessed using the following models:

- The latest version of U.S. EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for lead, (U.S. EPA, 2002d). This model is typically used to evaluate lead exposure assuming a residential land use scenario.

- The U.S. EPA's Technical Review Work Group (TRW) Model for Lead (U.S. EPA, 2003a). This model is typically used to evaluate lead exposure assuming a non-residential land use scenario.

The IEUBK Model for lead (U.S. EPA, 2002d) is designed to estimate blood levels of lead in children (under 7 years of age) based on either default or site-specific input values for air, drinking water, diet, dust, and soil exposure. Studies indicate that infants and young children are extremely susceptible to adverse effects from exposure to lead. Considerable behavioral and developmental impairments have been noted in children with elevated blood-lead levels. The threshold for toxic effects from this chemical is believed to be in the range of 10 to 15 micrograms per deciliter (µg/dL). Blood-lead levels greater than 10 µg/dL are considered to be a "concern."

For SWMU 16, the IEUBK Model for lead was used to address exposure to lead in children when detected groundwater concentrations exceed the 15 µg/L Federal Action Level promulgated under the Safe Drinking Water Act and when detected soil or sediment concentrations exceed the OSWER soil

screening level of 400 mg/kg for residential land use (U.S. EPA, 1994b). Average chemical concentrations, as well as default parameters for some input parameters, were used in the evaluation. Estimated blood-lead levels and probability density histograms will be presented as support documentation for this analysis and will be appended to the site-specific risk assessments.

Non-residential adult exposure to lead in soil was evaluated using U.S. EPA's TRW Model for lead (U.S. EPA, 2003a). In this model, adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood-lead concentration in the developing fetuses of adult women. The adult lead model generates a spreadsheet for each exposure scenario that is evaluated (i.e., industrial, recreational). The output of the spreadsheet is the probability that the blood-lead concentrations in the fetus exceed 10 µg/L. The probability that the fetal blood-lead level will exceed 10 µg/L was calculated in accordance with the following EPA guidelines:

- Use of the TRW Interim Adult Lead Methodology in Risk Assessment (U.S. EPA, 1999c).
- Frequently Asked Questions (FAQs) on the Adult Lead Model (U.S. EPA, 2004d).

No models are currently available to evaluate the periodic exposure of adolescent trespassers to lead. Therefore, the results of the IEUBK Model for children will be used to qualitatively assess exposure of this receptor. Essentially, the qualitative discussion will cite that potential adverse effects from exposure to lead are expected to be of a lesser magnitude for adolescent trespassers than for children.

7.4 TOXICITY ASSESSMENT

The objective of the toxicity assessment is to identify the potential health hazards and adverse effects in exposed populations. Quantitative estimates of the relationship between the magnitude and type of exposures and the severity or probability of human health effects are defined for the identified COPCs. Quantitative toxicity values determined during this component of the risk assessments were integrated with outputs of the exposure assessments to characterize the potential for the occurrence of adverse health effects for each receptor group.

The toxicity value used to evaluate non-carcinogenic health effects is the reference dose (RfD); carcinogenic effects are quantified using the CSF.

7.4.1 Toxicity Criteria

Oral and inhalation RfDs and CSFs used in the HHRA for SWMU 16 were obtained from the following primary literature sources (U.S. EPA 2003b):

- Integrated Risk Information System (IRIS) (online).

- U.S. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs) – The Office of Research and Development/National Center for Environmental Assessment (NCEA) Superfund Health Risk Technical Support Center develops PPRTVs on a chemical-specific basis when requested by U.S. EPA's Superfund program.

- Other Toxicity Values – These sources include but are not limited to California Environmental Protection Agency (Cal EPA) toxicity values, the Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs), and the Annual Health Effects Assessment Summary Tables (HEAST) (U.S. EPA, 1997b).

Although RfDs and CSFs can be found in several toxicological sources, U.S. EPA's IRIS on-line database is the preferred source of toxicity values. This database is continuously updated and values presented have been verified by U.S. EPA. The U.S. EPA Region 9 PRG Tables and Region III Risk-Based Concentration (RBC) Tables were also used as a source of toxicity criteria when these criteria were not available from the aforementioned references. The RfDs and CSFs for the constituents selected as COPCs for SWMU 16 are presented in Tables 7-27 through 7-30.

7.4.1.1 Toxicity Criteria for Dermal Exposure

RfDs and CSFs found in literature are typically expressed as administered doses; therefore, these values are considered inappropriate for estimating the risks associated with dermal routes of exposure. Oral dose-response parameters based on administered doses must be adjusted to absorbed doses before the evaluation of estimated dermal exposure intakes is made.

The adjustment from administered to absorbed dose was made using chemical-specific absorption efficiencies published in available guidance [i.e., U.S. EPA, 2004a (the primary reference), IRIS, ATSDR toxicological profiles, etc.] and the following equations:

$$RfD_{dermal} = (RfD_{oral})(ABS_{GI})$$

$$CSF_{dermal} = (CSF_{oral}) / (ABS_{GI})$$

where: ABS_{GI} = absorption efficiency in the gastrointestinal tract.

Absorption efficiencies used in the risk assessments reflect U.S. EPA's current dermal assessment guidance (U.S. EPA, 2004a).

7.4.1.2 Toxicity Criteria for Carcinogenic Effects of PAHs

Limited toxicity values are available to evaluate the carcinogenic effects from exposure to PAHs. The most extensively studied PAH is benzo(a)pyrene, which is classified by U.S. EPA as a probable human carcinogen. Although CSFs are available for benzo(a)pyrene, insufficient data are available to calculate CSFs for other carcinogenic PAHs. Toxic effects for these chemicals were evaluated using the concept of estimated orders of potential potency, which relate the potency of the other potentially carcinogenic PAHs to the potency of benzo(a)pyrene, as presented in current U.S. EPA guidance (U.S. EPA, 1993b). The equivalent oral and inhalation CSFs for these chemicals were derived by multiplying the CSFs for benzo(a)pyrene by the orders of potential potency.

7.4.1.3 Toxicity Criteria for Chromium

Toxicity criteria are available for different forms of chromium, which is considered to be more toxic in the hexavalent state. Because there is no evidence to support the conclusion that hexavalent chromium is present at the sites, speciation analyses were not completed for SWMU 16. However, risks associated with this chemical were assessed by conservatively assuming that 100 percent of the reported total chromium result is attributable to hexavalent chromium.

7.4.1.4 Toxicity Criteria for TCE

Toxicity criteria (i.e., RfDs, CSFs) for TCE are not currently published on the U.S. EPA's IRIS database or in HEAST. The toxicity criteria developed by the California EPA (CA EPA, 2002) were used for TCE in this risk assessment. The uncertainty associated with the use of the CA EPA toxicity values is discussed in Section 7.6.3.

7.5 RISK CHARACTERIZATION

This section provides a characterization of the potential human health risks associated with the potential exposures to COPCs at SWMU 16. Section 7.5.1 outlines the methods used to quantitatively estimate the type and magnitude of potential risks for human receptors. A summary of the risk characterization for the SWMU 16 is provided in Section 7.5.2.

7.5.1 Quantitative Analysis

Quantitative estimates of risk were calculated according to risk assessment methods outlined in U.S. EPA guidance (U.S. EPA, 1989). Lifetime cancer risks are expressed in the form of dimensionless probabilities, referred to as ILCRs, based on CSFs. Non-carcinogenic risk estimates are presented in the form of HQs determined through a comparison of intakes with published RfDs.

ILCR estimates were generated for each COPC using estimated exposure intakes and published CSFs, as follows:

$$\text{ILCR} = (\text{Estimated Exposure Intake})(\text{CSF})$$

If the above equation resulted in an ILCR greater than 0.01, the following equation was used:

$$\text{ILCR} = 1-[\exp(-\text{Estimated Exposure Intake})(\text{CSF})]$$

An ILCR of 1×10^{-6} indicates that the exposed receptor has a one-in-one-million chance of developing cancer under the defined exposure scenario. Alternatively, such a risk may be interpreted as representing one additional case of cancer in an exposed population of one million persons.

As mentioned previously, non-carcinogenic risks were assessed using the concepts of HQs and HIs. The HQ for a COPC is the ratio of the estimated intake to the RfD, as follows:

$$\text{HQ} = (\text{Estimated Exposure Intake}) / (\text{RfD})$$

An HI was generated by summing the individual HQs for all COPCs. The HI is not a mathematical prediction of the severity of toxic effects and therefore is not a true "risk"; it is simply a numerical indicator of the possibility of the occurrence of noncarcinogenic (threshold) effects.

7.5.1.1 Comparison of Quantitative Risk Estimates to Benchmarks

To interpret the quantitative risks and to aid risk managers in determining the need for remediation at a site, quantitative risk estimates were compared to typical benchmarks. Calculated ILCRs were interpreted using the U.S. EPA's "target range" (1×10^{-6} to 1×10^{-4}), and HIs will be evaluated using a value of 1.0.

U.S. EPA has defined the range of 1×10^{-6} to 1×10^{-4} as the ILCR "target range" for most hazardous waste facilities addressed under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and RCRA. IDEM has defined the same range for the nondefault evaluation under their RISC program. Individual or cumulative ILCRs greater than 1×10^{-4} will typically not be considered as protective of human health and ILCRs less than 1×10^{-6} will typically be regarded as protective. Risk management decisions are necessary when the ILCR is within the 1×10^{-4} to 1×10^{-6} cancer risk range.

An HI exceeding unity (1.0) indicates that there may be potential non-carcinogenic health risks associated with exposure. If an HI exceeds unity, a segregation of target organ effects associated with exposure to COPCs was performed. Only those chemicals that affect the same target organ(s) or exhibit similar critical effect(s) were regarded as truly additive. Consequently, it may be possible for a cumulative HI to exceed 1.0, but no adverse health effects are anticipated if the COPCs do not affect the same target organ or exhibit the same critical effect.

7.5.2 Results of the Risk Characterization

This section contains a summary of the results of the risk characterization for SWMU 16. Quantitative risk estimates for potential human receptors are developed for those chemicals identified as COPCs. Uncertainties associated with the risk estimates are discussed in Section 7.6. The methodology used to calculate the risks presented in this section is provided in Sections 7.3 and 7.4. Potential cancer risks and HIs were calculated for current/future maintenance workers, occupational workers, adolescent trespassers and future construction workers, child recreation users, adult recreational users, and hypothetical residents under the RME and CTE scenarios and are summarized in Tables 7-31 and 7-32, respectively. Sample calculations are presented in Appendix I, and the results of the risk assessment in RAGS Part D format are included in Appendix I.

7.5.2.1 Non-carcinogenic Risks – RME

Cumulative HIs for maintenance workers, adolescent trespassers, and adult recreational users under the RME scenario were less than or equal to unity (1), indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

HIs for the all receptors exposed to soil under the RME scenario were less than or equal to unity (1), with the exception of the construction worker and hypothetical child resident. The HI for a hypothetical child resident exposed to surface soil exceeded unity although the HQ for the target specific organs were less than one indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions. The HI for construction workers exposed to surface and subsurface soil was 3. Aluminum (HQ = 1) and manganese (HQ = 2) were the major contributors to the HI for the construction worker. It should be noted that as discussed in Section 5.2, concentrations of aluminum and manganese are within site wide background levels.

HIs for the potable use of groundwater by occupational workers (HI = 5), child recreational users (HI = 5), hypothetical child residents (HI = 57) and hypothetical adult residents (HI = 16) exceed unity. Manganese was the major contributor to the HI for occupational workers and child recreational users. VOCs and inorganics were the major contributors to the HI for hypothetical child residents. TCE, iron, and manganese were the major contributors to the HI for hypothetical adult residents. It should be noted that as discussed in Section 5.4, concentrations of manganese are within site wide background levels.

HIs for all receptors exposed to surface water and sediment under the RME scenario are less than or equal to unity (1), indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

7.5.2.2 Carcinogenic Risks - RME

Cumulative ILCRs for maintenance workers, adolescent trespassers, and construction workers were less than or within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. ILCRs for all receptors exposed to soil, surface water, and sediment under the RME scenario were less than or within U.S. EPA's target risk range of 10^{-4} to 10^{-6}.

The ILCRs for domestic use to groundwater by occupational workers (ILCR = 1×10^{-3}), child recreational users (ILCR = 3×10^{-4}), adult recreational users (ILCR = 3×10^{-4}), lifelong recreational users (ILCR = 5×10^{-4}), hypothetical child residents (ILCR = 3×10^{-3}), hypothetical adult residents (ILCR = 4×10^{-3}), and

hypothetical lifelong resident (7 x 10^{-3}) exceeded the U.S. EPA's target risk range. VOCs, primarily TCE and vinyl chloride, were the major contributors to the ILCRs for groundwater.

7.5.2.3 Non-carcinogenic Risks – CTE

Cumulative HIs for maintenance workers, adolescent trespassers, and adult recreational users under the CTE scenario were less than or equal to unity (1), indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

HIs for the all receptors exposed to soil under the CTE scenario are less than or equal to unity (1) with the exception of the construction worker. The HI for construction workers exposed to surface and subsurface soil was 3. Aluminum (HQ = 1) and manganese (HQ = 2) were the major contributors to the HI for the construction worker. It should be noted that as discussed in Section 5.2, concentrations of aluminum and manganese are within site wide background levels.

HIs for the potable use of groundwater by occupational worker (HI = 5), hypothetical child resident (HI = 17) and hypothetical adult resident (HI = 8) exceed unity. Manganese was the major contributor to the HI for the occupational worker. TCE, iron, and manganese were the major contributors to the HI for the hypothetical child and adult residents. It should be noted that as discussed in Section 5.4, concentrations of manganese are within site wide background levels.

HIs for all receptors exposed to surface water and sediment under the CTE scenario are less than or equal to unity (1), indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

7.5.2.4 Carcinogenic Risks - CTE

Cumulative ILCRs for maintenance workers, adolescent trespassers, construction workers, child recreational users, adult recreational users, and lifelong recreational users were less than or within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. ILCRs for all receptors exposed to soil, surface water, and sediment under the CTE scenario were less than or within U.S. EPA's target risk range of 10^{-4} to 10^{-6}.

The ILCRs for domestic use to groundwater by occupational workers (ILCR = 4 x 10^{-4}), hypothetical child residents (ILCR = 3 x 10^{-4}), hypothetical adult residents (ILCR = 5 x 10^{-4}), and hypothetical lifelong resident (9 x 10^{-4}) exceeded the U.S. EPA's target risk range. VOCs, primarily TCE, were the major contributors to the ILCRs for groundwater.

7.5.2.5 Risks from Lead

Lead was identified as a COPC in surface soil, groundwater, gully surface water, and gully sediment at SWMU 16. The maximum detected concentration of lead in surface soil (1,240 mg/kg) and gully sediment (15,200 mg/kg) exceeded the OSWER soil screening level of 400 mg/kg for residential land use. The maximum detected concentration of lead in groundwater (127 μg/L) and gully surface water (281 μg/L) exceeded the 15 μg/L Federal Action Level promulgated under the Safe Drinking Water Act.

Hypothetical residential exposures to lead in surface soil, groundwater, and sediment were evaluated using U.S. EPA's IEUBK lead model (U.S. EPA, 2002d). Exposures in lead in surface soil and/or sediment by occupational workers and adult trespassers and exposures to lead in surface/subsurface soil by construction workers were evaluated using a slope-factor approach developed by the U.S. EPA Technical Review Workgroup for Lead (U.S. EPA, 2003a). The IEUBK model and adult lead model can not be used to evaluate exposures to surface water by trespassers and recreational users, therefore risks from exposures to lead in surface water to these receptors were evaluated qualitatively.

Hypothetical future residential exposures to lead in surface soil, groundwater, and gullies sediment were evaluated using the IEUBK lead model (U.S. EPA, 2002d). The IEUBK model simulates exposures to lead at a single location. In order to use the IEUBK model to estimate exposures to both surface soil and gullies sediment at different locations a weighted lead concentration was calculated following the methodology presented in U.S. EPA's Assessing Intermittent or Variable Exposures at Lead Sites (U.S. EPA, 2003c). The weighted lead concentration for surface soil and gullies sediment was calculated as follows:

$$PbS_w = EF_{sed} \times [(F_{sed} \times Pb_{sed}) + (F_{soil} \times PbS_{soil})] + (EF_{soil} \times PbS_{soil})$$

Where:

PbS_w	=	weighted lead surface soil/sediment concentration (mg/kg)
EF_{sed}	=	exposure frequency or fraction of the days/week receptor is exposed to sediment (1/7 - assumed)
F_{sed}	=	fraction of time a receptor is exposed to sediment when the site is visited (0.5 - assumed)
Pb_{sed}	=	average lead concentration in sediment (1,730 mg/kg)

EF_{soil} = exposure frequency or fraction of the days/week a receptor is exposed to surface soil on days when they are also exposed to sediment
= 1 – F_{sed} (6/7 – assumed)

PbS_{soil} = average lead concentration in surface soil (127 mg/kg)

F_{soil} = fraction of time a receptor is exposed to surface soil on on days when they are also exposed to sediment
= 1 – EF_{soil} (0.5 - assumed)

The above equation results in a weighted lead concentration of 242 mg/kg, which was used as the EPC for surface soil/sediment. The average concentration of lead in groundwater(13.6 µg/L) was used as the EPC for drinking water. Default parameters were used for the rest of the model input parameters. IEUBK model outputs are included in Appendix I. The weighted lead concentration of 242 mg/kg in surface soil/sediment and 13.6 µg/L in groundwater results in 4.3 percent of hypothetical child residents having a blood lead level greater than 10 µg/dL (and results in a geometric mean blood lead level of 4.5 µg/dL). This value is within the U.S. EPA goal as described in the 1994 OSWER Directive of no more than 5 percent of children exceeding a 10 µg/dL blood lead level.

Although the potential risks for exposures to surface soil and sediment from the gullies are within acceptable levels under the defined conditions, the lead concentrations in the sediment from the gullies ($C_{maximum}$ = 15,200 mg/kg) warrant further discussion. Concentrations of lead exceeded the OSWER residential screening level of 400 mg/kg in 17 of 31 sediment samples from the gullies and 13 of the samples had lead concentrations exceeding the industrial screening level of 800 mg/kg. In addition, two sediment samples had lead concentrations exceeding the screen level of 6,500 mg/kg (Gadagbui, Pounds, Simons, and Roberts, 2002) for acute exposures to lead by children. The risk estimated presented above are based on a receptor being exposed to lead in sediments one day a week. However, if the exposure frequency for sediments was changed from one day a week to two days a week then the weighted lead concentration would be 356 mg/kg. Inputting a weighted lead concentration of 328 mg/kg for surface soil/sediment and 13.6 µg/L for groundwater results in 9.2 percent of hypothetical child residents having a blood lead level greater than 10 µg/dL (and results in a geometric mean blood lead level of 5.4 µg/dL). This value exceeds the U.S. EPA goal as described in the 1994 OSWER Directive of no more than 5 percent of children exceeding a 10 µg/dL blood lead level. Consequently, frequent exposure to lead in sediment from the gullies could result in unacceptable risks.

Child recreational users and adolescent trespassers could also be potentially exposed to lead in on-site surface soil and sediment. U.S. EPA's IEUBK model is typically used to evaluate exposures to lead by

children but the evaluation of recreational/trespass exposures of short duration is outside the limits of the model. Exposures to lead in on-site surface soil and sediments by child recreational users and adolescent trespassers will contribute to the individual total daily lead exposure for these receptors but this exposure is not expected to be significant under exposures of short duration. In addition, a child's or adolescent's total daily lead exposure will be heavily influenced by the concentration of lead in the soil of the child's or adolescent's own yard. Thus, the recreational child's and adolescent trespassers total daily lead exposure may depend mainly on the exposure to soils occurring in the receptor's own yard, which is unknown. The potential adverse health effects from exposures to lead in surface soil and sediment at SWMU 16 are expected to be of a lesser magnitude for child recreational users and adolescent trespassers than for hypothetical child residents. Since the potential risks from exposure to lead in surface soil and sediment are not a concern for hypothetical child residents under the defined conditions they are also not expected to be a concern for child recreational users and adolescent trespassers. Although as discussed above, exposure to lead in sediment from the gullies at frequencies higher than those evaluated in this HHRA could result in unacceptable risks.

Exposures to lead in surface soil and sediment by occupational workers and adult trespassers and in surface/subsurface soil by construction workers were evaluated using the Adult Lead Model (ALM) developed by the EPA Technical Review Workgroup for Lead (U.S. EPA, 2003a). The ALM was not used to evaluate exposures to lead in soil by maintenance workers because the model should not be used when exposures are less than one day a week; the exposure frequency assumed for maintenance workers is one day every other week (24 days/year). As recommended by the model, the average lead concentration of 82.2 mg/kg in surface/subsurface soil was used as the exposure point concentration for construction workers. The weighted surface soil/sediment lead concentration of 242 mg/kg was used as the exposure point concentration for occupational workers and adult trespassers. ILCRs and HIs are calculated for non-lead compounds using RME assumptions; however, the adult lead model guidance recommends the use of CTE assumptions in evaluating adult exposures to lead in soil (U.S. EPA, 2003a). Therefore, the incidental ingestion rate was assumed to be 100 mg/day for the construction worker and 50 mg/day for occupational workers and adult trespassers (U.S. EPA, 2003a). The exposure frequency was assumed to be 150 days/year for the construction worker, 219 days/year for the occupational worker, and 52 days/year for adult trespassers. Values of 2.18 and 1.53 µg/dL were used for the standard deviation and baseline blood lead concentration, respectively, which are the recommended values for the midwestern United States (U.S. EPA, 2002d). Default parameters were used for the remaining model input parameters. Results of the model runs are included in Appendix I. The fetus of a pregnant worker is the receptor of concern for the TRW model. For construction workers exposed to surface/subsurface soil, the lead concentration of 82.2 mg/kg results in 1.1 percent of the receptors (fetuses) having a blood lead level greater than 10 µg/dL and a geometric mean blood lead level of 1.9 µg/dL. For occupational

workers exposed to surface soil and sediment, the weighted lead concentration of 242 mg/kg results in 1.1 percent of the receptors (fetuses) having a blood lead level greater than 10.0 µg/dL and a geometric mean blood lead level of 1.9 µg/dL. For adolescent trespassers exposed to surface soil and sediment, the weighted lead concentration of 242 mg/kg results in 0.7 percent of the receptors (fetuses) having a blood lead level greater than 10.0 µg/dL and a geometric mean blood lead level of 1.6 µg/dL. These results do not exceed the U.S. EPA goal of no more than 5 percent of children (fetuses of exposed women) exceeding a 10 µg/dL blood lead level.

As discussed above, lead was identified as a COPC in surface water from the gullies. The ALM and IEUBK models can not be used to evaluate exposures to lead in surface water. The maximum detected (281 µg/L) and average concentrations (48.4 µg/L) of lead in gully surface water exceeded the Federal Action Level of 15 µg/L promulgated under the Safe Drinking Water Act. Although concentrations of lead in surface water exceed the Federal Action Level, exposure to lead in surface water from the gullies is not considered to be a significant exposure pathway. The gullies are not a flowing stream. Surface water is only present in the gullies after precipitation events. Consequently, surface water in the gullies can not be used as a drinking water source. Any contact with surface water in the gullies is expected to be incidental. Also, dermal exposure to lead in water is considered to be insignificant (ATSDR, 1999). Therefore, exposure to lead in surface water from the gullies is not expected to be significant for the identified receptor groups and exposure scenarios.

7.5.2.6 Effects of Background on Risk Estimates

As discussed in Section 7.2.2.1, all inorganics detected at maximum concentrations exceeding COPC screening levels were carried through the risk assessment regardless of whether they were present at naturally occurring levels or not. Table 7-33 indicates those inorganics which were identified in Section 5 as being within background levels but were retained as COPCs and carried through the HHRA. Table 7-33 presents the cancer risks and hazard indices for the organic COPCs and inorganic COPCs detected at concentrations exceeding background concentrations (i.e., risk estimates for inorganic COPCs determined to be less than background were not included in Table 7-33). The RAGS Part D Table 9s for the risk estimates presented in Table 7-34 are included in Appendix I.

Unacceptable HIs were identified for construction workers exposed to aluminum and manganese in soil when all inorganic COPCs where carried thought the HHRA. However, as discussed in Section 5, concentrations of aluminum and manganese are within background levels in soil. As presented in Table 7-34, the HHRA HIs for construction workers exposed to soil are less than 1 when the chemicals present at background levels are not included in the quantitative risk analysis.

Unacceptable HIs were identified for occupational workers and child recreational users using groundwater as a potable water supply. Manganese is the primary risk driver. However, manganese concentrations in groundwater are within background levels. When chemicals that are present at background levels are removed from the HHRA, HIs on a target organ basis are within acceptable levels for occupational workers and child recreational users using groundwater as a potable water supply.

VOCs, energetics, and inorganics (aluminum, arsenic, iron, lithium, manganese, and vanadium) for child residents and TCE, iron, and manganese for adult residents were the major contributors to the unacceptable HIs for exposures to groundwater when all organic and inorganic COPCs were carried through the HHRA. However, aluminum, arsenic, lithium, and manganese are present at background levels in groundwater. When chemicals present at background levels are considered, iron and vanadium are the only inorganic COPCs that contribute to the unacceptable HI for the child resident routinely using the groundwater for domestic purposes and iron is the only inorganic COPC that contributes to the unacceptable HI for the adult resident.

7.5.2.7 Risks from Exposures to Indoor Air at Building 146

TCE was identified as a COPC in indoor air at Building 146. Risks for the occupational worker exposed to TCE in indoor air at Building 146 were estimated using the methodology presented in Section 7.3. Toxicity criteria for TCE was obtained from the September, 2008 Oak Ridge National Laboratory (ORNL) Regional Screening Level (RSL) table. No inhalation RfD is listed on the ORNL RSL table for TCE, therefore only ILCRs were calculated. The ILCR for occupational workers exposed to indoor air at Building 146 was 4×10^{-6} for the RME scenario and 1×10^{-6} for the CTE scenario, which are within U.S. EPA's target risk range of 10^{-4} to 10^{-6}.

7.6 UNCERTAINTY ANALYSIS

There is uncertainty associated with all aspects of the baseline HHRA. A summary of the uncertainties, including a discussion of how they may affect the final risk numbers, is provided in this section.

Uncertainty in the selection of COPCs is related to the current status of the predictive databases, the grouping of samples, the numbers, types and distributions of samples, and the procedures used to include or exclude constituents as COPCs. Uncertainty associated with the exposure assessment includes the values used as input variables for a given intake route or scenario, the assumptions made to determine exposure point concentrations, and the predictions regarding future land use and population

characteristics. Uncertainty in the toxicity assessment includes the quality of the existing toxicity data needed to support dose-response relationships and the weight-of-evidence used to determine the carcinogenicity of COPCs. Uncertainty in risk characterization includes that associated with exposure to multiple chemicals and the cumulative uncertainty from combining conservative assumptions made in earlier steps of the risk assessment process.

Whereas there are various sources of uncertainty, the direction of uncertainty can be influenced by the assumptions made throughout the risk assessment, including selection of COPCs and selection of values for dose-response relationships. Throughout the entire risk assessment, assumptions are biased toward a margin of safety so that the final calculated risks are overestimated.

Generally, risk assessments carry two types of uncertainty: measurement and informational uncertainty. Measurement uncertainty refers to the usual variance that accompanies scientific measurements. For example, this type of uncertainty is associated with analytical data collected for each site. The risk assessment reflects the accumulated variances of the individual values used.

Informational uncertainty stems from inadequate availability of information needed to complete the toxicity and exposure assessments. Often, this gap is significant, such as the absence of information on the effects of human exposure to low doses of a chemical, on the biological mechanism of action of a chemical, or the behavior of a chemical in soil.

Once the risk assessment is complete, the results must be reviewed and evaluated to identify the type and magnitude of uncertainty involved. Reliance on results from a risk assessment without consideration of uncertainties, limitations, and assumptions inherent in the process can be misleading. For example, to account for uncertainties in the development of exposure assumptions, conservative estimates must be made to ensure that the particular assumptions made are protective of sensitive subpopulations or the maximum exposed individuals. If a number of conservative assumptions are combined in an exposure model, the resulting calculations can propagate the uncertainties associated with those assumptions, thereby producing a much larger uncertainty for the final results. This uncertainty is biased toward over predicting both carcinogenic and non-carcinogenic risks. Thus, both the results of the risk assessment and the uncertainties associated with those results must be considered when making risk management decisions.

This interpretation is especially relevant when the risks exceed the point of departure for defining "acceptable" risk. For example, when risks calculated using a high degree of uncertainty are less than an acceptable risk level (i.e., 10^{-4} to 10^{-6}), the interpretation of no significant risk is typically straightforward.

However, when risks calculated using a high degree of uncertainty exceed an acceptable risk level (i.e., 10^{-4}); a conclusion can be difficult unless uncertainty is considered.

7.6.1 Uncertainty in Data Evaluation

The most significant issues related to uncertainty in COPC selection are the screening levels that are used; the absence of screening levels for a few chemicals detected in the site media, and elevated detection limits for some compounds. A brief discussion of each of these issues is provided in the remainder of this section.

Usability of Existing Databases

All the data used in the HHRA were validated as discussed in Section 3.0. A review of data quality is also provided in this section. The qualification of data during the formal data validation process is not expected to compromise the results of the baseline HHRA. Analytical data qualified as estimated were utilized, even though the reported positive concentrations or sample-specific quantitation limits may be somewhat imprecise. The use of estimated data adds to the uncertainty associated with the risk assessment; however, the associated uncertainty is expected to be negligible compared to the other uncertainties inherent in the risk evaluation process (i.e., uncertainties with land uses, exposure scenarios, toxicological criteria, etc.). Analytical data qualified for blank contamination were used in the baseline risk assessment. When determining exposure concentrations via statistical procedures, chemicals not detected were conservatively assumed to be present at a concentration equal to one-half the sample-specific quantitation limit. Analytical results for some chemicals were qualified “R," unreliable, and were not used in the risk assessment. The sporadic rejection of a few chemicals in a few samples is not considered to be problematic because there are enough usable analytical data for these parameters to identify whether these chemicals are actually present at the site and to estimate the necessary data distribution parameters. In addition, based on historical knowledge of the site, most of the chemicals with rejected results (e.g., 2-butanone, acetone, acrolein, acrylonitrile, methacrylonitrile, and acetonitrile) are not expected to be present and are not expected to have been related to site activities. Because all data have been validated, the uncertainty in the calculated risks associated with the data is minimal. This is especially true because the COPCs used in the quantitative risk calculations were minimally affected by data quality problems.

Also, as discussed in Section 2, surface water samples planned for four Round 1 field investigation locations and for three Round 2 field investigation locations were not collected because surface water was not present at the time of the field investigations. The inability to collect these surface water samples

introduces minimal uncertainty into the risk assessment since these areas are frequently dry and only contain water after rainfall events. Consequently, there is limited potential for exposure in these areas. In addition, surface water samples were collected from all the designated/planned sampling locations during the Round 3 field investigation.

COPC Screening Levels

The use of risk-based SVs based on conservative land use scenarios (i.e., residential land use), corresponding to an ICR of 10^{-6} and HI of 0.1, should ensure that all the significant contributors to risk from a site are evaluated. The elimination of chemicals that are present at concentrations that correspond to an ILCR less than 10^{-6} and an HI less than 0.1 should not affect the final conclusions of the risk assessment because these chemicals are not expected to cause a potential health concern at the detected concentrations.

Chemicals without Established Screening Levels

Risk-based screening levels are currently not available for some constituents [e.g., acenaphthylene, 2-methylnaphthalene, benzo(g,h,i)perylene, phenanthrene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene]. Therefore, surrogates with similar chemical structures were selected for these chemicals. In the COPC screening, acenaphthene was used as a surrogate for acenaphthylene, naphthalene was used as a surrogate for 2-methylnaphthalene, pyrene was selected as a surrogate for benzo(g,h,i)perylene and phenanthrene, and aminodinitrotoluene was used as a surrogate for 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene. Applying toxicity values of one compound to another adds to the uncertainty in the risk assessment both in regard to the selection of COPCs and the subsequently calculated risks.

Safrole was detected in surface and subsurface soil samples. There are no human health screening levels for safrole, which is a common food additive (NJDEP, 2001). Safrole is often found in association with sassafras plants (safrole is present in the roots) and sassafras plants are known to grow all over NSW Crane, therefore it is not likely that this chemical is site related.

A large number of constituents do not have U.S. EPA SSLs for the migration from soil to air pathway. This uncertainty is expected to be small because potential risks associated with exposures via inhalation are typically orders of magnitude lower than those associated with exposures via incidental ingestion and dermal contact with soil. A comparison of the screening criteria for direct contact exposures with the screening criteria for migration from soil to air shows that, in most cases, the direct contact screening criteria

are at least an order of magnitude lower than the soil to air migration screening criteria for the same compound. If there are unacceptable risks resulting from inhalation exposures then usually there are also unacceptable risks from exposures via the incidental ingestion and dermal contact exposure pathways.

Uncertainty Associated with Changes in Screening Criteria

U.S. EPA continually reviews the toxicity data for chemicals that typically are detected at hazardous waste sites and as new studies become available U.S. EPA may revise the information presented in the IRIS database. In addition, as new information becomes available U.S. EPA may revise the methodology used to prepare risk assessments. These changes in the toxicity data or risk assessment methodology may result in changes in the screening levels used to select COPCs, which may introduce uncertainty into the selection of COPCs. However, given the conservative HHRA methodology presented herein, it is unlikely that risk estimates for SWMU 16 have been underestimated.

7.6.2 Uncertainty in the Exposure Assessment

Uncertainty in the exposure assessment arises because of the methods used to calculate exposure point concentrations, the determination of land use conditions, the selection of receptors and scenarios, the estimation of EPCs, and the selection of exposure parameters. Each of these is discussed below.

Land Use

The current land use patterns at NSWC Crane are well established, thereby limiting the uncertainty associated with land use assumptions. Land use at SWMU 16 is currently limited and is expected to be limited in the future, as long as NSWC Crane remains open (occupational workers, maintenance workers, and potential and infrequent trespassers are the only current and likely future receptors). To be conservative, risks to potential and future construction workers, recreational users, and hypothetical residents were estimated for the site.

Exposure Point Concentrations

Uncertainty is associated with the use of the 95 percent UCL on the mean concentration as the EPC. As a result of using the 95 percent UCL, the estimations of potential risk for the RME scenario are most likely overstated since this is a representation of the upper limit that potential receptors would be exposed to over the entire exposure period. In some cases (because datasets contained less than 10 samples or because the UCL was greater than the maximum concentration), the maximum concentration was used as the EPC. Use of the maximum concentration tends to overestimate potential risks because receptors

are assumed to be exposed continuously to the maximum concentration for the entire exposure period. Uncertainty is also introduced when the nondetects are assigned a value of one-half the nondetect quantitation limit in the calculation of the EPC. This may either overstate or understate the risks to the receptors.

There is uncertainty in assuming that current groundwater and surface water concentrations will not change in the future, and this would introduce additional uncertainty in the EPC and risks for any groundwater or surface water COPCs. Concentrations in groundwater may diminish over time due to natural attenuation processes involving source depletion and dilution. Since shallow groundwater discharges to surface water in Turkey Creek at the site any change in the groundwater concentrations will impact surface water concentrations.

Exposure Routes and Receptor Identification

The determination of various receptor groups and exposure routes of potential concern was based on current land use observed at the site and the anticipated future land use. Therefore, the uncertainty associated with the selection of exposure routes and potential receptors is minimal because they are considered to be well defined. Although residential use of groundwater was evaluated as an exposure scenario, groundwater is not currently used at the site nor is it expected to be used in the future. Therefore, the evaluation of direct exposure to groundwater performed in this baseline HHRA was included primarily to aid in risk management decision making.

Exposure Parameters

Each exposure factor (for RME and CTE scenarios) selected for use in the risk assessment has some associated uncertainty. Generally, exposure factors are based on surveys of physiological and lifestyle profiles across the United States. The attributes and activities studied in these surveys generally have a broad distribution. To avoid underestimation of exposure, in most cases, the U.S. EPA guidelines (U.S. EPA, 1991 and 1993a) on the RME receptor were used, which generally specify the use of the 95th percentile for most parameters. Therefore, the selected values for the RME receptor represent the upper bound of the observed or expected habits of the majority of the population.

Generally, the uncertainty can be assessed quantitatively for many assumptions made in determining factors for calculating exposures and intakes. Many of these parameters were determined from statistical analyses on human population characteristics. Often, the database used to summarize a particular

exposure parameter (i.e., body weight) is quite large. Consequently, the values chosen for such variables in the RME scenario have low uncertainty.

For many parameters for which limited information exists (i.e., dermal absorption of chemicals from soil), greater uncertainty exists. For example, current U.S. EPA guidance (U.S. EPA, 2004a) does not provide dermal absorption factors for exposure to most metals (except arsenic and cadmium) in soil. Therefore, risks for dermal contact from soil are not evaluated for most metals in this risk assessment. Consequently, risks from exposure to soil may be underestimated.

Many of the exposure parameters used to calculate exposures and risks in this report are selected from a distribution of possible values, including U.S. EPA guidance (U.S. EPA, 1991 and 1993a) and dermal guidance (U.S. EPA, 1997b and 2004a). For the RME scenario, the value representing the 95th percentile is generally selected for each parameter to ensure that the assessment bounds the actual risks from a postulated exposure. This risk number is used in risk management decisions but does not indicate what a more average or typical exposure might be or what risk range might be expected for individuals in the exposed population.

To address these issues, U.S. EPA (U.S. EPA, 1992) has suggested the use of the CTE receptor, whose intake variables are often set at approximately the 50th percentile of the distribution. The risks for this receptor seek to incorporate the range of uncertainty associated with various intake assumptions. Some of the parameters presented in this risk assessment were estimated using professional judgment, although U.S. EPA does provide limited guidance for the CTE evaluation (U.S. EPA, 1993a).

Uncertainty Associated with Exposures to Sediment Samples from the Gullies

As discussed in Section 5.3 concentrations of inorganics were elevated in several of the sediment samples collected from the gullies at SWMU 16. The HHRA assumed that receptors would be exposed to sediments on an infrequent basis (one day a week for recreational users and hypothetical residents and one day every other week for trespassers and maintenance workers). If the receptors are exposed to the sediments on a more frequent basis than was assumed in the HHRA then the risks would be higher than those presented in Section 7.5. For most inorganics the ILCRs and HIs for exposures to sediments are low enough that even if the exposure frequency was changed from one day a week to seven days a week the ILCRs and HIs (on a target organ basis) would still be within acceptable levels. However, as discussed in Section 7.5.2.4 there is uncertainty associated with exposure to lead in sediment located in the gullies.

Uncertainty Associated with Construction Workers Exposed to Vapors in a Trench

As discussed in Section 7.3.4.6, construction workers exposed to vapors in a trench were evaluated by a vadose zone model recommended by the Virginia Department of Environmental Quality (VDEQ) to estimate volatilization of gases from contaminated groundwater into a trench. Site-specific parameters, such as groundwater concentrations were used in the model, if possible. However, it was necessary to use model default values for most of the input parameters. The use of model default values tends to increase the uncertainty in the calculated risks. The direction of the uncertainty was not known.

One of the most sensitive parameters, in terms of potential risk, is the air-exchange rate (ACH) in the trench that was based on assumed trench dimensions (i.e., the ratio of trench width to depth). The risk assessment assumed that air exchange between the trench and aboveground atmosphere was not restricted (as opposed to a confined space) and may tend to underestimate risks. However, note that the model only gives the user two choices regarding the value of ACH, a very confined space that tends to greatly overestimate air concentrations in the trench or a less restricted space that results in lower air concentrations. The difference in vapor concentrations in a trench based on the two different ACHs is approximately 2 to 3 orders of magnitude. The ILCR and HI presented in the HHRA for construction workers exposed to volatiles in a trench were 2×10^{-6} and 0.1, respectively. Assuming that a construction worker is in a confined space (ACH=2) the ILCR and HI would be 5×10^{-4} and 28, which exceed the target risk levels. TCE is the major contributor to the risks. Consequently, a construction worker may experience adverse health effects if they are working in a confined space at SWMU 16.

Uncertainty Associated with Residential Exposures via Vapor Intrusion

As discussed in Section 7.2.3.3, several VOCs were detected in groundwater at concentration exceeding the screening levels for migration from groundwater through building foundations and into indoor air. The bedrock in the area is fractured which precludes the use of the U.S. EPA's Johnson and Ettinger vapor intrusion model (U.S. EPA, 2003d). Therefore potential exposures from vapor intrusion under a residential scenario could not be quantitatively evaluated at SWMU 16. Consequently the cumulative risks for a residential scenario are underestimated. This is not considered to be significant since SWMU 16 is not currently being used for residential purposes and residential land use is not likely in the future.

7.6.3 Uncertainty in the Toxicological Evaluation

Uncertainties associated with the toxicity assessment (determination of RfDs and CSFs and use of available criteria) are presented in this section.

Derivation of Toxicity Criteria

Uncertainty associated with the toxicity assessment is associated with hazard assessment and dose-response evaluations for the COPCs. The hazard assessment deals with characterizing the nature and strength of the evidence of causation or the likelihood that a chemical that induces adverse effects in animals will also induce adverse effects in humans. Hazard assessment of carcinogenicity is evaluated as a weight-of-evidence determination, using the U.S. EPA methods. Positive animal cancer test data suggest that humans contain tissue(s) that may manifest a carcinogenic response; however, the animal data cannot necessarily be used to predict the target tissue in humans. In the hazard assessment of noncancer effects, however, positive animal data often suggest the nature of the effects (i.e., the target tissues and type of effects) anticipated in humans.

Uncertainty in hazard assessment arises from the nature and quality of the animal and human data. Uncertainty is reduced when similar effects are observed across species, strain, sex, and exposure route; when the magnitude of the response is clearly dose related; when pharmacokinetic data indicate a similar fate in humans and animals; when postulated mechanisms of toxicity are similar for humans and animals; and when the COC is structurally similar to other chemicals for which the toxicity is more completely characterized.

Uncertainty in the dose-response evaluation includes the determination of a CSF for the carcinogenic assessment and derivation of an RfD for the noncarcinogenic assessment. Uncertainty is introduced from interspecies (animal to human) extrapolation, which, in the absence of quantitative pharmacokinetic or mechanistic data, is usually based on consideration of interspecies differences in basal metabolic rate. Uncertainty also results from intraspecies variation. Most toxicity experiments are performed with animals that are very similar in age and genotype, so intragroup biological variation is minimal, but the human population of concern may reflect a great deal of heterogeneity, including unusual sensitivity or tolerance to the COPC. Even toxicity data from human occupational exposure reflect a bias because only those individuals sufficiently healthy to attend work regularly (the "healthy worker effect") and those not unusually sensitive to the chemical are likely to be occupationally exposed. Finally, uncertainty arises from the quality of the key study from which the quantitative estimate is derived and the database. For cancer effects, the uncertainty associated with dose-response factors is mitigated by assuming the 95 percent upper bound for the slope factor. Another source of uncertainty in carcinogenic assessment is the method by which data from high doses in animal studies are extrapolated to the dose range expected for environmentally exposed humans. The linearized multistage model, which is used in nearly all quantitative estimations of human risk from animal data, is based on a nonthreshold assumption of carcinogenesis. Evidence suggests, however, that epigenetic carcinogens, as well as many genotoxic

carcinogens, have a threshold below which they are noncarcinogenic. Therefore, the use of the linearized multistage model is conservative for chemicals that exhibit a threshold for carcinogenicity.

For noncancer effects, additional uncertainty factors may be applied in the derivation of the RfD to mitigate poor quality of the key study or gaps in the database. Additional uncertainty for noncancer effects arises from the use of an effect level in the estimation of an RfD, because this estimation is predicated on the assumption of a threshold less than which adverse effects are not expected. Therefore, an uncertainty factor is usually applied to estimate a no-effect level. Additional uncertainty arises in estimation of an RfD for chronic exposure from subchronic data. Unless empirical data indicate that effects do not worsen with increasing duration of exposure, an additional uncertainty factor is applied to the no-effect level in the subchronic study. Uncertainty in the derivation of RfDs is mitigated by the use of uncertainty and modifying factors that normally range between 3 and 10. The resulting combination of uncertainty and modifying factors may reach 1,000 or more.

The derivation of dermal RfDs and CSFs from oral values may cause uncertainty. This is particularly the case when no gastrointestinal absorption rates are available in the literature or when only qualitative statements regarding absorption are available.

Uncertainty Associated with Evaluation of the Dermal Exposure Pathway

According to RAGS Part E (U.S. EPA, 2004a), risks for dermal absorption of inorganics in soil are to be quantitatively evaluated for arsenic and cadmium only. Therefore, risks from dermal exposure to aluminum, antimony, barium, cobalt, copper, iron, manganese, mercury, nickel, vanadium, and zinc in soils were not quantified in the risk assessment. Consequently, potential risks may be underestimated by excluding these constituents from the dermal risk assessment calculations. The following paragraphs provide further discussion regarding the uncertainty associated with the evaluation of the dermal absorption of metals from soils.

The model for dermal exposure to soil and sediment assumes that only a very thin, constant thickness layer of soil is available for contaminant transfer to the stratum corneum and that a constant amount of contaminant, proportional to the soil concentration, will be absorbed per unit area of skin and per exposure event. However, adherence to skin varies with such factors as particle size, soil type, and organic carbon content. As estimated by U.S. EPA (U.S. EPA, 2004a), the absorbed dermal dose could vary by as much as a factor of 50 from the model estimates, even assuming that activity patterns leading to the exposure duration applied in the experimental trials used to develop absorption factors.

Experimental determination of absorption rates indicates that interspecies differences are considerable, which, along with other variables related to condition and age of skin, differences in lag time, and site of application effects, yields appreciable uncertainty in estimated dermal exposures using published chemical-specific permeation functions. In addition, literature data indicate a variation by as much as a factor of 300 in chemical absorption rates for skin in different anatomical areas of the body. It should also be noted that children generally have greater absorption rates than adults.

Uncertainty Associated with Toxicity Criteria for TCE

As noted in Section 7.4.1.4 toxicity criteria (i.e., RfDs, CSFs) for TCE are not currently published on the U.S. EPA's IRIS database or in HEAST. The toxicity criteria developed by the California EPA (CA EPA, 2002) were used for TCE in this risk assessment. U.S. EPA has published draft toxicity values for TCE in a recent technical document (U.S. EPA, 2001b). The draft toxicity criteria are currently undergoing peer review. A range of CSFs [0.02 – 0.4 $(mg/kg/day)^{-1}$], as opposed to a single recommended value, is presented in the recent guidance. The draft CSFs are 2 to 30 times higher than the CA EPA CSF [0.013 $(mg/kg/day^{-1}$]. The draft oral RfD is 0.0004 mg/kg/day as compared to the CA EPA RfD of 0.5 mg/kg/day. TCE was identified as a COPC in soil, groundwater, and gully surface water. Risks for exposures to TCE in soil and gully surface water were within acceptable levels using the CA EPA toxicity values and would be within acceptable levels if the draft U.S. EPA criteria had been used in the calculations. Risks for exposures to TCE in groundwater exceeded acceptable levels and would also exceed acceptable levels if the draft U.S. EPA toxicity values had been used in the calculations. Therefore, the conclusions of the HHRA would be the same if the draft U.S. EPA toxicity values had been used in the calculations instead of the CA EPA values.

Uncertainty Associated with Toxicity Criteria for Aluminum and Iron

NCEA provisional RfDs are used to evaluate non-carcinogenic effects from exposure to aluminum and iron. The provisional RfDs for these chemicals are based on allowable intakes rather than adverse effect levels. Therefore, there is some degree of uncertainty associated with the use of the RfDs. Note that some U.S. EPA regions (e.g., Region 1) consider the use of the oral RfD for aluminum and iron inappropriate and recommend that these metals not be evaluated quantitatively in risk assessments.

Uncertainty Associated with Inhalation RfD for Manganese

The inhalation reference dose for manganese is based on an epidemiological study of workers exposed to manganese in its oxide form at an alkaline battery plant (U.S. EPA, 2004e). Manganese may or may not be present in this form in soil at SWMU 16. Consequently, there is uncertainty associated with the

RfD used to evaluate exposures to manganese via the inhalation route of exposure. It should be noted that concentrations of manganese in soil at SWMU 16 are within the range of manganese in background soils at NSWC Crane. HIs for inhalation of fugitive dust emissions from background soils would exceed acceptable levels.

7.6.4 Uncertainty in the Risk Characterization

Uncertainty in risk characterization resulted from assumptions made regarding additivity of effects from exposure to multiple COPCs from various exposure routes. High uncertainty exists when summing noncancer risks for several substances across different exposure pathways. This assumes that each substance has a similar effect and/or mode of action. Even when compounds affect the same target organs, they may have different mechanisms of action or differ in their fate in the body, so additivity may not have been an appropriate assumption. However, the assumption of additivity was considered acceptable because in most cases it represented a conservative estimate of risk.

Risks to any individual may also have been overestimated by summing multiple assumed exposure pathway risks for any single receptor. Although every effort was made to develop reasonable scenarios, not all individual receptors may have been exposed via all pathways considered.

Also, the risk characterization did not consider antagonistic or synergistic effects. Little or no information was available to determine the potential for antagonism or synergism for the COPCs. Because chemical-specific interactions could not be predicted, the likelihood for risks to be over predicted or under predicted could not be defined, but the methodology used was based on current U.S. EPA guidance.

7.6.4.1 Uncertainty Associated with Risk Estimates for Occupational Workers and Hypothetical Residents

There is uncertainty in risk estimates developed for both the occupational worker and hypothetical resident because the HHRA presented in the previous sections did not assume that these receptors would be directly exposed to subsurface soil contamination. However, Tables 7-35 and 7-36 do provide a risk evaluation for the subsurface soil contamination assuming an occupational worker or hypothetical resident are exposed to the subsurface soil contamination (i.e., subsurface soils excavated to the surface). Cancer and non-cancer risk estimates were developed using the EPCs and the Region 9 PRGs. As noted previously, the EPA Region 9 PRGs represent the 1×10^{-6} cancer risk level for carcinogenic effects and a HI of 1 for non-cancer effects. Thus risk estimates may be developed using the EPCs and Region 9 PRGs, and using a simple ratio technique:

$$\frac{\text{EPA Region 9 PRG}}{\text{EPC for COPC}} = \frac{\text{HI of 1 or Cancer Risk Estimate of } 1 \times 10^{-6}}{\text{HI or Cancer Risk Estimate}}$$

ILCRs for occupational workers and hypothetical future residents exposed to subsurface soil are within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. HIs for occupational workers and hypothetical future residents developed on a target organ specific basis are less than 1 indicating that potential adverse non-carcinogenic health effects are not anticipated under the defined conditions.

7.7 SUMMARY AND CONCLUSIONS

This section summarizes the results of the HHRA performed for SWMU 16. A brief summary of the information contained in the HHRA is provided.

The baseline HHRA for the SWMU 16 was performed to characterize the potential risks to likely human receptors under current and potential future land use. Potential receptors under current land use are maintenance workers, occupational workers, and adolescent trespassers. Potential receptors under future land use are construction workers, child and adult recreational users, and hypothetical child and adult residents. Although future land use is likely to be the same as current land use, the potential future receptors were evaluated in the baseline HHRA, primarily for decision-making purposes.

The list of COPCs for SWMU 16 includes the following:

- Surface Soil – TCE, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, aluminum, antimony, arsenic, copper, lead, iron, manganese, and vanadium.

- Subsurface Soil – TCE, aluminum, arsenic, iron, manganese, and vanadium.

- Groundwater - 1,1,2,2-PCA, 1,1,2-TCA, 1,1-DCE, 1,2,3-trichloropropane, 1,2-DCA, benzene, bromodichloromethane, carbon tetrachloride, chloroform, cis-1,2-DCE, methylene chloride, PCE, toluene, trans-1,2-DCE, TCE, vinyl chloride, pyridine, 2-nitrotoluene, TNT, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, RDX, aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, iron, lead, lithium, manganese, nickel, and vanadium.

- Surface Water from Gullies – TCE, RDX, aluminum, antimony, arsenic, barium, cadmium, chromium, iron, lead, manganese, vanadium, and zinc.

- Surface Water from Turkey Creek - arsenic and manganese.

- Sediment from Gullies - benzo(a)pyrene, aluminum, antimony, arsenic, barium, cadmium, copper, iron, lead, manganese, mercury, nickel, vanadium, and zinc.

- Sediment from Turkey Creek - aluminum, arsenic, iron, lead, manganese, and vanadium.

Quantitative estimates of non-carcinogenic and carcinogenic risks (HIs and ILCRs, respectively) were developed for potential human receptors. HIs for the all receptors exposed to surface soil under the RME scenario are less than or equal to unity (1). The HI for construction workers exposed to surface and subsurface soil exceeded unity. Aluminum and manganese were the major contributors to the HI for the construction worker. It should be noted that concentrations of aluminum and manganese are within site wide background levels.

HIs for the potable use of groundwater by occupational workers, child recreational users, hypothetical child residents and hypothetical adult residents exceed unity. Manganese was the major contributor to the HI for occupational workers and child recreational users. VOCs and inorganics were the major contributor to the HI for hypothetical child residents. TCE, iron, and manganese were the major contributors to the HI for hypothetical adult residents. It should be noted that concentrations of manganese are within site wide background levels.

HIs for all receptors exposed to surface water and sediment under the RME scenario are less than or equal to unity, indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

ILCRs for all receptors exposed to soil, surface water, and sediment under the RME scenario were less than or within U.S. EPA's target risk range of 10^{-4} to 10^{-6}.

The ILCRs for domestic use of groundwater by occupational workers, child recreational users, adult recreational users, lifelong recreational users, hypothetical child residents, hypothetical adult residents, and hypothetical lifelong resident exceeded the U.S. EPA's target risk range. VOCs, primarily TCE and vinyl chloride, were the major contributors to the ILCRs for groundwater.

Exposures to lead in surface soil, groundwater, and gully sediment by hypothetical child residents were evaluated with the IEUBK Model. The results of the IEUBK model indicated that risks to hypothetical child residents from exposures to lead in surface soil, groundwater, and gully sediment were with the U.S. EPA goal as described in the 1994 OSWER directive, of no more than 5 percent of children exceeding a 10 µg/dL blood-lead level when the child resident is only exposed to sediment one day a week. If a child resident is exposed to sediments more than two days a week then the risks would exceed the acceptable levels.

Exposures to lead in surface soil and sediment by occupational workers and adult trespassers and surface/subsurface soil by construction workers were evaluated using the Adult Lead Model. Results of the adult lead model analysis indicate that for occupational workers, adult trespassers, and construction workers blood-lead levels for children (fetuses of exposed woman) were within the goal of no more than 5 percent of children exceeding a 10 µg/L blood-lead level.

In summary for the SWMU 16, no significant potential human health risks are expected for exposures to surface soil, surface water, and sediment under current or future land use. Under future land use non-carcinogenic risks were elevated for construction workers exposed to aluminum and manganese in surface/subsurface soil, although concentrations of aluminum and manganese are within background levels. Also non-carcinogenic and/or carcinogenic risks were elevated (i.e., exceeded the aforementioned risk benchmarks) for occupational workers, child and adult recreational users, and hypothetical child and adult residents using groundwater as a potable water supply. Manganese was the major contributor to the HI for occupational workers and child recreational users. VOCs and inorganics were the major contributors to the HI for hypothetical child residents. TCE, iron, and manganese were the major contributors to the HI for hypothetical adult residents. It should be noted that concentrations of manganese in groundwater are within site wide background levels. A summary of the major contributors to risks at SWMU 16 is provided in Table 7-36.

TABLE 7-1

SCREENING CRITERIA USED IN SELECTION OF COPCs - SOIL/SEDIMENT
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CAS Number	Chemical	U.S. EPA Region 9 PRG[1] Residential	U.S. EPA Soil Screening Levels[2] Soil to Groundwater	U.S. EPA Soil Screening Levels[2] Soil to Air	IDEM[3] Residential	IDEM[3] Soil to Groundwater
Dioxins/Furans (µg/kg)						
3268-87-9	1,2,3,4,6,7,8,9-OCDD	39000 C[4]	2800 [4]	430000 C[4]	NA	NA
39001-02-0	1,2,3,4,6,7,8,9-OCDF	39000 C[4]	2800 [4]	430000 C[4]	NA	NA
35822-46-9	1,2,3,4,6,7,8-HPCDD	390 C[4]	28 [4]	4300 C[4]	NA	NA
67562-39-4	1,2,3,4,6,7,8-HPCDF	390 C[4]	28 [4]	4300 C[4]	NA	NA
55673-89-7	1,2,3,4,7,8,9-HPCDF	390 C[4]	28 [4]	4300 C[4]	NA	NA
39227-28-6	1,2,3,4,7,8-HXCDD	39 C[4]	2.8 [4]	430 C[4]	NA	NA
70648-26-9	1,2,3,4,7,8-HXCDF	39 C[4]	2.8 [4]	430 C[4]	NA	NA
57653-85-7	1,2,3,6,7,8-HXCDD	39 C[4]	2.8 [4]	430 C[4]	NA	NA
57117-44-9	1,2,3,6,7,8-HXCDF	39 C[4]	2.8 [4]	430 C[4]	NA	NA
19408-74-3	1,2,3,7,8,9-HXCDD	39 C[4]	2.8 [4]	430 C[4]	NA	NA
72918-21-9	1,2,3,7,8,9-HXCDF	39 C[4]	2.8 [4]	430 C[4]	NA	NA
40321-76-4	1,2,3,7,8-PECDD	3.9 C[4]	0.28 [4]	43 C[4]	NA	NA
60851-34-5	2,3,4,6,7,8-HXCDF	39 C[4]	2.8 [4]	430 C[4]	NA	NA
51207-31-9	2,3,7,8-TCDF	39 C[4]	2.8 [4]	430 C[4]	NA	NA
1746-01-6	2,3,7,8-TCDD	3.9 C	0.28	43 C	NA	NA
37871-00-4	Total HPCDD	NA	NA	NA	NA	NA
38998-75-3	Total HPCDF	NA	NA	NA	NA	NA
34465-46-8	Total HXCDD	NA	NA	NA	NA	NA
55684-94-1	Total HXCDF	NA	NA	NA	NA	NA
36088-22-9	Total PECDD	NA	NA	NA	NA	NA
30402-15-4	Total PECDF	NA	NA	NA	NA	NA
55722-27-5	Total TCDF	NA	NA	NA	NA	NA
VOCs (µg/kg)						
79-00-5	1,1,2-Trichloroethane	730 C	0.91	980 C	9400	30
78-93-3	2-Butanone	22000000 N	4400	24000000 sat	44000000	35000
591-78-6	2-Hexanone	NA	NA	NA	NA	NA
108-10-1	4-Methyl-2-Pentanone	5300000 N	620	2700000 sat	12000000	20000
67-64-1	Acetone	14000000 N	6600	NA	4800000	3800
74-83-9	Bromomethane	3900 N	12	9500 N	9900	52
75-15-0	Carbon Disulfide	360000 N	1500	720000 sat	900000	10000
67-66-3	Chloroform	220 C	29	280 C	910	470
156-59-2	cis-1,2-Dichloroethene	43000 N	20	NA	110000	400
75-71-8	Dichlorodifluoromethane	94000 N	28000	250000 N	NA	NA
75-09-2	Methylene Chloride	9100 C	1.2	13000 C	120000	23
100-42-5	Styrene	1700000 sat	180	1500000 sat	11000000	3500
108-88-3	Toluene	520000 sat	590	650000 sat	1700000	12000
1330-20-7	Total Xylenes	270000 N	7100	710000 N	690000	210000
156-60-5	trans-1,2-Dichloroethene	69000 N	34	NA	180000	680
79-01-6	Trichloroethene	53 C	2.8	71 C	710	57
75-69-4	Trichlorofluoromethane	390000 N	8000	1100000 N	NA	NA
108-05-4	Vinyl Acetate	430000 N	7800	990000 N	1100000	2300
75-01-4	Vinyl Chloride	79 C	0.67	280 C	1500	13
SVOCs (µg/kg)						
91-57-6	2-Methylnaphthalene	56000 N[5]	NA	NA	3200000	16000
83-32-9	Acenaphthene	3700000 N	31000	NA	9500000	130000
208-96-8	Acenaphthylene	3700000 N[6]	NA	NA	1100000	18000
120-12-7	Anthracene	22000000 N	650000	NA	47000000	51000
56-55-3	Benzo(a)anthracene	620 C	160	NA	5000	19000
50-32-8	Benzo(a)pyrene	62 C	410	NA	500	8200
205-99-2	Benzo(b)fluoranthene	620 C	490	NA	5000	57000
191-24-2	Benzo(g,h,i)perylene	2300000 N[7]	NA	NA	50000	16000
207-08-9	Benzo(k)fluoranthene	6200 C	490	NA	50000	39000
117-81-7	Bis(2-ethylhexyl)phthalate	35000 C	180000	NA	300000	3600000
218-01-9	Chrysene	62000 C	160	7500000 C	500000	25000
84-74-2	di-n-Butyl Phthalate	6100000 N	250000	NA	18000000	5000000

TABLE 7-1

SCREENING CRITERIA USED IN SELECTION OF COPCs - SOIL/SEDIMENT
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CAS Number	Chemical	U.S. EPA Region 9 PRG[1] Residential	U.S. EPA Soil Screening Levels[2]		IDEM[3]	
			Soil to Groundwater	Soil to Air	Residential	Soil to Groundwater
SVOCs (µg/kg) (Continued)						
53-70-3	Dibenzo(a,h)anthracene	62 C	1500	NA	500	18000
122-39-4	Diphenylamine	1500000 N	5000	NA	NA	NA
132-64-9	Dibenzofuran	150000 N	2400	NA	370000	4900
206-44-0	Fluoranthene	2300000 N	310000	NA	6300000	880000
86-73-7	Fluorene	2700000 N	41000	NA	6300000	170000
193-39-5	Indeno(1,2,3-cd)pyrene	620 C	1400	NA	5000	3100
120-58-1	Isosafrole	NA	NA	NA	NA	NA
91-20-3	Naphthalene	56000 N	3100	170000 N	3200000	700
85-01-8	Phenanthrene	2300000 N[7]	NA	NA	470000	13000
129-00-0	Pyrene	2300000 N	230000	NA	4700000	570000
94-59-7	Safrole	NA	NA	NA	NA	NA
Energetics (µg/kg)						
606-20-2	2,6-Dinitrotoluene	61 N	0.042	NA	6.3 [8]	290 [8]
121-82-4	RDX	4.4 C	NA	NA	NA	NA
2691-41-0	HMX	3100 N	NA	NA	NA	NA
Herbicides (µg/kg)						
70-30-4	Hexachlorophene	18000 N	570000	NA	NA	NA
87-86-5	Pentachlorophenol	3000 C	1.4	NA	20000	28
Inorganics (mg/kg)						
7429-90-5	Aluminum	76000 N	8.3	6860000 N	NA	NA
7440-36-0	Antimony	31 N	0.27	NA	140	5.4
7440-38-2	Arsenic	0.39 C	0.29	745 C	3.9	29
7440-39-3	Barium	5400 N	82	686000 N	23000	1600
7440-41-7	Beryllium	150 N	3.2	1330 C	680	63
7440-43-9	Cadmium	37 N	0.38	1780 C	12	7.5
7440-70-2	Calcium	NA	NA	NA	NA	NA
7440-47-3	Chromium	210 C[9]	2.1	267 C	430 [10]	NA
7440-48-4	Cobalt	1400 N[11]	0.17	1140 C	NA	NA
7440-50-8	Copper	3100 N	560	NA	13000	920
7439-89-6	Iron	23000 N	NA	NA	NA	NA
7439-92-1	Lead	400	NA	NA	400	81
7439-93-2	Lithium	1600 N	NA	NA	NA	NA
7439-95-4	Magnesium	NA	NA	NA	NA	NA
7439-96-5	Manganese	1800 N	110	68600 N	NA	NA
7439-97-6	Mercury	23 N	0.1	2.9 sat	100	2.1
7440-02-0	Nickel	1600 N	14	NA	6900	NA
7440-09-7	Potassium	NA	NA	NA	NA	NA
7782-49-2	Selenium	390 N	0.26	NA	1700	5.2
7440-22-4	Silver	390 N	1.6	NA	1700	31

TABLE 7-1

SCREENING CRITERIA USED IN SELECTION OF COPCs - SOIL/SEDIMENT
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CAS Number	Chemical	U.S. EPA Region 9 PRG[1] Residential	U.S. EPA Soil Screening Levels[2]		IDEM[3]	
			Soil to Groundwater	Soil to Air	Residential	Soil to Groundwater
Inorganics (mg/kg) (Continued)						
7440-23-5	Sodium	NA	NA	NA	NA	NA
7440-24-6	Strontium	47000 N	770	NA	NA	NA
7440-28-0	Thallium	5.2 N	0.056	NA	24	2.8
7440-31-5	Tin	47000 N	NA	NA	NA	NA
7440-32-6	Titanium	310000 N[12]	NA	NA	NA	NA
7440-62-2	Vanadium	78 N	260	NA	NA	NA
7440-66-6	Zinc	23000 N	680	NA	100000	14000

Notes:
1 - U.S. EPA Region 9 Preliminary Remediation Goal Table, October, 2004, Updated December 28, 2004. (Cancer benchmark value = 1E-06, HI = 1.0)
2 - U.S. EPA Soil Screening Levels. EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm (Soil to air SSLs for noncarcinogens are divided by 10).
The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
3 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
4 - Value is derived by multiplying criteria for 2,3,7,8-TCDD by World Health Organization Toxicity Equivalent Factor.
5 - The value for naphthalene is used as a surrogate for 2-methylnaphthalene.
6 - The value for acenaphthene was used as a surrogate for acenaphthylene.
7 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
8 - Value is for dinitrotoluene mixtures.
9 - The RBC for residential land use for total chromium is presented.
10 - Value is for hexavalent chromium.
11 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
12 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.
CAS - Chemical Abstracts Service.
COPC - Chemical of Potential Concern.
N - Non-carcinogenic.
C - Carcinogenic.
IDEM - Indiana Department of Environmental Management.
µg/kg - microgram per kilogram.
mg/kg - milligram per kilogram.
NA - No criteria available.
PRG - Preliminary Remediation Goal.
sat - Saturation concentration.
SVOC - Semi-volatile organic compound.
U.S. EPA - United States Environmental Protection Agency.
VOC - Volatile organic compound.

TABLE 7-2

SCREENING CRITERIA USED IN SELECTION OF COPCS - GROUNDWATER/SURFACE WATER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CAS Number	Chemical	U.S. EPA Region 9 PRG[1] Tap Water	U.S. EPA MCL[2]	IDEM Groundwater Residential[3]
Volatile Organic Compounds (µg/L)				
79-34-5	1,1,2,2-Tetrachloroethane	0.055 C	NA	0.9
79-00-5	1,1,2-Trichloroethane	0.2 C	5	3.2
75-35-4	1,1-Dichloroethene	340 N	7	430
96-18-4	1,2,3-Trichloropropane	0.0056 C	NA	NA
107-06-2	1,2-Dichloroethane	0.12 C	5	2
591-78-6	2-Hexanone	NA	NA	NA
108-10-1	4-Methyl-2-Pentanone	2000 N	NA	2200
67-64-1	Acetone	5500 N	NA	950
71-43-2	Benzene	0.35 C	5	5.2
75-27-4	Bromodichloromethane	0.18 C	80	2.9
75-15-0	Carbon Disulfide	1000 N	NA	1300
56-23-5	Carbon Tetrachloride	0.17 C	5	2.6
67-66-3	Chloroform	0.17 C	80	0.84
156-59-2	cis-1,2-Dichloroethene	61 N	70	77
74-84-0	Ethane	NA	NA	NA
74-85-1	Ethene	NA	NA	NA
100-41-4	Ethylbenzene	1300 N	700	1600
74-82-8	Methane	NA	NA	NA
75-09-2	Methylene Chloride	4.3 C	5	63
107-12-0	Propionitrile	NA	NA	NA
127-18-4	Tetrachloroethene	0.1 C	5	8.8
108-88-3	Toluene	720 N	1000	930
1330-20-7	Total Xylenes	210 N	10000	270
156-60-5	Trans-1,2-Dichloroethene	120 N	100	150
79-01-6	Trichloroethene	0.028 C	5	0.45
75-01-4	Vinyl Chloride	0.02 C	2	0.53
Semivolatile Organic Compounds (µg/L)				
91-57-6	2-Methylnaphthalene	6.2 N[4]	NA	150
83-32-9	Acenaphthene	370 N	NA	460
120-12-7	Anthracene	1800 N	NA	2300
56-55-3	Benzo(a)anthracene	NA	NA	NA
205-99-2	Benzo(b)fluoranthene	0.092 C	NA	1.2
117-81-7	Bis(2-ethylhexyl)phthalate	4.8 C	6	61
218-01-9	Chrysene	9.2 C	NA	120
84-66-2	Diethyl Phthalate	29000 N	NA	29000
206-44-0	Fluoranthene	1500 N	NA	1500
86-73-7	Fluorene	240 N	NA	310
91-20-3	Naphthalene	6.2 N	NA	8.3
85-01-8	Phenanthrene	180 N[5]	NA	23
129-00-0	Pyrene	180 N	NA	1100
110-86-1	Pyridine	36 N	NA	NA

TABLE 7-2

SCREENING CRITERIA USED IN SELECTION OF COPCS - GROUNDWATER/SURFACE WATER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CAS Number	Chemical	U.S. EPA Region 9 PRG[1] Tap Water	U.S. EPA MCL[2]	IDEM Groundwater Residential[3]
Energetics (µg/L)				
99-35-4	1,3,5-Trinitrobenzene	1100 N	NA	NA
118-96-7	2,4,6-Trinitrotoluene	18 N[6]	NA	NA
6629-29-4	2,4-Diamino-6-Nitrotoluene	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	7.3 N[7]	NA	NA
35572-78-2	2-Amino-4,6-Dinitrotoluene	7.3 N[7]	NA	NA
88-72-2	2-Nitrotoluene	0.049 C	NA	NA
99-08-1	3-Nitrotoluene	120 N	NA	NA
19406-51-0	4-Amino-2,6-Dinitrotoluene	7.3 N[7]	NA	NA
	DNX	NA	NA	NA
2691-41-0	HMX	1800 N	NA	NA
	MNX	NA	NA	NA
121-82-4	RDX	0.61 C	NA	NA
Herbicides (µg/L)				
70-30-4	Hexachlorophene	11 N	NA	NA
87-86-5	Pentachlorophenol	0.56 C	1	7.1
Metals (µg/L)				
7429-90-5	Aluminum	36000 N	NA	NA
7440-36-0	Antimony	15 N	6	15
7440-38-2	Arsenic	0.045 C	10	0.57
7440-39-3	Barium	2600 N	2000	2600
7440-41-7	Beryllium	73 N	4	73
7440-43-9	Cadmium	18 N	5	18
7440-70-2	Calcium	NA	NA	NA
7440-47-3	Chromium	110 N[8]	100	110[8]
7440-48-4	Cobalt	730 N	NA	NA
7440-50-8	Copper	1500 N	1300[9]	1400
7439-89-6	Iron	11000 N	NA	NA
7439-92-1	Lead	NA	15[9]	15
7439-93-2	Lithium	730 N	NA	NA
7439-95-4	Magnesium	NA	NA	NA
7439-96-5	Manganese	880 N	NA	NA
7439-97-6	Mercury	11 N	2	11
7440-02-0	Nickel	730 N	NA	NA
7440-09-7	Potassium	NA	NA	NA
7782-49-2	Selenium	180 N	50	180
7440-23-5	Sodium	NA	NA	NA
7440-24-6	Strontium	22000 N	NA	NA
7440-28-0	Thallium	2.4 N	2	2.6
7440-31-5	Tin	22000 N	NA	NA
7440-32-6	Titanium	150000 N	NA	NA

TABLE 7-2

SCREENING CRITERIA USED IN SELECTION OF COPCS - GROUNDWATER/SURFACE WATER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CAS Number	Chemical	U.S. EPA Region 9 PRG(1) Tap Water	U.S. EPA MCL(2)	IDEM Groundwater Residential(3)
7440-62-2	Vanadium	36 N	NA	NA
7440-66-6	Zinc	11000 N	NA	11000

Notes:
1 - U.S. EPA Region 9 Preliminary Remediation Goal Table, October, 2004, Updated December 28, 2004.
(Cancer benchmark value = 1E-06, HI = 1.0).
2 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004).
3 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
4 - Value is for naphthalene.
5 - Value is for pyrene.
6 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
7 - Values are for aminodinitrotoluene.
8 - Values are for hexavalent chromium.
9 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

N - Noncarcinogenic.
C - Carcinogenic.
NA - Not criteria available.
SDWA - Safe Drinking Water Act

TABLE 7-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
SWMU 16	**Dioxins/Furans**														
	3268-87-9	1,2,3,4,6,7,8,9-OCDD	79.1	11500	ng/kg	16SS0330002	27/28	49.4	11500	NA	39000 C[8]	NA	NA	No	BSL
	39001-02-0	1,2,3,4,6,7,8,9-OCDF	0.62 J	20.1	ng/kg	16SS0130002	9/28	0.2 - 2.6	20.1	NA	39000 C[8]	NA	NA	No	BSL
	35822-46-9	1,2,3,4,6,7,8-HPCDD	1.1 J	151	ng/kg	16SS0060002	27/28	1.5	151	NA	390 C[8]	NA	NA	No	BSL
	67562-39-4	1,2,3,4,6,7,8-HPCDF	0.33 J	8	ng/kg	16SS0130002	10/28	0.07 - 6.2	8	NA	390 C[8]	NA	NA	No	BSL
	55673-89-7	1,2,3,4,7,8,9-HPCDF	1.8 J	1.8 J	ng/kg	16SS0130002	1/28	0.08 - 1.2	1.8	NA	390 C[8]	NA	NA	No	BSL
	39227-28-6	1,2,3,4,7,8-HXCDD	0.2 J	1.5 J	ng/kg	16SS0270002	6/28	0.1 - 0.82	1.5	NA	39 C[8]	NA	NA	No	BSL
	70648-26-9	1,2,3,4,7,8-HXCDF	0.17 J	0.98 J	ng/kg	16SS0130002	9/28	0.05 - 0.44	0.98	NA	39 C[8]	NA	NA	No	BSL
	57653-85-7	1,2,3,6,7,8-HXCDD	0.27 J	2.5 J	ng/kg	16SS0270002	8/28	0.09 - 0.92	2.5	NA	39 C[8]	NA	NA	No	BSL
	57117-44-9	1,2,3,6,7,8-HXCDF	0.24 J	0.64 J	ng/kg	16SS0130002	4/28	0.04 - 0.4	0.64	NA	39 C[8]	NA	NA	No	BSL
	19408-74-3	1,2,3,7,8,9-HXCDD	0.47 J	4.7 J	ng/kg	16SS0270002	14/28	0.1 - 1.1	4.7	NA	39 C[8]	NA	NA	No	BSL
	72918-21-9	1,2,3,7,8,9-HXCDF	0.25 J	0.81 J	ng/kg	16SS0160002	3/28	0.06 - 0.5	0.81	NA	39 C[8]	NA	NA	No	BSL
	40321-76-4	1,2,3,7,8-PECDD	0.14 J	1.5 J	ng/kg	16SS0320002	3/28	0.1 - 0.8	1.5	NA	3.9 C[8]	NA	NA	No	BSL
	60851-34-5	2,3,4,6,7,8-HXCDF	0.12 J	0.75 J	ng/kg	16SS0270002	5/28	0.05 - 0.4	0.75	NA	39 C[8]	NA	NA	No	BSL
	51207-31-9	2,3,7,8-TCDF	0.51 J	0.75 J	ng/kg	16SS0270002	2/28	0.05 - 0.4	0.75	NA	39 C[8]	NA	NA	No	BSL
		2,3,7,8-TCDD TEQs	0.000079	3.30	ng/kg	16SS0270002	28/28	---	3.30	NA	3.9 C	NA	NA	No	BSL
	37871-00-4	TOTAL HPCDD	2.3	302	ng/kg	16SS0270002	27/28	3.3	302	NA	NA	NA	NA	No	NTX
	38998-75-3	TOTAL HPCDF	0.48 J	27.5 J	ng/kg	16SS0130002	12/28	0.08 - 1.4	27.5	NA	NA	NA	NA	No	NTX
	34465-46-8	TOTAL HXCDD	1.6	45.9	ng/kg	16SS0270002	20/28	0.1 - 2	45.9	NA	NA	NA	NA	No	NTX
	55684-94-1	TOTAL HXCDF	0.17	11.7 J	ng/kg	16SS0270002	15/28	0.05 - 0.51	11.7	NA	NA	NA	NA	No	NTX
	36088-22-9	TOTAL PECDD	0.34	4.4 J	ng/kg	16SS0270002	5/28	0.1 - 0.8	4.4	NA	NA	NA	NA	No	NTX
	30402-15-4	TOTAL PECDF	1.3 J	7.6 J	ng/kg	16SS0130002	8/28	0.07 - 0.87	7.6	NA	NA	NA	NA	No	NTX
	55722-27-5	TOTAL TCDF	0.26	13.3 J	ng/kg	16SS0320002	6/28	0.05 - 7.9	13.3	NA	NA	NA	NA	No	NTX
	Volatile Organic Compounds														
	78-93-3	2-Butanone	1.1 J	5 J	ug/kg	16SS0730102	5/65	0.888 - 1.3	5	NA	2200000 N	44000000	IDEM	No	BSL
	591-78-6	2-Hexanone	3 J	3 J	ug/kg	16SS0560102	1/69	0.888 - 1.3	3	NA	NA	NA	NA	No	NTX
	108-10-1	4-Methyl-2-Pentanone	1 J	1 J	ug/kg	16SS0730102	1/69	0.888 - 1.3	1	NA	530000 N	12000000	IDEM	No	BSL
	67-64-1	Acetone	1 J	71 J	ug/kg	16SS0290002	18/67	0.93 - 13	71	NA	1400000 N	4800000	IDEM	No	BSL
	75-15-0	Carbon Disulfide	2 J	3	ug/kg	16SS0720102	2/69	0.888 - 1.3	3	NA	36000 N	900000	IDEM	No	BSL
	67-66-3	Chloroform	1 J	1 J	ug/kg	16SS0990102	1/69	0.888 - 1.3	1	NA	220 C	910	IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1.1 J	73	ug/kg	16SS0660102	9/69	0.888 - 1.3	73	NA	4300 N	110000	IDEM	No	BSL
	75-71-8	Dichlorodifluoromethane	1 J	20 J	ug/kg	16SS0710102	15/69	0.893 - 1.3	20	NA	9400 N	NA	NA	No	BSL
	75-09-2	Methylene Chloride	3 J	3 J	ug/kg	16SS0710102	1/69	0.888 - 13	3	NA	9100 C	120000	IDEM	No	BSL
	100-42-5	Styrene	1 J	1 J	ug/kg	16SS0040002	1/69	0.888 - 1.3	1	NA	1700000 sat	11000000	IDEM	No	BSL
	108-88-3	Toluene	1 J	1 J	ug/kg	16SS0160002, 16SS0730102	2/69	0.888 - 1.3	1	NA	520000 sat	1700000	IDEM	No	BSL
	1330-20-7	Total Xylenes	3	3	ug/kg	16SS0730102	1/69	0.888 - 1.3	3	NA	27000 N	690000	IDEM	No	BSL
	156-60-5	trans-1,2-Dichloroethene	1 J	2 J	ug/kg	16SS0030002, 16SS0390002	5/69	0.888 - 1.3	2	NA	6900 N	180000	IDEM	No	BSL
	79-01-6	**Trichloroethene**	2 J	170	ug/kg	16SS0980102	17/69	0.893 - 1.3	170	NA	**53 C**	710	IDEM	**Yes**	ASL
	75-69-4	Trichlorofluoromethane	1	3	ug/kg	7 Samples	33/69	0.893 - 1.3	3	NA	39000 N	NA	NA	No	BSL
	108-05-4	Vinyl Acetate	1 J	1 J	ug/kg	16SS0190002, 16SS0350002	2/69	0.888 - 1.3	1	NA	43000 N	1100000	IDEM	No	BSL

TABLE 7-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	EPA Region 9 PRG (Residential)(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	4 J	94	ug/kg	16SS0030002	2/39	3.4 - 4.3	94	NA	5600 N(9)	3200000	IDEM	No	BSL
	83-32-9	Acenaphthene	5 J	1800	ug/kg	16SS0030002	2/39	3.5 - 4.3	1800	NA	370000 N	9500000	IDEM	No	BSL
	208-96-8	Acenaphthylene	4 J	680	ug/kg	16SS0030002	3/39	3.5 - 4.3	680	NA	370000 N(10)	1100000	IDEM	No	BSL
	120-12-7	Anthracene	5 J	3500	ug/kg	16SS0030002	4/39	3.5 - 4.3	3500	NA	2200000 N	47000000	IDEM	No	BSL
	56-55-3	**Benzo(a)anthracene**	4 J	9600	ug/kg	16SS0030002	12/39	3.5 - 4.3	9600	NA	**620 C**	**5000**	IDEM	**Yes**	ASL
	50-32-8	**Benzo(a)pyrene**	4 J	8400	ug/kg	16SS0030002	13/39	3.5 - 4.3	8400	NA	**62 C**	**500**	IDEM	**Yes**	ASL
	205-99-2	**Benzo(b)fluoranthene**	4 J	9200	ug/kg	16SS0030002	16/39	3.5 - 4.2	9200	NA	**620 C**	**5000**	IDEM	**Yes**	ASL
	191-24-2	Benzo(g,h,i)perylene	4 J	5100	ug/kg	16SS0030002	12/39	3.5 - 4.3	5100	NA	230000 N(11)	50000	IDEM	No	BSL
	207-08-9	Benzo(k)fluoranthene	4 J	5000	ug/kg	16SS0030002	11/39	3.5 - 4.3	5000	NA	6200 C	50000	IDEM	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	92 J	1200	ug/kg	16SS0040002	9/39	69 - 730	1200	NA	35000 C	300000	IDEM	No	BSL
	218-01-9	Chrysene	4 J	11000	ug/kg	16SS0030002	15/39	3.5 - 4.3	11000	NA	62000 C	500000	IDEM	No	BSL
	53-70-3	**Dibenzo(a,h)anthracene**	8	1600	ug/kg	16SS0030002	3/39	3.5 - 4.3	1600	NA	**62 C**	**500**	IDEM	**Yes**	ASL
	132-64-9	Dibenzofuran	560 J	560 J	ug/kg	16SS0030002	1/39	69 - 87	560	NA	15000 N	370000	IDEM	No	BSL
	206-44-0	Fluoranthene	4 J	19000	ug/kg	16SS0030002	15/39	3.5 - 4.3	19000	NA	230000 N	6300000	IDEM	No	BSL
	86-73-7	Fluorene	4 J	2300	ug/kg	16SS0030002	4/39	3.5 - 4.3	2300	NA	270000 N	6300000	IDEM	No	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	5 J	4400	ug/kg	16SS0030002	10/39	3.5 - 4.3	4400	NA	**620 C**	5000	IDEM	**Yes**	BSL
	91-20-3	Naphthalene	4 J	180	ug/kg	16SS0030002	3/39	3.4 - 4.3	180	NA	5600 N	3200000	IDEM	No	BSL
	85-01-8	Phenanthrene	4 J	8700	ug/kg	16SS0030002	8/39	3.5 - 4.3	8700	NA	230000 N(11)	470000	IDEM	No	BSL
	129-00-0	Pyrene	4 J	35000	ug/kg	16SS0030002	17/39	3.5 - 4.3	35000	NA	230000 N	4700000	IDEM	No	BSL
	94-59-7	Safrole	340 J	15000	ug/kg	16SS0130002	5/39	69 - 150	15000	NA	NA	NA	NA	No	NTX
	Energetics														
	2691-41-0	HMX	0.34 J	0.34 J	mg/kg	16SS0330002	1/39	0.25	0.34	NA	3100 N	NA	NA	No	BSL
	Herbicides														
	70-30-4	Hexachlorophene	2.6 J	2.6 J	ug/kg	16SS0030002	1/39	0.62 - 1.1	2.6	NA	1800 N	NA	NA	No	BSL
	87-86-5	Pentachlorophenol	0.79 J	14	ug/kg	16SS0050002	4/39	0.46 - 0.58	14	NA	3000 C	20000	IDEM	No	BSL
	Inorganics														
	7429-90-5	**Aluminum**	1780 J	34200 J	mg/kg	16SS0880002	48/49	3610	34200	5020 - 17400	**7600 N**	NA	NA	**Yes**	ASL
	7440-36-0	**Antimony**	0.51 J	27.2 J	mg/kg	16SS0140002	22/49	0.19 - 3.4	27.2	0.49 - 11.3	**3.1 N**	140	IDEM	**Yes**	ASL
	7440-38-2	**Arsenic**	0.75 J	12.7 J	mg/kg	16SS0880002	49/49	---	12.7	1.1 - 10.2	**0.39 C**	**3.9**	IDEM	**Yes**	ASL
	7440-39-3	Barium	11.9 J	303 J	mg/kg	16SS0130002	49/49	---	303	24.8 - 155	540 N	23000	IDEM	No	BSL
	7440-41-7	Beryllium	0.23 J	1.4 J	mg/kg	16SS0170002	23/49	0.06 - 1	1.4	0.3 - 0.82	15 N	680	IDEM	No	BSL
	7440-43-9	Cadmium	0.19 J	2.8 J	mg/kg	16SS0150002	17/49	0.13 - 1	2.8	0.05 - 3.6	3.7 N	12	IDEM	No	BSL
	7440-70-2	Calcium	212 J	246000 J	mg/kg	16SS0030002	46/49	152 - 236	246000	53.6 - 35300	NA	NA	NA	No	NUT
	7440-47-3	Chromium	4.3 J	38.2 J	mg/kg	16SS0880002	49/49	---	38.2	7.7 - 30.6	210 C(12)	430(13)	IDEM	No	BSL
	7440-48-4	Cobalt	0.87 J	25.9 J	mg/kg	16SS0170002	49/49	---	25.9	1.8 - 27.1	140 N(14)	NA	NA	No	BSL
	7440-50-8	**Copper**	2.4 J	413 J	mg/kg	16SS0150002	49/49	---	413	3.5 - 23.8	**310 N**	13000	IDEM	**Yes**	ASL
	7439-89-6	**Iron**	2170 J	43000 J	mg/kg	16SS0200002	49/49	---	43000	7140 - 40800	**2300 N**	NA	NA	**Yes**	ASL
	7439-92-1	**Lead**	3.5 J	1240 J	mg/kg	16SS0140002	48/49	14.8	1240	6.4 - 21.5	**400**	**400**	IDEM	**Yes**	ASL
	7439-93-2	Lithium	0.81 J	21.5 J	mg/kg	16SS0170002	37/39	4.3 - 5.6	21.5	7.8 - 46.6	160 N	NA	NA	No	BSL
	7439-95-4	Magnesium	105 J	62500 J	mg/kg	16SS0030002	49/49	---	62500	496 - 2870	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	3.8 J	1040 J	mg/kg	16SS0130002	49/49	---	1040	23.2 - 3040	**180 N**	NA	NA	**Yes**	ASL
	7439-97-6	Mercury	0.015 J	0.22 J	mg/kg	16SS0050002	34/49	0.002 - 0.021	0.22	0.04 - 0.14	2.3 N	100	IDEM	No	BSL
	7440-02-0	Nickel	0.71 J	41.3 J	mg/kg	16SS0170002	49/49	---	41.3	4.6 - 23.7	160 N	6900	IDEM	No	BSL

TABLE 7-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	EPA Region 9 PRG (Residential)(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7440-09-7	Potassium	206 J	2980 J	mg/kg	16SS0880002	49/49	---	2980	280 - 1650	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.16 J	0.31 J	mg/kg	16SS0320002	2/49	0.03 - 0.82	0.31	0.28 - 0.88	39 N	1700	IDEM	No	BSL
	7440-22-4	Silver	0.28 J	0.28 J	mg/kg	16SS0330002	1/49	0.02 - 0.26	0.28	0.04 - 0.11	39 N	1700	IDEM	No	BSL
	7440-23-5	Sodium	162 J	496 J	mg/kg	16SS0030002	4/49	12.7 - 84.9	496	3.7 - 205	NA	NA	NA	No	NUT
	7440-24-6	Strontium	4.5 J	252 J	mg/kg	16SS0030002	39/39	---	252	4.2 - 63.2	4700 N	NA	NA	No	BSL
	7440-28-0	Thallium	0.16 J	0.32 J	mg/kg	16SS0110002	2/49	0.03 - 0.5	0.32	0.05 - 0.31	0.52 N	24	IDEM	No	BSL
	7440-31-5	Tin	0.25 J	12.3 J	mg/kg	16SS0080002	8/49	0.32 - 2.4	12.3	NA	4700 N	NA	NA	No	BSL
	7440-32-6	Titanium	7.5 J	348 J	mg/kg	16SS0110002	44/44	---	348	4.1 - 11.7	31000 N(15)	NA	NA	No	BSL
	7440-62-2	**Vanadium**	3.6 J	65.2 J	mg/kg	16SS0880002	49/49	---	65.2	14.1 - 48.5	**7.8 N**	NA	NA	**Yes**	ASL
	7440-66-6	Zinc	24 J	1840 J	mg/kg	16SS0420002	36/49	5.2 - 2510	1840	9.4 - 60.2	2300 N	100000	IDEM	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Taken from Table 4-1 of the Final Basewide Background Soil Investigation Report, Naval Surface Warfare Center Crane, Crane, Indiana, January, 2001.
5 - U.S. EPA Region 9 Preliminary Remediation Goal (PRG). The non-carcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (U.S. EPA Region 9, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Value is derived by multiplying criteria for 2,3,7,8-TCDD by World Health Organization Toxicity Equivalent Factor.
9 - The value for naphthalene was used as a surrogate for 2-methylnaphthalene.
10 - The value for acenaphthene was used as a surrogate for acenaphthylene.
11 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
12 - The PRG for residential land use for total chromium is presented.
13 - Value is for hexavalent chromium.
14 - One tenth of the non-carcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth non-carcinogenic PRG is presented.
15 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Associated Samples

16SS0010002	16SS0150002	16SS0290002	16SS0450002	16SS0630102	16SS0770102
16SS0020002	16SS0160002	16SS0300002	16SS0460002	16SS0640102	16SS0780102
16SS0030002	16SS0170002	16SS0310002	16SS0510102	16SS0650102	16SS0850002
16SS0040002	16SS0180002	16SS0320002	16SS0520102	16SS0660102	16SS0860002
16SS0050002	16SS0190002	16SS0330002	16SS0530102	16SS0670102	16SS0870002
16SS0060002	16SS0200002	16SS0340002	16SS0540102	16SS0680102	16SS0880002
16SS0070002	16SS0210002	16SS0350002	16SS0550102	16SS0690102	16SS0890002
16SS0080002	16SS0220002	16SS0360002	16SS0560102	16SS0700102	16SS0980102
16SS0090002	16SS0230002	16SS0370002	16SS0570102	16SS0710102	16SS0990102
16SS0100002	16SS0240002	16SS0380002	16SS0580102	16SS0720102	
16SS0110002	16SS0250002	16SS0390002	16SS0590102	16SS0730102	
16SS0120002	16SS0260002	16SS0420002	16SS0600102	16SS0740102	
16SS0130002	16SS0270002	16SS0430002	16SS0610102	16SS0750102	
16SS0140002	16SS0280002	16SS0440002	16SS0620102	16SS0760102	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
sat = Soil Saturation Limit
TEQs = Toxicity Equivalent Concentration
ng/kg = nanograms per kilogram
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NTX = No Toxicity Data
NUT = Essential Nutrient

TABLE 7-4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	U.S. EPA Generic SSL for Soil to Air(5)	U.S. EPA Generic SSL for Migration to Groundwater(5)	IDEM SSL for Migration to Groundwater(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
SWMU 16	**Dioxins/Furans**														
	3268-87-9	**1,2,3,4,6,7,8,9-OCDD**	49.4	11500	ng/kg	16SS0330002	26/28	89.4 - 815	11500	NA	430000 C(8)	**2800**	NA	**Yes**	ASL
	39001-02-0	1,2,3,4,6,7,8,9-OCDF	0.62 J	20.1	ng/kg	16SS0130002	9/28	0.2 - 2.6	20.1	NA	430000 C(8)	2800	NA	No	BSL
	35822-46-9	**1,2,3,4,6,7,8-HPCDD**	1.1 J	151	ng/kg	16SS0060002	27/28	1.5	151	NA	4300 C(8)	**28**	NA	**Yes**	ASL
	67562-39-4	1,2,3,4,6,7,8-HPCDF	0.33 J	8	ng/kg	16SS0130002	10/28	0.07 - 6.2	8	NA	4300 C(8)	28	NA	No	BSL
	55673-89-7	1,2,3,4,7,8,9-HPCDF	1.8 J	1.8 J	ng/kg	16SS0130002	1/28	0.08 - 1.2	1.8	NA	4300 C(8)	28	NA	No	BSL
	39227-28-6	1,2,3,4,7,8-HXCDD	0.2 J	1.5 J	ng/kg	16SS0270002	6/28	0.1 - 0.82	1.5	NA	430 C(8)	2.8	NA	No	BSL
	70648-26-9	1,2,3,4,7,8-HXCDF	0.17 J	0.98 J	ng/kg	16SS0130002	9/28	0.05 - 0.44	0.98	NA	430 C(8)	2.8	NA	No	BSL
	57653-85-7	1,2,3,6,7,8-HXCDD	0.27 J	2.5 J	ng/kg	16SS0270002	8/28	0.09 - 0.92	2.5	NA	430 C(8)	2.8	NA	No	BSL
	57117-44-9	1,2,3,6,7,8-HXCDF	0.24 J	0.64 J	ng/kg	16SS0130002	4/28	0.04 - 0.4	0.64	NA	430 C(8)	2.8	NA	No	BSL
	19408-74-3	**1,2,3,7,8,9-HXCDD**	0.47 J	4.7 J	ng/kg	16SS0270002	14/28	0.1 - 1.1	4.7	NA	430 C(8)	**2.8**	NA	**Yes**	ASL
	72918-21-9	1,2,3,7,8,9-HXCDF	0.25 J	0.81 J	ng/kg	16SS0160002	3/28	0.06 - 0.5	0.81	NA	430 C(8)	2.8	NA	No	BSL
	40321-76-4	**1,2,3,7,8-PECDD**	0.14 J	1.5 J	ng/kg	16SS0320002	3/28	0.1 - 0.8	1.5	NA	43 C(8)	**0.28**	NA	**Yes**	ASL
	60851-34-5	2,3,4,6,7,8-HXCDF	0.12 J	0.75 J	ng/kg	16SS0270002	5/28	0.05 - 0.4	0.75	NA	430 C(8)	2.8	NA	No	BSL
	51207-31-9	2,3,7,8-TCDF	0.51 J	0.75 J	ng/kg	16SS0270002	2/28	0.05 - 0.4	0.75	NA	430 C(8)	2.8	NA	No	BSL
		2,3,7,8-TCDD TEQs	0.000079	3.30	ng/kg	16SS0270002	28/28	---	3.30	NA	43 C	**0.28**	NA	**Yes**	ASL
	37871-00-4	TOTAL HPCDD	2.3	302	ng/kg	16SS0270002	27/28	3.3	302	NA	NA	NA	NA	No	NTX
	38998-75-3	TOTAL HPCDF	0.48 J	27.5 J	ng/kg	16SS0130002	12/28	0.08 - 1.4	27.5	NA	NA	NA	NA	No	NTX
	34465-46-8	TOTAL HXCDD	1.6	45.9	ng/kg	16SS0270002	20/28	0.1 - 2	45.9	NA	NA	NA	NA	No	NTX
	55684-94-1	TOTAL HXCDF	0.17	11.7 J	ng/kg	16SS0270002	15/28	0.05 - 0.51	11.7	NA	NA	NA	NA	No	NTX
	36088-22-9	TOTAL PECDD	0.34	4.4 J	ng/kg	16SS0270002	5/28	0.1 - 0.8	4.4	NA	NA	NA	NA	No	NTX
	30402-15-4	TOTAL PECDF	1.3 J	7.6 J	ng/kg	16SS0130002	8/28	0.07 - 0.87	7.6	NA	NA	NA	NA	No	NTX
	55722-27-5	TOTAL TCDF	0.26	13.3 J	ng/kg	16SS0320002	6/28	0.05 - 7.9	13.3	NA	NA	NA	NA	No	NTX
	Volatile Organic Compounds														
	78-93-3	2-Butanone	1.1 J	5 J	ug/kg	16SS0730102	5/65	0.888 - 1.3	5	NA	24000000 sat	4400	35000	No	BSL
	591-78-6	2-Hexanone	3 J	3 J	ug/kg	16SS0560102	1/69	0.888 - 1.3	3	NA	NA	NA	NA	No	NTX
	108-10-1	4-Methyl-2-Pentanone	1 J	1 J	ug/kg	16SS0730102	1/69	0.888 - 1.3	1	NA	2700000 sat	620	20000	No	BSL
	67-64-1	Acetone	1 J	71 J	ug/kg	16SS0290002	18/67	0.93 - 13	71	NA	NA	6600	3800	No	BSL
	75-15-0	Carbon Disulfide	2 J	3	ug/kg	16SS0720102	2/69	0.888 - 1.3	3	NA	720000 sat	1500	10000	No	BSL
	67-66-3	Chloroform	1 J	1 J	ug/kg	16SS0990102	1/69	0.888 - 1.3	1	NA	280 C	29	470	No	BSL
	156-59-2	**cis-1,2-Dichloroethene**	1.1 J	73	ug/kg	16SS0660102	9/69	0.888 - 1.3	73	NA	NA	**20**	400	**Yes**	ASL
	75-71-8	Dichlorodifluoromethane	1 J	20 J	ug/kg	16SS0710102	15/69	0.893 - 1.3	20	NA	25000 N	28000	NA	No	BSL
	75-09-2	**Methylene Chloride**	3 J	3 J	ug/kg	16SS0710102	1/69	0.888 - 13	3	NA	13000 C	**1.2**	23	**Yes**	ASL
	100-42-5	Styrene	1 J	1 J	ug/kg	16SS0040002	1/69	0.888 - 1.3	1	NA	1500000 sat	180	3500	No	BSL
	108-88-3	Toluene	1 J	1 J	ug/kg	16SS0160002, 16SS0730102	2/69	0.888 - 1.3	1	NA	650000 sat	590	12000	No	BSL
	1330-20-7	Total Xylenes	3	3	ug/kg	16SS0730102	1/69	0.888 - 1.3	3	NA	71000 N	7100	210000	No	BSL
	156-60-5	trans-1,2-Dichloroethene	1 J	2 J	ug/kg	16SS0030002, 16SS0390002	5/69	0.888 - 1.3	2	NA	NA	34	680	No	BSL
	79-01-6	**Trichloroethene**	2 J	170	ug/kg	16SS0980102	17/69	0.893 - 1.3	170	NA	**71 C**	**2.8**	**57**	**Yes**	ASL
	75-69-4	Trichlorofluoromethane	1	3	ug/kg	7 Samples	33/69	0.893 - 1.3	3	NA	110000 N	8000	NA	No	BSL
	108-05-4	Vinyl Acetate	1 J	1 J	ug/kg	16SS0190002, 16SS0350002	2/69	0.888 - 1.3	1	NA	99000 N	7800	2300	No	BSL

TABLE 7-4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	U.S. EPA Generic SSL for Soil to Air[5]	U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM SSL for Migration to Groundwater[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	4 J	94	ug/kg	16SS0030002	2/39	3.4 - 4.3	94	NA	NA	NA	16000	No	BSL
	83-32-9	Acenaphthene	5 J	1800	ug/kg	16SS0030002	2/39	3.5 - 4.3	1800	NA	NA	31000	130000	No	BSL
	208-96-8	Acenaphthylene	4 J	680	ug/kg	16SS0030002	3/39	3.5 - 4.3	680	NA	NA	NA	18000	No	BSL
	120-12-7	Anthracene	5 J	3500	ug/kg	16SS0030002	4/39	3.5 - 4.3	3500	NA	NA	650000	51000	No	BSL
	56-55-3	**Benzo(a)anthracene**	4 J	9600	ug/kg	16SS0030002	12/39	3.5 - 4.3	9600	NA	NA	**160**	19000	**Yes**	ASL
	50-32-8	**Benzo(a)pyrene**	4 J	8400	ug/kg	16SS0030002	13/39	3.5 - 4.3	8400	NA	NA	**410**	**8200**	**Yes**	ASL
	205-99-2	**Benzo(b)fluoranthene**	4 J	9200	ug/kg	16SS0030002	16/39	3.5 - 4.2	9200	NA	NA	**490**	57000	**Yes**	ASL
	191-24-2	Benzo(g,h,i)perylene	4 J	5100	ug/kg	16SS0030002	12/39	3.5 - 4.3	5100	NA	NA	NA	16000	No	BSL
	207-08-9	**Benzo(k)fluoranthene**	4 J	5000	ug/kg	16SS0030002	11/39	3.5 - 4.3	5000	NA	NA	**490**	39000	**Yes**	ASL
	117-81-7	Bis(2-ethylhexyl)phthalate	92 J	1200	ug/kg	16SS0040002	9/39	69 - 730	1200	NA	NA	180000	3600000	No	BSL
	218-01-9	**Chrysene**	4 J	11000	ug/kg	16SS0030002	15/39	3.5 - 4.3	11000	NA	7500000 C	**160**	25000	**Yes**	ASL
	53-70-3	**Dibenzo(a,h)anthracene**	8	1600	ug/kg	16SS0030002	3/39	3.5 - 4.3	1600	NA	NA	**1500**	18000	**Yes**	ASL
	132-64-9	Dibenzofuran	560 J	560 J	ug/kg	16SS0030002	1/39	69 - 87	560	NA	NA	2400	4900	No	BSL
	206-44-0	Fluoranthene	4 J	19000	ug/kg	16SS0030002	15/39	3.5 - 4.3	19000	NA	NA	310000	880000	No	BSL
	86-73-7	Fluorene	4 J	2300	ug/kg	16SS0030002	4/39	3.5 - 4.3	2300	NA	NA	41000	170000	No	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	5 J	4400	ug/kg	16SS0030002	10/39	3.5 - 4.3	4400	NA	NA	**1400**	**3100**	**Yes**	ASL
	91-20-3	Naphthalene	4 J	180	ug/kg	16SS0030002	3/39	3.4 - 4.3	180	NA	17000 N	3100	700	No	BSL
	85-01-8	Phenanthrene	4 J	8700	ug/kg	16SS0030002	8/39	3.5 - 4.3	8700	NA	NA	NA	13000	No	BSL
	129-00-0	Pyrene	4 J	35000	ug/kg	16SS0030002	17/39	3.5 - 4.3	35000	NA	NA	230000	570000	No	BSL
	94-59-7	Safrole	340 J	15000	ug/kg	16SS0130002	5/39	69 - 150	15000	NA	NA	NA	NA	NA	NTX
	Energetics														
	2691-41-0	HMX	0.34 J	0.34 J	ug/kg	16SS0330002	1/39	0.25	0.34	NA	NA	NA	NA	No	NTX
	Herbicides														
	70-30-4	Hexachlorophene	2.6 J	2.6 J	ug/kg	16SS0030002	1/39	0.62 - 1.1	2.6	NA	NA	570000	NA	No	BSL
	87-86-5	**Pentachlorophenol**	0.79 J	14	ug/kg	16SS0050002	4/39	0.46 - 0.58	14	NA	NA	**1.4**	28	**Yes**	ASL
	Inorganics														
	7429-90-5	**Aluminum**	1780 J	34200 J	mg/kg	16SS0880002	48/49	3610	34200	5020 - 17400	686000 N	**8.3**	NA	**Yes**	ASL
	7440-36-0	**Antimony**	0.51 J	27.2 J	mg/kg	16SS0140002	22/49	0.19 - 3.4	27.2	0.49 - 11.3	NA	**0.27**	**5.4**	**Yes**	ASL
	7440-38-2	**Arsenic**	0.75 J	12.7 J	mg/kg	16SS0880002	49/49	---	12.7	1.1 - 10.2	745 C	**0.29**	29	**Yes**	ASL
	7440-39-3	**Barium**	11.9 J	303 J	mg/kg	16SS0130002	49/49	---	303	24.8 - 155	68600 N	**82**	1600	**Yes**	ASL
	7440-41-7	Beryllium	0.23 J	1.4 J	mg/kg	16SS0170002	23/49	0.06 - 1	1.4	0.3 - 0.82	1330 C	3.2	63	No	BSL
	7440-43-9	**Cadmium**	0.19 J	2.8 J	mg/kg	16SS0150002	17/49	0.13 - 1	2.8	0.05 - 3.6	1780 C	**0.38**	7.5	**Yes**	ASL
	7440-70-2	Calcium	212 J	246000 J	mg/kg	16SS0030002	46/49	152 - 236	246000	53.6 - 35300	NA	NA	NA	No	NUT
	7440-47-3	**Chromium[8]**	4.3 J	38.2 J	mg/kg	16SS0880002	49/49	---	38.2	7.7 - 30.6	267 C	**2.1**	NA	**Yes**	ASL
	7440-48-4	**Cobalt**	0.87 J	25.9 J	mg/kg	16SS0170002	49/49	---	25.9	1.8 - 27.1	1140 C	**0.17**	NA	**Yes**	ASL
	7440-50-8	Copper	2.4 J	413 J	mg/kg	16SS0150002	49/49	---	413	3.5 - 23.8	NA	560	920	No	BSL
	7439-89-6	Iron	2170 J	43000 J	mg/kg	16SS0200002	49/49	---	43000	7140 - 40800	NA	NA	NA	No	NTX
	7439-92-1	**Lead**	3.5 J	1240 J	mg/kg	16SS0140002	48/49	14.8	1240	6.4 - 21.5	NA	NA	**81**	**Yes**	ASL
	7439-93-2	Lithium	0.81 J	21.5 J	mg/kg	16SS0170002	37/39	4.3 - 5.6	21.5	7.8 - 46.6	NA	NA	NA	No	NTX
	7439-95-4	Magnesium	105 J	62500 J	mg/kg	16SS0030002	49/49	---	62500	496 - 2870	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	3.8 J	1040 J	mg/kg	16SS0130002	49/49	---	1040	23.2 - 3040	6860 N	**110**	NA	**Yes**	ASL
	7439-97-6	**Mercury**	0.015 J	0.22 J	mg/kg	16SS0050002	34/49	0.002 - 0.021	0.22	0.04 - 0.14	2.9 sat	**0.1**	2.1	**Yes**	ASL
	7440-02-0	**Nickel**	0.71 J	41.3 J	mg/kg	16SS0170002	49/49	---	41.3	4.6 - 23.7	NA	**14**	NA	**Yes**	ASL
	7440-09-7	Potassium	206 J	2980 J	mg/kg	16SS0880002	49/49	---	2980	280 - 1650	NA	NA	NA	No	NUT
	7782-49-2	**Selenium**	0.16 J	0.31 J	mg/kg	16SS0320002	2/49	0.03 - 0.82	0.31	0.28 - 0.88	NA	**0.26**	5.2	**Yes**	ASL
	7440-22-4	Silver	0.28 J	0.28 J	mg/kg	16SS0330002	1/49	0.02 - 0.26	0.28	0.04 - 0.11	NA	1.6	31	No	BSL

TABLE 7-4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	U.S. EPA Generic SSL for Soil to Air(5)	U.S. EPA Generic SSL for Migration to Groundwater(5)	IDEM SSL for Migration to Groundwater(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7440-23-5	Sodium	162 J	496 J	mg/kg	16SS0030002	4/49	12.7 - 84.9	496	3.7 - 205	NA	NA	NA	No	NUT
	7440-24-6	Strontium	4.5 J	252 J	mg/kg	16SS0030002	39/39	---	252	4.2 - 63.2	NA	770	NA	No	BSL
	7440-28-0	**Thallium**	0.16 J	0.32 J	mg/kg	16SS0110002	2/49	0.03 - 0.5	0.32	0.05 - 0.31	NA	**0.056**	2.8	**Yes**	ASL
	7440-31-5	Tin	0.25 J	12.3 J	mg/kg	16SS0080002	8/49	0.32 - 2.4	12.3	NA	NA	NA	NA	No	NTX
	7440-32-6	Titanium	7.5 J	348 J	mg/kg	16SS0110002	44/44	---	348	4.1 - 11.7	NA	NA	NA	No	NTX
	7440-62-2	Vanadium	3.6 J	65.2 J	mg/kg	16SS0880002	49/49	---	65.2	14.1 - 48.5	NA	260	NA	No	BSL
	7440-66-6	**Zinc**	24 J	1840 J	mg/kg	16SS0420002	36/49	5.2 - 2510	1840	9.4 - 60.2	NA	**680**	14000	**Yes**	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Taken from Table 4-1 of the Final Basewide Background Soil Investigation Report, Naval Surface Warfare Center Crane, Crane, Indiana, January, 2001.
5 - EPA Soil Screening Levels. EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm (Soil to air SSLs for noncarcinogens are divided by 10).
The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Value is derived by multiplying criteria for 2,3,7,8-TCDD by World Health Organization Toxicity Equivalent Factor.
9 - Value is for total chromium.

Associated Samples

16SS0010002	16SS0160002	16SS0310002	16SS0520102	16SS0670102	16SS0880002
16SS0020002	16SS0170002	16SS0320002	16SS0530102	16SS0680102	16SS0890002
16SS0030002	16SS0180002	16SS0330002	16SS0540102	16SS0690102	16SS0980102
16SS0040002	16SS0190002	16SS0340002	16SS0550102	16SS0700102	16SS0990102
16SS0050002	16SS0200002	16SS0350002	16SS0560102	16SS0710102	
16SS0060002	16SS0210002	16SS0360002	16SS0570102	16SS0720102	
16SS0070002	16SS0220002	16SS0370002	16SS0580102	16SS0730102	
16SS0080002	16SS0230002	16SS0380002	16SS0590102	16SS0740102	
16SS0090002	16SS0240002	16SS0390002	16SS0600102	16SS0750102	
16SS0100002	16SS0250002	16SS0420002	16SS0610102	16SS0760102	
16SS0110002	16SS0260002	16SS0430002	16SS0620102	16SS0770102	
16SS0120002	16SS0270002	16SS0440002	16SS0630102	16SS0780102	
16SS0130002	16SS0280002	16SS0450002	16SS0640102	16SS0850002	
16SS0140002	16SS0290002	16SS0460002	16SS0650102	16SS0860002	
16SS0150002	16SS0300002	16SS0510102	16SS0660102	16SS0870002	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
SSL = Soil Screening Level
sat = Soil Saturation Limit
ng/kg = nanogram per kilogram
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN -DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
SWMU 16	**Volatile Organic Compounds**														
	79-00-5	1,1,2-Trichloroethane	4	8 J	ug/kg	16SB0560206	2/79	0.814 - 1.48	8	NA	730 C	9400	IDEM	No	BSL
	78-93-3	2-Butanone	1 J	2 J	ug/kg	16SB0600206	3/70	0.814 - 1.48	2	NA	2200000 N	44000000	IDEM	No	BSL
	67-64-1	Acetone	3 J	72 J	ug/kg	16SB0650206	11/78	0.869 - 24	72	NA	1400000 N	4800000	IDEM	No	BSL
	74-83-9	Bromomethane	4 J	4 J	ug/kg	16SB0560206	1/79	0.814 - 1.48	4	NA	390 N	9900	IDEM	No	BSL
	75-15-0	Carbon Disulfide	2 J	2 J	ug/kg	16SB0650206	1/78	0.814 - 1.48	2	NA	36000 N	900000	IDEM	No	BSL
	67-66-3	Chloroform	1.1 J	15	ug/kg	16SB0950607	9/79	0.814 - 1.48	15	NA	220 C	910	IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1 J	200	ug/kg	16SB0390203	19/78	0.814 - 1.48	200	NA	4300 N	110000	IDEM	No	BSL
	75-71-8	Dichlorodifluoromethane	1 J	170	ug/kg	16SB0470405	49/78	0.929 - 1.45	170	NA	9400 N	NA	NA	No	BSL
	108-88-3	Toluene	1 J	1 J	ug/kg	16SB0980607	1/78	0.814 - 1.48	1	NA	520000 sat	1700000	IDEM	No	BSL
	1330-20-7	Total Xylenes	1 J	2 J	ug/kg	16SB0470405, 16SB0480203, 16SB0490405	4/78	0.869 - 1.48	2	NA	27000 N	690000	IDEM	No	BSL
	156-60-5	trans-1,2-Dichloroethene	1 J	12	ug/kg	16SB0390203	5/78	0.814 - 1.48	12	NA	6900 N	180000	IDEM	No	BSL
	79-01-6	**Trichloroethene**	1 J	9000	ug/kg	16SB0950406	50/79	0.92 - 1.35	9000	NA	**53 C**	**710**	IDEM	**Yes**	ASL
	75-69-4	Trichlorofluoromethane	1 J	2 J	ug/kg	11 Samples	15/78	0.814 - 1.45	2	NA	39000 N	NA	IDEM	No	BSL
	75-01-4	Vinyl Chloride	6	12	ug/kg	16SB0650206	2/79	0.814 - 1.48	12	NA	79 C	1500	IDEM	No	BSL
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	4 J	4 J	ug/kg	16SB0410507	1/27	3.5 - 4.1	4	NA	5600 N[8]	3200000	IDEM	No	BSL
	56-55-3	Benzo(a)anthracene	4 J	7 J	ug/kg	16SB0340203	2/27	3.5 - 4.1	7	NA	620 C	5000	IDEM	No	BSL
	50-32-8	Benzo(a)pyrene	6 J	10	ug/kg	16SB0340203	2/27	3.5 - 4.1	10	NA	62 C	500	IDEM	No	BSL
	205-99-2	Benzo(b)fluoranthene	8 J	16 J	ug/kg	16SB0340203	2/27	3.5 - 4.1	16	NA	620 C	5000	IDEM	No	BSL
	191-24-2	Benzo(g,h,i)perylene	6 J	6 J	ug/kg	16SB0340203	1/27	3.5 - 4.1	6	NA	230000 N[10]	50000	IDEM	No	BSL
	207-08-9	Benzo(k)fluoranthene	6 J	13	ug/kg	16SB0340203	2/27	3.5 - 4.1	13	NA	6200 C	50000	IDEM	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	86 J	1400	ug/kg	16SB0410507	3/27	70 - 1000	1400	NA	35000 C	300000	IDEM	No	BSL
	218-01-9	Chrysene	6 J	10	ug/kg	16SB0340203	3/27	3.5 - 4.1	10	NA	62000 C	500000	IDEM	No	BSL
	206-44-0	Fluoranthene	6 J	9	ug/kg	16SB0340203	2/27	3.5 - 4.1	9	NA	230000 N	6300000	IDEM	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	6 J	6 J	ug/kg	16SB0340203	1/27	3.5 - 4.1	6	NA	620 C	5000	IDEM	No	BSL
	120-58-1	Isosafrole	150 J	150 J	ug/kg	16SB0410507	1/27	70 - 83	150	NA	NA	NA	NA	No	NTX
	91-20-3	Naphthalene	5 J	6 J	ug/kg	16SB0410507	2/27	3.5 - 4.1	6	NA	5600 N	3200000	IDEM	No	BSL
	85-01-8	Phenanthrene	6 J	6 J	ug/kg	16SB0410507	1/27	3.5 - 4.1	6	NA	230000 N[10]	470000	IDEM	No	BSL
	129-00-0	Pyrene	6 J	12	ug/kg	16SB0340203	3/27	3.5 - 4.1	12	NA	230000 N	4700000	IDEM	No	BSL
	94-59-7	Safrole	480	67000	ug/kg	16SB0410507	2/27	70 - 83	67000	NA	NA	NA	NA	NA	NTX
	Herbicides														
	70-30-4	Hexachlorophene	0.96 J	0.96 J	ug/kg	16SB0260204	1/27	0.68 - 1	0.96	NA	1800 N	NA	NA	No	BSL
	87-86-5	Pentachlorophenol	1.6 J	1.6 J	ug/kg	16SB0300203	1/27	0.47 - 0.56	1.6	NA	3000 C	20000	IDEM	No	BSL
	Inorganics														
	7429-90-5	**Aluminum**	1540 J	26700 J	mg/kg	16SB0850204	32/32	---	26700	5020 - 17400	**7600 N**	NA	NA	**Yes**	ASL
	7440-36-0	Antimony	0.33 J	1.4 J	mg/kg	16SB0870204	4/32	0.14 - 1.5	1.4	0.49 - 11.3	3.1 N	140	IDEM	No	BSL
	7440-38-2	**Arsenic**	0.35 J	11.5 J	mg/kg	16SB0890204	32/32	---	11.5	1.1 - 10.2	**0.39 C**	**3.9**	IDEM	**Yes**	ASL
	7440-39-3	Barium	9.1 J	119 J	mg/kg	16SB0320204	32/32	---	119	24.8 - 155	540 N	23000	IDEM	No	BSL
	7440-41-7	Beryllium	0.2 J	2.4 J	mg/kg	16SB0180203	12/32	0.17 - 0.81	2.4	0.3 - 0.82	15 N	680	IDEM	No	BSL
	7440-43-9	Cadmium	0.19 J	0.74 J	mg/kg	16SB0180203	7/32	0.09 - 0.37	0.74	0.05 - 3.6	3.7 N	12	IDEM	No	BSL
	7440-70-2	Calcium	68.7 J	2150 J	mg/kg	16SB0340203	29/32	35.6 - 380	2150	53.6 - 35300	NA	NA	NA	No	NUT
	7440-47-3	Chromium	5.1 J	48.2 J	mg/kg	16SB0890204	32/32	---	48.2	7.7 - 30.6	210 C[11]	430[12]	IDEM	No	BSL

TABLE 7-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN -DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	EPA Region 9 PRG (Residential)(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7440-48-4	Cobalt	0.54 J	15.7 J	mg/kg	16SB0170204	32/32	---	15.7	1.8 - 27.1	140 N(13)	NA	NA	No	BSL
	7440-50-8	Copper	3.6 J	34.8 J	mg/kg	16SB0180203	32/32	---	34.8	3.5 - 23.8	310 N	13000	IDEM	No	BSL
	7439-89-6	**Iron**	3630 J	34500 J	mg/kg	16SB0850204	32/32	---	34500	7140 - 40800	**2300 N**	NA	NA	**Yes**	ASL
	7439-92-1	Lead	3.4 J	71.1 J	mg/kg	16SB0870204	31/32	7.9	71.1	6.4 - 21.5	400	400	IDEM	No	BSL
	7439-93-2	Lithium	3.4 J	23.6 J	mg/kg	16SB0170204	18/27	2 - 6.3	23.6	7.8 - 46.6	160 N	NA	NA	No	BSL
	7439-95-4	Magnesium	279 J	2620 J	mg/kg	16SB0410305	32/32	---	2620	496 - 2870	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	3.2 J	415 J	mg/kg	16SB0390203	32/32	---	415	23.2 - 3040	**180 N**	NA	NA	**Yes**	ASL
	7439-97-6	Mercury	0.003 J	0.083 J	mg/kg	16SB0860204	20/32	0.002 - 0.012	0.083	0.04 - 0.14	2.3 N	100	IDEM	No	BSL
	7440-02-0	Nickel	2 J	35.6 J	mg/kg	16SB0170204	32/32	---	35.6	4.6 - 23.7	160 N	6900	IDEM	No	BSL
	7440-09-7	Potassium	225 J	2980 J	mg/kg	16SB0890204	32/32	---	2980	280 - 1650	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.22 J	0.63 J	mg/kg	16SB0180203	2/32	0.02 - 0.62	0.63	0.28 - 0.88	39 N	1700	IDEM	No	BSL
	7440-22-4	Silver	0.42 J	0.42 J	mg/kg	16SB0340203	1/32	0.02 - 0.22	0.42	0.04 - 0.11	39 N	1700	IDEM	No	BSL
	7440-23-5	Sodium	50.5 J	50.5 J	mg/kg	16SB0320204	1/32	13.9 - 75.8	50.5	3.7 - 205	NA	NA	NA	No	NUT
	7440-24-6	Strontium	2.8 J	21.8 J	mg/kg	16SB0130204	27/27	---	21.8	4.2 - 63.2	4700 N	NA	NA	No	BSL
	7440-31-5	Tin	0.31 J	1.3 J	mg/kg	16SB0320204	5/32	0.22 - 0.71	1.3	NA - NA	4700 N	NA	NA	No	BSL
	7440-32-6	Titanium	12.2 J	177 J	mg/kg	16SB0410305	27/27	---	177	4.1 - 11.7	31000 N(14)	NA	NA	No	BSL
	7440-62-2	**Vanadium**	2.9 J	55.2 J	mg/kg	16SB0890204	32/32	---	55.2	14.1 - 48.5	**7.8 N**	NA	NA	**Yes**	ASL
	7440-66-6	Zinc	10.2 J	130	mg/kg	16SB0870204	24/32	4.5 - 39.7	130	9.4 - 60.2	2300 N	100000	IDEM	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Taken from Table 4-1 of the Final Basewide Background Soil Investigation Report, Naval Surface Warfare Center Crane, Crane, Indiana, January, 2001.
5 - U.S. EPA Region 9 Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (U.S. EPA Region 9, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for naphthalene is used as a surrogate for 2-methylnaphthalene.
9 - The value for acenaphthene is used as a surrogate for acenaphthylene.
10 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
11 - The PRG for residential land use for total chromium is presented.
12 - Value is for hexavalent chromium.
13 - One tenth of the non-carcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth non-carcinogenic PRG is presented.
14 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
sat = Soil Saturation Limit
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN -DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	EPA Region 9 PRG (Residential)(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Associated Samples															
16SB0010406	16SB0290203	16SB0500103	16SB0600609	16SB0680206	16SB0770610		16SB0930608								
16SB0020406	16SB0300203	16SB0510204	16SB0610206	16SB0680609	16SB0780206		16SB0940708								
16SB0110204	16SB0320204	16SB0520205	16SB0610607	16SB0690206	16SB0780609		16SB0950406								
16SB0120204	16SB0330204	16SB0530205	16SB0620206	16SB0690607	16SB0850204		16SB0950607								
16SB0130204	16SB0340203	16SB0540205	16SB0620607	16SB0700206	16SB0860204		16SB0960406								
16SB0170204	16SB0360203	16SB0550206	16SB0630206	16SB0700607	16SB0870204		16SB0960608								
16SB0180203	16SB0380203	16SB0550607	16SB0630608	16SB0710206	16SB0880204		16SB0970406								
16SB0190203	16SB0390203	16SB0560206	16SB0640206	16SB0720206	16SB0890204		16SB0970607								
16SB0220203	16SB0400506	16SB0560608	16SB0640608	16SB0720607	16SB0900406		16SB0980206								
16SB0230203	16SB0400608	16SB0570206	16SB0650206	16SB0730204	16SB0900608		16SB0980607								
16SB0240203	16SB0410305	16SB0580206	16SB0650608	16SB0740206	16SB0910406		16SB0990206								
16SB0250203	16SB0410507	16SB0580607	16SB0660206	16SB0750203	16SB0910609		16SB0990608								
16SB0260204	16SB0470405	16SB0590206	16SB0660608	16SB0760206	16SB0920406										
16SB0270203	16SB0480203	16SB0590608	16SB0670206	16SB0760607	16SB0920608										
16SB0280203	16SB0490405	16SB0600206	16SB0670609	16SB0770206	16SB0930406										

TABLE 7-6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	U.S. EPA Generic SSL for Soil to Air(5)	U.S. EPA Generic SSL for Migration to Groundwater(5)	IDEM SSL for Migration to Groundwater(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
SWMU 16	**Volatile Organic Compounds**														
	79-00-5	**1,1,2-Trichloroethane**	4	8 J	ug/kg	16SB0560206	2/79	0.814 - 1.48	8	NA	980 C	**0.91**	30	**Yes**	ASL
	78-93-3	2-Butanone	1 J	2 J	ug/kg	16SB0600206	3/70	0.814 - 1.48	2	NA	24000000 sat	4400	35000	No	BSL
	67-64-1	Acetone	3 J	72 J	ug/kg	16SB0650206	11/78	0.869 - 24	72	NA	NA	6600	3800	No	BSL
	74-83-9	Bromomethane	4 J	4 J	ug/kg	16SB0560206	1/79	0.814 - 1.48	4	NA	950 N	12	52	No	BSL
	75-15-0	Carbon Disulfide	2 J	2 J	ug/kg	16SB0650206	1/78	0.814 - 1.48	2	NA	720000 sat	1500	10000	No	BSL
	67-66-3	Chloroform	1.1 J	15	ug/kg	16SB0950607	9/79	0.814 - 1.48	15	NA	280 C	29	470	No	BSL
	156-59-2	**cis-1,2-Dichloroethene**	1 J	200	ug/kg	16SB0390203	19/78	0.814 - 1.48	200	NA	NA	**20**	400	**Yes**	ASL
	75-71-8	Dichlorodifluoromethane	1 J	170	ug/kg	16SB0470405	49/78	0.929 - 1.45	170	NA	25000 N	28000	NA	No	BSL
	108-88-3	Toluene	1 J	1 J	ug/kg	16SB0980607	1/78	0.814 - 1.48	1	NA	650000 sat	590	12000	No	BSL
	1330-20-7	Total Xylenes	1 J	2 J	ug/kg	16SB0470405, 16SB0480203, 16SB0490405	4/78	0.869 - 1.48	2	NA	71000 N	7100	210000	No	BSL
	156-60-5	trans-1,2-Dichloroethene	1 J	12	ug/kg	16SB0390203	5/78	0.814 - 1.48	12	NA	NA	34	680	No	BSL
	79-01-6	**Trichloroethene**	1 J	9000	ug/kg	16SB0950406	50/79	0.92 - 1.35	9000	NA	**71 C**	**2.8**	**57**	**Yes**	ASL
	75-69-4	Trichlorofluoromethane	1 J	2 J	ug/kg	11 Samples	15/78	0.814 - 1.45	2	NA	110000 N	8000	NA	No	BSL
	75-01-4	**Vinyl Chloride**	6	12	ug/kg	16SB0650206	2/79	0.814 - 1.48	12	NA	280 C	**0.67**	13	**Yes**	ASL
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	4 J	4 J	ug/kg	16SB0410507	1/27	3.5 - 4.1	4	NA	NA	NA	16000	No	BSL
	56-55-3	Benzo(a)anthracene	4 J	7 J	ug/kg	16SB0340203	2/27	3.5 - 4.1	7	NA	NA	160	19000	No	BSL
	50-32-8	Benzo(a)pyrene	6 J	10	ug/kg	16SB0340203	2/27	3.5 - 4.1	10	NA	NA	410	8200	No	BSL
	205-99-2	Benzo(b)fluoranthene	8 J	16 J	ug/kg	16SB0340203	2/27	3.5 - 4.1	16	NA	NA	490	57000	No	BSL
	191-24-2	Benzo(g,h,i)perylene	6 J	6 J	ug/kg	16SB0340203	1/27	3.5 - 4.1	6	NA	NA	NA	16000	No	BSL
	207-08-9	Benzo(k)fluoranthene	6 J	13	ug/kg	16SB0340203	2/27	3.5 - 4.1	13	NA	NA	490	39000	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	86 J	1400	ug/kg	16SB0410507	3/27	70 - 1000	1400	NA	NA	180000	3600000	No	BSL
	218-01-9	Chrysene	6 J	10	ug/kg	16SB0340203	3/27	3.5 - 4.1	10	NA	7500000 C	160	25000	No	BSL
	206-44-0	Fluoranthene	6 J	9	ug/kg	16SB0340203	2/27	3.5 - 4.1	9	NA	NA	310000	880000	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	6 J	6 J	ug/kg	16SB0340203	1/27	3.5 - 4.1	6	NA	NA	1400	3100	No	BSL
	120-58-1	Isosafrole	150 J	150 J	ug/kg	16SB0410507	1/27	70 - 83	150	NA	NA	NA	NA	No	NTX
	91-20-3	Naphthalene	5 J	6 J	ug/kg	16SB0410507	2/27	3.5 - 4.1	6	NA	17000 N	3100	700	No	BSL
	85-01-8	Phenanthrene	6 J	6 J	ug/kg	16SB0410507	1/27	3.5 - 4.1	6	NA	NA	NA	13000	No	BSL
	129-00-0	Pyrene	6 J	12	ug/kg	16SB0340203	3/27	3.5 - 4.1	12	NA	NA	230000	570000	No	BSL
	94-59-7	Safrole	480	67000	ug/kg	16SB0410507	2/27	70 - 83	67000	NA	NA	NA	NA	NA	NTX
	Herbicides														
	70-30-4	Hexachlorophene	0.96 J	0.96 J	ug/kg	16SB0260204	1/27	0.68 - 1	0.96	NA	NA	570000	NA	No	BSL
	87-86-5	**Pentachlorophenol**	1.6 J	1.6 J	ug/kg	16SB0300203	1/27	0.47 - 0.56	1.6	NA	NA	**1.4**	28	**Yes**	ASL
	Inorganics														
	7429-90-5	**Aluminum**	1540 J	26700 J	mg/kg	16SB0850204	32/32	---	26700	5020 - 17400	686000 N	**8.3**	NA	**Yes**	ASL
	7440-36-0	**Antimony**	0.33 J	1.4 J	mg/kg	16SB0870204	4/32	0.14 - 1.5	1.4	0.49 - 11.3	NA	**0.27**	5.4	**Yes**	ASL
	7440-38-2	**Arsenic**	0.35 J	11.5 J	mg/kg	16SB0890204	32/32	---	11.5	1.1 - 10.2	745 C	**0.29**	29	**Yes**	ASL
	7440-39-3	**Barium**	9.1 J	119 J	mg/kg	16SB0320204	32/32	---	119	24.8 - 155	68600 N	**82**	1600	**Yes**	ASL
	7440-41-7	Beryllium	0.2 J	2.4 J	mg/kg	16SB0180203	12/32	0.17 - 0.81	2.4	0.3 - 0.82	1330 C	3.2	63	No	BSL
	7440-43-9	**Cadmium**	0.19 J	0.74 J	mg/kg	16SB0180203	7/32	0.09 - 0.37	0.74	0.05 - 3.6	1780 C	**0.38**	7.5	**Yes**	ASL
	7440-70-2	Calcium	68.7 J	2150 J	mg/kg	16SB0340203	29/32	35.6 - 380	2150	53.6 - 35300	NA	NA	NA	No	NUT
	7440-47-3	**Chromium**	5.1 J	48.2 J	mg/kg	16SB0890204	32/32	---	48.2	7.7 - 30.6	267 C	**2.1**	NA	**Yes**	ASL
	7440-48-4	**Cobalt**	0.54 J	15.7 J	mg/kg	16SB0170204	32/32	---	15.7	1.8 - 27.1	1140 C	**0.17**	NA	**Yes**	ASL
	7440-50-8	Copper	3.6 J	34.8 J	mg/kg	16SB0180203	32/32	---	34.8	3.5 - 23.8	NA	560	920	No	BSL

TABLE 7-6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	U.S. EPA Generic SSL for Soil to Air(5)	U.S. EPA Generic SSL for Migration to Groundwater(5)	IDEM SSL for Migration to Groundwater(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7439-89-6	Iron	3630 J	34500 J	mg/kg	16SB0850204	32/32	---	34500	7140 - 40800	NA	NA	NA	No	NTX
	7439-92-1	Lead	3.4 J	71.1 J	mg/kg	16SB0870204	31/32	7.9	71.1	6.4 - 21.5	NA	NA	81	No	BSL
	7439-93-2	Lithium	3.4 J	23.6 J	mg/kg	16SB0170204	18/27	2 - 6.3	23.6	7.8 - 46.6	NA	NA	NA	No	NTX
	7439-95-4	Magnesium	279 J	2620 J	mg/kg	16SB0410305	32/32	---	2620	496 - 2870	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	3.2 J	415 J	mg/kg	16SB0390203	32/32	---	415	23.2 - 3040	6860 N	**110**	NA	**Yes**	ASL
	7439-97-6	Mercury	0.003 J	0.083 J	mg/kg	16SB0860204	20/32	0.002 - 0.012	0.083	0.04 - 0.14	2.9 sat	0.1	2.1	No	BSL
	7440-02-0	**Nickel**	2 J	35.6 J	mg/kg	16SB0170204	32/32	---	35.6	4.6 - 23.7	NA	**14**	NA	**Yes**	ASL
	7440-09-7	Potassium	225 J	2980 J	mg/kg	16SB0890204	32/32	---	2980	280 - 1650	NA	NA	NA	No	NUT
	7782-49-2	**Selenium**	0.22 J	0.63 J	mg/kg	16SB0180203	2/32	0.02 - 0.62	0.63	0.28 - 0.88	NA	**0.26**	5.2	**Yes**	ASL
	7440-22-4	Silver	0.42 J	0.42 J	mg/kg	16SB0340203	1/32	0.02 - 0.22	0.42	0.04 - 0.11	NA	1.6	31	No	BSL
	7440-23-5	Sodium	50.5 J	50.5 J	mg/kg	16SB0320204	1/32	13.9 - 75.8	50.5	3.7 - 205	NA	NA	NA	No	NUT
	7440-24-6	Strontium	2.8 J	21.8 J	mg/kg	16SB0130204	27/27	---	21.8	4.2 - 63.2	NA	770	NA	No	BSL
	7440-31-5	Tin	0.31 J	1.3 J	mg/kg	16SB0320204	5/32	0.22 - 0.71	1.3	NA - NA	NA	NA	NA	No	NTX
	7440-32-6	Titanium	12.2 J	177 J	mg/kg	16SB0410305	27/27	---	177	4.1 - 11.7	NA	NA	NA	No	NTX
	7440-62-2	Vanadium	2.9 J	55.2 J	mg/kg	16SB0890204	32/32	---	55.2	14.1 - 48.5	NA	260	NA	No	BSL
	7440-66-6	Zinc	10.2 J	130	mg/kg	16SB0870204	24/32	4.5 - 39.7	130	9.4 - 60.2	NA	680	14000	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Taken from Table 4-1 of the Final Basewide Background Soil Investigation Report, Naval Surface Warfare Center Crane, Crane, Indiana, January, 2001.
5 - EPA Soil Screening Levels. EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm (Soil to air SSLs for noncarcinogens are divided by 10).
The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples

16SB0010406	16SB0290203	16SB0500103	16SB0600609	16SB0680206	16SB0770610	16SB0930608
16SB0020406	16SB0300203	16SB0510204	16SB0610206	16SB0680609	16SB0780206	16SB0940708
16SB0110204	16SB0320204	16SB0520205	16SB0610607	16SB0690206	16SB0780609	16SB0950406
16SB0120204	16SB0330204	16SB0530205	16SB0620206	16SB0690607	16SB0850204	16SB0950607
16SB0130204	16SB0340203	16SB0540205	16SB0620607	16SB0700206	16SB0860204	16SB0960406
16SB0170204	16SB0360203	16SB0550206	16SB0630206	16SB0700607	16SB0870204	16SB0960608
16SB0180203	16SB0380203	16SB0550607	16SB0630608	16SB0710206	16SB0880204	16SB0970406
16SB0190203	16SB0390203	16SB0560206	16SB0640206	16SB0720206	16SB0890204	16SB0970607
16SB0220203	16SB0400506	16SB0560608	16SB0640608	16SB0720607	16SB0900406	16SB0980206
16SB0230203	16SB0400608	16SB0570206	16SB0650206	16SB0730204	16SB0900608	16SB0980607
16SB0240203	16SB0410305	16SB0580206	16SB0650608	16SB0740206	16SB0910406	16SB0990206
16SB0250203	16SB0410507	16SB0580607	16SB0660206	16SB0750203	16SB0910609	16SB0990608
16SB0260204	16SB0470405	16SB0590206	16SB0660608	16SB0760206	16SB0920406	
16SB0270203	16SB0480203	16SB0590608	16SB0670206	16SB0760607	16SB0920608	
16SB0280203	16SB0490405	16SB0600206	16SB0670609	16SB0770206	16SB0930406	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
SSL = Soil Screening Level
sat = Soil Saturation Limit
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Upper Zone	**Volatile Organic Compounds**														
	79-34-5	**1,1,2,2-Tetrachloroethane**	1.6 J	2.1	ug/L	16GWT0604	2/23	0.3 - 60	2.1	ND	**0.055 C**	NA **0.9**	NA IDEM	**Yes**	ASL
	79-00-5	**1,1,2-Trichloroethane**	2.1	220 J	ug/L	16GWT0603	7/23	0.3 - 60	220	ND	**0.2 C**	**5** **5**	FED-MCL IDEM	**Yes**	ASL
	75-35-4	**1,1-Dichloroethene**	1.4	160	ug/L	16GWT0604	6/23	0.3 - 60	160	ND	**34 N**	**7** **7**	FED-MCL IDEM	**Yes**	ASL
	96-18-4	**1,2,3-Trichloropropane**	0.6 J	0.6 J	ug/L	16GWT0604	1/23	0.3 - 60	0.6	ND	**0.0056 C**	NA NA	NA NA	**Yes**	ASL
	107-06-2	**1,2-Dichloroethane**	0.6 J	2.3	ug/L	16GWT0604	2/23	0.3 - 60	2.3	ND	**0.12 C**	5 5	FED-MCL IDEM	**Yes**	ASL
	591-78-6	2-Hexanone	1.4 J	16 J	ug/L	16GWT0603	2/23	0.5 - 100	16	ND	NA	NA NA	NA NA	No	NTX
	108-10-1	4-Methyl-2-Pentanone	3.5 J	27	ug/L	16GWT0604	3/23	0.5 - 100	27	ND	200 N	NA 2200	NA IDEM	No	BSL
	67-64-1	Acetone	0.5 J	18 J	ug/L	16GWT0603	3/17	0.5 - 100	18	ND	550 N	NA 950	NA IDEM	No	BSL
	71-43-2	**Benzene**	0.9 J	3.5	ug/L	16GWT0604	5/23	0.3 - 60	3.5	ND	**0.35 C**	5 5	FED-MCL IDEM	**Yes**	ASL
	75-27-4	**Bromodichloromethane**	0.8 J	0.8 J	ug/L	16GWT0601	1/23	0.3 - 60	0.8	ND	**0.18 C**	80 80	FED-MCL IDEM	**Yes**	ASL
	75-15-0	Carbon Disulfide	0.8 J	4.3	ug/L	16GWT0603	3/23	0.3 - 60	4.3	ND	100 N	NA 1300	NA IDEM	No	BSL
	56-23-5	**Carbon Tetrachloride**	0.8 J	15	ug/L	16GW0301	4/23	0.3 - 60	15	ND	**0.17 C**	**5** **5**	FED-MCL IDEM	**Yes**	ASL
	67-66-3	**Chloroform**	0.8 J	15	ug/L	16GWT0604	12/23	0.3 - 60	15	ND	**0.17 C**	80 80	FED-MCL IDEM	**Yes**	ASL
	156-59-2	**cis-1,2-Dichloroethene**	0.2 J	4200	ug/L	16GWT0603	16/23	0.3	4200	ND	**6.1 N**	**70** **70**	FED-MCL IDEM	**Yes**	ASL
	74-84-0	Ethane	0.013	7.7	ug/L	16GWT0603	4/4	---	7.7	0.062	NA	NA NA	NA NA	No	NTX
	74-85-1	Ethene	0.027	65	ug/L	16GWT0603	4/4	---	65	0.018	NA	NA NA	NA NA	No	NTX
	100-41-4	Ethylbenzene	1.6	3.9	ug/L	16GWT0604	3/23	0.3 - 60	3.9	ND	130 N	700 700	FED-MCL IDEM	No	BSL
	74-82-8	Methane	0.032	280	ug/L	16GWT0603	4/4	---	280	15	NA	NA NA	NA NA	No	NTX
	75-09-2	**Methylene Chloride**	59 J	59 J	ug/L	16GWT1301	1/23	0.3 - 60	59	ND	**4.3 C**	**5** **5**	FED-MCL IDEM	**Yes**	ASL
	127-18-4	**Tetrachloroethene**	1.4	160	ug/L	16GWT0603	5/23	0.3 - 60	160	ND	**0.1 C**	**5** **5**	FED-MCL IDEM	**Yes**	ASL
	108-88-3	**Toluene**	2.8	310 J	ug/L	16GWT0604	4/23	0.3 - 60	310	ND	**72 N**	1000 1000	FED-MCL IDEM	**Yes**	ASL
	1330-20-7	Total Xylenes	2.8	6.5	ug/L	16GWT0604	3/23	0.3 - 60	6.5	ND	21 N	10000 10000	FED-MCL IDEM	No	BSL

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	156-60-5	**Trans-1,2-Dichloroethene**	1	22	ug/L	16GWT0603	6/23	0.3 - 60	22	ND	**12 N**	100 100	FED-MCL IDEM	**Yes**	ASL
	79-01-6	**Trichloroethene**	1.2	330000	ug/L	16GWT0604	23/23	---	330000	ND	**0.028 C**	**5** **5**	FED-MCL IDEM	**Yes**	ASL
	75-01-4	**Vinyl Chloride**	0.3 J	390 J	ug/L	16GWT0604	7/23	0.3 - 60	390	ND	**0.02 C**	**2** **2**	FED-MCL IDEM	**Yes**	ASL
	Semivolatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	0.11	0.11	ug/L	16GWT0601	1/4	0.05	0.11	ND	0.62 N[8]	NA 150	NA IDEM	No	BSL
	83-32-9	Acenaphthene	0.07 J	0.07 J	ug/L	16GWT0601	1/4	0.05	0.07	ND	37 N	NA 460	NA IDEM	No	BSL
	205-99-2	Benzo(b)fluoranthene	0.09 J	0.09 J	ug/L	16GWT0601	1/4	0.05	0.09	ND	0.092 C	NA 1.2	NA IDEM	No	BSL
	218-01-9	Chrysene	0.1 J	0.1 J	ug/L	16GWT0601	1/4	0.05	0.1	ND	9.2 C	NA 1.6	NA IDEM	No	BSL
	84-66-2	Diethyl Phthalate	1 J	1 J	ug/L	16GWT0601	1/5	1	1	ND	2900 N	NA 29000	NA IDEM	No	BSL
	206-44-0	Fluoranthene	0.11	0.11	ug/L	16GWT0601	1/4	0.05	0.11	ND	150 N	NA 210	NA IDEM	No	BSL
	86-73-7	Fluorene	0.1 J	0.1 J	ug/L	16GWT0601	1/4	0.05	0.1	ND	24 N	NA 310	NA IDEM	No	BSL
	85-01-8	Phenanthrene	0.54	0.54	ug/L	16GWT0601	1/4	0.05	0.54	ND	18 N[9]	NA 23	NA IDEM	No	BSL
	129-00-0	Pyrene	0.2	0.2	ug/L	16GWT0601	1/4	0.05	0.2	ND	18 N	NA 140	NA IDEM	No	BSL
	110-86-1	**Pyridine**	9	9	ug/L	16GWT0602	1/5	1	9	ND	**3.6 N**	NA NA	NA NA	**Yes**	ASL
	Energetics														
	99-35-4	1,3,5-Trinitrobenzene	1.8	1.8	ug/L	16GWT0604	1/21	0.242 - 0.55	1.8	ND	110 N	NA NA	NA NA	No	BSL
	118-96-7	**2,4,6-Trinitrotoluene**	4.8	4.8	ug/L	16GWT0604	1/21	0.242 - 0.55	4.8	ND	**1.8 N[10]**	NA NA	NA NA	**Yes**	ASL
	6629-29-4	2,4-Diamino-6-Nitrotoluene	0.27 J	0.27 J	ug/L	16GWT0603	1/8	0.25 - 0.287	0.27	ND	NA	NA NA	NA NA	No	NTX
	121-14-2	2,4-Dinitrotoluene	0.8	0.8	ug/L	16GWT0604	1/21	0.242 - 0.55	0.8	ND	7.3 N	NA NA	NA NA	No	BSL
	35572-78-2	**2-Amino-4,6-Dinitrotoluene**	0.31 J	29 J	ug/L	16GWT0604	7/21	0.26 - 0.55	29	ND	**0.73 N[11]**	NA NA	NA NA	**Yes**	ASL
	99-08-1	3-Nitrotoluene	1.5 J	2.1 J	ug/L	16GWT1002	2/21	0.242 - 0.55	2.1	ND	12 N	NA NA	NA NA	No	BSL
	19406-51-0	**4-Amino-2,6-Dinitrotoluene**	0.56	14	ug/L	16GWT0604	8/21	0.26 - 0.55	14	ND	**0.73 N[11]**	NA NA	NA NA	**Yes**	ASL
	TTNUS498	DNX	0.63 J	0.63 J	ug/L	16GWT0402	1/8	0.25 - 0.287	0.63	ND	NA	NA NA	NA NA	No	NTX

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	2691-41-0	HMX	0.27 J	21	ug/L	16GWT0402	13/21	0.26 - 0.385	21	ND	180 N	NA NA	NA NA	No	BSL
	TTNUS232	MNX	0.5 J	4.1	ug/L	16GWT0402	4/8	0.25 - 0.275	4.1	ND	NA	NA NA	NA NA	No	NTX
	121-82-4	**RDX**	0.79	200	ug/L	16GWT0402	18/21	0.26 - 0.275	200	ND	**0.61 C**	NA NA	NA NA	**Yes**	ASL
	Total Metals														
	7429-90-5	**Aluminum**	168	5810 J	ug/L	16GWT1001	11/12	29.1	5810	85.6	**3600 N**	NA NA	NA NA	**Yes**	ASL
	7440-38-2	**Arsenic**	0.81 J	4.5 J	ug/L	16GWT0601	4/12	0.1 - 1.9	4.5	0.66 J	**0.045 C**	10 50	FED-MCL IDEM	**Yes**	ASL
	7440-39-3	Barium	13.4 J	107 J	ug/L	16GWT0201	12/12	---	107	17.8 J - 21.6 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-41-7	Beryllium	1.9 J	1.9 J	ug/L	16GWT1001	1/12	0.03 - 1.3	1.9	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-70-2	Calcium	22600 J	101000 J	ug/L	16GWT0603	12/12	---	101000	97300 J - 212000 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium	0.68 J	5.5 J	ug/L	16GWT1301	4/12	0.3 - 1.3	5.5	ND	11 N[12]	100 100	FED-MCL IDEM[12]	No	BSL
	7440-48-4	**Cobalt**	2 J	131 J	ug/L	16GWT1001	12/12	---	131	9.2 J - 18.7 J	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-50-8	Copper	0.82 J	12.4 J	ug/L	16GWT1001	7/12	0.56 - 1.2	12.4	0.87 J	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	**Iron**	171 J	50200 J	ug/L	16GWT1001	12/12	---	50200	287 J - 13700 J	**1100 N**	NA NA	NA NA	**Yes**	ASL
	7439-92-1	Lead	2.6 J	6.6 J	ug/L	16GWT1001	3/12	0.12 - 0.55	6.6	ND	NA	15 15	FED-MCL[13] IDEM[13]	No	BSL
	7439-93-2	Lithium	8.5 J	33.2 J	ug/L	16GW0301	3/4	0.72	33.2	32.7 J - 33.6 J	73 N	NA NA	NA NA	No	BSL
	7439-95-4	Magnesium	8270 J	78800 J	ug/L	16GWT1001	12/12	---	78800	6240 J - 35200 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese**	353 J	24600 J	ug/L	16GWT1001	12/12	---	24600	864 J - 2440 J	**88 N**	NA NA	NA NA	**Yes**	ASL
	7440-02-0	**Nickel**	1.5 J	219 J	ug/L	16GWT1001	12/12	---	219	27 J - 36.7 J	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-09-7	Potassium	1360 J	11900 J	ug/L	16GWT0601	12/12	---	11900	738 J - 2640 J	NA	NA NA	NA NA	No	NUT
	7782-49-2	Selenium	1.2 J	1.2 J	ug/L	16GWT0601	1/12	0.04 - 1.4	1.2	ND	18 N	50 50	FED-MCL IDEM	No	BSL
	7440-23-5	Sodium	6770 J	149000 J	ug/L	16GWT0603	12/12	---	149000	17900 J - 20200 J	NA	NA NA	NA NA	No	NUT
	7440-24-6	Strontium	186 J	387 J	ug/L	16GWT0201	4/4	---	387	88.4 J - 98.4 J	2200 N	NA NA	NA NA	No	BSL
	7440-32-6	Titanium	1 J	35 J	ug/L	16GWT0603	7/12	0.45 - 4.5	35	3 J - 3.8 J	15000 N	NA NA	NA NA	No	BSL

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7440-62-2	**Vanadium**	0.51 J	4.1 J	ug/L	16GWT1301	4/12	0.05 - 0.36	4.1	ND	**3.6 N**	NA NA	NA NA	**Yes**	ASL
	7440-66-6	Zinc	6.2 J	443 J	ug/L	16GWT1001	12/12	---	443	15.8 J - 50 J	1100 N	NA 11000	NA IDEM	No	BSL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	342 J	342 J	ug/L	16GWT1301-F	1/1	---	342	NA	3600 N	NA NA	NA NA	No	BSL
	7440-39-3	Barium, Filtered	56.6 J	56.6 J	ug/L	16GWT1301-F	1/1	---	56.6	NA	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-70-2	Calcium, Filtered	38800 J	38800 J	ug/L	16GWT1301-F	1/1	---	38800	NA	NA	NA NA	NA NA	No	NUT
	7440-48-4	Cobalt, Filtered	58.5 J	58.5 J	ug/L	16GWT1301-F	1/1	---	58.5	NA	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper, Filtered	5.4 J	5.4 J	ug/L	16GWT1301-F	1/1	---	5.4	NA	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	**Iron, Filtered**	5230 J	5230 J	ug/L	16GWT1301-F	1/1	---	5230	NA	**1100 N**	NA NA	NA NA	**Yes**	ASL
	7439-95-4	Magnesium, Filtered	11800 J	11800 J	ug/L	16GWT1301-F	1/1	---	11800	NA	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese, Filtered**	3600 J	3600 J	ug/L	16GWT1301-F	1/1	---	3600	NA	**88 N**	NA NA	NA NA	**Yes**	ASL
	7440-02-0	**Nickel, Filtered**	193 J	193 J	ug/L	16GWT1301-F	1/1	---	193	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-09-7	Potassium, Filtered	7280 J	7280 J	ug/L	16GWT1301-F	1/1	---	7280	NA	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium, Filtered	18500 J	18500 J	ug/L	16GWT1301-F	1/1	---	18500	NA	NA	NA NA	NA NA	No	NUT
	7440-66-6	Zinc, Filtered	244 J	244 J	ug/L	16GWT1301-F	1/1	---	244	NA	1100 N	NA 11000	NA IDEM	No	BSL
	Miscellaneous Parameters														
		Nitrite/Nitrate-N	0.03	0.7	mg/L	16GW0302	8/12	0.025 - 0.05	0.7	ND	1	1 NA	FED-MCL NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - The U.S. EPA Region 9 tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004).
Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Value is for naphthalene.
9 - Value is for pyrene.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected
PRG = Preliminary Remediation Goal
SDWA = Safe Drinking Water Act
µg/L = microgram per liter
mg/L = milligram per liter

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)

10 - One tenth of the non-carcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth non-carcinogenic PRG is presented.
11 - Values are for aminodinitrotoluene.
12 - Values are for hexavalent chromium.
13 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Associated Samples

16GW0301	16GWT0402	16GWT1301
16GW0302	16GWT0403	16GWT1301-F
16GW0303	16GWT0601	16GWT1302
16GWT0101	16GWT0602	16GWT1701
16GWT0102	16GWT0603	16GWT1702
16GWT0103	16GWT0604	16GW0201
16GWT0201	16GWT0901	16GW0202
16GWT0202	16GWT0902	16GW0203
16GWT0203	16GWT1001	16GW0204
16GWT0401	16GWT1002	

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Upper Zone	**Volatile Organic Compounds**														
	79-34-5	1,1,2,2-Tetrachloroethane	1.6 J	2.1	ug/L	16GWT0604	2/23	0.3 - 60	2.1	ND	3	NA	NA	No	BSL
	79-00-5	**1,1,2-Trichloroethane**	2.1	220 J	ug/L	16GWT0603	7/23	0.3 - 60	220	ND	**5**	NA	NA	**Yes**	ASL
	75-35-4	1,1-Dichloroethene	1.4	160	ug/L	16GWT0604	6/23	0.3 - 60	160	ND	190	NA	NA	No	BSL
	96-18-4	1,2,3-Trichloropropane	0.6 J	0.6 J	ug/L	16GWT0604	1/23	0.3 - 60	0.6	ND	290	NA	NA	No	BSL
	107-06-2	1,2-Dichloroethane	0.6 J	2.3	ug/L	16GWT0604	2/23	0.3 - 60	2.3	ND	5	NA	NA	No	BSL
	591-78-6	2-Hexanone	1.4 J	16 J	ug/L	16GWT0603	2/23	0.5 - 100	16	ND	NA	NA	NA	No	NTX
	108-10-1	4-Methyl-2-Pentanone	3.5 J	27	ug/L	16GWT0604	3/23	0.5 - 100	27	ND	14000	NA	NA	No	BSL
	67-64-1	Acetone	0.5 J	18 J	ug/L	16GWT0603	3/17	0.5 - 100	18	ND	220000	NA	NA	No	BSL
	71-43-2	Benzene	0.9 J	3.5	ug/L	16GWT0604	5/23	0.3 - 60	3.5	ND	5	NA	NA	No	BSL
	75-27-4	Bromodichloromethane	0.8 J	0.8 J	ug/L	16GWT0601	1/23	0.3 - 60	0.8	ND	2.1	NA	NA	No	BSL
	75-15-0	Carbon Disulfide	0.8 J	4.3	ug/L	16GWT0603	3/23	0.3 - 60	4.3	ND	560	NA	NA	No	BSL
	56-23-5	**Carbon Tetrachloride**	0.8 J	15	ug/L	16GW0301	4/23	0.3 - 60	15	ND	**5**	NA	NA	**Yes**	ASL
	67-66-3	Chloroform	0.8 J	15	ug/L	16GWT0604	12/23	0.3 - 60	15	ND	80	NA	NA	No	BSL
	156-59-2	**cis-1,2-Dichloroethene**	0.2 J	4200	ug/L	16GWT0603	16/23	0.3	4200	ND	**210**	NA	NA	**Yes**	ASL
	74-84-0	Ethane	0.013	7.7	ug/L	16GWT0603	4/4	---	7.7	0.062	NA	NA	NA	No	NTX
	74-85-1	Ethene	0.027	65	ug/L	16GWT0603	4/4	---	65	0.018	NA	NA	NA	No	NTX
	100-41-4	Ethylbenzene	1.6	3.9	ug/L	16GWT0604	3/23	0.3 - 60	3.9	ND	700	NA	NA	No	BSL
	74-82-8	Methane	0.032	280	ug/L	16GWT0603	4/4	---	280	15	NA	NA	NA	No	NTX
	75-09-2	**Methylene Chloride**	59 J	59 J	ug/L	16GWT1301	1/23	0.3 - 60	59	ND	**6.7**	NA	NA	**Yes**	ASL
	127-18-4	**Tetrachloroethene**	1.4	160	ug/L	16GWT0603	5/23	0.3 - 60	160	ND	**5**	NA	NA	**Yes**	ASL
	108-88-3	Toluene	2.8	310 J	ug/L	16GWT0604	4/23	0.3 - 60	310	ND	1500	NA	NA	No	BSL
	1330-20-7	Total Xylenes	2.8	6.5	ug/L	16GWT0604	3/23	0.3 - 60	6.5	ND	NA	NA	NA	No	BSL
	156-60-5	Trans-1,2-Dichloroethene	1	22	ug/L	16GWT0603	6/23	0.3 - 60	22	ND	180	NA	NA	No	BSL
	79-01-6	**Trichloroethene**	1.2	330000	ug/L	16GWT0604	23/23	---	330000	ND	**5**	NA	NA	**Yes**	ASL
	75-01-4	**Vinyl Chloride**	0.3 J	390 J	ug/L	16GWT0604	7/23	0.3 - 60	390	ND	**2**	NA	NA	**Yes**	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002. EPA530-F-02-052.
Values are from Table 2c and correspond to a target cancer risk level of 1E-6 or HI =1 and an attenuation factor of 0.001.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples

16GW0301	16GWT0401	16GWT1001	
16GW0302	16GWT0402	16GWT1002	16GW0203
16GW0303	16GWT0403	16GWT1301	16GW0204
16GWT0101	16GWT0601	16GWT1301-F	
16GWT0102	16GWT0602	16GWT1302	
16GWT0103	16GWT0603	16GWT1701	
16GWT0201	16GWT0604	16GWT1702	
16GWT0202	16GWT0901	16GW0201	
16GWT0203	16GWT0902	16GW0202	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected
µg/L = microgram per liter

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - MIDDLE ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Middle Zone	**Volatile Organic Compounds**														
	75-15-0	Carbon Disulfide	0.3 J	0.3 J	ug/L	16GWT1601	1/19	0.3	0.3	ND	100 N	NA 1300	NA IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	0.3 J	0.3 J	ug/L	16GW0401 16GWT1601	2/19	0.3	0.3	ND	6.1 N	70 70	FED-MCL IDEM	No	BSL
	74-84-0	Ethane	0.032	0.37 J	ug/L	16GWT1201	2/2	---	0.37	0.062	NA	NA NA	NA NA	No	NTX
	74-85-1	Ethene	0.0093	0.031 J	ug/L	16GWT1201	2/2	---	0.031	0.018	NA	NA NA	NA NA	No	NTX
	74-82-8	Methane	0.86	11	ug/L	16GWT1201	2/2	---	11	15	NA	NA NA	NA NA	No	NTX
	127-18-4	**Tetrachloroethene**	0.3 J	0.3 J	ug/L	16GWT1601	1/19	0.3	0.3	ND	**0.1 C**	5 5	FED-MCL IDEM	**Yes**	ASL
	79-01-6	**Trichloroethene**	0.5 J	340	ug/L	16GWT1602	9/19	0.3	340	ND	**0.028 C**	**5** **5**	FED-MCL IDEM	**Yes**	ASL
	Energetics														
	88-72-2	**2-Nitrotoluene**	1	1	ug/L	16GWT1602	1/19	0.165 - 0.65	1	ND	**0.049 C**	NA NA	NA NA	**Yes**	ASL
	2691-41-0	HMX	0.39	1.3 J	ug/L	16GWT1201	6/19	0.25 - 0.65	1.3	ND	180 N	NA NA	NA NA	No	BSL
	121-82-4	**RDX**	0.66	4.8	ug/L	16GW0501	6/19	0.25 - 0.6	4.8	ND	**0.61 C**	NA NA	NA NA	**Yes**	ASL
	Total Metals														
	7429-90-5	**Aluminum**	19.2 J	53900 J	ug/L	16GWT1601	12/13	26.4	53900	85.6	**3600 N**	NA NA	NA NA	**Yes**	ASL
	7440-38-2	**Arsenic**	1.1 J	32.1 J	ug/L	16GW0102	12/13	1.5	32.1	0.66 J	**0.045 C**	**10** 50	FED-MCL IDEM	**Yes**	ASL
	7440-39-3	**Barium**	5 J	286 J	ug/L	16GWT1601	13/13	---	286	17.8 J - 21.6 J	**260 N**	2000 2000	FED-MCL IDEM	**Yes**	ASL
	7440-41-7	**Beryllium**	2 J	8.3 J	ug/L	16GWT1601	6/13	0.16 - 2.7	8.3	ND	**7.3 N**	**4** **4**	FED-MCL IDEM	**Yes**	ASL
	7440-43-9	**Cadmium**	0.83 J	4 J	ug/L	16GWT1601	4/13	0.05 - 1.4	4	ND	**1.8 N**	5 5	FED-MCL IDEM	**Yes**	ASL
	7440-70-2	Calcium	39500 J	194000 J	ug/L	16GW0101	12/13	106000	194000	97300 J - 212000 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	**Chromium**	12.4 J	73.6 J	ug/L	16GWT1601	3/13	0.27 - 0.68	73.6	ND	**11 N[8]**	100 100	FED-MCL IDEM[8]	**Yes**	ASL
	7440-48-4	**Cobalt**	32 J	563 J	ug/L	16GWT1602	13/13	---	563	9.2 J - 18.7 J	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-50-8	Copper	1.4 J	51.5 J	ug/L	16GWT1602	6/13	0.06 - 0.32	51.5	0.87 J	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	**Iron**	2190 J	83900 J	ug/L	16GW0102	13/13	---	83900	287 J - 13700 J	**1100 N**	NA NA	NA NA	**Yes**	ASL
	7439-92-1	**Lead**	0.89 J	54.8 J	ug/L	16GWT1601	7/13	0.03 - 0.7	54.8	ND	NA	**15** **15**	FED-MCL[9] IDEM[9]	**Yes**	ASL

TABLE 7-9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - MIDDLE ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7439-93-2	**Lithium**	92.7 J	328 J	ug/L	16GW0101	5/5	---	328	32.7 J - 33.6 J	**73 N**	NA NA	NA NA	**Yes**	ASL
	7439-95-4	Magnesium	25000 J	133000 J	ug/L	16GWT1601	13/13	---	133000	6240 J - 35200 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese**	2450 J	29300 J	ug/L	16GW0101	13/13	---	29300	864 J - 2440 J	**88 N**	NA NA	NA NA	**Yes**	ASL
	7440-02-0	**Nickel**	86.3 J	808 J	ug/L	16GWT1602	13/13	---	808	27 J - 36.7 J	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-09-7	Potassium	2970 J	19300 J	ug/L	16GWT1601	13/13	---	19300	738 J - 2640 J	NA	NA NA	NA NA	No	NUT
	7782-49-2	Selenium	2.8 J	5.2 J	ug/L	16GWT1601	2/13	0.04 - 0.9	5.2	ND	18 N	50 50	FED-MCL IDEM	No	BSL
	7440-23-5	Sodium	10400 J	107000 J	ug/L	16GWT1601	13/13	---	107000	17900 J - 20200 J	NA	NA NA	NA NA	No	NUT
	7440-24-6	Strontium	106 J	279 J	ug/L	16GW0501	5/5	---	279	88.4 J - 98.4 J	2200 N	NA NA	NA NA	No	BSL
	7440-31-5	Tin	1.8 J	2.5 J	ug/L	16GWT1601	2/13	0.03 - 0.58	2.5	ND	2200 N	NA NA	NA NA	No	BSL
	7440-32-6	Titanium	1.2 J	134 J	ug/L	16GWT1601	7/12	0.07 - 1.5	134	3 J - 3.8 J	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	**Vanadium**	0.6 J	64.8 J	ug/L	16GWT1601	8/13	0.05 - 1.7	64.8	ND	**3.6 N**	NA NA	NA NA	**Yes**	ASL
	7440-66-6	Zinc	86.1 J	791 J	ug/L	16GWT1601	13/13	---	791	15.8 J - 50 J	1100 N	NA 11000	NA IDEM	No	BSL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	2460 J	2460 J	ug/L	16GWT1601-F	1/2	33	2460	NA	3600 N	NA NA	NA NA	No	BSL
	7440-38-2	**Arsenic, Filtered**	4.6 J	4.6 J	ug/L	16GWT1601-F	1/2	1.2	4.6	NA	**0.045 C**	10 50	FED-MCL IDEM	**Yes**	ASL
	7440-39-3	Barium, Filtered	12.9 J	17 J	ug/L	16GWT1601-F	2/2	---	17	NA	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-41-7	Beryllium, Filtered	3.8 J	3.8 J	ug/L	16GWT1601-F	1/2	0.17	3.8	NA	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	**Cadmium, Filtered**	3 J	3 J	ug/L	16GWT1601-F	1/2	0.04	3	NA	**1.8 N**	5 5	FED-MCL IDEM	**Yes**	ASL
	7440-70-2	Calcium, Filtered	38900 J	158000 J	ug/L	16GWT1601-F	2/2	---	158000	NA	NA	NA NA	NA NA	No	NUT
	7440-48-4	**Cobalt, Filtered**	36.9 J	522 J	ug/L	16GWT1601-F	2/2	---	522	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-50-8	Copper, Filtered	20 J	20 J	ug/L	16GWT1601-F	1/2	0.49	20	NA	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	**Iron, Filtered**	43200 J	43200 J	ug/L	16GWT0302-F	1/2	1140	43200	NA	**1100 N**	NA NA	NA NA	**Yes**	ASL
	7439-92-1	Lead, Filtered	6.2 J	6.2 J	ug/L	16GWT1601-F	1/2	0.15	6.2	NA	NA	15 15	FED-MCL(9) IDEM(9)	No	BSL

TABLE 7-9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - MIDDLE ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	7439-95-4	Magnesium, Filtered	27200 J	131000 J	ug/L	16GWT1601-F	2/2	---	131000	NA	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese, Filtered**	4030 J	16700 J	ug/L	16GWT1601-F	2/2	---	16700	NA	**88 N**	NA NA	NA NA	**Yes**	ASL
	7440-02-0	**Nickel, Filtered**	80.6 J	622 J	ug/L	16GWT1601-F	2/2	---	622	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-09-7	Potassium, Filtered	3920 J	16500 J	ug/L	16GWT1601-F	2/2	---	16500	NA	NA	NA NA	NA NA	No	NUT
	7782-49-2	Selenium, Filtered	3.1 J	3.1 J	ug/L	16GWT1601-F	1/2	0.05	3.1	NA	18 N	50 50	FED-MCL IDEM	No	BSL
	7440-23-5	Sodium, Filtered	29000 J	105000 J	ug/L	16GWT1601-F	2/2	---	105000	NA	NA	NA NA	NA NA	No	NUT
	7440-32-6	Titanium, Filtered	2.4 J	2.4 J	ug/L	16GWT1601-F	1/2	2.3	2.4	NA	15000 N	NA NA	NA NA	No	BSL
	7440-66-6	Zinc, Filtered	67 J	596 J	ug/L	16GWT1601-F	2/2	---	596	NA	1100 N	NA 11000	NA IDEM	No	BSL
	Miscellaneous Parameters														
		Nitrite/Nitrate-N	0.07	0.07	mg/L	16GW0102	1/11	0.025 - 0.05	0.7	ND	1	1 NA	FED-MCL NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - The U.S. EPA Region 9 tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004).
Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Values are for hexavalent chromium.
9 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Associated Samples

16GW0101	16GWT0302	16GW0202
16GW0102	16GWT1602	16GW0203
16GW0103	16GWT0303	16GW0204
16GW0401	16GWT0501	16GWT0302-F
16GW0402	16GWT0502	16GWT1601-F
16GW0403	16GWT0503	
16GW0501	16GWT1201	
16GW0502	16GWT1202	
16GW0503	16GWT1601	
16GWT0301	16GW0201	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SDWA - Safe Drinking Water Act
µg/L = microgram per liter
mg/L = milligram per liter

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-10

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - MIDDLE ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
Middle Zone	**Volatile Organic Compounds**														
	75-15-0	Carbon Disulfide	0.3 J	0.3 J	ug/L	16GWT1601	1/19	0.3	0.3	ND	560	NA	NA	No	BSL
	156-59-2	cis-1,2-Dichloroethene	0.3 J	0.3 J	ug/L	16GW0401	2/19	0.3	0.3	ND	210	NA	NA	No	BSL
	74-84-0	Ethane	0.032	0.37 J	ug/L	16GWT1201	2/2	---	0.37	0.062	NA	NA	NA	No	NTX
	74-85-1	Ethene	0.0093	0.031 J	ug/L	16GWT1201	2/2	---	0.031	0.018	NA	NA	NA	No	NTX
	74-82-8	Methane	0.86	11	ug/L	16GWT1201	2/2	---	11	15	NA	NA	NA	No	NTX
	127-18-4	Tetrachloroethene	0.3 J	0.3 J	ug/L	16GWT1601	1/19	0.3	0.3	ND	5	NA	NA	No	BSL
	79-01-6	**Trichloroethene**	0.5 J	340	ug/L	16GWT1602	9/19	0.3	340	ND	**5**	NA	NA	**Yes**	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002. EPA530-F-02-052.
Values are from Table 2c and correspond to a target cancer risk level of 1E-6 or HI =1 and an attenuation factor of 0.001.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples

16GW0101	16GWT0302	16GW0202
16GW0102	16GWT1602	16GW0203
16GW0103	16GWT0303	16GW0204
16GW0401	16GWT0501	16GWT0302-F
16GW0402	16GWT0502	16GWT1601-F
16GW0403	16GWT0503	
16GW0501	16GWT1201	
16GW0502	16GWT1202	
16GW0503	16GWT1601	
16GWT0301	16GW0201	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
µg/L = microgram per liter

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-11

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - LOWER ZONE AND VALLEY WELLS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Lower Zone and Valley Wells	**Volatile Organic Compounds**														
	67-64-1	Acetone	0.8 J	7.4 J	ug/L	16GWT2101	4/10	0.5	7.4	ND	550 N	NA 950	NA IDEM	No	BSL
	71-43-2	**Benzene**	0.7 J	0.7 J	ug/L	16GWT1501	1/10	0.3	0.7	ND	**0.35 C**	5 5	FED-MCL IDEM	**Yes**	ASL
	67-66-3	**Chloroform**	0.8 J	16	ug/L	16GWT1101	5/10	0.3	16	ND	**0.17 C**	80 80	FED-MCL IDEM	**Yes**	ASL
	74-84-0	Ethane	1	5.4	ug/L	16GWT1801	2/2	---	5.4	0.062	NA	NA NA	NA NA	No	NTX
	74-85-1	Ethene	0.14	0.22	ug/L	16GWT1501	2/2	---	0.22	0.018	NA	NA NA	NA NA	No	NTX
	100-41-4	Ethylbenzene	0.9 J	0.9 J	ug/L	16GWT2101	1/10	0.3	0.9	ND	130 N	700 700	FED-MCL IDEM	No	BSL
	74-82-8	Methane	4500	5800	ug/L	16GWT1801	2/2	---	5800	15	NA	NA NA	NA NA	No	NTX
	75-09-2	Methylene Chloride	0.6 J	0.6 J	ug/L	16GWT0801	1/10	0.3	0.6	ND	4.3 C	5 5	FED-MCL IDEM	No	BSL
	107-12-0	Propionitrile	26 J	26 J	ug/L	16GWT1501	1/10	20	26	ND	NA	NA NA	NA NA	No	NTX
	108-88-3	Toluene	1.3	1.3	ug/L	16GWT2101	1/10	0.3	1.3	ND	72 N	1000 1000	FED-MCL IDEM	No	BSL
	1330-20-7	Total Xylenes	2.2	2.2	ug/L	16GWT2101	1/10	0.3	2.2	ND	21 N	10000 10000	FED-MCL IDEM	No	BSL
	Total Metals														
	7429-90-5	**Aluminum**	65.8 J	296000 J	ug/L	16GWT0801	7/8	8.35	296000	85.6	**3600 N**	NA NA	NA NA	**Yes**	ASL
	7440-36-0	**Antimony**	2.1 J	6.3 J	ug/L	16GWT1101	2/8	0.09 - 1.3	6.3	ND	**1.5 N**	6 **6**	FED-MCL IDEM	**Yes**	ASL
	7440-38-2	**Arsenic**	1.9 J	29.2 J	ug/L	16GWT0801	5/8	0.13 - 1.5	29.2	0.66 J	**0.045 C**	**10** 50	FED-MCL IDEM	**Yes**	ASL
	7440-39-3	**Barium**	41.7 J	1700 J	ug/L	16GWT0801	8/8	---	1700	17.8 J - 21.6 J	**260 N**	2000 2000	FED-MCL IDEM	**Yes**	ASL
	7440-41-7	**Beryllium**	4.8 J	15.1 J	ug/L	16GWT0801	2/8	0.02 - 0.5	15.1	ND	**7.3 N**	**4** **4**	FED-MCL IDEM	**Yes**	ASL
	7440-70-2	Calcium	6800 J	91800 J	ug/L	16GWT2101	7/8	19700	91800	97300 J - 212000 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	**Chromium**	5.1 J	452 J	ug/L	16GWT0801	5/8	0.69 - 1.1	452	ND	**11 N[8]**	**100** **100**	FED-MCL IDEM[8]	**Yes**	ASL
	7440-48-4	**Cobalt**	0.3 J	95.7 J	ug/L	16GWT0801	7/8	0.71	95.7	9.2 J - 18.7 J	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-50-8	Copper	2.5	86.1 J	ug/L	16GWT0801	5/8	0.24 - 0.47	86.1	0.87 J	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	**Iron**	376	241000 J	ug/L	16GWT0801	6/8	19.8 - 73.5	241000	287 J - 13700 J	**1100 N**	NA NA	NA NA	**Yes**	ASL

TABLE 7-11

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - LOWER ZONE AND VALLEY WELLS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	7439-92-1	**Lead**	3 J	127 J	ug/L	16GWT0801	3/8	0.069 - 2	127	ND	NA	**15** **15**	FED-MCL[9] IDEM[9]	**Yes**	ASL
	7439-95-4	Magnesium	108 J	39000 J	ug/L	16GWT1901	8/8	---	39000	6240 J - 35200 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese**	5.7	3800 J	ug/L	16GWT0801	8/8	---	3800	864 J - 2440 J	**88 N**	NA NA	NA NA	**Yes**	ASL
	7439-97-6	Mercury	0.028 J	0.12 J	ug/L	16GWT0801	2/8	0.007 - 0.049	0.12	ND	1.1 N	2 2	FED-MCL IDEM	No	BSL
	7440-02-0	**Nickel**	1.6	338 J	ug/L	16GWT0801	8/8	---	338	27 J - 36.7 J	**73 N**	NA NA	NA NA	**Yes**	ASL
	7440-09-7	Potassium	1140 J	74400 J	ug/L	16GWT0801	8/8	---	74400	738 J - 2640 J	NA	NA NA	NA NA	No	NUT
	7782-49-2	Selenium	2.1 J	5 J	ug/L	16GWT0801	3/8	0.094 - 1.4	5	ND	18 N	50 50	FED-MCL IDEM	No	BSL
	7440-23-5	Sodium	11100 J	231000 J	ug/L	16GWT2101	8/8	---	231000	17900 J - 20200 J	NA	NA NA	NA NA	No	NUT
	7440-31-5	Tin	3.9 J	3.9 J	ug/L	16GWT0801	1/8	0.06 - 2.6	3.9	ND	2200 N	NA NA	NA NA	No	BSL
	7440-32-6	Titanium	32.3 J	1020 J	ug/L	16GWT0801	4/4	---	1020	3 J - 3.8 J	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	**Vanadium**	4.4 J	410 J	ug/L	16GWT0801	5/8	1.14	410	ND	**3.6 N**	NA NA	NA NA	**Yes**	ASL
	7440-66-6	Zinc	6.5 J	454 J	ug/L	16GWT0801	6/8	2.7 - 4.8	454	15.8 J - 50 J	1100 N	NA 11000	NA IDEM	No	BSL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	126 J	126 J	ug/L	16GWT1801-F	1/3	65.9 - 85.5	126	NA	3600 N	NA NA	NA NA	No	BSL
	7440-36-0	**Antimony, Filtered**	1.5 J	8.8 J	ug/L	16GWT1101-F	2/3	1.5	8.8	NA	**1.5 N**	**6** **6**	FED-MCL IDEM	**Yes**	ASL
	7440-38-2	**Arsenic, Filtered**	1.3 J	1.3 J		16GWT1801-F	1/3	1.3 - 1.5	1.3	NA	**0.045 C**	10 50	FED-MCL IDEM	**Yes**	ASL
	7440-39-3	**Barium, Filtered**	28 J	341 J	ug/L	16GWT1801-F	3/3	---	341	NA	**260 N**	2000 2000	FED-MCL IDEM	**Yes**	ASL
	7440-70-2	Calcium, Filtered	7910 J	10600 J	ug/L	16GWT1101-F	3/3	---	10600	NA	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium, Filtered	0.59 J	0.59 J	ug/L	16GWT1801-F	1/3	0.42 - 0.69	0.59	NA	11 N[8]	100 100	FED-MCL IDEM[8]	No	BSL
	7440-48-4	Cobalt, Filtered	4.8 J	7.5 J	ug/L	16GWT1101-F	2/3	1.1	7.5	NA	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper, Filtered	2.8 J	2.8 J	ug/L	16GWT1501-F	1/3	0.72 - 1.5	2.8	NA	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-95-4	Magnesium, Filtered	2850 J	3500 J	ug/L	16GWT1801-F	3/3	---	3500	NA	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese, Filtered**	17.7 J	194 J	ug/L	16GWT1101-F	3/3	---	194	NA	**88 N**	NA NA	NA NA	**Yes**	ASL

TABLE 7-11

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - LOWER ZONE AND VALLEY WELLS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7440-02-0	Nickel, Filtered	4.6 J	5.2 J	ug/L	16GWT1101-F	2/3	1.4	5.2	NA	73 N	NA NA	NA NA	No	BSL
	7440-09-7	Potassium, Filtered	3410 J	5880 J	ug/L	16GWT1801-F	3/3	---	5880	NA	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium, Filtered	77500 J	218000 J	ug/L	16GWT1801-F	3/3	---	218000	NA	NA	NA NA	NA NA	No	NUT
	7440-32-6	Titanium, Filtered	1.9 J	1.9 J	ug/L	16GWT1801-F	1/3	0.68 - 0.85	1.9	NA	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	Vanadium, Filtered	0.53 J	0.53 J	ug/L	16GWT1801-F	1/3	0.31 - 0.59	0.53	NA	3.6 N	NA NA	NA NA	No	BSL
	7440-66-6	Zinc, Filtered	1.6 J	48.2 J	ug/L	16GWT1101-F	3/3	---	48.2	NA	1100 N	NA 11000	NA IDEM	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - The U.S. EPA Region 9 tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004).
Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Values are for hexavalent chromium.
9 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Associated Samples

16GWT0801	16GWT1802
16GWT0802	16GWT2101
16GWT1101	16GWT1901
16GWT1101-F	16GWT2001
16GWT1102	16GW0201
16GWT1501	16GW0202
16GWT1501-F	16GW0203
16GWT1502	16GW0204
16GWT1801	
16GWT1801-F	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SDWA - Safe Drinking Water Act
µg/L = microgram per liter

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-12

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - LOWER ZONE AND VALLEY WELLS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Lower Zone and Valley Wells	**Volatile Organic Compounds**														
	67-64-1	Acetone	0.8 J	7.4 J	ug/L	16GWT2101	4/10	0.5	7.4	ND	220000	NA	NA	No	BSL
	71-43-2	Benzene	0.7 J	0.7 J	ug/L	16GWT1501	1/10	0.3	0.7	ND	5	NA	NA	No	BSL
	67-66-3	Chloroform	0.8 J	16	ug/L	16GWT1101	5/10	0.3	16	ND	80	NA	NA	No	BSL
	74-84-0	Ethane	1	5.4	ug/L	16GWT1801	2/2	---	5.4	0.062	NA	NA	NA	No	NTX
	74-85-1	Ethene	0.14	0.22	ug/L	16GWT1501	2/2	---	0.22	0.018	NA	NA	NA	No	NTX
	100-41-4	Ethylbenzene	0.9 J	0.9 J	ug/L	16GWT2101	1/10	0.3	0.9	ND	700	NA	NA	No	BSL
	74-82-8	Methane	4500	5800	ug/L	16GWT1801	2/2	---	5800	15	NA	NA	NA	No	NTX
	75-09-2	Methylene Chloride	0.6 J	0.6 J	ug/L	16GWT0801	1/10	0.3	0.6	ND	6.7	NA	NA	No	BSL
	107-12-0	Propionitrile	26 J	26 J	ug/L	16GWT1501	1/10	20	26	ND	NA	NA	NA	No	NTX
	108-88-3	Toluene	1.3	1.3	ug/L	16GWT2101	1/10	0.3	1.3	ND	1500	NA	NA	No	BSL
	1330-20-7	Total Xylenes	2.2	2.2	ug/L	16GWT2101	1/10	0.3	2.2	ND	NA	NA	NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002. EPA530-F-02-052.
Values are from Table 2c and correspond to a target cancer risk level of 1E-6 or HI =1 and an attenuation factor of 0.001.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples

16GWT0801	16GWT1802
16GWT0802	16GWT2101
16GWT1101	16GWT1901
16GWT1101-F	16GWT2001
16GWT1102	16GW0201
16GWT1501	16GW0202
16GWT1501-F	16GW0203
16GWT1502	16GW0204
16GWT1801	
16GWT1801-F	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
µg/L = microgram per liter

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-13

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Gullies	**Volatile Organic Compounds**														
	67-64-1	Acetone	0.5 J	2.8 J	ug/L	16SW2701	3/10	0.5	2.8	0.6 J	550 N	NA 950	NA IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1.4	3.4	ug/L	16SW2901	2/11	0.3	3.4	ND	6.1 N	70 70	FED-MCL IDEM	No	BSL
	79-01-6	**Trichloroethene**	0.8 J	26	ug/L	16SW2901	5/11	0.3	26	ND	**0.028 C**	**5** **5**	FED-MCL IDEM	**Yes**	ASL
	Energetics														
	35572-78-2	2-Amino-4,6-Dinitrotoluene	0.29 J	0.29 J	ug/L	16SW3001	1/7	0.25 - 0.255	0.29	ND	0.73 N	NA NA	NA NA	No	BSL
	19406-51-0	4-Amino-2,6-Dinitrotoluene	0.63	0.63	ug/L	16SW3001	1/7	0.25 - 0.255	0.63	ND	0.73 N	NA NA	NA NA	No	BSL
	2691-41-0	HMX	0.27 J	4.8	ug/L	16SW3001	3/7	0.25 - 0.255	4.8	ND	180 N	NA NA	NA NA	No	BSL
	121-82-4	**RDX**	0.29 J	24	ug/L	16SW3001	2/7	0.25 - 0.255	24	ND	**0.61 C**	NA NA	NA NA	**Yes**	ASL
	Total Metals														
	7429-90-5	**Aluminum**	173 J	9510 J	ug/L	16SW1501	18/21	87.3 - 128	9510	485 J - 891 J	**3600 N**	NA NA	NA NA	**Yes**	ASL
	7440-36-0	**Antimony**	4.2 J	14.2 J	ug/L	16SW0301	8/21	0.085 - 2.7	14.2	ND	**1.5 N**	**6** **6**	FED-MCL IDEM	**Yes**	ASL
	7440-38-2	**Arsenic**	0.29 J	3.8 J	ug/L	16SW1501	15/21	0.16 - 0.52	3.8	ND	**0.045 C**	10 50	FED-MCL IDEM	**Yes**	ASL
	7440-39-3	**Barium**	44.3 J	425 J	ug/L	16SW0601	21/21	---	425	53.4 J - 57.3 J	**260 N**	2000 2000	FED-MCL IDEM	**Yes**	ASL
	7440-41-7	Beryllium	0.02 J	0.5 J	ug/L	16SW2801	12/21	0.02 - 0.52	0.5	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	**Cadmium**	0.2 J	4.4	ug/L	16SW0601	15/21	0.04 - 0.4	4.4	ND	**1.8 N**	5 5	FED-MCL IDEM	**Yes**	ASL
	7440-70-2	Calcium	6800 J	49600 J	ug/L	16SW0601	21/21	---	49600	16600 J - 38700 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	**Chromium**	1.4 J	11.8 J	ug/L	16SW1501	11/21	0.34 - 1.3	11.8	0.78 J	**11 N[12]**	100 110	FED-MCL IDEM[12]	**Yes**	ASL
	7440-48-4	Cobalt	0.11 J	4.6 J	ug/L	16SW1501	18/21	0.1 - 0.48	4.6	ND	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper	0.95 J	134 J	ug/L	16SW0401	19/21	1.1 - 1.5	134	ND	150 N	1300 1300	FED-MCL[13] IDEM	No	BSL
	7439-89-6	**Iron**	278 J	9990 J	ug/L	16SW1501	18/21	44.6 - 114	9990	263 J - 599 J	**1100 N**	NA NA	NA NA	**Yes**	ASL
	7439-92-1	**Lead**	4.8 J	281 J	ug/L	16SW0401	17/21	0.27 - 0.55	281	ND	NA	**15** **15**	FED-MCL[13] IDEM	**Yes**	ASL
	7439-95-4	Magnesium	1310 J	9450 J	ug/L	16SW1501	21/21	---	9450	5820 J - 7810 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese**	4.9 J	443 J	ug/L	16SW1501	18/21	3 - 10	443	19.2 J - 135 J	**88 N**	NA NA	NA NA	**Yes**	ASL

TABLE 7-13

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	7440-02-0	Nickel	1.2 J	11.8	ug/L	16SW2701	18/21	0.94 - 1.6	11.8	1.1 J - 2.3 J	73 N	NA NA	NA NA	No	BSL
	7440-09-7	Potassium	727	4520 J	ug/L	16SW1101	21/21	---	4520	1780 J - 2230 J	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium	1820 J	18900 J	ug/L	16SW1101	16/21	1070 - 1540	18900	9580 J - 15000 J	NA	NA NA	NA NA	No	NUT
	7440-28-0	Thallium	0.16 J	0.16 J	ug/L	16SW0601	1/21	0.04 - 0.41	0.16	ND	0.24 N	2 2	FED-MCL IDEM	No	BSL
	7440-31-5	Tin	0.47 J	0.84 J	ug/L	16SW0401	2/21	0.05 - 0.52	0.84	ND	2200 N	NA NA	NA NA	No	BSL
	7440-32-6	Titanium	2 J	156 J	ug/L	16SW1501	4/4	---	156	3.4 J - 19.7 J	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	**Vanadium**	0.63 J	19 J	ug/L	16SW1501	15/21	0.56 - 1.14	19	0.85 J	**3.6 N**	NA NA	NA NA	**Yes**	ASL
	7440-66-6	**Zinc**	16.9 J	1340 J	ug/L	16SW0401	19/21	4.2 - 12.3	1340	16.6 J	**1100 N**	NA 11000	NA IDEM	**Yes**	ASL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	21 J	124	ug/L	16SW2701-F	8/21	8.35 - 71.1	124	164 J	3600 N	NA NA	NA NA	No	BSL
	7440-36-0	**Antimony, Filtered**	4.3 J	10.8 J	ug/L	16SW0301-F	6/21	0.21 - 3.4	10.8	ND	**1.5 N**	**6** **6**	FED-MCL IDEM	**Yes**	ASL
	7440-38-2	**Arsenic, Filtered**	0.26 J	0.65 J	ug/L	16SW1101-F	3/21	0.07 - 0.22	0.65	ND	**0.045 C**	10 50	FED-MCL IDEM	**Yes**	ASL
	7440-39-3	**Barium, Filtered**	43.2 J	335 J	ug/L	16SW0601-F	21/21	---	335	46.6 J - 57.2 J	**260 N**	2000 2000	FED-MCL IDEM	**Yes**	ASL
	7440-41-7	Beryllium, Filtered	0.02 J	0.1 J	ug/L	6SW1302-F, 16SW2701-	6/21	0.02 - 0.06	0.1	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	**Cadmium, Filtered**	0.12 J	3.7	ug/L	16SW0901-F	15/21	0.039 - 0.09	3.7	ND	**1.8 N**	5 5	FED-MCL IDEM	**Yes**	ASL
	7440-70-2	Calcium, Filtered	6570 J	49100 J	ug/L	16SW1501-F	21/21	---	49100	15700 J - 37400 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium, Filtered	2.1 J	2.1 J	ug/L	16SW3001-F	1/21	0.16 - 0.7	2.1	ND	11 N[12]	100 110	FED-MCL IDEM[12]	No	BSL
	7440-48-4	Cobalt, Filtered	0.09 J	2.9 J	ug/L	16SW1301-F	17/21	0.088 - 0.11	2.9	2.7 J - 3.1 J	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper, Filtered	1 J	35.7 J	ug/L	16SW1001-F	17/21	0.57 - 0.93	35.7	ND	150 N	1300 1300	FED-MCL[13] IDEM	No	BSL
	7439-89-6	Iron, Filtered	76.4 J	188 J	ug/L	16SW2901-F	9/21	7.8 - 131	188	ND	1100 N	NA NA	NA NA	No	BSL
	7439-92-1	**Lead, Filtered**	0.81 J	35.8 J	ug/L	16SW0301-F	15/21	0.08 - 0.38	35.8	ND	NA	**15** **15**	FED-MCL[13] IDEM	**Yes**	ASL
	7439-95-4	Magnesium, Filtered	1280 J	8870 J	ug/L	16SW1501-F	21/21	---	8870	5400 J - 7390 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese, Filtered**	1.9 J	171 J	ug/L	16SW1201-F	18/21	0.82 - 9.7	171	10.9 J - 29.8 J	**88 N**	NA NA	NA NA	**Yes**	ASL

TABLE 7-13

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7439-97-6	Mercury, Filtered	0.04 J	0.04 J	ug/L	16SW1501-F	1/21	0.02 - 0.03	0.04	ND	1.1 N	2 2	FED-MCL IDEM	No	BSL
	7440-02-0	Nickel, Filtered	0.95 J	9.4	ug/L	16SW1202-F	18/21	0.83 - 1.4	9.4	1.2 J	73 N	NA NA	NA NA	No	BSL
	7440-09-7	Potassium, Filtered	647	4720	ug/L	16SW1101-F	21/21	---	4720	1550 J - 2140 J	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium, Filtered	2030 J	19900 J	ug/L	16SW1101-F	15/21	1060 - 1480	19900	9010 J - 14000 J	NA	NA NA	NA NA	No	NUT
	7440-32-6	Titanium, Filtered	1.4 J	1.6 J	ug/L	16SW1301-F	2/4	0.55 - 1.1	1.6	1.5 J - 8.5 J	15000 N	NA NA	NA NA	No	BSL
	7440-66-6	Zinc, Filtered	3.1 J	421 J	ug/L	16SW1601-F	18/21	6 - 197	421	18.1 J - 33.3 J	1100 N	NA 11000	NA IDEM	No	BSL
	Miscellaneous Parameters														
		Nitrite/Nitrate-N	0.11	0.55	mg/L	16SW1302	4/7	0.025 - 0.05	0.55	0.07 - 3.2	1	1 NA	FED-MCL NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from locations 16SW/SD14, 16SW/SD20, and 16SW/SD21.
5 - The U.S. EPA Region 9 tap water PRG is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004, updated December 28, 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004).
Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Value is for naphthalene.
9 - Value is for pyrene.
10 - One tenth of the non-carcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth non-carcinogenic PRG is presented.
11 - Values are for aminodinitrotoluene.
12 - Values are for hexavalent chromium.
13 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Associated Samples

16SW0301	16SW0801-F	16SW1202	16SW1601-F	16SW2801	16SW2001-F
16SW0301-F	16SW0901	16SW1202-F	16SW1701	16SW2801-F	16SW2101
16SW0401	16SW0901-F	16SW1301	16SW1701-F	16SW2901	16SW2101-F
16SW0401-F	16SW1001	16SW1301-F	16SW2301	16SW2901-F	
16SW0501	16SW1001-F	16SW1302	16SW2301-F	16SW3001	
16SW0501-F	16SW1101	16SW1302-F	16SW2601	16SW3001-F	
16SW0601	16SW1101-F	16SW1501	16SW2601-F	16SW1401	
16SW0601-F	16SW1201	16SW1501-F	16SW2701	16SW1401-F	
16SW0801	16SW1201-F	16SW1601	16SW2701-F	16SW2001	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SDWA = Safe Drinking Water Act
µg/L = microgram per liter
mg/L = milligram per liter

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-14

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - TURKEY CREEK
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	Energetics														
Turkey Creek	2691-41-0	HMX	0.32 J	0.32 J	ug/L	16SW2401	1/1	---	0.32	ND	180 N	NA NA	NA NA	No	BSL
	Total Metals														
	7429-90-5	Aluminum	146 J	822 J	ug/L	16SW1901	2/3	48.7	822	ND	3600 N	NA NA	NA NA	No	BSL
	7440-38-2	**Arsenic**	0.37 J	0.37 J	ug/L	16SW1901	1/3	0.09 - 0.23	0.37	ND	**0.045 C**	10 50	FED-MCL IDEM	**Yes**	ASL
	7440-39-3	Barium	48.1 J	95.7 J	ug/L	16SW2401	3/3	---	95.7	23 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-41-7	Beryllium	0.09 J	0.09 J	ug/L	16SW1901	1/3	0.02 - 0.03	0.09	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	Cadmium	0.66 J	0.66 J	ug/L	16SW1901	1/3	0.039 - 0.05	0.66	ND	1.8 N	5 5	FED-MCL IDEM	No	BSL
	7440-70-2	Calcium	9360 J	17900 J	ug/L	16SW2501	3/3	---	17900	9930 J	NA	NA NA	NA NA	No	NUT
	7440-48-4	Cobalt	0.14 J	0.72 J	ug/L	16SW2501	3/3	---	0.72	ND	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper	0.24 J	4.1 J	ug/L	16SW1901	3/3	---	4.1	2.7 J	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
	7439-89-6	Iron	43.6 J	886 J	ug/L	16SW1901	3/3	---	886	ND	1100 N	NA NA	NA NA	No	BSL
	7439-92-1	Lead	1.2	1.2	ug/L	16SW1901	1/3	0.11 - 0.31	1.2	ND	NA	15 15	FED-MCL[8] IDEM	No	BSL
	7439-95-4	Magnesium	3370	6340 J	ug/L	16SW2501	3/3	---	6340	2460 J	NA	NA NA	NA NA	No	NTX
	7439-96-5	**Manganese**	21.5	476	ug/L	16SW2501	3/3	---	476	30 J	**88 N**	NA NA	NA NA	**Yes**	ASL
	7440-02-0	Nickel	4.5 J	5.7	ug/L	16SW2401 16SW2501	3/3	---	5.7	ND	73 N	NA NA	NA NA	No	NTX
	7440-09-7	Potassium	989 J	1680	ug/L	16SW1901	3/3	---	1680	790 J	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium	3660 J	8600 J	ug/L	16SW2401	3/3	---	8600	8330 J	NA	NA NA	NA NA	No	NUT
	7440-62-2	Vanadium	1.5 J	1.5 J	ug/L	16SW1901	1/3	1.14	1.5	ND	3.6 N	NA NA	NA NA	No	BSL
	7440-66-6	Zinc	6.9 J	18.7 J	ug/L	16SW1901	3/3	---	18.7	ND	1100 N	NA 11000	NA IDEM	No	BSL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	90.1	119 J	ug/L	16SW2401-F	2/3	61.8	119	ND	3600 N	NA NA	NA NA	No	BSL
	7440-39-3	Barium, Filtered	43.7 J	98.3 J	ug/L	16SW2401-F	3/3	---	98.3	48.2 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-41-7	Beryllium, Filtered	0.04 J	0.04 J	ug/L	16SW1901-F	1/3	0.02	0.04	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL

TABLE 7-14

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - TURKEY CREEK
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentration(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7440-43-9	Cadmium, Filtered	1.4	1.4	ug/L	16SW1901-F	1/3	0.039	1.4	ND	1.8 N	5 5	FED-MCL IDEM	No	BSL
	7440-70-2	Calcium, Filtered	9910 J	17400 J	ug/L	16SW2501-F	3/3	---	17400	10100 J	NA	NA NA	NA NA	No	NUT
	7440-48-4	Cobalt, Filtered	0.16 J	1.9	ug/L	16SW2501-F	3/3	---	1.9	2.6 J	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper, Filtered	0.22 J	3.9 J	ug/L	16SW1901-F	3/3	---	3.9	ND	150 N	1300 1300	FED-MCL(8) IDEM	No	BSL
	7439-89-6	Iron, Filtered	11.8 J	163	ug/L	16SW2501-F	3/3	---	163	ND	1100 N	NA NA	NA NA	No	BSL
	7439-92-1	Lead, Filtered	0.54 J	0.54 J	ug/L	16SW1901-F	1/3	0.11 - 0.19	0.54	ND	NA	15 15	FED-MCL(8) IDEM	No	BSL
	7439-95-4	Magnesium, Filtered	3020 J	6450	ug/L	16SW2501-F	3/3	---	6450	3770 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	**Manganese, Filtered**	7.7	1970 J	ug/L	16SW2501-F	3/3	---	1970	12.5 J	**88 N**	NA NA	NA NA	**Yes**	ASL
	7440-02-0	Nickel, Filtered	4 J	8.6	ug/L	16SW2501-F	3/3	---	8.6	ND	73 N	NA NA	NA NA	No	BSL
	7440-09-7	Potassium, Filtered	1030 J	1900 J	ug/L	16SW2501-F	3/3	---	1900	846 J	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium, Filtered	3840 J	8190 J	ug/L	16SW2401-F	3/3	---	8190	4360 J	NA	NA NA	NA NA	No	NUT
	7440-66-6	Zinc, Filtered	9.1 J	21.8 J	ug/L	16SW2401-F	3/3	---	21.8	ND	1100 N	NA 11000	NA IDEM	No	BSL
	Miscellaneous Parameters														
		Nitrite/Nitrate-N	0.05	0.05	mg/L	16SW2401	1/1	---	0.05	ND	1	1 NA	FED-MCL NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient concentrations are from location 16SW/SD18.
5 - The U.S. EPA Region 9 tap water PRG is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for non-carcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004, updated December 28, 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004). Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Associated Samples

16SW1901	16SW2401	16SW2501
16SW1901-F	16SW2401-F	16SW2501-F

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SDWA = Safe Drinking Water Act
µgL = microgram per liter
mg/L = milligram per liter

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-15

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - GULLIES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Gullies	**Volatile Organic Compounds**														
	67-64-1	Acetone	3 J	69 J	ug/kg	16SD2201	6/10	1.3 - 10	69	5 J - 7 J	1400000 N	4800000	IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	3 J	3 J	ug/kg	16SD1201	1/10	0.948 - 1.58	3	ND	4300 N	110000	IDEM	No	BSL
	75-71-8	Dichlorodifluoromethane	2 J	2 J	ug/kg	16SD2701	1/10	0.948 - 1.58	2	ND	9400 N	NA	NA	No	BSL
	79-01-6	Trichloroethene	2 J	19	ug/kg	16SD2901	2/10	0.948 - 1.58	19	ND	53 C	710	IDEM	No	BSL
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	5 J	5 J	ug/kg	16SD0301	1/10	4 - 5.8	5	NA	5600 N[8]	3200000	IDEM	No	BSL
	83-32-9	Acenaphthene	8 J	8 J	ug/kg	16SD0501	1/10	3.9 - 5.8	8	NA	370000 N	9500000	IDEM	No	BSL
	208-96-8	Acenaphthylene	4 J	8	ug/kg	16SD0301	3/10	4.1 - 5.8	8	NA	370000 N[9]	1100000	IDEM	No	BSL
	120-12-7	Anthracene	5 J	15	ug/kg	16SD0501	4/10	3.9 - 4.6	15	NA	2200000 N	47000000	IDEM	No	BSL
	56-55-3	Benzo(a)anthracene	5 J	66	ug/kg	16SD0501	8/10	4.3 - 4.4	66	NA	620 C	5000	IDEM	No	BSL
	50-32-8	**Benzo(a)pyrene**	7 J	84	ug/kg	16SD0501	6/10	3.9 - 4.6	84	NA	**62 C**	500	IDEM	**Yes**	ASL
	205-99-2	Benzo(b)fluoranthene	6 J	120	ug/kg	16SD0501	7/10	3.9 - 4.6	120	NA	620 C	5000	IDEM	No	BSL
	191-24-2	Benzo(g,h,i)perylene	5 J	65	ug/kg	16SD0501	7/10	4.3 - 4.6	65	NA	230000 N[10]	50000	IDEM	No	BSL
	207-08-9	Benzo(k)fluoranthene	7 J	65	ug/kg	16SD0501	6/10	3.9 - 4.6	65	NA	6200 C	50000	IDEM	No	BSL
	218-01-9	Chrysene	5 J	100	ug/kg	16SD0501	8/10	4.4 - 4.6	100	NA	62000 C	500000	IDEM	No	BSL
	84-74-2	di-n-Butyl Phthalate	130 J	130 J	ug/kg	16SD0801	1/9	79 - 120	130	NA	610000 N	18000000	IDEM	No	BSL
	53-70-3	Dibenzo(a,h)anthracene	18	18	ug/kg	16SD0501	1/10	3.9 - 5.8	18	NA	62 C	500	IDEM	No	BSL
	122-39-4	Diphenylamine	140 J	170 J	ug/kg	16SD0301	2/9	82 - 120	170	NA	150000 N	NA	NA	No	BSL
	206-44-0	Fluoranthene	5 J	160	ug/kg	16SD0501	9/10	4.6	160	NA	230000 N	6300000	IDEM	No	BSL
	86-73-7	Fluorene	8 J	8 J	ug/kg	16SD0501	1/10	3.9 - 5.8	8	NA	270000 N	6300000	IDEM	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	7 J	55	ug/kg	16SD0501	6/10	4.1 - 4.6	55	NA	620 C	5000	IDEM	No	BSL
	91-20-3	Naphthalene	5 J	6 J	ug/kg	16SD0301	2/10	4.1 - 5.8	6	NA	5600 N	3200000	IDEM	No	BSL
	85-01-8	Phenanthrene	4 J	100	ug/kg	16SD0501	8/10	4.3 - 4.6	100	NA	230000 N[10]	470000	IDEM	No	BSL
	129-00-0	Pyrene	6 J	170	ug/kg	16SD0501	9/10	4.6	170	NA	230000 N	4700000	IDEM	No	BSL
	Energetics														
	606-20-2	2,6-Dinitrotoluene	0.54 J	0.92 J	mg/kg	16SD1501	2/14	0.25	0.92	ND	6.1 N	6.3	IDEM[11]	No	BSL
	121-82-4	RDX	0.27 J	0.27 J	mg/kg	16SD0301	1/14	0.25	0.27	ND	4.4 C	NA	NA	No	BSL
	Herbicides														
	87-86-5	Pentachlorophenol	2.6 J	19 J	ug/kg	16SD1101	5/9	0.55 - 0.6	19	NA	3000 C	20000	IDEM	No	BSL
	Inorganics														
	7429-90-5	**Aluminum**	5560	19500 J	mg/kg	16SD0402	31/31	---	19500	8710 J - 12800 J	**7600 N**	NA	NA	**Yes**	ASL
	7440-36-0	**Antimony**	0.65 J	174 J	mg/kg	16SD0601	30/31	0.6	174	1.3 J - 1.7 J	**3.1 N**	**140**	IDEM	**Yes**	ASL
	7440-38-2	**Arsenic**	2.5 J	34.1 J	mg/kg	16SD2601	31/31	---	34.1	24.4 J - 27.5 J	**0.39 C**	**3.9**	IDEM	**Yes**	ASL
	7440-39-3	**Barium**	56.6 J	2820 J	mg/kg	16SD0301	31/31	---	2820	84.5 J - 454 J	**540 N**	23000	IDEM	**Yes**	ASL
	7440-41-7	Beryllium	0.43 J	2.3 J	mg/kg	16SD1301	21/31	0.39 - 1.4	2.3	1.6 J - 3 J	15 N	680	IDEM	No	BSL
	7440-43-9	**Cadmium**	0.47 J	27.2 J	mg/kg	16SD0402	30/31	0.33	27.2	0.38 J - 0.62 J	**3.7 N**	**12**	IDEM	**Yes**	ASL
	7440-70-2	Calcium	395 J	98100 J	mg/kg	16SD0602	31/31	---	98100	539 J - 846 J	NA	NA	NA	No	NUT
	7440-47-3	Chromium	13.3 J	85.2 J	mg/kg	16SD1002	31/31	---	85.2	36.9 J - 85 J	210 C[12]	430[13]	IDEM	No	BSL
	7440-48-4	Cobalt	2.5 J	41.2 J	mg/kg	16SD1201	31/31	---	41.2	29.7 J - 38.7 J	140 N[14]	NA	NA	No	BSL
	7440-50-8	**Copper**	9.2 J	2570 J	mg/kg	16SD0601	31/31	---	2570	14.8 J - 15 J	**310 N**	13000	IDEM	**Yes**	ASL
	7439-89-6	**Iron**	16500 J	127000 J	mg/kg	16SD1002	31/31	---	127000	74000 J - 141000 J	**2300 N**	NA	NA	**Yes**	ASL
	7439-92-1	**Lead**	13.6 J	15200 J	mg/kg	16SD0601	31/31	---	15200	29.6 J - 73.2 J	**400**	**400**	IDEM	**Yes**	ASL
	7439-93-2	Lithium	2.9 J	10.4 J	mg/kg	16SD0401	9/9	---	10.4	NA	160 N	NA	NA	No	BSL
	7439-95-4	Magnesium	470 J	6080 J	mg/kg	16SD0501	31/31	---	6080	491 J - 916 J	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	54.6 J	2510 J	mg/kg	16SD2601	31/31	---	2510	2270 J - 3650 J	**180 N**	NA	NA	**Yes**	ASL

TABLE 7-15

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - GULLIES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	EPA Region 9 PRG (Residential)(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7439-97-6	**Mercury**	0.023 J	4.6	mg/kg	16SD0402	26/31	0.03 - 0.056	4.6	0.026 J - 0.043 J	**2.3 N**	100	IDEM	**Yes**	ASL
	7440-02-0	**Nickel**	8.9 J	804 J	mg/kg	16SD0602	31/31	---	804	34.5 J - 39.2 J	**160 N**	6900	IDEM	**Yes**	ASL
	7440-09-7	Potassium	282 J	1530 J	mg/kg	16SD0902	31/31	---	1530	739 J - 1120 J	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.33 J	1.5 J	mg/kg	16SD1301	18/31	0.14 - 0.57	1.5	0.7 J - 1.2 J	39 N	1700	IDEM	No	BSL
	7440-22-4	Silver	1.5 J	1.5 J	mg/kg	16SD2901	1/31	0.01 - 0.53	1.5	ND	39 N	1700	IDEM	No	BSL
	7440-23-5	Sodium	33.8 J	283 J	mg/kg	16SD1102	8/31	11.7 - 65.3	283	40.3 J - 43.9 J	NA	NA	NA	No	NUT
	7440-24-6	Strontium	51 J	2740 J	mg/kg	16SD0301	9/9	---	2740	NA	4700 N	NA	NA	No	BSL
	7440-31-5	Tin	0.4 J	19.6 J	mg/kg	16SD0602	20/31	0.31 - 1.8	19.6	ND	4700 N	NA	NA	No	BSL
	7440-32-6	Titanium	9.4 J	156 J	mg/kg	16SD0401	14/14	---	156	39.5 J - 54.3 J	31000 N(15)	NA	NA	No	BSL
	7440-62-2	**Vanadium**	12.8 J	71.7 J	mg/kg	16SD1301	31/31	---	71.7	43.7 J - 52.4 J	**7.8 N**	NA	NA	**Yes**	ASL
	7440-66-6	**Zinc**	68.3 J	23400 J	mg/kg	16SD0301	30/31	270	23400	109 J - 131 J	**2300 N**	100000	IDEM	**Yes**	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from locations 16SW/SD14, 16SW/SD20, and 16SW/SD21.
5 - U.S. EPA Region 9 Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (U.S. EPA Region 9, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for naphthalene is used as a surrogate for 2-methylnaphthalene.
9 - The value for acenaphthene is used as a surrogate for acenaphthylene.
10 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
11 - Value is for dinitrotoluene mixtures.
12 - The RBC for residential land use for total chromium is presented.
13 - Value is for hexavalent chromium.
14 - One tenth of the non-carcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth non-carcinogenic PRG is presented.
15 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Associated Samples

16SD0201	16SD0802	16SD1302	16SD2901
16SD0301	16SD0901	16SD1501	16SD3001
16SD0302	16SD0902	16SD1601	16SD1401
16SD0401	16SD1001	16SD1602	16SD2001
16SD0402	16SD1002	16SD1701	16SD2101
16SD0501	16SD1101	16SD2201	
16SD0502	16SD1102	16SD2302	
16SD0601	16SD1201	16SD2601	
16SD0602	16SD1202	16SD2701	
16SD0801	16SD1301	16SD2801	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected
PRG = Preliminary Remediation Goal
sat = Soil Saturation Limit
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-16

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - TURKEY CREEK
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentration(4)	EPA Region 9 PRG (Residential)(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Turkey Creek	**Volatile Organic Compounds**														
	67-64-1	Acetone	7 J	7 J	ug/kg	16SD1901	1/1	---	7	ND	1400000 N	4800000	IDEM	No	BSL
	75-71-8	Dichlorodifluoromethane	22	22	ug/kg	16SD1901	1/1	---	22	ND	9400 N	NA	NA	No	BSL
	Inorganics														
	7429-90-5	**Aluminum**	8730 J	10500 J	mg/kg	16SD1902	4/4	---	10500	8090 J	**7600 N**	NA	NA	**Yes**	ASL
	7440-36-0	Antimony	0.8 J	1.1 J	mg/kg	16SD1901, 16SD2501	3/4	0.74	1.1	1.2 J	3.1 N	140	IDEM	No	BSL
	7440-38-2	**Arsenic**	7 J	30.8 J	mg/kg	16SD1901	4/4	---	30.8	34.8 J	**0.39 C**	**3.9**	IDEM	**Yes**	ASL
	7440-39-3	Barium	69.7 J	110 J	mg/kg	16SD1901	4/4	---	110	62.5 J	540 N	23000	IDEM	No	BSL
	7440-41-7	Beryllium	1.5 J	2.4 J	mg/kg	16SD1901	3/4	0.4	2.4	2.6 J	15 N	680	IDEM	No	BSL
	7440-43-9	Cadmium	0.54 J	0.79 J	mg/kg	16SD1901	3/4	0.47	0.79	0.54 J	3.7 N	12	IDEM	No	BSL
	7440-70-2	Calcium	539 J	973 J	mg/kg	16SD1901	4/4	---	973	362 J	NA	NA	NA	No	NUT
	7440-47-3	Chromium	16.3 J	79.9 J	mg/kg	16SD2401	4/4	---	79.9	78.5 J	210 C(8)	430(9)	IDEM	No	BSL
	7440-48-4	Cobalt	16.1 J	26.9 J	mg/kg	16SD1901	4/4	---	26.9	21.4 J	140 N(10)	NA	NA	No	BSL
	7440-50-8	Copper	13.4 J	15.1 J	mg/kg	16SD1902	4/4	---	15.1	12.6 J	310 N	13000	IDEM	No	BSL
	7439-89-6	**Iron**	15800 J	122000 J	mg/kg	16SD1901	4/4	---	122000	124000 J	**2300 N**	NA	NA	**Yes**	ASL
	7439-92-1	Lead	23.3 J	32.9 J	mg/kg	16SD2501	4/4	---	32.9	28.1 J	400	400	IDEM	No	BSL
	7439-95-4	Magnesium	400 J	916 J	mg/kg	16SD2501	4/4	---	916	292 J	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	398 J	1900 J	mg/kg	16SD1901	4/4	---	1900	1370 J	**180 N**	NA	NA	**Yes**	ASL
	7439-97-6	Mercury	0.022 J	0.022 J	mg/kg	16SD1901	1/4	0.036 - 0.046	0.022	0.025 J	2.3 N	100	IDEM	No	BSL
	7440-02-0	Nickel	20.8 J	43.4 J	mg/kg	16SD1901	4/4	---	43.4	43 J	160 N	6900	IDEM	No	BSL
	7440-09-7	Potassium	462 J	1040 J	mg/kg	16SD2501	4/4	---	1040	438 J	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.5 J	0.8 J	mg/kg	16SD2401	3/4	0.31	0.8	0.5 J	39 N	1700	IDEM	No	BSL
	7440-32-6	Titanium	50.6 J	50.6 J	mg/kg	16SD1901	1/1	---	50.6	56.4 J	31000 N(11)	NA	NA	No	BSL
	7440-62-2	**Vanadium**	21.1 J	51.2 J	mg/kg	16SD2401	4/4	---	51.2	56.3 J	**7.8 N**	NA	NA	**Yes**	ASL
	7440-66-6	Zinc	84.4 J	206 J	mg/kg	16SD1901	4/4	---	206	92.5 J	2300 N	100000	IDEM	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient concentrations are from location 16SW/SD18.
5 - U.S. EPA Region 9 Preliminary Remediation Goal (PRG). The non-carcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (U.S. EPA Region 9, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The RBC for residential land use for total chromium is presented.
9 - Value is for hexavalent chromium.
10 - One tenth of the non-carcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth non-carcinogenic PRG is presented.
11 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Associated Samples
16SD1901 16SD2501
16SD1902 16SD1801
16SD2401

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected
PRG = Preliminary Remediation Goal
sat = Soil Saturation Limit
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-17

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - BUILDING 146 INDOOR AIR
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Indoor Air

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	ORNL RSL Air (Residential)(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Building 146	**Volatile Organic Compounds**														
	79-01-6	**Trichloroethene**	4.46 J	11.3	ug/m^3	146ASIN04	6/10	4.73 - 5.37	11.3	NA	**1.2 C**	**1.2**	IDEM	**Yes**	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - No upgradient or background air samples were collected.
5 - Oak Ridge National Laboratory (ORNL) Regional Screening Level (RSL). Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (ORNL, September 12, 2008).
6 - IDEM Draft Vapor Intrusion Pilot Plant Guidance Appendix VIII, Table 2 - 30 year chronic action levels (IDEM, 2006).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level . Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples
146ASIN01
146ASIN02
146ASIN03
146ASIN04
146ASIN05
146ASIN06
146ASIN06
146ASIN06-D
146ASIN07
146ASIN08
146ASOT01

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
NA = Not Applicable/Not Available

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BSL = Below Screening Level

TABLE 7-18

CHEMICALS RETAINED AS COPCs
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical	Surface Soil			Subsurface Soil			Ground Water						Surface Water		Sediment		Building 146 Indoor Air
							Upper Aquifer		Middle Aquifer		Lower and Valley Aquifers						
	Direct Contact	Soil to Air	Soil to Groundwater	Direct Contact	Soil to Air	Soil to Groundwater	Direct Contact	Vapor Intrusion	Direct Contact	Vapor Intrusion	Direct Contact	Vapor Intrusion	Gullies	Turkey Creek	Gullies	Turkey Creek	
Dioxin/Furans																	
1,2,3,4,6,7,8,9-OCDD			X														
1,2,3,4,6,7,8-HPCDD			X														
1,2,3,7,8,9-HXCDD			X														
1,2,3,7,8-PECDD			X														
Volatile Organic Compounds																	
1,1,2,2-Tetrachloroethane							X	X									
1,1,2-Trichloroethane						X	X										
1,1-Dichloroethene							X										
1,2,3-Trichloropropane							X										
1,2-Dichloroethane							X										
Benzene							X				X						
Bromodichloromethane							X										
Carbon Tetrachloride							X	X									
Chloroform							X				X						
cis-1,2-Dichloroethene			X			X	X	X									
Methylene Chloride			X				X	X									
Tetrachloroethene							X	X	X								
Toluene							X										
trans-1,2-Dichloroethene							X										
Trichloroethene	X	X	X	X	X	X	X	X	X	X			X				X
Vinyl Chloride						X	X	X									
Semivolatile Organic Compounds																	
Benzo(a)anthracene	X		X														
Benzo(a)pyrene	X		X												X		
Benzo(b)fluoranthene	X		X														
Benzo(k)fluoranthene			X														
Bis(2-ethylhexyl)phthalate																	
Chrysene			X														
Dibenzo(a,h)anthracene	X		X														
Indeno(1,2,3-cd)pyrene	X		X														
Naphthalene			X														
Pyridine							X										
Herbicides																	
Pentachlorophenol			X			X											
Energetics																	
2-Nitrotoluene									X								
2,4,6-Trinitrotoluene							X										
2-Amino-4,6-Dinitrotoluene							X										
4-Amino-2,6-Dinitrotoluene							X										
HMX																	
RDX							X		X				X				
Inorganics																	
Aluminum	X		X	X		X	X		X		X		X		X	X	
Antimony	X		X			X					X		X		X		
Arsenic	X		X	X		X	X		X		X		X	X	X	X	
Barium			X			X			X		X		X		X		
Beryllium									X		X						
Cadmium			X			X			X				X		X		
Chromium			X			X			X		X		X				
Cobalt			X			X	X		X		X						
Copper	X														X		
Iron	X			X			X		X		X		X		X	X	

TABLE 7-18

CHEMICALS RETAINED AS COPCs
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical	Surface Soil			Subsurface Soil			Ground Water						Surface Water		Sediment		Building 146 Indoor Air
							Upper Aquifer		Middle Aquifer		Lower and Valley Aquifers						
	Direct Contact	Soil to Air	Soil to Groundwater	Direct Contact	Soil to Air	Soil to Groundwater	Direct Contact	Vapor Intrusion	Direct Contact	Vapor Intrusion	Direct Contact	Vapor Intrusion	Gullies	Turkey Creek	Gullies	Turkey Creek	
Lead	X		X						X		X		X		X		
Lithium									X								
Manganese	X		X	X		X	X		X		X		X	X	X	X	
Mercury			X												X		
Nickel			X			X	X		X		X				X		
Selenium			X			X											
Thallium			X														
Vanadium	X			X			X		X		X		X		X	X	
Zinc			X										X		X		

Notes
X - Indicates chemical was retained as a COPC.

TABLE 7-19

SELECTION OF EXPOSURE PATHWAYS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	SWMU 16	Maintenance Worker	Adult	Ingestion Dermal	Quant Quant	Maintenance workers may contact surface soil during normal work activities.
				Occupational Worker	Adult	Ingestion Dermal	Quant Quant	Occupational workers may contact surface soil during normal work activities.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 16 is not limited by any physical restraint. Adolescent trespassers may be exposed to surface soil while at the site.
		Air	SWMU 16	Maintenance Worker	Adult	Inhalation	Quant	Maintenance workers may be exposed to fugitive dust and volatile emissions during work activities.
				Occupational Worker	Adult	Inhalation	Quant	Occupational workers may be exposed to fugitive dust and volatile emissions during work activities.
				Trespassers	Adolescents	Inhalation	Quant	Although access to the base is controlled, once inside the base, access to the SWMU 16 is not limited by any physical restraint.
	Subsurface Soil	Subsurface Soil	SWMU 16	Maintenance Worker	Adult	Ingestion Dermal	None None	Maintenance workers are not expected to be exposed to subsurface soil.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to subsurface soil.
				Trespassers	Adolescents	Ingestion Dermal	None None	Trespassers are not exposed to subsurface soil.
		Air	SWMU 16	Maintenance Worker	Adult	Inhalation	None	Maintenance workers are not expected to be exposed to subsurface soil.
				Occupational Worker	Adult	Inhalation	None	Occupational workers are not expected to be exposed to subsurface soil.
				Trespassers	Adolescents	Inhalation	None	Trespassers are not exposed to subsurface soil.
	Groundwater	Groundwater	All Aquifers	Maintenance Workers	Adult	Ingestion Dermal	None None	Maintenance workers are not expected to have contact with groundwater.
				Occupational Worker	Adult	Ingestion Dermal	Quant Quant	Occupational workers may be exposed to groundwater if groundwater was used as a potable water source.
				Trespassers	Adolescents	Ingestion Dermal	None None	Adolescent trespassers are not expected to be exposed to groundwater.
		Air	All Aquifers	Maintenance Workers	Adult	Inhalation	None	Maintenance workers are not expected to be exposed to COPCs that have volatilized from groundwater.
				Occupational Worker	Adult	Inhalation	None	Occupational workers are not expected to be exposed to COPCs that have volatilized from groundwater.
				Trespassers	Adolescents	Inhalation	None	Adolescent trespassers are not expected to be exposed to groundwater.
			Vapor Intrusion	Occupational Worker	Adult	Inhalation	Quant	Occupational workes may be exposed to COPCs that have volatilzed from groundwater and migrated through building foundations into indoor air

TABLE 7-19

SELECTION OF EXPOSURE PATHWAYS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Water	Surface Water	Gullies and Turkey Creek	Maintenance Workers	Adult	Ingestion Dermal	None Quant	Maintenance workers are not expected to ingest surface water. Maintenance workers may have dermal contact with surface water.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to surface water.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 16 is not limited by any physical restraint. Adolescent trespassers may be exposed to surface water while at the site.
	Sediment	Sediment	Gullies and Turkey Creek	Maintenance Workers	Adult	Ingestion Dermal	Quant Quant	Maintenance workers may contact sediment.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to sediment.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 16 is not limited by any physical restraint. Adolescent trespassers may be exposed to sediment while at the site.
Future	Surface Soil	Surface Soil	SWMU 16	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with surface soil during excavation activities.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions.
		Air	SWMU 16	Construction Workers	Adult	Inhalation	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Recreational Users	Child	Inhalation	Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Inhalation	Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
	Subsurface Soil	Subsurface Soil	SWMU 16	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Recreational Users	Child	Ingestion Dermal	None None	Recreational users are not expected to be exposed to subsurface soil.
					Adult	Ingestion Dermal	None None	Recreational users are not expected to be exposed to subsurface soil.

TABLE 7-19

SELECTION OF EXPOSURE PATHWAYS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
				Residents	Child	Ingestion Dermal	None None	Future residents are not expected to be exposed to subsurface soil.
					Adult	Ingestion Dermal	None None	Future residents are not expected to be exposed to subsurface soil.
Future	Subsurface Soil	Air	SWMU 16	Construction Workers	Adult	Inhalation	None	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Recreational Users	Child	Inhalation	None	Recreational workers are not expected to be exposed to subsurface soil.
					Adult	Inhalation	None	Recreational workers are not expected to be exposed to subsurface soil.
		Air	SWMU 16	Residents	Child	Inhalation	None	Future residents are not expected to be exposed to subsurface soil.
					Adult	Inhalation	None	Future residents are not expected to be exposed to subsurface soil.
	Groundwater	Groundwater	All Aquifers	Construction Workers	Adult	Ingestion Dermal	None Quant	Construction workers are not expected to ingest groundwater. Construction workers may have dermal contact with ground water during excavation activities.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	Recreational users may be exposed to groundwater if groundwater was used as a potable water source.
					Adult	Ingestion Dermal	Quant Quant	Recreational users may be exposed to groundwater if groundwater was used as a potable water source.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
		Air	All Aquifers	Construction Workers	Adult	Inhalation	Quant	Construction workers may be exposed to COPCs that have volatilized from groundwater during excavation activities.
				Recreational Users	Child	Inhalation	None	Recreational users are not expected to be exposed to COPCs that have volatilized from groundwater.
					Adult	Inhalation	None	Recreational users are not expected to be exposed to COPCs that have volatilized from groundwater.
				Residents	Child	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
			Vapor Intrusion	Residents	Child	Inhalation	Quant	Child Residents may be exposed to COPCs that have volatilzed from groundwater and migrated through building foundations into indoor air.
					Adult	Inhalation	Quant	Adult Residents may be exposed to COPCs that have volatilzed from groundwater and migrated through building foundations into indoor air.
	Surface Water	Surface Water	Gullies and Turkey Creek	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not expected to be exposed to surface water.

TABLE 7-19

SELECTION OF EXPOSURE PATHWAYS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
Future	Sediment	Sediment	Gullies and Turkey Creek	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not expected to be exposed to sediment.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.

Notes:
Quant - Quantitative.
Qual - Qualitative.

TABLE 7-20

RECEPTORS AND EXPOSURE ROUTES FOR QUANTITATIVE EVALUATION
SWMU 16 CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE, CRANE INDIANA

Receptors	Exposure Routes
Maintenance Workers (current/future land use)	• Soil dermal contact (surface) • Soil ingestion (surface) • Inhalation of air/dust/emissions (surface) • Surface water/sediment dermal contact • Sediment (Incidental ingestion)
Occupational Worker (current/future land use)(1)	• Soil dermal contact (surface) • Soil ingestion (surface) • Inhalation of air/dust/emissions (surface) • Direct ingestion of ground water • Groundwater dermal contact • Inhalation of vapors intruding into a building from the groundwater
Adolescent Trespassers (6 to 17 years) (current/future land use)	• Soil dermal contact (surface) • Soil ingestion (surface) • Inhalation of air/dust/emissions (surface) • Surface water/sediment dermal contact • Surface water/sediment Ingestion
Construction Workers (future land use)	• Soil dermal contact (surface and subsurface) • Soil ingestion (surface and subsurface) • Inhalation of air/dust/emissions (surface and subsurface) • Groundwater dermal contact (during excavation) • Groundwater inhalation of volatile organics (during excavation)
Small Child (0 to 6 years) and Adult Recreational Users (future land use)	• Soil dermal contact (surface) • Soil ingestion (surface) • Inhalation of air/dust/emissions (surface) • Surface water/sediment dermal contact • Surface water/sediment ingestion • Groundwater dermal contact • Direct ingestion of groundwater

TABLE 7-20

RECEPTORS AND EXPOSURE ROUTES FOR QUANTITATIVE EVALUATION
SWMU 16 CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE, CRANE INDIANA

Receptors	Exposure Routes
On-Base Residents (Adult/Children) (future land use)[1]	• Soil dermal contact (surface) • Soil ingestion (surface) • Inhalation of air/dust/emissions (surface) • Direct ingestion of groundwater • Groundwater dermal contact (showering/bathing) • Inhalation of volatiles in groundwater (showering/bathing) • Inhalation of vapors intruding into a building from the groundwater • Surface water/sediment dermal contact • Surface water/sediment ingestion

1 – Occupational workers and residents will also be evaluated for exposures to chemicals of concern in subsurface soil in the uncertainty section of the risk assessments. This scenario is included to account for the possibility that subsurface soil could be brought to the surface in future excavation projects.

TABLE 7-21

EXPOSURE POINT CONCENTRATIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical	Surface Soil (mg/kg)	Surface/ Subsurface Soil (mg/kg)	Groundwater (ug/L)	Surface Water		Sediment	
				Gullies (ug/L)	Turkey Creek (ug/L)	Gullies (mg/kg)	Turkey Creek (mg/kg)
Volatile Organic Compounds							
1,1,2,2-Tetrachloroethane	NA	NA	1.52[1]	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	18.2[1]	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	10.5[1]	NA	NA	NA	NA
1,2,3-Trichloropropane	NA	NA	1.44[1]	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	1.5[1]	NA	NA	NA	NA
Benzene	NA	NA	1.7[1]	NA	NA	NA	NA
Bromodichloromethane	NA	NA	1.45[1]	NA	NA	NA	NA
Carbon Tetrachloride	NA	NA	2.58[1]	NA	NA	NA	NA
Chloroform	NA	NA	4.24[1]	NA	NA	NA	NA
cis-1,2-Dichloroethene	NA	NA	286[1]	NA	NA	NA	NA
Methylene Chloride	NA	NA	2.7[1]	NA	NA	NA	NA
Tetrachloroethene	NA	NA	10.9[1]	NA	NA	NA	NA
Toluene	NA	NA	19[1]	NA	NA	NA	NA
trans-1,2-Dichloroethene	NA	NA	2.89[1]	NA	NA	NA	NA
Trichloroethene	0.031[2]	0.774[3]	21055[1]	20.4[2]	NA	NA	NA
Vinyl Chloride	NA	NA	24.2[1]	NA	NA	NA	NA
Semivolatile Organic Compounds							
Benzo(a)anthracene	2.70[3]	1.06[2]	NA	NA	NA	NA	NA
Benzo(a)pyrene	2.36[3]	0.927[2]	NA	NA	NA	0.043[4]	NA
Benzo(b)fluoranthene	2.59[3]	1.02[2]	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	0.451[3]	0.132[5]	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.24[3]	0.486[2]	NA	NA	NA	NA	NA
Naphthalene	0.027[5]	0.017[5]	NA	NA	NA	NA	NA
Pyridine	NA	NA	1.92[1]	NA	NA	NA	NA
Energetics							
2-Nitrotoluene	NA	NA	0.172[1]	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	0.284[1]	NA	NA	NA	NA
2-Amino-4,6-Dinitrotoluene	NA	NA	1.18[1]	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	NA	NA	0.722[1]	NA	NA	NA	NA
RDX	NA	NA	25.1[1]	24[6]	NA	NA	NA

TABLE 7-21

EXPOSURE POINT CONCENTRATIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical	Surface Soil (mg/kg)	Surface/ Subsurface Soil (mg/kg)	Groundwater (ug/L)	Surface Water		Sediment	
				Gullies (ug/L)	Turkey Creek (ug/L)	Gullies (mg/kg)	Turkey Creek (mg/kg)
Inorganics							
Aluminum	13725(7)	12636(7)	23388(1)	2767(4)	NA	12961(7)	10500(6)
Antimony	5.15(8)	4.59(2)	0.745(1)	5.82(4)	NA	48.7(4)	NA
Arsenic	6.29(4)	5.81(4)	5.29(1)	1.49(9)	0.37(6)	13.1(4)	30.8(6)
Barium	NA	NA	284(1)	200(4)	NA	1662(3)	NA
Beryllium	NA	NA	1.88(1)	NA	NA	NA	NA
Cadmium	NA	NA	0.455(1)	2.25(4)	NA	14.5(8)	NA
Chromium	NA	NA	32(1)	3.67(4)	NA	NA	NA
Cobalt	NA	NA	81.7(1)	NA	NA	NA	NA
Copper	70(8)	82.9(2)	NA	NA	NA	1463(9)	NA
Iron	21817(7)	20410(7)	29423(1)	3038(4)	NA	64255(5)	122000(6)
Lead	127(1)	82.2(1)	13.6(1)	48.4(1)	NA	1730(1)	NA
Lithium	NA	NA	33(1)	NA	NA	NA	NA
Manganese	354(4)	257(4)	4948(1)	127(4)	476(6)	1193(7)	1900(6)
Mercury	NA	NA	NA	NA	NA	0.933(9)	NA
Nickel	NA	NA	145(1)	NA	NA	159(5)	NA
Vanadium	28.3(4)	25.4(7)	29.3(1)	5.29(4)	NA	38.4(4)	51.2(6)
Zinc	NA	NA	NA	513(4)	NA	5842(4)	NA

Notes
NA - Not applicable. Not a COPC for this media.
1 - Arithmetic Mean.
2 - 97.5% Chebyshev(Mean, Std) UCL.
3 - 99% Chebyshev(Mean, Std) UCL.
4 - Approximate Gamma 95% UCL.
5 - 95% Chebyshev(Mean, Std) UCL.
6 - Maximum detected concentration.
7 - Student-t UCL.
8 - H-UCL.
9 - 95% Chebyshev(MVUE) UCL.

RAGS Part D tables for the exposure point concentrations are included in Appendix I.

TABLE 7-22

SUMMARY OF EXPOSURE INPUT PARAMETERS
REASONABLE MAXIMUM EXPOSURES
SWMU 16 CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
All Exposures								
C_{soil}/C_{sed} (mg/kg)	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
C_{gw} (µg/L)	Average	NA	Average	NA	Average	Average	Average	Average
C_{sw} (µg/L)	NA	Maximum or 95% UCL[1]	NA	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
ED (years)	1[2]	25[3]	25[3]	11[4]	6[5]	24[5]	6[5]	24[5]
BW (kg)	70[5]	70[5]	70[5]	43[6]	15[5]	70[5]	15[5]	70[5]
AT_n (days)	365[6]	9,125[6]	9,125[6]	4,015[6]	2,190[6]	8,760[6]	2,190[6]	8,760[6]
AT_c (days)	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]
Incidental Ingestion/Dermal Contact with Soil								
IR (mg/day)	330[7]	100[5]	100[5]	100[5]	200[5]	100[5]	200[5]	100[5]
EF-Soil (days/year)	150[8]	24[9]	250[5]	26[10]	52[11]	52[11]	350[5]	350[5]
FI (unitless)	1[5]	1[5]	1[5]	1[5]	0.5[2]	0.5[2]	1[5]	1[5]
SA (cm^2/day)	3,300[12]	3,300[12]	3,300[12]	3,280[13]	3,300[14]	9,070[15]	2,800[12]	5,700[12]
AF (mg/cm^2)	0.3[12]	0.2[12]	0.2[12]	0.2[12]	0.2[12]	0.07[12]	0.2[12]	0.07[12]
ABS (unitless)	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Inhalation Fugitive Dust/Volatile Emissions from Surface Soil								
C_{air} (mg/m^3)	calculated[16]	calculated[16]	calculated[16]	calculated[16]	calculated[16]	calculated[16]	calculated[16]	calculated[16]
InhR (m^3/hour)	2.5[17]	20 m^3/day[3]	20 m^3/day[3]	1.2[17]	1.2[17]	1.6[17]	15 m^3/day[17]	20 m^3/day[17]
ET (hours/day)	8[18]	8[18]	8[18]	4[2]	4[2]	4[2]	24[17]	24[17]
EF-Soil (days/year)	150[8]	24[9]	250[5]	26[10]	52[11]	52[11]	350[5]	350[5]
PEF (m^3/kg)	1.49E+06[7]	1.316E+09[19]	1.316E+09[19]	1.316E+09[19]	1.316E+09[19]	1.316E+09[19]	1.316E+09[19]	1.316E+09[19]
Ingestion/Dermal Contact with Groundwater								
IR_{gw} (L/day)	NA	NA	1[2]	NA	1[2]	1[2]	1.5[17]	2[5]
EF (days/year)	150[8]	NA	250[5]	NA	52[11]	52[11]	350[5]	350[5]
ET (hours/day) and t_{event} (hours/event)	2[2]	NA	0.25[2]	NA	0.25[2]	0.25[2]	0.25[17]	0.25[17]
EV (events/day)	1[2]	NA	1[2]	NA	1[2]	1[2]	1[2]	1[2]
A (cm^2/day)	3,300[12]	NA	3,300[12]	NA	3,300[14]	9,070[15]	6,600[12]	18,000[12]
K_p (cm/hour)	chemical-specific[12]	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]

TABLE 7-22

SUMMARY OF EXPOSURE INPUT PARAMETERS
REASONABLE MAXIMUM EXPOSURES
SWMU 16 CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
t* (hour/event), τ (hour), and B (unitless)	chemical-specific[12]	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
Inhalation of Volatile Emissions from Groundwater								
C_{air} (mg/m^3)	calculated[20]	NA	NA	NA	NA	NA	Calculated[21]	Calculated[21]
InhR (m^3/hour)	2.5[17]	NA	NA	NA	NA	NA	0.6[3]	0.6[3]
ET (hours/day)	2[2]	NA	NA	NA	NA	NA	0.33[2]	0.33[2]
Ingestion/Dermal Contact with Surface Water								
CR_{sw} (ml/hr)	NA	NA	NA	0.05[22]	0.05[22]	0.01[22]	0.05[22]	0.01[22]
EF (days/year)	NA	24[9]	NA	26[10]	52[11]	52[11]	52[11]	52[11]
ET (hours/day) and t_{event} (hours/event)	NA	2[2]	NA	4[2]	4[2]	4[2]	4[2]	4[2]
EV (events/day)	NA	1[2]	NA	1[2]	1[2]	1[2]	1[2]	1[2]
A (cm^2/day)	NA	3,300[12]	NA	3,280[13]	3,300[14]	9,070[15]	3,300[14]	9,070[15]
K_p (cm/hour)	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
t* (hour/event), τ (hour), and B (unitless)	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF (L/cm^3)	NA	1E-03	NA	1E-03	1E-03	1E-03	1E-03	1E-03
Incidental Ingestion/Dermal Contact with Sediment								
IR (mg/day)	NA	100[5]	NA	100[5]	200[5]	100[5]	100[2]	50[2]
EF-Sediment (days/year)	NA	24[9]	NA	26[10]	52[11]	52[11]	52[11]	52[11]
FI (unitless)	NA	1[5]	NA	1[5]	0.5[2]	0.5[2]	1[5]	1[5]
SA (cm^2/day)	NA	3,300[12]	NA	3,280[13]	3,300[14]	9,070[15]	2,800[12]	5,700[12]
AF (mg/cm^2)	NA	0.2[12]	NA	0.2[12]	0.2[12]	0.07[12]	0.2[12]	0.07[12]
ABS (unitless)	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF (kg/mg)	NA	1E-06	NA	1E-06	1E-06	1E-06	1E-06	1E-06

TABLE 7-22

SUMMARY OF EXPOSURE INPUT PARAMETERS
REASONABLE MAXIMUM EXPOSURES
SWMU 16 CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident

Notes:

A	Skin surface area available for contact	EF	Exposure frequency
ABS	Absorption factor	ET	Exposure time
AF	Soil-to-skin adherence factor	EV	Event frequency
AT_c	Averaging time for carcinogenic effects	FI	Fraction ingested from contaminated source
AT_n	Averaging time for non-carcinogenic effects	InhR	Inhalation rate
B	Bunge Model partitioning coefficient	IR	Ingestion rate (soil or groundwater)
BW	Body weight	K_p	Permeability coefficient from water through skin
CF	Conversion factor	SA	Skin surface area available for contact
CR	Contact rate	PEF	Particulate emission factor
$C_{soil/sed}$	Exposure concentration for soil/sediment	τ	Lag time
$C_{gw/sw}$	Exposure concentration for groundwater/surface water	t*	Time it takes to reach steady-state conditions
C_{air}	Exposure concentration for air	t_{event}	Duration of event
ED	Exposure duration		

1 - U.S. EPA, 2002. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
2 - Professional judgment.
3 - U.S. EPA, 1991: Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03.
4 - Adolescents ages 7 to 16 years old.
5 - U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
6 - U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.
7 - U.S. EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9365.4-24.
8 - Ground is assumed to be frozen or snow covered 22 weeks/year.
9 - Assume two days a month for reasonable maximum exposure and one day a month for central tendency exposure.
10 - Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.
11 - Assume two days a week in warm weather months for reasonable maximum exposure and one day a week for central tendency exposure.
12 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. PA/540/R/99/005.
13 - Assume 25 percent of total body surface area is exposed, U.S. EPA, 1997b: Exposure Factors Handbook. EPA/600/8-95/002FA.
14 - Assume 50 percent of total body surface area is exposed, U.S. EPA, 2004.
15 - Assume that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997b.
16 - U.S. EPA, 1996: Soil Screening Guidance: Technical Background Document (PEF values site specific).
17 - U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.
18 - Assume an 8-hour work shift.
19 - IDEM, 2004: RISC Technical Guide, January Update.
20 - VDEQ September 2004. Virginia Department of Environmental Quality (VDEQ, online -http://www.deq.state.va.us/brownfieldweb/vrp.html).
21 - Foster, S.A. and P.C. Chrostowski, 1987. Inhalation Exposure to Volatile Organic Contaminants in the Shower.
22 - U.S. EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

TABLE 7-23

SUMMARY OF EXPOSURE INPUT PARAMETERS
CENTRAL TENDENCY EXPOSURES
SWMU 16 CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
All Exposures								
C_{soil}/C_{sed} (mg/kg)	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
C_{gw} (µg/L)	Average	NA	Average	NA	Average	Average	Average	Average
C_{sw} (µg/L)	NA	Maximum or 95% UCL[1]	NA	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
ED (years)	1[2]	9[3]	9[3]	11[4]	2[3]	7[3]	2[3]	7[3]
BW (kg)	70[3]	70[3]	70[3]	43[5]	15[3]	70[3]	15[3]	70[3]
AT_n (days)	365[5]	3,285[5]	3,285[5]	4,015[5]	730[5]	2,555[5]	730[5]	2,555[5]
AT_c (days)	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]
Incidental Ingestion/Dermal Contact with Soil								
IR (mg/day)	165[6]	50[3]	50[3]	50[3]	100[3]	50[3]	100[3]	50[3]
EF-Soil (days/year)	150[7]	12[8]	219[3]	13[9]	26[10]	26[10]	234[3]	234[3]
FI (unitless)	1[3]	1[3]	1[3]	1[3]	0.5[2]	0.5[2]	1[3]	1[3]
SA (cm^2/day)	3,300[11]	3,300[11]	3,300[11]	3,100[12]	3,300[13]	9,070[14]	2,800[11]	5,700[11]
AF (mg/cm^2)	0.1[11]	0.02[11]	0.02[11]	0.04[11]	0.04[11]	0.01[11]	0.04[11]	0.01[11]
ABS (unitless)	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
CF (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Inhalation Fugitive Dust/Volatile Emissions from Surface Soil								
C_{air} (mg/m^3)	calculated[15]	calculated[15]	calculated[15]	calculated[15]	calculated[15]	calculated[15]	calculated[15]	calculated[15]
InhR (m^3/hour)	2.5[16]	20 m^3/day[17]	20 m^3/day[17]	1.2[16]	1.2[16]	1.6[16]	15 m^3/day[16]	20 m^3/day[16]
ET (hours/day)	8[18]	8[18]	8[18]	2[2]	2[2]	2[2]	24[16]	24[16]
EF-Soil (days/year)	150[7]	12[8]	219[3]	13[9]	26[10]	26[10]	234[3]	234[3]
PEF (m^3/kg)	1.49E+06[19]	1.316E+09[20]	1.316E+09[20]	1.316E+09[20]	1.316E+09[20]	1.316E+09[20]	1.316E+09[20]	1.316E+09[20]
Ingestion/Dermal Contact with Groundwater								
IR_{gw} (L/day)	NA	NA	1[2]	NA	1[2]	1[2]	0.66[16]	1.4[3]
EF (days/year)	150[7]	NA	219[3]	NA	26[10]	26[10]	234[3]	234[3]
ET (hours/day) and t_{event} (hours/event)	1.5[2]	NA	0.167[2]	NA	0.167[2]	0.167[2]	0.167[16]	0.167[16]
EV (events/day)	1[2]	NA	1[2]	NA	1[2]	1[2]	1[2]	1[2]
A (cm^2/day)	3,300[11]	NA	3,300[11]	NA	3,300[13]	9,070[14]	6,600[11]	18,000[11]
K_p (cm/hour)	chemical-specific[11]	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
t* (hour/event), τ (hour), and B (unitless)	chemical-specific[11]	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]

TABLE 7-23

SUMMARY OF EXPOSURE INPUT PARAMETERS
CENTRAL TENDENCY EXPOSURES
SWMU 16 CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
Inhalation of Volatile Emissions from Groundwater								
C_{air} (mg/m^3)	calculated[21]	NA	NA	NA	NA	NA	Calculated[22]	Calculated[22]
InhR (m^3/hour)	2.5[16]	NA	NA	NA	NA	NA	0.6[17]	0.6[17]
ET (hours/day)	1.5[2]	NA	NA	NA	NA	NA	0.25[2]	0.25[2]
Ingestion/Dermal Contact with Surface Water								
CR_{sw} (ml/hr)	NA	NA	NA	0.05[23]	0.05[23]	0.01[23]	0.05[23]	0.01[23]
EF (days/year)	NA	12[8]	NA	13[9]	26[10]	26[10]	26[10]	26[10]
ET (hours/day) and t_{event} (hours/event)	NA	1.5[2]	NA	2[2]	2[2]	2[2]	2[2]	2[2]
EV (events/day)	NA	1[2]	NA	1[2]	1[2]	1[2]	1[2]	1[2]
A (cm^2/day)	NA	3,300[11]	NA	3,100[12]	3,300[13]	9,070[14]	3,300[13]	9,070[14]
K_p (cm/hour)	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
t* (hour/event), τ (hour), and B (unitless)	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
CF (L/cm^3)	NA	1E-03	NA	1E-03	1E-03	1E-03	1E-03	1E-03
Incidental Ingestion/Dermal Contact with Sediment								
IR (mg/day)	NA	50[3]	NA	50[3]	100[3]	50[3]	50[2]	25[2]
EF-Sediment (days/year)	NA	12[8]	NA	13[9]	26[10]	26[10]	26[10]	26[10]
FI (unitless)	NA	1[3]	NA	1[3]	0.5[2]	0.5[2]	1[3]	1[3]
SA (cm^2/day)	NA	3,300[11]	NA	3,100[12]	3,300[13]	9,070[14]	2,800[11]	5,700[11]
AF (mg/cm^2)	NA	0.02[11]	NA	0.04[11]	0.04[11]	0.01[11]	0.04[11]	0.01[11]
ABS (unitless)	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
CF (kg/mg)	NA	1E-06	NA	1E-06	1E-06	1E-06	1E-06	1E-06

TABLE 7-23

SUMMARY OF EXPOSURE INPUT PARAMETERS
CENTRAL TENDENCY EXPOSURES
SWMU 16 CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident

Notes:

A	Skin surface area available for contact	EF	Exposure frequency
ABS	Absorption factor	ET	Exposure time
AF	Soil-to-skin adherence factor	EV	Event frequency
AT_c	Averaging time for carcinogenic effects	FI	Fraction ingested from contaminated source
AT_n	Averaging time for non-carcinogenic effects	InhR	Inhalation rate
B	Bunge Model partitioning coefficient	IR	Ingestion rate (soil or groundwater)
BW	Body weight	K_p	Permeability coefficient from water through skin
CF	Conversion factor	NA	Not applicable
CR	Contact rate	SA	Skin surface area available for contact
$C_{soil/sed}$	Exposure concentration for soil/sediment	PEF	Particulate emission factor
$C_{gw/sw}$	Exposure concentration for groundwater/surface water	τ	Lag time
C_{air}	Exposure concentration for air	t*	Time it takes to reach steady-state conditions
ED	Exposure duration	t_{event}	Duration of event
		UCL	Upper confidence limit on arithmetic mean

1 - U.S. EPA, 2002. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
2 - Professional judgment.
3 - U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
4 - Adolescents ages 7 to 16 years old.
5 - U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.
6 - Central tendency exposure is assumed to be one-half the reasonable maximum exposure value.
7 - Ground is assumed to be frozen or snow covered 22 weeks per year.
8 - Assume 2 days a month for RME and one day a month for CTE.
9 - Assume 1 day a week in warm weather months for RME and every other week for CTE.
10 - Assume 2 days a week in warm weather months for RME and one day a week for CTE.
11 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. PA/540/R/99/005.
12 - Assume 25 percent of total body surface area is exposed, U.S. EPA, 1997b: Exposure Factors Handbook. EPA/600/8-95/002FA.
13 - Assume 50 percent of total body surface area is exposed, U.S. EPA, 2004.
14 - Assume that head, arms, hands, lower legs, and feet are exposed (U.S. EPA, 1997b).
15 - U.S. EPA, 1996: Soil Screening Guidance: Technical Background Document (PEF values site specific).
16 - U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.
17 - U.S. EPA, 1991: Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03.
18 - Assume an 8-hour work shift.
19 - U.S. EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9365.4-24.
20 - IDEM, 2004: RISC Technical Guide, January Update.
21 - VDEQ September 2004. Virginia Department of Environmental Quality (VDEQ, online -http://www.deq.state.va.us/brownfieldweb/vrp.html).
22 - Foster, S.A. and P.C. Chrostowski, 1987. Inhalation Exposure to Volatile Organic Contaminants in the Shower.
23 - U.S. EPA Region IV, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

TABLE 7-24

CHEMICAL PROPERTIES FOR
VOLATILIZATION FROM SOIL/GROUNDWATER TO OUTDOOR AIR MODELS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical	Molecular Weight (g/mole)	Organic Carbon Partition Coefficient (cm^3/g)	Air Diffusivity (cm^2/sec)	Water Diffusivity (cm^2/sec)	Solubility Limit (mg/L)	Henry's Law Constant	
						(Dimensionless)	($atm\text{-}m^3/mol$)
1,1,2,2-Tetrachloroethane	1.68E+02	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04
1,1,2-Trichloroethane	1.33E+02	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04
1,1-Dichloroethene	9.69E+01	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02
1,2,3-Trichloropropane	1.47E+02	1.75E+00	7.10E-02	7.90E-06	1.75E+03	1.15E+00	2.80E-02
1,2-Dichloroethane	9.90E+01	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04
2-Nitrotoluene	1.37E+02	1.05E+02	4.75E-02	8.67E-06	6.50E+02	3.60E-03	8.79E-05
Benzene	7.81E+01	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03
Bromodichloromethane	1.64E+02	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03
Carbon Tetrachloride	1.54E+02	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02
Chloroform	1.19E+02	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03
cis-1,2-Dichloroethene	9.70E+01	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03
Methylene Chloride	8.49E+01	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03
Naphthalene	1.28E+02	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04
Tetrachloroethene	1.66E+02	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02
Toluene	9.21E+01	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03
trans-1,2-Dichloroethene	9.70E+01	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03
Trichloroethene	1.31E+02	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02
Vinyl Chloride	6.25E+01	1.86E+01	1.06E-01	1.23E-05	2.76E+03	1.11E+00	2.71E-02

Source: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, U.S. EPA, December 2002.

TABLE 7-25

INPUT PARAMETERS FOR CALCULATION OF
THE VOLATILIZATION FROM SOIL TO OUTDOOR AIR MODELS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Parameter	Definition	Value	Reference
Q/C	Inverse of mean concentration at center of source (g/m^2-s per kg/m^3).	68.81	U.S. EPA, 1996; IDEM, 2004
T	Exposure interval (seconds).	9.5E+08	U.S. EPA, 1996; IDEM, 2004
pb	Dry soil bulk density (g/cm^3).	1.5	U.S. EPA, 1996; IDEM, 2004
ps	Soil particle density (g/cm^3).	2.65	U.S. EPA, 1996; IDEM, 2004
θw	Water-filled soil porosity (L_{pore}/L_{soil}).	0.15	U.S. EPA, 1996; IDEM, 2004
n	Total soil porosity (L_{pore}/L_{soil}).	0.434	U.S. EPA, 1996; IDEM, 2004
Di	Diffusivity in air (cm^2/sec).	Chemical specific	U.S. EPA, 2002
H'	Dimensionless Henry's Law Constant.	Chemical specific	U.S. EPA, 2002
S	Solubility limit (mg/L)	Chemical specific	U.S. EPA, 2002
Dw	Diffusivity in water (cm^2/sec).	Chemical specific	U.S. EPA, 2002
Koc	Soil organic carbon partition coefficient (cm^3/g).	Chemical specific	U.S. EPA, 2002
foc	Fraction organic carbon in soil (g/g).	0.006	U.S. EPA, 1996; IDEM, 2004

Notes:
Chemical specific values are presented in Table 7-20
IDEM, 2004: RISC Technical Guide, January Update.
U.S. EPA, 1996: Soil Screening Guidance: Technical Background Document. EPA/540/R95/128.
U.S. EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 7-26

INTERMEDIATE VARIABLES FOR CALCULATING DA(EVENT)
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Media	Dermal Absorption Fraction (soil)	FA	Kp		T(event)		Tau		T*		B
			Value	Value	Units	Value	Units	Value	Units	Value	Units	Value
Volatile Organic Compounds												
1,1,2,2-Tetrachloroethane	Groundwater	NA	1	6.9E-03	cm/hr	(1)	hr	9.3E-01	hr	2.2E+00	hr	3.5E-02
1,1,2-Trichloroethane	Groundwater	NA	1	6.4E-03	cm/hr	(1)	hr	6.0E-01	hr	1.4E+00	hr	2.9E-02
1,1-Dichloroethene	Groundwater	NA	1	1.2E-02	cm/hr	(1)	hr	3.7E-01	hr	8.9E-01	hr	4.4E-02
1,2,3-Trichloropropane	Groundwater	NA	1	7.5E-03	cm/hr	(1)	hr	7.0E-01	hr	1.7E+00	hr	3.5E-02
1,2-Dichloroethane	Groundwater	NA	1	4.2E-03	cm/hr	(1)	hr	3.8E-01	hr	9.2E-01	hr	1.6E-02
Benzene	Groundwater	NA	1	1.5E-02	cm/hr	(1)	hr	2.9E-01	hr	7.0E-01	hr	5.1E-02
Bromodichloromethane	Groundwater	NA	1	4.6E-03	cm/hr	(1)	hr	8.8E-01	hr	2.1E+00	hr	2.3E-02
Carbon Tetrachloride	Groundwater	NA	1	1.6E-02	cm/hr	(1)	hr	7.8E-01	hr	1.9E+00	hr	7.8E-02
Chloroform	Groundwater, Surface Water	NA	1	6.8E-03	cm/hr	(1)	hr	5.0E-01	hr	1.2E+00	hr	2.9E-02
cis-1,2-Dichloroethene	Surface Water	NA	1	1.1E-02	cm/hr	(1)	hr	3.7E-01	hr	8.8E-01	hr	4.1E-02
Methylene Chloride	Groundwater	NA	1	3.5E-03	cm/hr	(1)	hr	3.2E-01	hr	7.6E-01	hr	1.3E-02
Tetrachloroethene	Groundwater	NA	1	3.3E-02	cm/hr	(1)	hr	9.1E-01	hr	2.2E+00	hr	1.7E-01
Toluene	Groundwater	NA	1	3.1E-02	cm/hr	(1)	hr	3.5E-01	hr	8.4E-01	hr	1.1E-01
Trans-1,2-Dichloroethene	Groundwater	NA	1	7.7E-03	cm/hr	(1)	hr	3.7E-01	hr	8.9E-01	hr	2.9E-02
Trichloroethene	Soil, Groundwater, Surface Water	0	1	1.2E-02	cm/hr	(1)	hr	5.8E-01	hr	1.4E+00	hr	5.1E-02
Vinyl Chloride	Groundwater	NA	1	5.6E-03	cm/hr	(1)	hr	2.4E-01	hr	5.7E-01	hr	1.7E-02
Semivolatile Organic Compounds												
Benzo(a)anthracene	Soil, Surface Water	0.13	1	4.7E-01	cm/hr	(1)	hr	2.0E+00	hr	8.5E+00	hr	2.8E+00
Benzo(a)pyrene	Soil, Sediment	0.13	NA	NA	NA	(1)	hr	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	Soil	0.13	1	7.0E-01	cm/hr	(1)	hr	2.8E+00	hr	1.2E+01	hr	4.3E+00
Bis(2-ethylhexyl)phthalate	Surface Water	NA	0.8	2.5E-02	cm/hr	(1)	hr	1.7E+01	hr	4.0E+01	hr	1.9E-01
Dibenzo(a,h)anthracene	Soil	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	Soil	0.13	0.6	1.0E+00	cm/hr	(1)	hr	3.8E+00	hr	1.7E+01	hr	6.7E+00
Naphthalene	Soil, Surface Water	0.13	1	4.7E-02	cm/hr	(1)	hr	5.6E-01	hr	1.3E+00	hr	2.0E-01
Pyridine	Groundwater	NA	1	1.5E-03	cm/hr	(1)	hr	2.9E-01	hr	7.0E-01	hr	5.2E-03
Herbicides												
Pentachlorophenol	Surface Water	NA	0.9	3.9E-01	cm/hr	(1)	hr	3.3E+00	hr	1.4E+01	hr	2.5E+00
Energetics												
2-Nitrotoluene	Groundwater	NA	1	8.9E-03	cm/hr	(1)	hr	6.2E-01	hr	1.5E+00	hr	4.0E-02
2,4,6-Trinitrotoluene	Groundwater, Surface Water	NA	1	9.6E-04	cm/hr	(1)	hr	2.0E+00	hr	4.7E+00	hr	5.6E-03
2-Amino-4,6-Dinitrotoluene	Groundwater, Surface Water	NA	1	2.0E-03	cm/hr	(1)	hr	1.3E+00	hr	3.2E+00	hr	1.1E-02
4-Amino-2,6-Dinitrotoluene	Groundwater, Surface Water	NA	1	1.3E-02	cm/hr	(1)	hr	3.7E-01	hr	8.8E-01	hr	4.9E-02
HMX	Surface Water	NA	1	1.2E-04	cm/hr	(1)	hr	4.8E+00	hr	1.1E+01	hr	8.0E-04
RDX	Groundwater, Surface Water	NA	1	3.4E-04	cm/hr	(1)	hr	1.8E+00	hr	4.4E+00	hr	1.9E-03

TABLE 7-26

INTERMEDIATE VARIABLES FOR CALCULATING DA(EVENT)
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Media	Dermal Absorption Fraction (soil)	FA	Kp		T(event)		Tau		T*		B
			Value	Value	Units	Value	Units	Value	Units	Value	Units	Value
Inorganics												
Aluminum	Soil, Groundwater, Surface Water, Sediment	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Antimony	Soil, Groundwater, Surface Water, Sediment	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Arsenic	Soil, Groundwater, Surface Water, Sediment	0.03	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Barium	Groundwater, Surface Water, Sediment	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Beryllium	Groundwater	NA		1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Cadmium	Groundwater, Surface Water, Sediment	0.001	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Chromium III	Groundwater, Surface Water	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Chromium VI	Groundwater, Surface Water	0	1	2.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Cobalt	Groundwater, Sediment	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Copper	Soil	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Iron	Soil, Groundwater, Surface Water, Sediment	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Lithium	Groundwater	NA		4.9E-04	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Manganese	Soil, Surface Water, Sediment	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Mercury	Surface Water, Sediment	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Nickel	Groundwater, Sediment	0	1	2.0E-04	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Selenium	Groundwater	NA		1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Vanadium	Soil, Groundwater, Surface Water, Sediment	0	1	1.0E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA
Zinc	Surface Water, Sediment	0	1	6.0E-04	cm/hr	(1)	hr	NA	NA	NA	NA	NA

TABLE 7-26

INTERMEDIATE VARIABLES FOR CALCULATING DA(EVENT)
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Media	Dermal Absorption Fraction (soil)	FA	Kp		T(event)		Tau		T*		B
			Value	Value	Units	Value	Units	Value	Units	Value	Units	Value

Notes:
All values from EPA's Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final, July 2004a.
1 - T(event) is 2 hr for the construction worker and 0.25 hr for the occupational worker, child and adult recreational user, and child and adult resident for exposures to groundwater.
T(event) is 2 hr for the construction worker and 4 hr for the occupational worker, child and adult recreational user, and child and adult resident for exposures to surface water.
FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
T(event) = Event Duration
Tau = Lag Time
T* = Time to Reach Steady-State
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis
NA = Not applicable.

TABLE 7-27

NON-CANCER TOXICITY DATA - ORAL/DERMAL
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds										
1,1,2,2-Tetrachloroethane	Chronic	6.0E-02	mg/kg/day	1	6.0E-02	mg/kg/day	Liver	NA	NCEA	10/19/2004
1,1,2-Trichloroethane	Chronic	4.0E-03	mg/kg/day	1	4.0E-03	mg/kg/day	Blood	1000/1	IRIS	3/24/2005
1,1-Dichloroethene	Chronic	5.0E-02	mg/kg/day	1	5.0E-02	mg/kg/day	Liver	100/1	IRIS	3/24/2005
1,2,3-Trichloropropane	Chronic	6.0E-03	mg/kg/day	1	6.0E-03	mg/kg/day	Blood	1000/1	IRIS	3/24/2005
1,2-Dichloroethane	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	NA	NA	NCEA	10/19/2004
Benzene	Chronic	4.0E-03	mg/kg/day	1	4.0E-03	mg/kg/day	Blood	300/1	IRIS	3/24/2005
Bromodichloromethane	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Kidney	1000/1	IRIS	3/24/2005
Carbon Tetrachloride	Chronic	7.0E-04	mg/kg/day	1	7.0E-04	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
Chloroform	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
cis-1,2-Dichloroethene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Blood	NA	EPA 3	10/19/2004
Methylene Chloride	Chronic	6.0E-02	mg/kg/day	1	6.0E-02	mg/kg/day	Liver	100/1	IRIS	3/24/2005
Tetrachloroethene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
Toluene	Chronic	2.0E-01	mg/kg/day	1	2.0E-01	mg/kg/day	Kidney, Liver	1000/1	IRIS	3/24/2005
trans-1,2-Dichloroethene	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Blood	1000/1	IRIS	3/24/2005
Trichloroethene	Chronic	5.0E-01	mg/kg/day	1	5.0E-01	mg/kg/day	Liver	NA	CA EPA	12/2002
Vinyl Chloride	Chronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Liver	30/1	IRIS	3/24/2005
Semivolatile Organic Compounds										
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Body Weight	3000/1	IRIS	3/24/2005
Pyridine	Chronic	1.0E-03	mg/kg/day	1	1.0E-03	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
Herbicides										
Pentachlorophenol	Chronic	3.0E-02	mg/kg/day	1	3.0E-02	mg/kg/day	Liver, Kidney	100/1	IRIS	3/24/2005
Energetics										
2-Nitrotoluene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Spleen	1000	HEAST	7/1997
2,4,6-Trinitrotoluene	Chronic	5.0E-04	mg/kg/day	1	5.0E-04	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
2-Amino-4,6-Dinitrotoluene	Chronic	2.00E-04	mg/kg/day	1	2.0E-04	mg/kg/day	Liver	NA	NCEA	10/19/2004
4-Amino-2,6-Dinitrotoluene	Chronic	2.00E-04	mg/kg/day	1	2.0E-04	mg/kg/day	Liver	NA	NCEA	10/19/2004
HMX	Chronic	5.0E-02	mg/kg/day	1	5.0E-02	mg/kg/day	Liver, Blood	1000/1	IRIS	3/24/2005
RDX	Chronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Prostate	100/1	IRIS	3/24/2005
Metals										
Aluminum	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	CNS	100	NCEA	10/19/2004
Antimony	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	3/24/2005
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, CVS	3/1	IRIS	3/24/2005
Barium	Chronic	7.0E-02	mg/kg/day	0.07	4.9E-03	mg/kg/day	Kidney	3/1	IRIS	3/24/2005
Beryllium	Chronic	2.0E-03	mg/kg/day	0.007	1.4E-05	mg/kg/day	GS	300/1	IRIS	3/24/2005
Cadmium[3]	Chronic	5.0E-04	mg/kg/day	0.05	2.5E-05	mg/kg/day	Kidney	10/1	IRIS	3/24/2005
Chromium III	Chronic	1.5E+00	mg/kg/day	0.013	2.0E-02	mg/kg/day	NOEL	100/10	IRIS	3/24/2005
Chromium VI	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	Fetotoxicity/GS/Bone	300/3	IRIS	3/24/2005
Cobalt	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	NA	NA	EPA 3	10/19/2004
Copper	Chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	GS	NA	HEAST	7/1997
Iron	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	NA	1	NCEA	10/19/2004
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lithium	Chronic	2.0E-03	mg/kg/day	1	2.0E-03	mg/kg/day	NA	NA	NCEA	10/19/2004

TABLE 7-27

NON-CANCER TOXICITY DATA - ORAL/DERMAL
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Manganese (Soil)	Chronic	7.0E-02	mg/kg/day	0.04	2.8E-03	mg/kg/day	CNS	1/1	IRIS	3/24/2005
Manganese (Water)	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	CNS	3/1	IRIS	3/24/2005
Mercury[4]	Chronic	3.0E-04	mg/kg/day	0.07	2.1E-05	mg/kg/day	CNS	1000/1	IRIS	3/24/2005
Nickel	Chronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	300/1	IRIS	3/24/2005
Selenium	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	Skin, CNS	3/1	IRIS	3/24/2005
Vanadium	Chronic	1.0E-03	mg/kg/day	0.026	2.6E-05	mg/kg/day	Kidney	300	NCEA	10/19/2004
Zinc	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Blood	3/1	IRIS	3/24/2005

Notes:
1 - U.S. EPA, 2004a: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.
3 - Water value for cadmium is listed.
4 - Value is for mercuric chloride.

Definitions:
CNS = Central Nervous System
CVS = Cardiovascular system
EPA 3 = U.S. EPA Region III Risk-Based Concentration Table, October 19, 2004.
GS = Gastrointestinal System
HEAST= Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
NA = Not Applicable
NOEL = No Observed Effect Level
CA EPA = California EPA, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

TABLE 7-28

NON-CANCER TOXICITY DATA - INHALATION
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 2

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds									
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	Chronic	2.0E-01	mg/m^3	5.7E-02	(mg/kg/day)	Liver	30/1	IRIS	3/24/2005
1,2,3-Trichloropropane	Chronic	4.9E-03	mg/m^3	1.4E-03	(mg/kg/day)	Blood	NA	NCEA	10/19/2004
1,2-Dichloroethane	Chronic	4.9E-03	mg/m^3	1.4E-03	(mg/kg/day)	NA	NA	NCEA	10/19/2004
Benzene	Chronic	3.0E-02	mg/m^3	1.4E-03	(mg/kg/day)	Blood	300/1	IRIS	3/24/2005
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	Chronic	2.0E-03	mg/m^3	5.7E-04	(mg/kg/day)	Liver	NA	NCEA	10/19/2004
Chloroform	Chronic	4.9E-02	mg/m^3	1.4E-02	(mg/kg/day)	Liver	NA	NCEA	10/19/2004
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	Chronic	3.0E+00	mg/m^3	8.6E-01	(mg/kg/day)	Liver	100	HEAST	7/1997
Tetrachloroethene	Chronic	4.9E-01	mg/m^3	1.4E-01	(mg/kg/day)	Liver	NA	NCEA	10/19/2004
Toluene	Chronic	4.0E-01	mg/m^3	1.1E-01	(mg/kg/day)	CNS	300/1	IRIS	3/24/2005
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	Chronic	6.0E-01	mg/m^3	1.7E-01	(mg/kg/day)	Liver	NA	CA EPA	12/2002
Vinyl Chloride	Chronic	1.0E-01	mg/m^3	2.9E-02	(mg/kg/day)	Liver	30/1	IRIS	3/24/2005
Semivolatile Organic Compounds									
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	0.003	mg/m^3	8.6E-04	(mg/kg/day)	Nasal	3000/1	IRIS	3/24/2005
Pyridine	NA	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides									
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Energetics									
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 7-28

NON-CANCER TOXICITY DATA - INHALATION
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
HMX	NA	NA	NA	NA	NA	NA	NA	NA	NA
RDX	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals									
Aluminum	Chronic	3.5E-03	mg/m^3	1.0E-03	(mg/kg/day)	CNS	300	NCEA	7/26/2001
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	Chronic	5.0E-04	mg/m^3	1.4E-04	(mg/kg/day)	Fetus	1000/1	HEAST	7/1997
Beryllium	Chronic	2.0E-05	mg/m^3	5.7E-06	(mg/kg/day)	Lungs	10/1	IRIS	3/24/2005
Cadmium	Chronic	2.0E-04	mg/m^3	5.7E-05	(mg/kg/day)	Kidney	NA	EPA 3	10/19/2004
Chromium III	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium VI	Chronic	1.0E-04	mg/m^3	2.9E-05	(mg/kg/day)	Lungs	300/1	IRIS	3/24/2005
Cobalt	Chronic	2.0E-05	mg/m^3	5.7E-06	(mg/kg/day)	NA	NA	EPA 3	10/19/2004
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lithium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Chronic	5.0E-05	mg/m^3	1.4E-05	(mg/kg/day)	CNS	1000/1	IRIS	3/24/2005
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg

Definitions:
CNS = Central Nervous System
EPA 3 = U.S. EPA Region 3 RBC Table, October 19, 2004.
HEAST= Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
NA = Not Applicable
NCEA = National Center for Environmental Assessment
CA EPA = California EPA, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

TABLE 7-29

CANCER TOXICITY DATA - ORAL/DERMAL
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds								
1,1,2,2-Tetrachloroethane	2.0E-01	$(mg/kg/day)^{-1}$	1	2.0E-01	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
1,1,2-Trichloroethane	5.7E-02	$(mg/kg/day)^{-1}$	1	5.7E-02	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
1,1-Dichloroethene	NA	NA	NA	NA	NA	C	IRIS	3/24/2005
1,2,3-Trichloropropane	2.0E-03	$(mg/kg/day)^{-1}$	1	2.0E-03	$(mg/kg/day)^{-1}$	NA	NCEA	10/19/2004
1,2-Dichloroethane	9.1E-02	$(mg/kg/day)^{-1}$	1	9.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Benzene	5.5E-02	$(mg/kg/day)^{-1}$	1	5.5E-02	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Bromodichloromethane	6.2E-02	$(mg/kg/day)^{-1}$	1	6.2E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Carbon Tetrachloride	1.3E-01	$(mg/kg/day)^{-1}$	1	1.3E-01	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Chloroform	NA	NA	NA	NA	NA	B2	IRIS	3/24/2005
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Methylene Chloride	7.5E-03	$(mg/kg/day)^{-1}$	1	7.5E-03	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Tetrachloroethene	5.4E-01	$(mg/kg/day)^{-1}$	1	5.4E-01	$(mg/kg/day)^{-1}$	NA	EPA 3	10/19/2004
Toluene	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	1.3E-02	$(mg/kg/day)^{-1}$	1	1.3E-02	$(mg/kg/day)^{-1}$	C	CA EPA	12/2002
Vinyl Chloride	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Semivolatile Organic Compounds								
Benzo(a)anthracene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Benzo(a)pyrene	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Benzo(b)fluoranthene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Bis(2-ethylhexyl)phthalate	1.4E-02	$(mg/kg/day)^{-1}$	1	1.4E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Dibenzo(a,h)anthracene	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Indeno(1,2,3-cd)pyrene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Naphthalene	NA	NA	NA	NA	NA	C	IRIS	3/24/2005
Pyridine	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides								
Pentachlorophenol	1.2E-01	$(mg/kg/day)^{-1}$	1	1.2E-01	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Energetics								
2-Nitrotoluene	2.3E-01	$(mg/kg/day)^{-1}$	1	2.3E-01	$(mg/kg/day)^{-1}$	NA	EPA 3	10/19/2004
2,4,6-Trinitrotoluene	3.0E-02	$(mg/kg/day)^{-1}$	1	3.0E-02	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
2-Amino-4,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	1.0E+00	NA	NA	D	IRIS	3/24/2005
RDX	1.1E-01	$(mg/kg/day)^{-1}$	1	1.1E-01	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005

TABLE 7-29

CANCER TOXICITY DATA - ORAL/DERMAL
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal(1)	Absorbed Cancer Slope Factor for Dermal(2)		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Metals								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Barium	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	B1	IRIS	3/24/2005
Chromium III	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Chromium VI	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	B2	IRIS	3/24/2005
Lithium	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	C	IRIS	3/24/2005
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Zinc	NA	NA	NA	NA	NA	D	IRIS	3/24/2005

Notes:
1 - U.S. EPA, 2004a: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor x Oral Absorption Efficiency for Dermal.

EPA Group:
A - Human carcinogen.
B1 - Probable human carcinogen - indicates that limited human data are available.
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans .
C - Possible human carcinogen.
D - Not classifiable as a human carcinogen.
E - Evidence of noncarcinogenicity.

EPA 3 = U.S. EPA Region 3 RBC Table, October 19, 2004.

EPA(1) = U.S. EPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.

IRIS = Integrated Risk Information System.

NA = Not Available.

CA EPA = California EPA, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

TABLE 7-30

CANCER TOXICITY DATA - INHALATION
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds							
1,1,2,2-Tetrachloroethane	5.8E-02	$(mg/m^3)^{-1}$	2.0E-01	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
1,1,2-Trichloroethane	1.6E-02	$(mg/m^3)^{-1}$	5.6E-02	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
1,1-Dichloroethene	NA	NA	NA	NA	C	IRIS	3/24/2005
1,2,3-Trichloropropane	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	2.6E-02	$(mg/m^3)^{-1}$	9.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Benzene	7.8E-03	$(mg/m^3)^{-1}$	2.7E-02	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	1.5E-02	$(mg/m^3)^{-1}$	5.3E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Chloroform	2.3E-02	$(mg/m^3)^{-1}$	8.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
cis-1,2-Dichloroethene	NA	NA	NA	NA	D	IRIS	3/24/2005
Methylene Chloride	4.7E-04	$(mg/m^3)^{-1}$	1.6E-03	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Tetrachloroethene	5.7E-03	$(mg/m^3)^{-1}$	2.0E-02	$(mg/kg/day)^{-1}$	NA	EPA 3	10/19/2004
Toluene	NA	NA	NA	NA	D	IRIS	3/24/2005
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	2.0E-03	$(mg/m^3)^{-1}$	7.0E-03	$(mg/kg/day)^{-1}$	C	CA EPA	12/2002
Vinyl Chloride	4.4E-03	$(mg/m^3)^{-1}$	1.5E-02	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Semivolatile Organic Compounds							
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	8.9E-01	$(mg/m^3)^{-1}$	3.1E+00	$(mg/kg/day)^{-1}$	B2	NCEA	10/19/2004
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	4.0E-03	$(mg/m^3)^{-1}$	1.4E-02	$(mg/kg/day)^{-1}$	B2	NCEA	10/19/2004
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	C	IRIS	3/24/2005
Pyridine	NA	NA	NA	NA	NA	NA	NA
Herbicides							
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA

TABLE 7-30

CANCER TOXICITY DATA - INHALATION
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Energetics							
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	NA	NA	D	IRIS	3/24/2005
RDX	NA	NA	NA	NA	NA	NA	NA
Metals							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	4.3E+00	$(mg/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Barium	NA	NA	NA	NA	D	IRIS	3/24/2005
Beryllium	2.4E+00	$(mg/m^3)^{-1}$	8.4E+00	$(mg/kg/day)^{-1}$	B1	IRIS	3/24/2005
Cadmium	1.8E+00	$(mg/m^3)^{-1}$	6.3E+00	$(mg/kg/day)^{-1}$	B1	IRIS	3/24/2005
Chromium III	NA	NA	NA	NA	D	IRIS	3/24/2005
Chromium VI	1.2E+01	$(mg/m^3)^{-1}$	4.2E+01	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Cobalt	2.8E+00	$(mg/m^3)^{-1}$	9.8E+00	$(mg/kg/day)^{-1}$	NA	EPA 3	10/19/2004
Copper	NA	NA	NA	NA	D	IRIS	3/24/2005
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	B2	IRIS	3/24/2005
Lithium	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	D	IRIS	3/24/2005
Nickel	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	C	IRIS	3/24/2005
Vanadium	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	D	IRIS	3/24/2005
Zinc	NA	NA	NA	NA	D	IRIS	3/24/2005

TABLE 7-30

CANCER TOXICITY DATA - INHALATION
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)

Notes:
1 - Inhalation CSF = Unit Risk * 70 kg / 20m^3/day.

Definitions:
IRIS = Integrated Risk Information System.
NA = Not Available.
NCEA = National Center for Environmental Assessment
EPA 3 = U.S. EPA Region 3 RBC Table, October 19, 2004.
CA EPA = California EPA, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

EPA Group:
A - Human carcinogen.
B1 - Probable human carcinogen - indicates that limited human data are available.
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans .
C - Possible human carcinogen.
D - Not classifiable as a human carcinogen.
E - Evidence of noncarcinogenicity.

TABLE 7-31

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Maintenance Worker	Surface Soil	Incidental Ingestion	1E-06	- -	- -	- -	0.01	- -
		Dermal Contact	8E-07	- -	- -	- -	0.0004	- -
		Inhalation	1E-09	- -	- -	- -	0.0006	- -
		Total	2E-06	- -	- -	- -	0.02	- -
	Surface Water - Gullies	Dermal Contact	2E-08	- -	- -	- -	0.004	- -
	Surface Water - Turkey Creek	Dermal Contact	1E-09	- -	- -	- -	0.003	- -
	Sediment - Gullies	Incidental Ingestion	7E-07	- -	- -	- -	0.05	- -
		Dermal Contact	1E-07	- -	- -	- -	0.001	- -
		Total	8E-07	- -	- -	- -	0.05	- -
	Sediment - Turkey Creek	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.06	- -
		Dermal Contact	3E-07	- -	- -	- -	0.002	- -
		Total	2E-06	- -	- -	Arsenic	0.06	- -
		Total All Media	5E-06				0.1	
Occupational Worker	Surface Soil	Incidental Ingestion	1E-05	- -	- -	Benzo(a)pyrene, Arsenic	0.2	- -
		Dermal Contact	8E-06	- -	- -	Benzo(a)pyrene	0.004	- -
		Inhalation	1E-08	- -	- -	- -	0.006	- -
		Total	2E-05	- -	- -	Benzo(a)pyrene, Dibenzo(a,h)anthracene, Arsenic	0.2	- -
	Groundwater	Incidental Ingestion	1E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, Arsenic	1,1,2-Trichloroethane, RDX	5	Manganese
		Dermal Contact	4E-05	- -	Trichloroethene	Tetrachloroethene, Vinyl Chloride	0.09	- -
		Total	1E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, Arsenic	1,1,2-Trichloroethane, RDX	5	Manganese
		Total All Media	1E-03				5	
Adolescent Trespasser	Surface Soil	Incidental Ingestion	9E-07	- -	- -	- -	0.03	- -
		Dermal Contact	6E-07	- -	- -	- -	0.0007	- -
		Inhalation	2E-10	- -	- -	- -	0.0002	- -
		Total	2E-06	- -	- -	- -	0.03	- -
	Surface Water - Gullies	Incidental Ingestion	3E-07	- -	- -	- -	0.02	- -
		Dermal Contact	3E-08	- -	- -	- -	0.01	- -
		Total	3E-07	- -	- -	- -	0.04	- -
	Surface Water - Turkey Creek	Incidental Ingestion	3E-08	- -	- -	- -	0.007	- -
		Dermal Contact	2E-09	- -	- -	- -	0.01	- -
		Total	3E-08	- -	- -	- -	0.02	- -
	Sediment - Gullies	Incidental Ingestion	5E-07	- -	- -	- -	0.09	- -
		Dermal Contact	1E-07	- -	- -	- -	0.002	- -
		Total	6E-07	- -	- -	- -	0.1	- -
	Sediment - Turkey Creek	Incidental Ingestion	1E-06	- -	- -	- -	0.1	- -
		Dermal Contact	2E-07	- -	- -	- -	0.003	- -
		Total	1E-06	- -	- -	- -	0.1	- -
		Total All Media	4E-06				0.3	

TABLE 7-31

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Construction Worker	Surface/Subsurface Soil	Incidental Ingestion	1E-06	- -	- -	- -	0.3	- -
		Dermal Contact	3E-07	- -	- -	- -	0.004	- -
		Inhalation	1E-07	- -	- -	- -	3	Aluminum, Manganese
		Total	1E-06	- -	- -	- -	3	Aluminum, Manganese
	Groundwater	Dermal Contact	3E-06	- -	- -	Trichloroethene	0.4	- -
		Inhalation	2E-06	- -	- -	Trichloroethene	0.1	- -
		Total	5E-06	- -	- -	Trichloroethene	0.5	- -
		Total All Media	7E-06				4	
Child Recreational User	Surface Soil	Incidental Ingestion	3E-06	- -	- -	- -	0.1	- -
		Dermal Contact	2E-06	- -	- -	- -	0.004	- -
		Inhalation	6E-10	- -	- -	- -	0.001	- -
		Total	5E-06	- -	- -	Benzo(a)pyrene	0.2	- -
	Groundwater	Incidental Ingestion	3E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	5	Manganese
		Dermal Contact	1E-05	- -	- -	Trichloroethene	0.09	- -
		Total	3E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	5	Manganese
	Surface Water - Gullies	Incidental Ingestion	8E-07	- -	- -	- -	0.1	- -
		Dermal Contact	8E-08	- -	- -	- -	0.09	- -
		Total	9E-07	- -	- -	- -	0.2	- -
	Surface Water - Turkey Creek	Incidental Ingestion	9E-08	- -	- -	- -	0.04	- -
		Dermal Contact	6E-09	- -	- -	- -	0.06	- -
		Total	1E-07	- -	- -	- -	0.1	- -
	Sediment - Gullies	Incidental Ingestion	2E-06		- -	Arsenic	0.5	- -
		Dermal Contact	3E-07	- -	- -	- -	0.01	- -
		Total	2E-06	- -	- -	Arsenic	0.6	- -
	Sediment - Turkey Creek	Incidental Ingestion	4E-06	- -	- -	Arsenic	0.6	- -
		Dermal Contact	7E-07	- -	- -	- -	0.02	- -
		Total	5E-06	- -	- -	Arsenic	0.6	- -
		Total All Media	3E-04				7	

TABLE 7-31

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Adult Recreational User	Surface Soil	Incidental Ingestion	1E-06	- -	- -	- -	0.02	- -
		Dermal Contact	2E-06	- -	- -	- -	0.0008	- -
		Inhalation	6E-10	- -	- -	- -	0.0004	- -
		Total	3E-06	- -	- -	Benzo(a)pyrene	0.02	- -
	Groundwater	Incidental Ingestion	2E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	1	- -
		Dermal Contact	2E-05	- -	Trichloroethene	Tetrachloroethene	0.05	- -
		Total	3E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	1	- -
	Surface Water - Gullies	Incidental Ingestion	1E-07	- -	- -	- -	0.005	- -
		Dermal Contact	2E-07	- -	- -	- -	0.05	- -
		Total	3E-07	- -	- -	- -	0.06	- -
	Surface Water - Turkey Creek	Incidental Ingestion	2E-08	- -	- -	- -	0.002	- -
		Dermal Contact	1E-08	- -	- -	- -	0.04	- -
		Total	3E-08	- -	- -	- -	0.04	- -
	Sediment - Gullies	Incidental Ingestion	7E-07	- -	- -	- -	0.06	- -
		Dermal Contact	3E-07	- -	- -	- -	0.002	- -
		Total	1E-06	- -	- -	- -	0.06	- -
	Sediment - Turkey Creek	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.06	- -
		Dermal Contact	6E-07	- -	- -	- -	0.004	- -
		Total	2E-06	- -	- -	Arsenic	0.06	- -
		Total All Media	3E-04				1	
Lifelong Recreational User (Child and Adult)	Surface Soil	Incidental Ingestion	4E-06	- -	- -	Benzo(a)pyrene	NA	- -
		Dermal Contact	4E-06	- -	- -	Benzo(a)pyrene	NA	- -
		Inhalation	1E-09	- -	- -	- -	NA	- -
		Total	8E-06	- -	- -	Benzo(a)pyrene	NA	- -
	Groundwater	Incidental Ingestion	5E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	NA	- -
		Dermal Contact	3E-05	- -	Trichloroethene	Tetrachloroethene	NA	- -
		Total	5E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, 1,1,2-Trichloroethane, RDX, Arsenic	NA	- -
	Surface Water - Gullies	Incidental Ingestion	1E-06	- -	- -	- -	NA	- -
		Dermal Contact	3E-07	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	- -	NA	- -
	Surface Water - Turkey Creek	Incidental Ingestion	1E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-08	- -	- -	- -	NA	- -
		Total	1E-07	- -	- -	- -	NA	- -
	Sediment - Gullies	Incidental Ingestion	2E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	6E-07	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	Arsenic	NA	- -
	Sediment - Turkey Creek	Incidental Ingestion	5E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	1E-06	- -	- -	- -	NA	- -
		Total	7E-06	- -	- -	Arsenic	NA	- -
		Total All Media	5E-04				NA	

TABLE 7-31

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Child Residents	Surface Soil	Incidental Ingestion	4E-05	- -	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Arsenic	2	- -
		Dermal Contact	1E-05	- -	- -	Benzo(a)pyrene	0.02	- -
		Inhalation	1E-08	- -	- -	- -	0.03	- -
		Total	5E-05	- -	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Arsenic	2	- -
	Groundwater	Ingestion	3E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, Carbon Tetrachloride	51	cis-1,2-Dichloroethene, Trichloroethene, Vinyl Chloride, Aluminum, Arsenic, Iron, Lithium, Manganese, Vanadium, 2-Amino-4,6-Dinitrotoluene
		Dermal Contact	1E-04	- -	Trichloroethene	Tetrachloroethene, Vinyl Chloride	1	- -
		Inhalation	4E-04	Trichloroethene	- -	1,1,2-Trichloroethene	5	Trichloroethene
		Total	3E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	1,1,2,2-Tetrachloroethane, 1,2-Dichloroethane, 1,1,2-Trichloroethane, Carbon Tetrachloride	57	cis-1,2-Dichloroethene, Carbon Tetrachloride, Trichloroethene, Vinyl Chloride, Aluminum, Arsenic, Iron, Lithium, Manganese, Vanadium, 2-Amino-4,6-Dinitrotoluene, 4-Amino-2,6-Dinitrotoluene
	Surface Water - Gullies	Incidental Ingestion	8E-07	- -	- -	- -	0.1	- -
		Dermal Contact	8E-08	- -	- -	- -	0.09	- -
		Total	9E-07	- -	- -	- -	0.2	- -
	Surface Water - Turkey Creek	Incidental Ingestion	9E-08	- -	- -	- -	0.04	- -
		Dermal Contact	6E-09	- -	- -	- -	0.06	- -
		Total	1E-07	- -	- -	- -	0.1	- -
	Sediment - Gullies	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.5	- -
		Dermal Contact	3E-07	- -	- -	- -	0.01	- -
		Total	2E-06	- -	- -	Arsenic	0.5	- -
	Sediment - Turkey Creek	Incidental Ingestion	4E-06	- -	- -	Arsenic	0.6	- -
		Dermal Contact	6E-07	- -	- -	- -	0.02	- -
		Total	4E-06	- -	- -	Arsenic	0.6	- -
		Total All Media	3E-03				60	

TABLE 7-31

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Adult Residents	Surface Soil	Incidental Ingestion	2E-05	- -	- -	Benzo(a)pyrene, Dibenzo(a,h)anthracene, Arsenic	0.2	- -
		Dermal Contact	7E-06	- -	- -	Benzo(a)pyrene	0.003	- -
		Inhalation	1E-08	- -	- -	- -	0.008	- -
		Total	2E-05	- -	- -	Benzo(a)pyrene, Dibenzo(a,h)anthracene, Arsenic	0.2	- -
	Groundwater	Ingestion	3E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, Carbon Tetrachloride	15	Trichloroethene, Iron, Manganese
		Dermal Contact	3E-04	Trichloroethene	Tetrachloroethene	Vinyl Chloride	0.7	- -
		Inhalation	4E-04	Trichloroethene	- -	1,1,2-Trichloroethane	1.0	- -
		Total	4E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	1,1,2,2-Tetrachloroethane, 1,2-Dichloroethane, 1,1,2-Trichloroethane, Carbon Tetrachloride	16	Trichloroethene, Iron, Manganese
	Surface Water - Gullies	Incidental Ingestion	1E-07	- -	- -	- -	0.005	- -
		Dermal Contact	2E-07	- -	- -	- -	0.05	- -
		Total	3E-07	- -	- -	- -	0.06	- -
	Surface Water - Turkey Creek	Incidental Ingestion	2E-08	- -	- -	- -	0.002	- -
		Dermal Contact	1E-08	- -	- -	- -	0.04	- -
		Total	3E-08	- -	- -	- -	0.04	- -
	Sediment - Gullies	Incidental Ingestion	7E-07	- -	- -	- -	0.06	- -
		Dermal Contact	2E-07	- -	- -	- -	0.002	- -
		Total	9E-07	- -	- -	- -	0.06	- -
	Sediment - Turkey Creek	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.06	- -
		Dermal Contact	4E-07	- -	- -	- -	0.003	- -
		Total	2E-06	- -	- -	Arsenic	0.06	- -
		Total All Media	4E-03				17	

TABLE 7-31

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	5E-05	- -	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Arsenic	NA	- -
		Dermal Contact	2E-05	- -	- -	Benzo(a)pyrene, Dibenzo(a,h)anthracene	NA	- -
		Inhalation	3E-08	- -	- -	- -	NA	- -
		Total	7E-05	- -	Benzo(a)pyrene, Arsenic	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene	NA	- -
	Groundwater	Ingestion	6E-03	Trichloroethene, Vinyl Chloride	1,1,2-Trichloroethane, Tetrachloroethene, RDX, Arsenic	1,1,2,2-Tetrachloroethane, 1,2-Dichloroethane, Benzene, Bromodichloromethane, Carbon Tetrachloride,	NA	- -
		Dermal Contact	5E-04	Trichloroethene	Tetrachloroethene, Vinyl Chloride	- -	NA	- -
		Inhalation	8E-04	Trichloroethene	- -	1,1,2-Trichloroethane, Chloroform, Vinyl Chloride	NA	- -
		Total	7E-03	Trichloroethene, Vinyl Chloride	1,1,2-Trichloroethane, Tetrachloroethene, RDX, Arsenic	1,1,2,2-Tetrachloroethane, 1,2-Dichloroethane, Benzene, Bromodichloromethane, Carbon Tetrachloride, Chloroform	NA	- -
	Surface Water - Gullies	Incidental Ingestion	1E-06	- -	- -	- -	NA	- -
		Dermal Contact	3E-07	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	- -	NA	- -
	Surface Water - Turkey Creek	Incidental Ingestion	1E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-08	- -	- -	- -	NA	- -
		Total	1E-07	- -	- -	- -	NA	- -
	Sediment - Gullies	Incidental Ingestion	2E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	5E-07	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	Arsenic	NA	- -
	Sediment - Turkey Creek	Incidental Ingestion	5E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	1E-06	- -	- -	- -	NA	- -
		Total	6E-06	- -	- -	Arsenic	NA	- -
		Total All Media	7E-03				NA	

TABLE 7-32

SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Maintenance Worker	Surface Soil	Incidental Ingestion	1E-07	- -	- -	- -	0.004	- -
		Dermal Contact	1E-08	- -	- -	- -	0.00002	- -
		Inhalation	2E-10	- -	- -	- -	0.0003	- -
		Total	1E-07	- -	- -	- -	0.004	- -
	Surface Water - Gullies	Dermal Contact	3E-09	- -	- -	- -	0.002	- -
	Surface Water - Turkey Creek	Dermal Contact	2E-10	- -	- -	- -	0.001	- -
	Sediment - Gullies	Incidental Ingestion	6E-08	- -	- -	- -	0.01	- -
		Dermal Contact	3E-09	- -	- -	- -	0.00006	- -
		Total	6E-08	- -	- -	- -	0.01	- -
	Sediment - Turkey Creek	Incidental Ingestion	1E-07	- -	- -	- -	0.01	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0001	- -
		Total	1E-07	- -	- -	- -	0.01	- -
		Total All Media	3E-07				0.03	
Occupational Worker	Surface Soil	Incidental Ingestion	2E-06	- -	- -	- -	0.07	- -
		Dermal Contact	3E-07	- -	- -	- -	0.0004	- -
		Inhalation	3E-09	- -	- -	- -	0.005	- -
		Total	2E-06	- -	- -	- -	0.07	- -
	Groundwater	Incidental Ingestion	4E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	5	Manganese
		Dermal Contact	1E-05	- -	- -	Trichloroethene	0.06	- -
		Total	4E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	5	Manganese
		Total All Media	4E-04				5	
Adolescent Trespasser	Surface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.006	- -
		Dermal Contact	6E-08	- -	- -	- -	0.00006	- -
		Inhalation	5E-11	- -	- -	- -	0.00006	- -
		Total	3E-07	- -	- -	- -	0.007	- -
	Surface Water - Gullies	Incidental Ingestion	7E-08	- -	- -	- -	0.005	RDX
		Dermal Contact	8E-09	- -	- -	- -	0.004	- -
		Total	7E-08	- -	- -	- -	0.009	RDX
	Surface Water - Turkey Creek	Incidental Ingestion	7E-09	- -	- -	- -	0.002	- -
		Dermal Contact	4E-10	- -	- -	- -	0.003	- -
		Total	8E-09	- -	- -	- -	0.004	- -
	Sediment - Gullies	Incidental Ingestion	1E-07	- -	- -	- -	0.02	- -
		Dermal Contact	1E-08	- -	- -	- -	0.0002	- -
		Total	1E-07	- -	- -	- -	0.02	- -
	Sediment - Turkey Creek	Incidental Ingestion	2E-07	- -	- -	- -	0.01	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0003	- -
		Total	2E-07	- -	- -	- -	0.01	- -
		Total All Media	7E-07				0.06	

TABLE 7-32

SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Construction Worker	Surface/Subsurface Soil	Incidental Ingestion	5E-07	- -	- -	- -	0.2	- -
		Dermal Contact	1E-07	- -	- -	- -	0.001	- -
		Inhalation	1E-07	- -	- -	- -	3	Aluminum, Manganese
		Total	7E-07	- -	- -	- -	3	Aluminum, Manganese
	Groundwater	Dermal Contact	3E-06	- -	- -	Trichloroethene	0.3	- -
		Inhalation	3E-07	- -	- -	- -	0.02	- -
		Total	3E-06	- -	- -	Trichloroethene	0.3	- -
		Total All Media	4E-06				4	
Child Recreational User	Surface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.04	- -
		Dermal Contact	6E-08	- -	- -	- -	0.0004	- -
		Inhalation	5E-11	- -	- -	- -	0.0003	- -
		Total	3E-07	- -	- -	- -	0.04	- -
	Groundwater	Incidental Ingestion	4E-05	- -	Trichloroethene	Vinyl Chloride	3	- -
		Dermal Contact	1E-06	- -	- -	- -	0.03	- -
		Total	5E-05	- -	Trichloroethene	Vinyl Chloride	3	- -
	Surface Water - Gullies	Incidental Ingestion	7E-08	- -	- -	- -	0.03	- -
		Dermal Contact	8E-09	- -	- -	- -	0.02	- -
		Total	8E-08	- -	- -	- -	0.05	- -
	Surface Water - Turkey Creek	Incidental Ingestion	8E-09	- -	- -	- -	0.01	- -
		Dermal Contact	5E-10	- -	- -	- -	0.02	- -
		Total	8E-09	- -	- -	- -	0.03	- -
	Sediment - Gullies	Incidental Ingestion	1E-07	- -	- -	- -	0.1	- -
		Dermal Contact	1E-08	- -	- -	- -	0.001	- -
		Total	1E-07	- -	- -	- -	0.1	- -
	Sediment - Turkey Creek	Incidental Ingestion	3E-07	- -	- -	- -	0.1	- -
		Dermal Contact	2E-08	- -	- -	- -	0.002	- -
		Total	3E-07	- -	- -	- -	0.1	- -
		Total All Media	9E-05				3	

TABLE 7-32

SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Adult Recreational User	Surface Soil	Incidental Ingestion	9E-08	- -	- -	- -	0.004	- -
		Dermal Contact	3E-08	- -	- -	- -	0.00006	- -
		Inhalation	5E-11	- -	- -	- -	0.0001	- -
		Total	1E-07	- -	- -	- -	0.004	- -
	Groundwater	Incidental Ingestion	3E-05	- -	Trichloroethene	Vinyl Chloride	0.5	- -
		Dermal Contact	3E-06	- -	- -	Trichloroethene	0.02	- -
		Total	4E-05	- -	Trichloroethene	Vinyl Chloride	0.6	- -
	Surface Water - Gullies	Incidental Ingestion	1E-08	- -	- -	- -	0.001	- -
		Dermal Contact	2E-08	- -	- -	- -	0.01	- -
		Total	3E-08	- -	- -	- -	0.01	- -
	Surface Water - Turkey Creek	Incidental Ingestion	1E-09	- -	- -	- -	0.0004	- -
		Dermal Contact	1E-09	- -	- -	- -	0.009	- -
		Total	2E-09	- -	- -	- -	0.01	- -
	Sediment - Gullies	Incidental Ingestion	5E-08	- -	- -	- -	0.01	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0002	- -
		Total	6E-08	- -	- -	- -	0.01	- -
	Sediment - Turkey Creek	Incidental Ingestion	1E-07	- -	- -	- -	0.02	- -
		Dermal Contact	1E-08	- -	- -	- -	0.0003	- -
		Total	1E-07	- -	- -	- -	0.02	- -
		Total All Media	4E-05				0.6	
Lifelong Recreational User (Child and Adult)	Surface Soil	Incidental Ingestion	3E-07	- -	- -	- -	NA	- -
		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Inhalation	9E-11	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	NA	- -
	Groundwater	Incidental Ingestion	8E-05	- -	Trichloroethene	Vinyl Chloride, Arsenic	NA	- -
		Dermal Contact	4E-06	- -	- -	Trichloroethene	NA	- -
		Total	8E-05	- -	Trichloroethene	Tetrachloroethene, Vinyl Chloride, Arsenic	NA	- -
	Surface Water - Gullies	Incidental Ingestion	8E-08	- -	- -	- -	NA	- -
		Dermal Contact	3E-08	- -	- -	- -	NA	- -
		Total	1E-07	- -	- -	- -	NA	- -
	Surface Water - Turkey Creek	Incidental Ingestion	9E-09	- -	- -	- -	NA	- -
		Dermal Contact	2E-09	- -	- -	- -	NA	- -
		Total	1E-08	- -	- -	- -	NA	- -
	Sediment - Gullies	Incidental Ingestion	2E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-08	- -	- -	- -	NA	- -
		Total	2E-07	- -	- -	- -	NA	- -
	Sediment - Turkey Creek	Incidental Ingestion	4E-07	- -	- -	- -	NA	- -
		Dermal Contact	4E-08	- -	- -	- -	NA	- -
		Total	5E-07	- -	- -	- -	NA	- -
		Total All Media	8E-05				NA	

TABLE 7-32

SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals Contributing to an HI > 1
Child Residents	Surface Soil	Incidental Ingestion	4E-06	- -	- -	Benzo(a)pyrene	0.7	- -
		Dermal Contact	5E-07	- -	- -	- -	0.003	- -
		Inhalation	3E-09	- -	- -	- -	0.02	- -
		Total	5E-06	- -	- -	Benzo(a)pyrene	0.7	- -
	Groundwater	Ingestion	3E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	15	Trichloroethene, Iron, Manganese
		Dermal Contact	2E-05	- -	Trichloroethene	Tetrachloroethene	0.6	- -
		Inhalation	5E-05	- -	Trichloroethene	- -	2	Trichloroethene
		Total	3E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	17	Trichloroethene, Iron, Manganese
	Surface Water - Gullies	Incidental Ingestion	7E-08	- -	- -	- -	0.03	- -
		Dermal Contact	8E-09	- -	- -	- -	0.02	- -
		Total	8E-08	- -	- -	- -	0.05	- -
	Surface Water - Turkey Creek	Incidental Ingestion	8E-09	- -	- -	- -	0.01	- -
		Dermal Contact	5E-10	- -	- -	- -	0.02	- -
		Total	8E-09	- -	- -	- -	0.03	- -
	Sediment - Gullies	Incidental Ingestion	1E-07	- -	- -	- -	0.1	- -
		Dermal Contact	1E-08	- -	- -	- -	0.001	- -
		Total	1E-07	- -	- -	- -	0.1	- -
	Sediment - Turkey Creek	Incidental Ingestion	3E-07	- -	- -	- -	0.1	- -
		Dermal Contact	2E-08	- -	- -	- -	0.002	- -
		Total	3E-07	- -	- -	- -	0.1	- -
		Total All Media	3E-04				18	

TABLE 7-32

SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Adult Residents	Surface Soil	Incidental Ingestion	2E-06	- -	- -	- -	0.07	- -
		Dermal Contact	2E-07	- -	- -	- -	0.0003	- -
		Inhalation	3E-09	- -	- -	- -	0.006	- -
		Total	2E-06	- -	- -	- -	0.08	- -
	Groundwater	Ingestion	4E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	7	Iron, Manganese
		Dermal Contact	5E-05	- -	Trichloroethene	Tetrachloroethene, Vinyl Chloride	0.3	- -
		Inhalation	4E-05	- -	Trichloroethene	- -	1	- -
		Total	5E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX, Arsenic	8	Trichloroethene, Iron, Manganese
	Surface Water - Gullies	Incidental Ingestion	1E-08	- -	- -	- -	0.001	- -
		Dermal Contact	2E-08	- -	- -	- -	0.01	- -
		Total	3E-08	- -	- -	- -	0.01	- -
	Surface Water - Turkey Creek	Incidental Ingestion	1E-09	- -	- -	- -	0.0004	- -
		Dermal Contact	1E-09	- -	- -	- -	0.009	- -
		Total	2E-09	- -	- -	- -	0.01	- -
	Sediment - Gullies	Incidental Ingestion	5E-08	- -	- -	- -	0.01	- -
		Dermal Contact	4E-09	- -	- -	- -	0.0001	- -
		Total	5E-08	- -	- -	- -	0.01	- -
	Sediment - Turkey Creek	Incidental Ingestion	1E-07	- -	- -	- -	0.02	- -
		Dermal Contact	8E-09	- -	- -	- -	0.0002	- -
		Total	1E-07	- -	- -	- -	0.02	- -
		Total All Media	5E-04				9	

TABLE 7-32

SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	6E-06	- -	- -	Benzo(a)pyrene, Arsenic	NA	- -
		Dermal Contact	7E-07	- -	- -	- -	NA	- -
		Inhalation	5E-09	- -	- -	- -	NA	- -
		Total	7E-06	- -	- -	Benzo(a)pyrene, Arsenic	NA	- -
	Groundwater	Ingestion	7E-04	Trichloroethene	Vinyl Chloride, Arsenic	1,1,2-Trichloroethane, Tetrachloroethene, RDX	NA	- -
		Dermal Contact	8E-05	- -	Trichloroethene	Tetrachloroethene, Vinyl Chloride	NA	- -
		Inhalation	1E-04	- -	Trichloroethene	- -	NA	- -
		Total	9E-04	Trichloroethene	Tetrachloroethene, Vinyl Chloride, Arsenic	1,1,2-Trichloroethane, RDX	NA	- -
	Surface Water - Gullies	Incidental Ingestion	8E-07	- -	- -	- -	NA	- -
		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Total	9E-07	- -	- -	- -	NA	- -
	Surface Water - Turkey Creek	Incidental Ingestion	9E-08	- -	- -	- -	NA	- -
		Dermal Contact	7E-09	- -	- -	- -	NA	- -
		Total	1E-07	- -	- -	- -	NA	- -
	Sediment - Gullies	Incidental Ingestion	2E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	3E-07	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Arsenic	NA	- -
	Sediment - Turkey Creek	Incidental Ingestion	4E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	6E-07	- -	- -	- -	NA	- -
		Total	5E-06	- -	- -	Arsenic	NA	- -
		Total All Media	9E-04				NA	

TABLE 7-33

INORGANIC RETAINED AS COPCs INCLUDING BACKGROUND ANALYSIS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical	Surface Soil	Subsurface Soil	Ground Water			Surface Water		Sediment	
			Upper Aquifer	Middle Aquifer	Lower and Valley Aquifers	Gully	Turkey Creek	Gully	Turkey Creek
Inorganics									
Aluminum	B	B	B	B	B	B		B	B
Antimony	X				X	X		X	
Arsenic	B	B	B	B	B	B	B	B	B
Barium				B	B	X		X	
Beryllium				B	B				
Cadmium				B		X		X	
Chromium				X	X	X			
Cobalt			B	B	B			X	
Copper	X								
Iron	X	X	X	X	X	X		X	X
Lead	X			B	B	X		X	
Lithium				B					
Manganese	B	B	B	B	B	X	X	X	X
Mercury								X	
Nickel			X	X	X			X	
Selenium									
Thallium									
Vanadium	B	B	X	X	X	X		X	X
Zinc						X		X	

Notes
B - Indicates that chemical was present at concentration exceeding screening levels but were within background levels.
X - Indicates chemical was retained as a COPC.

TABLE 7-34

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES - EXCLUDING BACKGROUND
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Maintenance Worker	Surface Soil	Incidental Ingestion	8E-07	- -	- -	- -	0.008	- -
		Dermal Contact	7E-07	- -	- -	- -	0.0000001	- -
		Inhalation	5E-10	- -	- -	- -	0.00001	- -
		Total	2E-06	- -	- -	- -	0.008	- -
	Surface Water - Gullies	Dermal Contact	2E-08	- -	- -	- -	0.002	- -
	Surface Water - Turkey Creek	Dermal Contact	NC	- -	- -	- -	0.003	- -
	Sediment - Gullies	Incidental Ingestion	1E-08	- -	- -	- -	0.04	- -
		Dermal Contact	9E-09	- -	- -	- -	0.0004	- -
		Total	2E-08	- -	- -	- -	0.04	- -
	Sediment - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.04	- -
		Dermal Contact	NC	- -	- -	- -	0	- -
		Total	NC	- -	- -	- -	0.04	- -
Occupational Worker	Surface Soil	Incidental Ingestion	9E-06	- -	- -	Benzo(a)pyrene	0.09	- -
		Dermal Contact	8E-06	- -	- -	Benzo(a)pyrene	0.000001	- -
		Inhalation	5E-09	- -	- -	- -	0.0001	- -
		Total	2E-05	- -	- -	Benzo(a)pyrene, Dibenzo(a,h)anthracene	0.09	- -
	Groundwater	Incidental Ingestion	1E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethane	1,1,2-Trichloroethane, RDX	2	- -
		Dermal Contact	4E-05	- -	Trichloroethene	Trichloroethene, Vinyl Chloride	0.03	- -
		Total	1E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethane	1,1,2-Trichloroethane, RDX	2	- -
Adolescent Trespasser	Surface Soil	Incidental Ingestion	7E-07	- -	- -	- -	0.01	- -
		Dermal Contact	6E-07	- -	- -	- -	0.0000002	- -
		Inhalation	9E-11	- -	- -	- -	0.000005	- -
		Total	1E-06	- -	- -	- -	0.01	- -
	Surface Water - Gullies	Incidental Ingestion	3E-07	- -	- -	- -	0.01	- -
		Dermal Contact	3E-08	- -	- -	- -	0.008	- -
		Total	3E-07	- -	- -	- -	0.02	- -
	Surface Water - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.007	- -
		Dermal Contact	NC	- -	- -	- -	0.01	- -
		Total	NC	- -	- -	- -	0.02	- -
	Sediment - Gullies	Incidental Ingestion	8E-09	- -	- -	- -	0.08	- -
		Dermal Contact	7E-09	- -	- -	- -	0.0006	- -
		Total	2E-08	- -	- -	- -	0.08	- -
	Sediment - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.07	- -
		Dermal Contact	NC	- -	- -	- -	0	- -
		Total	NC	- -	- -	- -	0.07	- -
Construction Worker	Surface/Subsurface Soil	Incidental Ingestion	7E-07	- -	- -	- -	0.2	- -
		Dermal Contact	3E-07	- -	- -	- -	0.000001	- -
		Inhalation	9E-09	- -	- -	- -	--	- -
		Total	1E-06	- -	- -	- -	0.2	- -
	Groundwater	Dermal Contact	3E-06	- -	- -	Trichloroethene	0.07	- -
		Inhalation	2E-06	- -	- -	Trichloroethene	0.1	- -
		Total	5E-06	- -	- -	Trichloroethene	0.2	- -

TABLE 7-34

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES - EXCLUDING BACKGROUND
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Child Recreational User	Surface Soil	Incidental Ingestion	2E-06	- -	- -	- -	0.08	- -
		Dermal Contact	2E-06	- -	- -	- -	0.000001	- -
		Inhalation	3E-10	- -	- -	- -	0.00003	- -
		Total	4E-06	- -	- -	Benzo(a)pyrene	0.08	- -
	Groundwater	Incidental Ingestion	3E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX	2	- -
		Dermal Contact	1E-05	- -	- -	Trichloroethene	0.03	- -
		Total	3E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX	2	- -
	Surface Water - Gullies	Incidental Ingestion	8E-07	- -	- -	- -	0.07	- -
		Dermal Contact	8E-08	- -	- -	- -	0.05	- -
		Total	9E-07	- -	- -	- -	0.1	- -
	Surface Water - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.04	- -
		Dermal Contact	NC	- -	- -	- -	0.06	- -
		Total	NC	- -	- -	- -	0.10	- -
	Sediment - Gullies	Incidental Ingestion	3E-08		- -	- -	0.4	- -
		Dermal Contact	2E-08	- -	- -	- -	0.004	- -
		Total	5E-08	- -	- -	- -	0.5	- -
	Sediment - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.4	- -
		Dermal Contact	NC	- -	- -	- -	0	- -
		Total	NC	- -	- -	- -	0.4	- -
Adult Recreational User	Surface Soil	Incidental Ingestion	9E-07	- -	- -	- -	0.009	- -
		Dermal Contact	1E-06	- -	- -	- -	0.0000002	- -
		Inhalation	3E-10	- -	- -	- -	0.000008	- -
		Total	2E-06	- -	- -	Benzo(a)pyrene	0.009	- -
	Groundwater	Incidental Ingestion	2E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX	0.4	- -
		Dermal Contact	2E-05	- -	Trichloroethene	Tetrachloroethene	0.02	- -
		Total	2E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX	0.4	- -
	Surface Water - Gullies	Incidental Ingestion	1E-07	- -	- -	- -	0.003	- -
		Dermal Contact	2E-07	- -	- -	- -	0.03	- -
		Total	3E-07	- -	- -	- -	0.03	- -
	Surface Water - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.002	- -
		Dermal Contact	NC	- -	- -	- -	0.04	- -
		Total	NC	- -	- -	- -	0.04	- -
	Sediment - Gullies	Incidental Ingestion	1E-08	- -	- -	- -	0.05	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0007	- -
		Total	3E-08	- -	- -	- -	0.05	- -
	Sediment - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.04	- -
		Dermal Contact	NC	- -	- -	- -	0	- -
		Total	NC	- -	- -	- -	0.04	- -

TABLE 7-34

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES - EXCLUDING BACKGROUND
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Lifelong Recreational User (Child and Adult)	Surface Soil	Incidental Ingestion	3E-06	- -	- -	Benzo(a)pyrene	NA	- -
		Dermal Contact	3E-06	- -	- -	Benzo(a)pyrene	NA	- -
		Inhalation	6E-10	- -	- -	- -	NA	- -
		Total	6E-06	- -	- -	Benzo(a)pyrene	NA	- -
	Groundwater	Incidental Ingestion	5E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX	NA	- -
		Dermal Contact	3E-05	- -	Trichloroethene	Tetrachloroethene	NA	- -
		Total	5E-04	Trichloroethene	Vinyl Chloride	Tetrachloroethene, RDX	NA	- -
	Surface Water - Gullies	Incidental Ingestion	1E-06	- -	- -	- -	NA	- -
		Dermal Contact	3E-07	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	- -	NA	- -
	Surface Water - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	NA	- -
		Dermal Contact	NC	- -	- -	- -	NA	- -
		Total	NC	- -	- -	- -	NA	- -
	Sediment - Gullies	Incidental Ingestion	4E-08	- -	- -	- -	NA	- -
		Dermal Contact	4E-08	- -	- -	- -	NA	- -
		Total	8E-08	- -	- -	- -	NA	- -
	Sediment - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	NA	- -
		Dermal Contact	NC	- -	- -	- -	NA	- -
		Total	NC	- -	- -	- -	NA	- -

TABLE 7-34

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES - EXCLUDING BACKGROUND
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Child Residents	Surface Soil	Incidental Ingestion	3E-05	- -	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene	1	- -
		Dermal Contact	1E-05	- -	- -	Benzo(a)pyrene	0.000006	- -
		Inhalation	6E-09	- -	- -	- -	0.0006	- -
		Total	4E-05	- -	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene	1	- -
	Groundwater	Ingestion	3E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, RDX	1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethene, Carbon Tetrachloride	20	cis-1,2-Dichloroethene, Trichloroethene, Vinyl Chloride, Iron, Vanadium, 2-Amino-4,6-Dinitrotoluene
		Dermal Contact	1E-04	- -	Trichloroethene	Tetrachloroethene, Vinyl Chloride	0.5	- -
		Inhalation	4E-04	Trichloroethene	- -	1,1,2-Trichloroethene	5	Trichloroethene
		Total	3E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, RDX	1,1,2,2-Tetrachloroethane, 1,2-Dichloroethane, 1,1,2-Trichloroethene, Carbon Tetrachloride	25	cis-1,2-Dichloroethene, Carbon Tetrachloride, Trichloroethene, Vinyl Chloride, Iron, Vanadium, 2-Amino-4,6-Dinitrotoluene, 4-Amino-2,6-Dinitrotoluene
	Surface Water - Gullies	Incidental Ingestion	8E-07	- -	- -	- -	0.07	- -
		Dermal Contact	8E-08	- -	- -	- -	0.05	- -
		Total	9E-07	- -	- -	- -	0.1	- -
	Surface Water - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.04	- -
		Dermal Contact	NC	- -	- -	- -	0.06	- -
		Total	NC	- -	- -	- -	0.10	- -
	Sediment - Gullies	Incidental Ingestion	3E-08	- -	- -	- -	0.4	- -
		Dermal Contact	2E-08	- -	- -	- -	0.003	- -
		Total	4E-08	- -	- -	- -	0.5	- -
	Sediment - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.4	- -
		Dermal Contact	NC	- -	- -	- -	0	- -
		Total	NC	- -	- -	- -	0.4	- -

TABLE 7-34

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES - EXCLUDING BACKGROUND
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Adult Residents	Surface Soil	Incidental Ingestion	1E-05	- -	- -	Benzo(a)pyrene, Dibenzo(a,h)anthracene	0.1	- -
		Dermal Contact	6E-06	- -	- -	Benzo(a)pyrene	0.0000010	- -
		Inhalation	7E-09	- -	- -	- -	0.0002	- -
		Total	2E-05	- -	- -	Benzo(a)pyrene, Dibenzo(a,h)anthracene	0.1	- -
	Groundwater	Ingestion	3E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, RDX	1,1,2,2-Tetrachloroethane, Carbon Tetrachloride	6	Trichloroethene, Iron
		Dermal Contact	3E-04	Trichloroethene	Tetrachloroethene	Vinyl Chloride	0.3	- -
		Inhalation	4E-04	Trichloroethene	- -	1,1,2-Trichloroethane	1.0	- -
		Total	4E-03	Trichloroethene, Vinyl Chloride	Tetrachloroethene, RDX	1,1,2,2-Tetrachloroethane, 1,2-Dichloroethane, Carbon Tetrachloride	7	Trichloroethene, Iron
	Surface Water - Gullies	Incidental Ingestion	1E-07	- -	- -	- -	0.003	- -
		Dermal Contact	2E-07	- -	- -	- -	0.03	- -
		Total	3E-07	- -	- -	- -	0.03	- -
	Surface Water - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.002	- -
		Dermal Contact	NC	- -	- -	- -	0.04	- -
		Total	NC	- -	- -	- -	0.04	- -
	Sediment - Gullies	Incidental Ingestion	1E-08	- -	- -	- -	0.05	- -
		Dermal Contact	1E-08	- -	- -	- -	0.0005	- -
		Total	2E-08	- -	- -	- -	0.05	- -
	Sediment - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	0.04	- -
		Dermal Contact	NC	- -	- -	- -	0	- -
		Total	NC	- -	- -	- -	0.04	- -

TABLE 7-34

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES - EXCLUDING BACKGROUND
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an HI > 1
Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	4E-05	- -	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene	NA	- -
		Dermal Contact	2E-05	- -	- -	Benzo(a)pyrene, Dibenzo(a,h)anthracene	NA	- -
		Inhalation	1E-08	- -	- -	- -	NA	- -
		Total	6E-05	- -	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene	NA	- -
	Groundwater	Ingestion	6E-03	Trichloroethene, Vinyl Chloride	1,1,2-Trichloroethane, Tetrachloroethene	1,1,2,2-Tetrachloroethane, 1,2-Dichloroethane, Benzene, Bromodichloromethane, Carbon Tetrachloride,	NA	- -
		Dermal Contact	5E-04	Trichloroethene	Tetrachloroethene, Vinyl Chloride	- -	NA	- -
		Inhalation	8E-04	Trichloroethene	- -	1,1,2-Trichloroethane, Chloroform, Vinyl Chloride	NA	- -
		Total	7E-03	Trichloroethene, Vinyl Chloride	1,1,2-Trichloroethane, Tetrachloroethene, RDX	1,1,2,2-Tetrachloroethane, 1,2-Dichloroethane, Benzene, Bromodichloromethane, Carbon Tetrachloride, Chloroform	NA	- -
	Surface Water - Gullies	Incidental Ingestion	1E-06	- -	- -	- -	NA	- -
		Dermal Contact	3E-07	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	- -	NA	- -
	Surface Water - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	NA	- -
		Dermal Contact	NC	- -	- -	- -	NA	- -
		Total	NC	- -	- -	- -	NA	- -
	Sediment - Gullies	Incidental Ingestion	4E-08	- -	- -	- -	NA	- -
		Dermal Contact	3E-08	- -	- -	- -	NA	- -
		Total	7E-08	- -	- -	- -	NA	- -
	Sediment - Turkey Creek	Incidental Ingestion	NC	- -	- -	- -	NA	- -
		Dermal Contact	NC	- -	- -	- -	NA	- -
		Total	NC	- -	- -	- -	NA	- -

Notes:
NC - Not calculated, no carcinogenic COPCs were identified for this media.

TABLE 7-35

SUMMARY OF OCCUPATIONAL WORKERS CANCER RISKS AND HAZARDS INDICES FOR EXPOSURES TO SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CAS Number	Chemical	Incremental Lifetime Cancer Risk (ILCR)			Estimated Non-Carcinogenic Hazard Quotient (HQ)		
		EPC[1] (mg/kg)	PRG - Industrial[2] (mg/kg)	Estimated ILCR	Primary Target Organs[3]	PRG - Industrial[2] (mg/kg)	Estimated HQ
Volatile Organic Compounds							
79-01-6	Trichloroethene	1.43	0.11	1.E-05	Liver	110	0.01
Inorganics							
7429-90-5	Aluminum	12668	NA[4]	--	CNS	920000	0.01
7440-38-2	Arsenic	5.71	1.6	4.E-06	Skin, CVS	260	0.02
7439-89-6	Iron	19793	NA[4]	--	NA	310000	0.06
7439-96-5	Manganese	148	NA[4]	--	CNS	19000	0.008
7440-62-2	Vanadium	24.8	NA[4]	--	Kidney	1000	0.02
			Total Cancer Risk	**2.E-05**		**Total HI**	**0.1**

Target Organ HIs

Total Liver HI =	0.01
Total Central Nervous System (CNS) HI =	0.02
Total Skin HI =	0.02
Total Cardiovascular System (CVS) HI =	0.02
Total Kidney HI =	0.02
Total None Available (NA) HI =	0.06

Footnotes:
1 - Exposure Point Concentration (EPC) is the 95 percent UCL calculated according to U.S. EPA's ProUCL guidance.
2 - U.S. Region 9 Preliminary Remediation Goals (PRGs), October 2004, Updated December 28, 2004.
3 - Primary Target Organs are from IRIS and NCEA.
4 - NA(4) - Not applicable. The U.S. EPA has not established a cancer slope factor (CSF) for this chemical.

TABLE 7-36

SUMMARY OF HYPOTHETICAL FUTURE RESIDENT CANCER RISKS AND HAZARDS INDICES FOR EXPOSURES TO SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CAS Number	Chemical	Incremental Lifetime Cancer Risk (ILCR)			Estimated Non-Carcinogenic Hazard Quotient (HQ)		
		EPC[1] (mg/kg)	PRG - Residential[2] (mg/kg)	Estimated ILCR	Primary Target Organs[3]	PRG - Residential[2] (mg/kg)	Estimated HQ
Volatile Organic Compounds							
79-01-6	Trichloroethene	1.43	0.053	3.E-05	Liver	16	0.09
Inorganics							
7429-90-5	Aluminum	12668	NA[4]	--	CNS	76000	0.2
7440-38-2	Arsenic	5.71	0.39	1.E-05	Skin, CVS	22	0.3
7439-89-6	Iron	19793	NA[4]	--	NA	23000	1
7439-96-5	Manganese	148	NA[4]	--	CNS	1800	0.1
7440-62-2	Vanadium	24.8	NA[4]	--	Kidney	78	0.3
			Total Carcinogenic Risk	**4.E-05**		**Total HI**	**2**

Target Organ HIs

Total Liver HI =	0.089
Total Central Nervous System (CNS) HI =	0.2
Total Skin HI =	0.3
Total Cardiovascular System (CVS) HI =	0.3
Total Kidney HI =	0.3
Total None Available (NA) HI =	1

Footnotes:
1 - Exposure Point Concentration (EPC) is the 95 percent UCL calculated according to U.S. EPA's ProUCL guidance.
2 - U.S. Region 9 Preliminary Remediation Goals (PRGs), October 2004, Updated December 28, 2004.
3 - Primary Target Organs are from IRIS and NCEA.
4 - NA(4) - Not applicable. The U.S. EPA has not established a cancer slope factor (CSF) for this chemical.

TABLE 7-37

SUMMARY OF CONCLUSIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[1]	Impact on Human Receptors	Comments
SURFACE SOIL		
Benzo(a)anthracene	Child Resident ILCR = 3E-06 Lifelong Resident ILCR = 4E-06	Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene only exceeded the screening criteria in sample 16SS0030002. Concentrations of benzo(a)pyrene only exceeded the screening criteria in samples 16SS0010002 and 16SS0030002. These samples are located under asphalt; therefore it is unlikely that a receptor would be exposed to soil at these locations under current conditions. Recommend no further action.
Benzo(a)pyrene	Occupational Worker ILCR = 1E-05 Child Recreational User ILCR = 3E-06 Adult Recreational User ILCR = 2E-06 Lifelong Recreational User ILCR = 4E-06 Child Resident ILCR = 3E-05 Adult Resident ILCR = 1E-05 Lifelong Resident ILCR = 4E-05	
Benzo(b)fluoranthene	Child Resident ILCR = 3E-06 Lifelong Resident ILCR = 4E-06	
Dibenzo(a,h)anthracene	Occupational Worker ILCR = 2E-06 Child Resident ILCR = 5E-06 Adult Resident ILCR = 2E-06 Lifelong Resident ILCR = 7E-06	
Arsenic	Occupational Worker ILCR = 4E-06 Child Resident ILCR = 1E-05 Adult Resident ILCR = 5E-06 Lifelong Resident ILCR = 2E-05	Concentrations of arsenic are within base-wide background levels. Recommend no further action.
SURFACE/SUBSURFACE SOIL		
Aluminum	Construction Worker HQ = 1	Concentrations of aluminum are within base-wide background levels. Recommend no further action.
Manganese	Construction Worker HQ = 2	Concentrations of manganese are within base-wide background levels. Recommend no further action.
GROUNDWATER		
1,1,2,2-Tetrachloroethane	Child Resident ILCR = 3E-06 Adult Resident ILCR = 4E-06 Lifelong Resident ILCR = 7E-06	1,1,2,2-Tetrachloroethane was only detected in 2 of 23 groundwater samples. Recommend no further action.

TABLE 7-37

SUMMARY OF CONCLUSIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[1]	Impact on Human Receptors	Comments
1,1,2-Trichloroethane	Occupational Worker ILCR = 4E-06 Lifelong Recreational User ILCR = 2E-06 Child Resident ILCR = 1E-05 Adult Resident ILCR = 1E-05 Lifelong Resident ILCR = 2E-05	Concentrations of 1,1,2-trichloroethane exceeded the U.S. EPA MCL and IDEM default closure level in six groundwater samples. Proceed to CMS.
1,2-Dichloroethane	Child Resident ILCR = 2E-06 Adult Resident ILCR = 2E-06 Lifelong Resident ILCR = 3E-06	1,2-Dichloroethane was only detected in 2 of 23 groundwater samples and the detected concentrations were less than the U.S. EPA MCL and IDEM default closure level. Recommend no further action.
Benzene	Lifelong Resident ILCR = 2E-06	Detected concentrations of benzene were less than the U.S. EPA MCL and IDEM default closure level. Recommend no further action.
Bromodichloromethane	Lifelong Resident ILCR = 2E-06	Detected concentrations of bromodichloromethane were less than the U.S. EPA MCL and IDEM default closure level. Recommend no further action.
Carbon Tetrachloride	Child Resident ILCR = 3E-06 Child Resident HQ = 0.5 Adult Resident ILCR = 4E-06 Lifelong Resident ILCR = 7E-06	Concentrations of carbon tetrachloride exceeded the U.S. EPA MCL and IDEM default closure level in three groundwater samples. Proceed to CMS.
Chloroform	Lifelong Resident ILCR = 2E-06	Detected concentrations of chloroform were less than the U.S. EPA MCL and IDEM default closure level. Recommend no further action.
cis-1,2-Dichloroethene	Child Resident HQ = 3	Proceed to CMS.
Tetrachloroethene	Occupational Worker ILCR = 2E-05 Child Recreational User ILCR = 5E-06 Adult Recreational User ILCR = 6E-06 Lifelong Recreational User ILCR = 1E-05 Child Resident ILCR = 6E-05 Adult Resident ILCR = 8E-05 Lifelong Resident ILCR = 1E-04	Proceed to CMS.

TABLE 7-37

SUMMARY OF CONCLUSIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[1]	Impact on Human Receptors	Comments
Trichloroethene	Occupational Worker ILCR = 1E-03 Construction Worker ILCR = 5E-06 Child Recreational User ILCR = 2E-04 Adult Recreational User ILCR = 2E-04 Lifelong Recreational User ILCR = 4E-04 Child Resident ILCR = 3E-03 Child Resident HQ = 9 Adult Resident ILCR = 3E-03 Adult Resident HQ = 2 Lifelong Resident ILCR = 6E-03	Proceed to CMS.
Vinyl Chloride	Occupational Worker ILCR = 1E-04 Child Recreational User ILCR = 3E-05 Adult Recreational User ILCR = 3E-05 Lifelong Recreational User ILCR = 6E-05 Child Resident ILCR = 3E-04 Child Resident HQ = 0.8 Adult Resident ILCR = 4E-04 Lifelong Resident ILCR = 7E-04	Concentrations of vinyl chloride exceeded the U.S. EPA MCL and IDEM default closure level in three groundwater samples. Proceed to CMS.
2-Amino-4,6-Dinitrotoluene	Child Resident HQ = 0.6	Concentrations of 2-amino-4,6-dinitrotoluene exceeded the U.S. EPA Region 9 PRG in only one groundwater sample. Proceed to CMS.
4-Amino-2,6-Dinitrotoluene	Child Resident HQ = 0.4	Concentrations of 4-amino-2,6-dinitrotoluene exceeded the U.S. EPA Region 9 PRG in only one groundwater sample. Proceed to CMS.
RDX	Occupational Worker ILCR = 1E-05 Child Recreational User ILCR = 2E-06 Adult Recreational User ILCR = 2E-06 Lifelong Recreational User ILCR = 4E-06 Child Resident ILCR = 2E-05 Adult Resident ILCR = 3E-05 Lifelong Resident ILCR = 5E-05	Recommend no further action.
Aluminum	Child Resident HQ = 2	Aluminum is not a site related chemical. Recommend no further action.

TABLE 7-37

SUMMARY OF CONCLUSIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[1]	Impact on Human Receptors	Comments
Arsenic	Occupational Worker ILCR = 3E-05 Child Recreational User ILCR = 6E-06 Adult Recreational User ILCR = 6E-06 Lifelong Recreational User ILCR = 1E-05 Child Resident ILCR = 7E-05 Child Resident HQ = 2 Adult Resident ILCR = 7E-05 Lifelong Resident ILCR = 1E-04	Arsenic is not a site related chemical. Recommend no further action.
Iron	Child Resident HQ = 9 Adult Resident HQ = 3	Proceed to CMS.
Lithium	Child Resident HQ = 2	Lithium is not a site related chemical. Recommend no further action.
Manganese	Occupational Worker HQ = 2 Child Recreational User HQ = 2 Child Resident HQ = 20 Adult Resident HQ = 6	Manganese is not a site related chemical. Recommend no further action.
Vanadium	Child Resident HQ = 3	Proceed to CMS.
SEDIMENT - GULLIES		
Arsenic	Child Recreational Users ILCR = 2E-06 Lifelong Recreational Users ILCR = 3E-06 Child Residents ILCR = 2E-06 Lifelong Residents ILCR = 3E-06	Concentrations of arsenic are within base wide background levels. Recommend no further action.
Lead	Hypothetical residents - More than 5 % of children are predicted to have blood lead levels greater than 10 ug/dL if they are exposed to lead in sediments from the gullies more than one day a week.	Lead was detected at a maximum concentration of 15,200 mg/kg. Concentrations of lead exceed the OSWER residential screening level of 400 mg/kg in 17 of 31 samples and the industrial screening level of 800 mg/kg in 13 of 31 samples. Proceed to CMS.

TABLE 7-37

SUMMARY OF CONCLUSIONS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[1]	Impact on Human Receptors	Comments
SEDIMENT - TURKEY CREEK		
Arsenic	Maintenance Workers ILCR = 2E-06 Child Recreational Users ILCR = 5E-06 Adult Recreational Users ILCR = 2E-06 Lifelong Recreational Users ILCR = 7E-06 Child Residents ILCR = 4E-06 Adult Residents ILCR = 2E-06 Lifelong Residents ILCR = 6E-06	Concentrations of arsenic are within base-wide background levels. Recommend no further action.

HQ = Hazard Quotient.
ILCR = Incremental Lifetime Cancer Risk
(1) - Any carcinogenic chemical with an ILCR greater than 1.0E-6 or a non-carcinogenic chemical contributing to target organ hazard indices (HI) greater than 1.0.

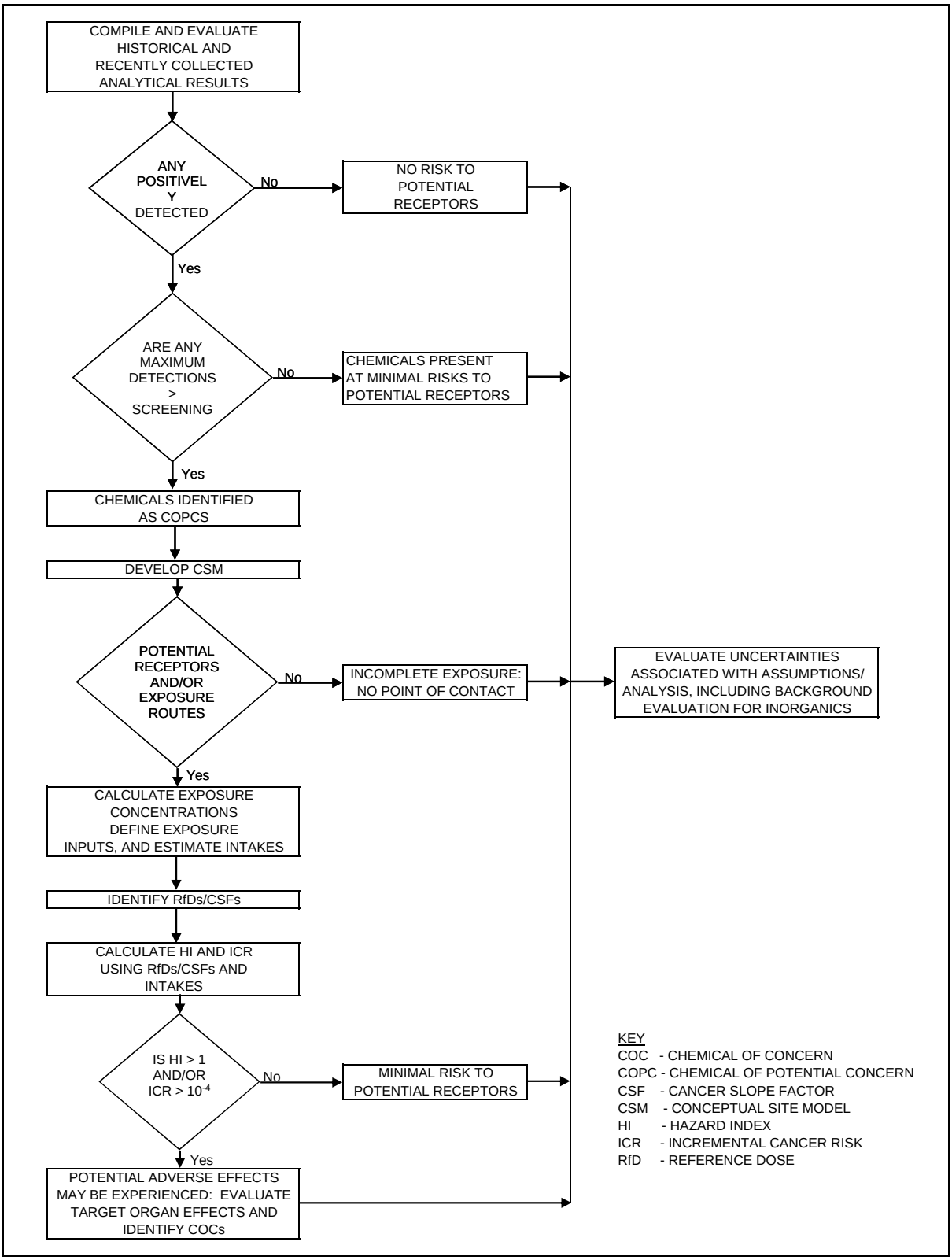
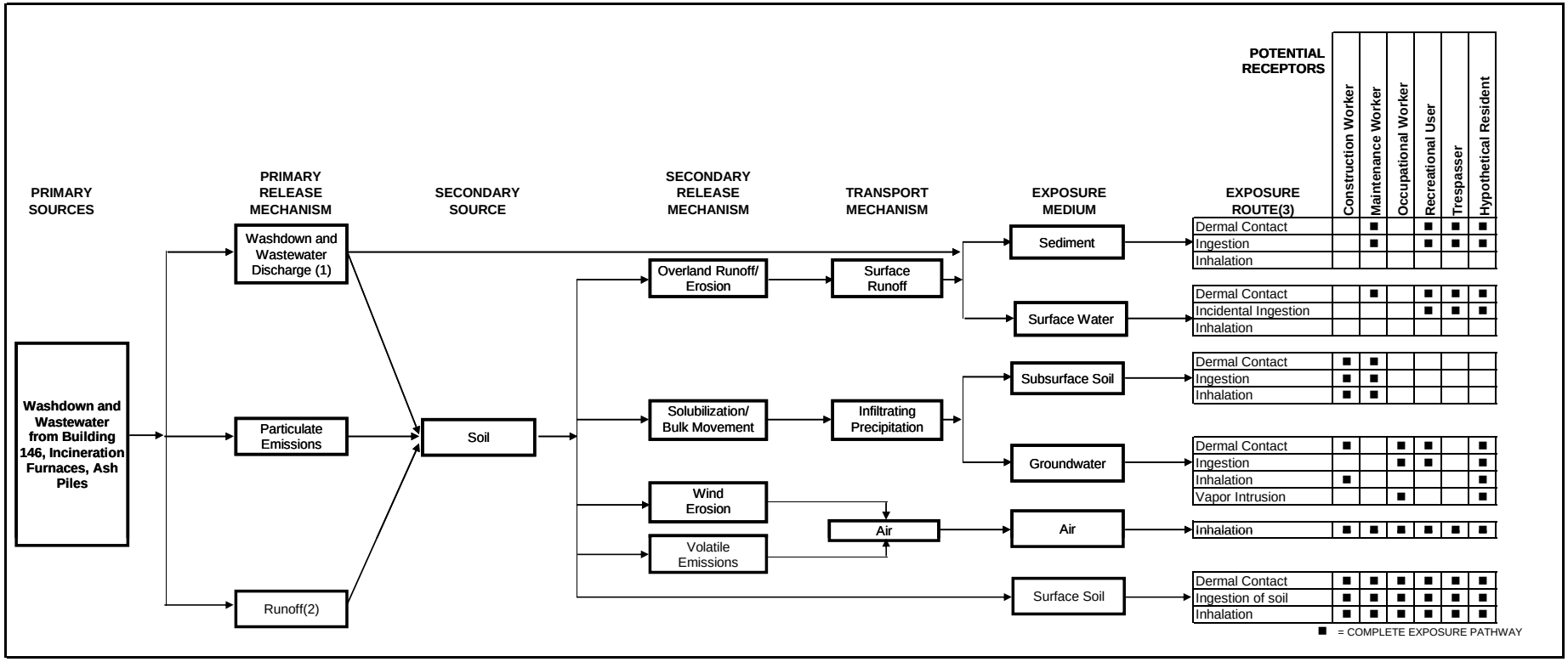


FIGURE 7-1

SUMMARY OF HUMAN HEALTH RISK ASSESSMENT PROCESS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

FIGURE 7-2

HUMAN HEALTH CONCEPTUAL SITE MODEL
SWMU 16 - CAST HIGH EXPLOSIVE FILL / B146 INCINERATOR
NSWC CRANE, INDIANA



1. Washdown and washout wastewater were discharged through floor drains of Building 146 to sumps which emptied into the Boggs Creek watershed.
2. Runoff from incinerator ash piles.
3. Blank space indicates incomplete exposure pathway or relatively insignificant, or not applicable potential exposure.

8.0 ECOLOGICAL RISK ASSESSMENT

The goal of this SERA for SWMU 16 – Cast High Explosives Fill/B146 Incinerator is to evaluate the potential for adverse ecological impacts of site-related contamination. The goal of this SERA was accomplished by identifying the COPCs detected at concentrations that exceed screening levels, identifying the locations of these exceedances, and concluding whether or not further investigation and/or remedial action at SWMU 16 at NSWC Crane is warranted from an ecological perspective.

8.1 INTRODUCTION

The SERA methodology used at NSWC Crane is in accordance with the following guidance documents:

- Department of Navy Environmental Policy Memorandum 97-04: Use of Ecological Risk Assessments dated May 16, 1997.
- Navy Policy for Conducting Ecological Risk Assessment (Navy, 1999).
- Final Guidelines for Ecological Risk Assessment (U.S. EPA, 1998).
- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (U.S. EPA, 1997a).

This SERA consists of Steps 1, 2, and 3a of the eight ecological risk evaluation steps required by U.S. EPA guidance (U.S. EPA, 1997a and 1998) and the Navy Policy for Conducting ERAs (Navy, 1999). These eight steps comprise Steps 1 and 2, which constitute a SERA, followed by four additional steps, which constitute a Baseline ERA (BERA), and conclude with Step 8, a risk management evaluation. Step 3a is technically the first step of the BERA and it consists of a refinement of the conservative exposure assumptions, but it is included in this SERA in accordance with Navy guidance. Steps 3b through 7 are conducted if additional evaluations or investigations are necessary. Aspects of Step 8, risk management, are addressed throughout the ERA process, in cooperation with the Region 5 regulators.

A schematic diagram of the general risk assessment process is provided in Figure 8-1. In addition, Figures 8-2, 8-3, and 8-4 are flow charts that summarize the ERA process that was used to evaluate risks for ecological receptors exposed to chemicals to surface soil, sediment, and surface water, respectively.

These flow charts are discussed later in this ERA. The supporting documentation for the SERA is presented in Appendices J.1 to J.6.

8.2 SCREENING-LEVEL PROBLEM FORMULATION

The screening-level problem formulation is the first step of the SERA and includes identification of potential receptor groups, COPCs, and the mechanisms for contaminant fate, transport, and toxicity. Determination of the complete exposure pathways that exist at a site is accomplished at this point to facilitate receptor selection. The problem formulation process enables the risk assessor to identify the ecological resources to be protected (known as assessment endpoints); the measurements that will be used to evaluate risks to those resources (known as measures of effects); and the chemicals, geographic areas, and environmental media relevant to the risk assessment.

As part of receptor identification, site habitats and potential ecological receptors are described. These characteristics, as they apply to ecological risk, are described in the following subsections.

8.2.1 Environmental Setting

8.2.1.1 Basewide Environmental Setting

A biological characterization of NSWC Crane, including a list of plants and animals found at the facility, is presented in the Installation Assessment (IA) (Army, 1978) and the Initial Assessment Study (IAS) (NEESA, 1983) and is summarized in the Environmental Monitoring Reports (EMRs) (Halliburton NUS, 1992a and 1992b). A list of the species that may inhabit NSWC Crane and are protected under the United States Endangered Species Act, Indiana Department of Natural Resources Heritage Data Center, or the United States Fish and Wildlife Service is summarized in the RCRA Facility Permit (U.S. EPA, 1995) and below. The following paragraphs briefly summarize the environmental setting at the base.

Eighty (80) percent of NSWC Crane's 63,000 acres is classified as Central Hardwoods Forest of the United States (NEESA, 1983). In addition, some agricultural fields are in various stages of succession. Open spaces on dry upland sites contain almost pure stands of grasses with some clumps of woody plants such as persimmon, sassafras, and sumac. Wetter sites have river birch, willow, sycamore, and cottonwood. Hillside communities have mostly hickory, white and black oak, red maple, sugar maple, tulip poplar, ash, and beech (NEESA, 1983).

The great variety of habitats at NSWC Crane (i.e., many stages of forest succession, streams, ponds, Lake Greenwood, grassy open spaces) lead to great diversity of animal species (NEESA, 1983). Some

of these species include, but are not limited to, mammals such as white-tailed deer, beaver, coyote, hawks, red fox, rabbits, raccoons, and mice; birds such as ducks, geese, wild turkey, bobwhite quail, red-tailed hawks, and American robins; and various amphibians, reptiles, fish, and invertebrates.

Six main creeks receive drainage in five separate drainage basins at NSWC Crane: Furst Creek, Sulphur Creek, Little Sulphur Creek, Boggs Creek, Turkey Creek, and Seed Tick Creek. There also are many smaller streams, creeks, and drainage ditches located at the facility, along with several small man-made ponds and one large lake (Lake Greenwood). Lake Greenwood is the source of potable water for NSWC Crane. Surface water from the facility eventually discharges to the eastern fork of the White River, which is located south of the facility.

Threatened and Endangered Species

The Endangered Species Management Plan for NSWC Crane (Comarco Systems, Inc., 2000) identified the federal and State threatened and endangered species and species of special concern potentially present at NSWC Crane. Information included in the Endangered Species Management Plan was obtained from studies and surveys conducted by the Navy and other agencies and groups such as universities and research institutions. A small subset of these studies include the Inventory of Neotropical Migratory Birds, Mist Net and Radiotelemetry Surveys for the Indiana bat, Bobcat Trapping, Rattlesnake Survey, Purdue University Wildlife Studies, and several fish surveys, and bird counts. These studies and others that were used in compiling the list of endangered species present at NSWC Crane are described in more detail in the Endangered Species Management Plan (Comarco Systems, Inc., 2000) and below.

The Indiana bat and bald eagle are the only federally threatened or endangered species at NSWC Crane. The bald eagle is not likely present at SWMU 16 due to a lack of vast expanses of open water (i.e., the preferred hunting habitat for the bald eagle). Two mist net sites were located in the mainstream tributary to Boggs Creek adjacent to SWMU 13; however, no Indiana bats were captured at these two locations between May 18 and July 11, 1998. Therefore, although Indiana bats have been captured at NSWC Crane, their presence surrounding SWMU 13 has not been documented.

In addition, a number of state endangered and federal and state species of concern have been listed for NSWC Crane (Comarco Systems, Inc., 2000). The state endangered species list for NSWC Crane includes two mammals (bobcat and Indiana bat), one reptile (timber rattlesnake), and several birds (bald eagle, osprey, loggerhead shrike, yellow-crowned night-heron, Virginia rail, king rail, and Henslow's sparrow. The Rare Animals of Indiana list (Indiana DNR, 2002) was also reviewed to verify that no changes in the status of these species had occurred since October 2000. This list is much larger than

that presented in Comarco Systems, Inc. (2000) and is not reiterated here. An internet search was conducted and it was verified that the species listed above did not experience a change in status.

Turkey Creek discharges off-site to Boggs Creek, which eventually discharges to the East Fork of the White River. River otters, a state endangered species, are being reintroduced to Indiana. The otters are expanding from their original release sites into other watersheds including the East Fork of the White River (IDNR, 2000). Also, the East Fork of the White River is the site for an ongoing study of lake sturgeon populations, another state endangered species (IDNR, 2000). Finally, spotted darters, a state endangered species, has been found in the East Fork of the White River (IDNR, 2000). Note that other threatened, endangered, or special concern species also may be present in the water bodies just off-site of Crane, as well.

The Navy sent a letter to the U.S. Fish and Wildlife Service (U.S. FWS) detailing the ongoing RCRA projects at Crane and requesting informal consultation on possible impacts to the federally endangered Indiana bat and federally threatened bald eagle. The U.S. FWS responded, in a letter dated October 18, 2005, that the likelihood of Indiana bats or bald eagles at Crane being exposed to contaminants from SWMUs is very remote (i.e., discountable) and if some exposure were to occur, it is anticipated that it would not rise to the level of take (i.e. insignificant) (see Appendix J.1).

8.2.1.2 Site Specific Environmental Setting

Figure 8-5 is an aerial photograph of SWMU 16 and indicates the SWMU boundaries. Appendix J.2 presents the ecological assessment checklist and a figure presenting the different ecological habitats at the SWMU.

Building 146 (Figure 1-3) is the largest building at SWMU 16, approximately 2/3 acre in size. The areas immediately surrounding Building 146 consist of gravel parking lots and paved road that allows access to Building 146. Most grassy areas are located southeast of Building 146. The majority of the SWMU surrounding Building 146 consists of heavily forested areas (see Figure 8-5). Surface drainage at SWMU 16 is routed via ditches and culverts to intermittent drainage ways that drain to Turkey Creek.

The drainage ditches at SWMU 16 (which is approximately 16 acres in size) discharge to Turkey Creek. The drainage ditches are usually dry and are typically only wet during and immediately after rain events. The Turkey Creek waterbody segment was included in the 2004 Indiana Integrated Water Quality Monitoring and Assessment Report, but was not assessed because insufficient data or no data was

available to determine designated state water uses (i.e., aquatic life support, fish consumption, and primary contact) (IDEM, 2004).

Based on the fact that the creek was dry or only had ponded water during some of the sampling events, it appears that this portion of Turkey Creek is intermittent. Location 16SD/SW19 and the intermittent gullies are typically dry except during heavy rain events; however, during several site visits water was present and there is a possibility of macroinvertebrates at these locations at least during some portions of the year. It is not likely that the gullies at SWMU 16 support small fish; however, small fish may be present in Turkey Creek. As previously mentioned portions of Turkey Creek are perennial and support aquatic organisms, including fish, year-round. In fact, small fish (2 to 3 inches) were noted in ponded water at locations 16SD/SW24 and 16SD/SW25 during Round 3 (see the supplemental sample documentation sheets in Appendix C). Appendix A presents photographs of many of the surface water and sediment sample locations and from the photographs it can be seen that many locations were dry.

8.2.2 Contaminants, Ecotoxicity, and Fate and Transport

Based on the historical site data and sampling, the following parameters are among the site-related chemical contaminants known to be present or potentially present in environmental media in SWMU 16:

- Explosives and their degradation products
- SVOCs
- VOCs
- Dioxins
- Inorganics

8.2.2.1 Physical and Chemical Characteristics

Physical and chemical characteristics of contaminants may affect their mobility, transport, and bioavailability in the environment. These characteristics include bioaccumulation factors (BAFs), organic carbon partition coefficients, and octanol-water partition coefficients. The physical and chemical characteristics of the different chemical classes present in SWMU 16 media are presented in Appendix J.3.

8.2.3 Potential Exposure Pathways

Section 1.2 of this RFI describes the operational history, deposition mechanisms, and potential contaminant migration patterns for SWMU 16. Section 1.3 presents detailed descriptions of previous investigations and the potential sources of contamination for SWMU 16. The contaminants from these sources may have migrated to soil, sediment, surface water, and/or groundwater via various transport pathways (e.g., particulate emissions, runoff, leaks, direct discharge, etc.).

8.2.3.1 Surface Soil

Several groups of terrestrial ecological receptors can be exposed to contaminants in surface soil. Invertebrates such as earthworms are exposed to contaminants as they move through the soil and ingest soil particles while searching for food. Plants are exposed to the contaminants via direct contact as contaminants are absorbed through the roots. Contaminants are then translocated to different parts of the plants (e.g., leaves, seeds). These pathways are evaluated in the SERA.

Small mammals may be exposed to contaminants in soil via several exposure routes. They may be exposed by direct contact as they search for food or burrow into the soil. Exposure of terrestrial wildlife to contaminants in the soil via dermal contact is unlikely to represent a major exposure pathway because fur, feathers, and chitinous exoskeletons are expected to minimize transfer of contaminants across dermal tissue. Therefore, the dermal pathway was not evaluated in the SERA. Small mammals also may be exposed to contaminants in the soil via incidental ingestion of soil and ingestion of plants and/or invertebrates that have accumulated contaminants from the soil. These pathways are evaluated in the SERA.

Larger predatory species such as the red fox and red-tailed hawk can be indirectly exposed to soil contaminants by ingesting small mammals that have accumulated contaminants from soil. These pathways were not evaluated in the SERA for the reasons discussed in Section 8.2.4.1.

8.2.3.2 Groundwater

Ecological receptors are not directly exposed to contaminants in groundwater at the site. Exposure to groundwater discharging as a seep or directly to a surface water body represents a complete exposure pathway and is evaluated as part of the surface water pathway.

8.2.3.3 Surface Water/Sediment

As mentioned above, contaminants in groundwater may discharge as a seep that flows into surface water or may discharge directly into a surface water body. Contaminants in soil may also enter the intermittent drainage channels at SWMU 16 via overland flow.

The aquatic habitat at SWMU 16 consists of small and intermittent gullies that drain SWMU 16 water run-off to Turkey Creek. Although the small tributaries are typically wet during rain events only, these gullies contribute water and sediments to Turkey Creek. Figure 2-3 shows Turkey Creek and its unnamed tributaries. Fish could be exposed to chemical contamination by direct contact with, and ingestion of, contaminated surface water or sediments. Piscivorous wildlife may consume fish that have accumulated chemicals from surface water and sediment; however, it is unlikely that piscivorous wildlife will obtain significant portions of their diet from these surface water sources because the drainage channels and Turkey Creek at SWMU 16 do not support significant populations of fish. Therefore, this exposure pathway was not evaluated in this SERA.

8.2.3.4 Air

Inhalation of particulates by mammals and birds is not considered a complete pathway at SWMU 16 because the incinerators at SWMU 16 were closed in the early 1990s; therefore, air should no longer be a migration pathway of significance because the furnaces and ash piles have been removed. Also, inhalation pathways are not typically evaluated in SERAs because of the uncertainty inherent in estimating exposure levels and toxicological effects. Therefore, the air inhalation pathway is not evaluated in the SERA.

8.2.4 <u>Endpoints</u>

8.2.4.1 Assessment Endpoints

Assessment endpoints are an explicit expression of the environmental value that is to be protected (U.S. EPA, 1997a). The selection of these endpoints is based on the habitats present, the migration pathways of probable contaminants, and the relevant exposure routes for the receptors.

As already discussed in 8.2.1.2, the habitat at SWMU 16 consists primarily of wooded areas. However, the contaminated areas at the SWMU are covered to some extent by roads and Building 146 (see Figure 8-5). The drainageways adjacent to the site are intermittent, but they ultimately drain to Turkey Creek. Based on

the habitats at SWMU 16, the assessment endpoints include protection of the following groups of receptors from adverse effects of contaminants on their growth, survival, and reproduction:

- Soil invertebrates
- Terrestrial vegetation
- Herbivorous birds and mammals
- Soil invertebrate-eating birds and mammals
- Benthic macroinvertebrates
- Fish
- Amphibians and reptiles

The following paragraphs discuss the reasons that the above assessment endpoints were selected for evaluation in the SERA.

Soil Invertebrates: Soil invertebrates are present in the soil at SWMU 16. They aid in the formation of soil and the redistribution and decomposition of organic matter in the soil, and they serve as a food source for higher trophic-level organisms. They also can accumulate bioaccumulative contaminants that can then be transferred to the higher trophic-level organisms that consume soil invertebrates.

Terrestrial Vegetation: Terrestrial vegetation at SWMU 16 consists of grasses, shrubs, and trees. They serve as a food source and provide shade and cover for many organisms, and they help to prevent soil erosion, among other important functions. They also can accumulate some contaminants that can then be transferred to the higher trophic-level organisms that consume plants.

Herbivorous Birds and Mammals: Herbivorous birds and mammals (i.e., animals that consume only plant tissue) forage in some portions of SWMU 16. Their role in the community is essential because, without them, higher trophic levels could not exist (Smith, 1966). They may be exposed to and accumulate contaminants present in the plants they consume.

Soil Invertebrate-Eating Birds and Mammals: Soil invertebrate-eating birds and mammals are present throughout the base in different terrestrial habitats (i.e., forested, open field) and are present at SWMU 16. These are considered first-level carnivores, and they serve as a food source for higher trophic-level carnivores. They may be exposed to and accumulate contaminants present in the food items they consume.

Benthic Macroinvertebrates: Benthic macroinvertebrates are similar to soil invertebrates in that they serve as a food source for higher trophic-level organisms (i.e., fish, amphibians, birds, mammals). Their presence in the intermittent drainageways will be ephemeral because of a lack of suitable habitat and water flow; however, these receptors are likely present in Turkey Creek during and after heavy rain events. Benthic macroinvertebrates can accumulate contaminants that can then be transferred to higher trophic-level organisms such as fish in Turkey Creek that consume them.

Fish: Fish are not present in the drainageways leading away from SWMU 16 because the drainageways are usually dry. However, SWMU 16 is located within the Boggs and Turkey Creek Drainage Basin, which is one of five drainage basins that carry surface water off the installation. In particular, surface run-off at SWMU 16 flows to Turkey Creek, which is a perennial stream that supports fish year-round. Fish in Turkey Creek may be exposed to and can accumulate contaminants from the food items they consume or from the surface water in which they live. Additionally, fish in Turkey Creek may swim upstream into the intermittent drainageways at SWMU 16 during higher flow periods. Therefore, in order to be conservative, fish in Turkey Creek are evaluated as part of the SERA for the potential migration of SWMU 16 surface water and sediment concentrations and the potential migration of fish into the intermittent drainageways.

Amphibians and Reptiles: Amphibians are expected to inhabit water bodies and the surrounding areas, and reptiles can inhabit both aquatic environments and terrestrial habitats. Amphibians and reptiles feed primarily on invertebrates, plants, fish, and/or small mammals. They are exposed to and can accumulate contaminants from the food items they consume or from the surface water, sediment, or surface soil in which they live.

Not all of the potential assessment endpoints listed above will be evaluated in the SERA. As indicated in U.S. EPA guidance (U.S. EPA, 1997a), “it is not practical or possible to directly evaluate risks to all of the individual components of the ecosystem at a site. Instead, assessment endpoints focus the risk assessment on particular components of the ecosystem that could be adversely affected by contaminants from the site.” Therefore, the SERA will focus on the endpoints that will tend to yield the highest risks, which should then account for endpoints that will have lower risks.

Large carnivorous mammals and birds (e.g., red fox, red-tailed hawk) were not selected as assessment endpoints because the greatest exposure to site contaminants is expected to occur to small mammals and birds that ingest invertebrates, fish, or plants. Additionally, SWMU 16 represents only a small percentage of these large carnivores’ home ranges. Conservative data indicates a home range size of 150 hectares (ha) (370 acres, southern Michigan fields and wood lots) for the red-tailed hawk and 78 ha

(193 acres, Wisconsin marsh, forests, and prairies) for the red fox (U.S. EPA, 1993c). Although SWMU 16 is approximately 16 acres, the potentially contaminated area that wildlife are exposed to is approximately 1.7 acres, representing approximately 0.5 percent and 0.9 percent of the home ranges for the hawk and fox, respectively. Therefore, by protecting the small mammals and birds, large carnivorous mammals and birds will also be protected. The uncertainties associated with not performing food-chain modeling for large carnivorous mammals at the site are presented in Section 8.5.

Omnivores were not selected as assessment endpoints because exposure to contaminants in plants is greatest for herbivores and exposure to contaminants in animals is greatest for insectivores. Therefore, omnivores will be protected by protecting herbivores and insectivores.

8.2.4.2 Measurement Endpoints

Measurement endpoints are estimates of measurable biological impacts (e.g., mortality, growth, and reproduction) that are used to evaluate the assessment endpoints. The following measures of effects were used to evaluate the assessment endpoints in the SERA:

- Soil screening values - Mortality, growth, and reproduction of plants and soil invertebrates are evaluated by comparing the measured concentrations of chemicals in surface soil to screening values designed to be protective of ecological receptors.

- Wildlife toxicity reference values (TRVs) - Mortality, reproductive, and/or developmental effects of birds and mammals are evaluated by comparing the estimated dose incurred (based on conservative and average assumptions) from ingestion of contaminants in surface water, sediment, surface soil, plants, and invertebrates TRVs.

- Sediment screening values - Mortality and other adverse effects (e.g., growth, feeding rates, and behavioral changes) of benthic macroinvertebrates are evaluated by comparing the measured concentrations of chemicals in sediment to screening values designed to be protective of ecological receptors.

- Surface water screening values - Mortality and other adverse effects (e.g., growth, feeding rates, and behavioral changes) of aquatic organisms are evaluated by comparing the measured concentrations of chemicals in the surface water to screening values designed to be protective of ecological receptors.

8.2.4.3 Selection of Receptor Species

Many receptors in the soil environments at SWMU 16 are typically grouped into general categories such as soil invertebrates and vegetation. This is a reflection of the nature of the threshold values, effects values, or criteria typically used to characterize risk for such organisms. However, for vertebrate receptors, selection of a representative species is required so that risks incurred by intake through eating and drinking can be estimated to these upper-level species.

Ingestion is the primary route of exposure for most mammals and birds. The selection of species used to represent the receptor groups identified in Section 8.2.4.1 was based on considerations of their preferred habitat, body size, sensitivity to contaminants, home range, abundance, commercial or sport utilization, legal status, and functional role (e.g., predators). The availability of exposure parameters such as body mass, feeding rate, and drinking rate may also be a factor in selecting surrogate species. The following surrogate species were used in the food-chain modeling:

- Herbivorous mammal - meadow vole
- Herbivorous bird - bobwhite quail
- Insectivorous mammals - short tail shrew
- Insectivorous bird - American woodcock

Receptor profiles for each of the species above are presented in Appendix J.4.

8.2.4.4 Conceptual Model

A conceptual model in problem formulation is a written description and visual representation of predicted relationships between ecological entities and the stressors to which they may be exposed. The conceptual model consists of two primary components: predicted relationships among stressor, exposure, and assessment endpoint response and a diagram that illustrates the relationships (U.S. EPA, 1998).

The primary sources of known or potential contamination at SWMU 16 were identified based on past operational practices and the physical characteristics of the sites. As discussed in Section 1.0, the primary sources of contamination have been identified as washdown and wastewater from Building 146, incineration furnaces, and ash piles. These contaminants have been released to environmental media via washdown and wastewater discharge through floor drains of Building 146 to sumps that emptied into the Boggs Creek Watershed, particulate emissions, and runoff from incinerator ash piles; therefore, the

primary stressors to ecological receptors are contaminants in surface soil, surface water, and sediment. The primary receptors for contaminants in surface soil are plants, invertebrates, amphibians and reptiles, and secondary receptors are birds and mammals. The primary receptors for contaminants in surface water and sediment are fish, amphibians and reptiles, and aquatic/benthic invertebrates. Figure 8-6 presents the conceptual site model for SWMU 16.

8.3 ECOLOGICAL EFFECTS EVALUATION/SELECTION OF COPCs

8.3.1 Ecological Effects Evaluation

The preliminary ecological effects evaluation is an investigation of the relationship between the magnitude of exposure to a chemical and the nature and magnitude of adverse effects resulting from exposure. In addition to being a toxicological evaluation, it may also include descriptions of apparent effects seen during the site visit (i.e., stressed vegetation, see Appendix J.2). Toxicity thresholds are usually expressed in units of concentration when the medium of concern is in intimate contact with the receptor, such as surface water for aquatic organisms or soil for soil invertebrates. For other receptors, such as terrestrial vertebrates, toxicity data are typically available as doses, with units equal to mass of contaminant per unit of body mass per unit of time (usually mg/kg/day).

As the first step in the ecological effects evaluation, COPCs were selected by comparing contaminant concentrations in surface water, sediment, and surface soil samples to Region 5 ecological screening levels (ESLs) (U.S. EPA, 2003e). U.S. EPA has developed Ecological Soil Screening Levels (Eco SSLs) for a few chemicals. These values were used in place of the Region 5 ESLs because they are based on more recent data. Also, the Region 5 ESLs for surface water are the lowest water quality criteria for the various states in U.S. EPA Region 5. State of Indiana Water Quality Standards (WQSs) and U.S. EPA Water Quality Criteria (WQC) were considered; however, only the WQC were used in the Step 3a evaluation because these values have been more recently updated. The following bullets present the rules used in the selection of COPCs:

- A contaminant was retained as a COPC for risks to plants and invertebrates, aquatic organisms, and benthic invertebrates and/or wildlife if the maximum detected concentration exceeded the associated ESL (or substituted screening level as described above) in surface soil, surface water, or sediment, respectively. Contaminants retained as COPCs are further evaluated as part of Step 3a of the eight-step ERA process.

- Calcium, magnesium, potassium, and sodium were not retained as COPCs in any medium because of their relatively low toxicity to ecological receptors and their high natural variability in concentrations. These inorganics are considered essential nutrients.

- Contaminants without ESLs (or substituted screening levels, as appropriate) were retained as COPCs for further evaluation as part of Step 3a of the eight-step ERA process.

An Ecological Effects Quotient (EEQ) approach was used to characterize the risk to ecological receptors. This approach characterizes the potential effects by comparing exposure concentrations with the effects data. The EEQs for terrestrial receptors were calculated as follows:

$$EEQ = \frac{Css}{SSSL}$$

where:

Css = Contaminant concentration in surface soil (µg/kg or mg/kg)

SSSL = Surface Soil Screening Level (µg/kg or mg/kg)

The EEQs for the aquatic receptors were calculated as follows:

$$EEQ = \frac{C_{sw}}{SWSL} \text{ or } \frac{C_{sd}}{SDSL}$$

where:

Csw = Contaminant concentration in surface water (µg/L)

Csd = Contaminant concentration in sediment (µg/kg or mg/kg)

SWSL = Surface Water Screening Level (µg/L)

SDSL = Sediment Screening Level (µg/kg or mg/kg)

An EEQ of greater than 1.0 was considered to indicate potential risk. Such values do not necessarily indicate that an effect will occur but only that a low (i.e., conservative) threshold has been exceeded.

8.3.2 Selection of COPCs at SWMU 16

As discussed in Section 2.5.1, 66 surface and subsurface soil samples were collected from 41 soil borings during Round 1 of the RFI activities. During Round 2, 18 soil samples were collected from 9 soil borings and during Round 3, 106 surface and subsurface soil samples were collected from 43 soil

borings. Twenty-one (21) of the soil samples collected during Round 3 were located within B146 after coring out a 6 inch concrete plug from the building floor. Other samples that were collected during the three rounds were not included in the ecological risk evaluation for various reasons. Samples were excluded because they were collected from within Building 146 or they were collected under a roadway or parking lot. Figure 8-7 shows the surface soil locations included in the ecological COPC selection. These locations represent areas where ecological receptors could potentially be exposed to. Samples were analyzed for a wide array of chemical fractions; however, after the first round, the analyte list was reduced to inorganics and VOCs because only few detections were observed for chemicals in the other analytical fractions. The subsequent sampling rounds were designed to delineate the extent of VOC and inorganics contamination in soil and to obtain a refined understanding of the extent of contamination.

Sediment and surface water samples were collected from intermittent streams, drainageways, and surface runoff locations at SWMU 16 during the three rounds of sampling for the RFI. These data were separated into gully samples and mainstream samples. Because SWMU 16 sits atop a ridge, gully samples were collected to evaluate contaminants migrating from the SWMU into the Turkey Creek mainstream that is located at the base of the ridge. The mainstream samples were collected in order to evaluate contaminant concentrations that have already migrated from the SWMU and their impacts on aquatic receptors.

8.3.2.1 Surface Soil

Table 8-1 is the ecological surface soil screening table for SWMU 16. Dioxins, VOCs, SVOCs, herbicides, and inorganics data were collected as a part of the RFI investigation. Only sample data collected in areas where potential ecological habitat exists were included in Table 8-1 as discussed above. The maximum concentrations were used for the initial screening. Chemicals that were selected as COPCs for plants, invertebrates, and wildlife have been highlighted in Table 8-1.

Although samples were analyzed for individual dioxins, the TEQ was used to evaluate risks in surface soil. This was done because individual congeners have been found to cause toxic responses similar to those caused by tetrachlorodibenzo-p-dioxin (TCDD) and the TEQ accounts for the cumulative effects of the individual congeners. Dioxins were retained as COPCs because the TEQ value exceeded the 2,3,7,8-TCDD ESL. Two SVOCs, and 13 inorganics were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, six inorganics were selected as COPCs for further evaluation in the Step 3a because no criteria are available.

Dioxin TEQs and nine inorganics in surface soil were included in the food chain model (Section 8.4.2), because they are considered bioaccumulative chemicals (U.S. EPA, 2000) (see Table 8-1).

8.3.2.2 Sediment

Table 8-2 is the ecological sediment screening table for gully samples collected at SWMU 16. One VOC, three SVOCs, one energetic, and nine inorganics were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, 1 VOC, 1 energetic, and 12 inorganics were selected as COPCs for further evaluation in Step 3a because no criteria are available.

Table 8-3 is the ecological sediment screening table for Turkey Creek samples collected at SMWU 16. Four inorganics were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, one VOC and nine inorganics were selected as COPCs for further evaluation in Step 3a because no criteria are available.

8.3.2.3 Surface Water

Table 8-4 is the ecological surface water screening table for the gully samples collected at SWMU 16. Nine inorganics in unfiltered samples and seven dissolved inorganics in filtered samples were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, all explosives, two inorganics in unfiltered samples, two inorganics in filtered samples, and nitrite/nitrate-N were selected as COPCs for further evaluation in Step 3a because no criteria are available for comparison to the maximum concentrations.

Table 8-5 is the ecological surface water screening table for Turkey Creek samples collected at SWMU 16. Four inorganics (aluminum, cadmium, copper, and lead) in unfiltered samples and three inorganics (aluminum, cadmium, and copper) in filtered samples were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, HMX, nitrite/nitrate-N, and manganese (unfiltered and filtered) were selected as COPCs for further evaluation in Step 3a because no criteria are available.

8.3.2.4 Summary

A conservative ecological screening on surface soil, sediment, and surface water data collected as part of the RFI was conducted at SWMU 16. The chemicals selected as COPCs are evaluated further in the Step 3a evaluation.

In summary, a SERA was performed for SWMU 16. Based on the results of the evaluation, adequate information exists to determine that potential risks are possible for receptors exposed to the selected COPCs. Also, sampling locations were biased towards areas where the contamination, if present, should be detected. Therefore, the SERA is advancing to the Step 3a of the BERA – the refinement of the conservative exposure assumptions.

8.4 STEP 3A -REFINEMENT OF CONSERVATIVE EXPOSURE ASSUMPTIONS

Step 3a consists of refining the conservative exposure assumptions/concentrations when evaluating potential risks to ecological receptors (i.e., plants, invertebrates, and wildlife receptors) and re-evaluating the analytical data using benchmarks that are more appropriate for the assessment endpoints. The objective of the Step 3a refinement was to better define those chemicals that contribute to potentially unacceptable levels of ecological risk, and to identify and eliminate from further consideration those COPCs that were retained because of the use of very conservative exposure scenarios. The Step 3a evaluation is designed to eliminate chemicals from further evaluation for certain groups of receptors. For example, a chemical may not be retained as a COPC in soil based on risks to soil invertebrates, but may be retained for evaluating risks to plants or wildlife. Therefore, chemicals are evaluated during Step 3a in order of plants/invertebrates, aquatic receptors, and wildlife.

Figures 8-2, 8-3, and 8-4 are flow charts that present the ERA process that is used to evaluate risks to ecological receptors from chemicals in the soil, sediment, and surface water, respectively. The following sections describe the process for further evaluating chemicals initially selected as COPCs in soil, sediment, and surface water.

Surface Soil

Chemicals that were initially selected as COPCs in surface soil were carried through three independent flow paths: 1) to further evaluate risks to plants, 2) to further evaluate risks to invertebrates, and 3) to further evaluate risks to wildlife (i.e., mammals and birds). This evaluation was conducted to determine whether there are potential risks to all three receptor groups (i.e., plants, invertebrates, and wildlife), or to only one or two of the receptor groups. This is important because if the site proceeds further in a BERA, the studies in the BERA should only focus on the receptors that are at potential risk. Because most of the Region 5 SSLs are based on risks to mammals or birds, potential risks to plants and invertebrates cannot be determined using these values. Therefore, the first step in the Step 3a evaluation was to compare the maximum chemical concentration in the soil to "no-effects benchmarks" for plants and invertebrates such as the U.S. EPA Eco-SSLs. Although some of the alternate benchmarks may be based on effects

concentrations such as EC_{20}s, samples with chemical concentrations less than the "no-effects benchmarks" are not expected to have significant effects. The following bullets outline decisions that were made based on this comparison:

- If the concentration was less than the no-effects benchmark, it was concluded that the chemical is not causing an unacceptable risk to that receptor group and the chemical was not evaluated further in Step 3a.

- If the chemical concentration was greater than the no-effects benchmark (or the chemical does not have a no-effects benchmark) and greater than background concentrations, the chemical was further evaluated in Step 3a to determine if the risks are great enough to warrant additional evaluations [i.e., proceed to a BERA, develop cleanup levels, proceed to a corrective measures study (CMS), etc.].

- If the concentration was greater than the no-effects benchmark (or the chemical does not have a no-effects benchmark), but is less than background concentrations, it was concluded that the chemical is not causing an unacceptable site-related risk to that receptor group and the chemical was not evaluated further in Step 3a.

Concurrent with the evaluation of risks to plants and invertebrates, bioaccumulative chemicals that were selected as COPCs were evaluated to determine if there are unacceptable risks to wildlife. Even though the conservative COPC screening level may have been based on risks to wildlife, risks to wildlife were further evaluated in Step 3a to determine potential risks under an average exposure scenario. The first step in the process was to determine whether the COPC is bioaccumulative. A chemical was considered to be bioaccumulative, and thus carried through the food chain model, if it was included in the list of important bioaccumulative chemicals in U.S. EPA (2000). Also, some chemicals, such as energetics, that are not typically considered to be very bioaccumulative were included in the food chain models to be conservative. Non-bioaccumulative chemicals were not carried through the food chain model and it was concluded that they were not causing an unacceptable risk to wildlife. The following bullets outline decisions that were made based on the results of the food chain model:

- If the EEQ is less than 1.0 using average contaminant concentrations and exposure factors and the No Observable Adverse Effects Level (NOAEL) as the TRV, it was concluded that the chemical is not causing an unacceptable risk to wildlife and the chemical was not evaluated further in Step 3a.

- If the EEQ is greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, and the concentration is greater than background concentrations, the chemical was further evaluated in Step 3a to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

- If the EEQ is greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, but the concentration of the chemical is less than background, it will be concluded that the chemical is not causing an unacceptable site-related risk to wildlife and the chemical was not evaluated further in Step 3a.

For chemicals evaluated further in Step 3a, the other Step 3a factors described below were used to determine if the risks were great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

Sediment

Chemicals initially selected as COPCs in sediment were carried through one single flow path, i.e., to further evaluate risks to invertebrates. Because many of the Region 5 sediment screening levels are based on equilibrium partitioning, the maximum contaminant concentration was compared to an alternate lower effects level following the order of preference listed below (as applicable):

- Long and Morgan (1991) Effects-Range Low
- Long et al. (1995) Effects-Range Low
- Other values, as necessary and available

The following bullets outline decisions that were made based on this comparison:

- If the concentration was less than the lower-effects benchmark and greater than the upgradient concentrations, it was concluded that the chemical is not causing an unacceptable risk to invertebrates and the chemical was not evaluated further in Step 3a.

- If the concentration was greater than the lower-effects benchmark, the chemical was further evaluated in Step 3a to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

- If the concentration was greater than the lower-effects benchmark but the chemical concentration was less than upgradient concentrations, it was concluded that the chemical is not causing an unacceptable site-related risk to invertebrates and the chemical was not evaluated further in Step 3a.

For chemicals evaluated further in Step 3a, the other factors described below were used to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

Surface Water

Chemicals selected as COPCs in surface water were carried through two independent flow paths: 1) to further evaluate risks to aquatic organisms, and 2) to further evaluate risks to terrestrial wildlife (i.e., mammals and birds). This further evaluation was conducted to determine if there are potential risks from that chemical to both receptor groups (i.e., invertebrates and wildlife), or to only one of the receptor groups. This is important because if the site proceeds further in a BERA, the studies in the BERA should only focus on the receptors that are at potential risk. Organic chemicals that are initially selected as COPCs were evaluated directly in Step 3a. However, for inorganics, the following decisions were made:

- If the metal was either not detected in the filtered samples, or was detected at a concentration less than the screening level in the filtered samples, it was concluded that the chemical is not causing an unacceptable risk to aquatic organisms and the chemical was not evaluated further in Step 3a.

- If the metal was detected in the filtered samples at a concentration greater than the screening level, and the chemical concentration was greater than upgradient concentrations, it was concluded that the chemical may be causing an unacceptable risk to aquatic organisms and the chemical was evaluated further in Step 3a.

- If the metal was detected in the filtered samples at a concentration greater than the screening level, but the chemical concentration was less than upgradient concentrations, it was concluded that the chemical is not causing an unacceptable risk to aquatic organisms and the chemical was not evaluated further in Step 3a.

Concurrent with the evaluation of risks to aquatic organisms, chemicals that are retained as site-related COPCs were further evaluated to determine if there are unacceptable risks to terrestrial wildlife. The following bullets outline decisions that were made based on the results of the food chain model:

- If the EEQ (see Section 8.4) is less than 1.0 (based on the surface water portion of the food chain model) using average contaminant concentrations and exposure factors and the NOAEL as the TRV, it was concluded that the chemical is not causing an unacceptable risk to terrestrial wildlife.

- If the EEQ is greater than 1.0 (based on the surface water portion of the food chain model) using average contaminant concentrations and exposure factors and the NOAEL as the TRV, and the chemical concentration is greater than upgradient concentrations, the chemical will be further evaluated in Step 3a to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

- If the EEQ is greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, but the chemical concentration is less than upgradient concentrations, it will be concluded that the chemical is not causing an unacceptable site-related risk to terrestrial wildlife.

For chemicals evaluated further in Step 3a, the other Step 3a factors described below were used to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

Other Step 3a Factors

For chemicals that are evaluated further in Step 3a, the following factors were evaluated, as appropriate, to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS). Note that all of these factors may not be discussed for each chemical and/or receptor group.

- Magnitude of criterion exceedance: Although the magnitude of the risks may not relate directly to the magnitude of a criterion exceedance, the magnitude of the criterion exceedance may be one item used in a lines-of-evidence approach to determine the need for further site evaluation. The greater the criterion exceedance, the greater the probability and concern that an unacceptable risk exists.

- Frequency of chemical detection and spatial distribution: A chemical detected at a low frequency typically is of less concern than a chemical detected at higher frequency if toxicity and concentrations and spatial areas represented by the data are similar. All else being equal, chemicals detected frequently were given greater consideration than those detected relatively infrequently. In addition, the spatial distribution of a chemical may be evaluated to determine the area that a sample represents.

- Contaminant bioavailability: Many contaminants (especially inorganics) are present in the environment in forms that are typically not bioavailable, and the limited bioavailability was considered when evaluating the exposures of receptors to site contaminants. Contaminants with generally less bioavailability are considered to be less toxic than the more bioavailable contaminants, all other factors being equal.

- Habitat: Although exceedances of criteria may occur, potential risks to ecological receptors may be minimal if there is little habitat for those receptors. Therefore, the extent of habitat was used qualitatively when considering additional evaluation. Areas with little habitat were less of a concern than areas with suitable habitat to support the receptors of interest.

- Alternate benchmarks: These benchmarks are used to further evaluate risks to specific groups of ecological receptors (e.g., plants, invertebrates) because while ESLs are useful for initial screening they are the most conservative values available for soil, sediment, and surface water evaluation. Use of alternate benchmarks ensures that more realistic exposure assumptions are evaluated. However, some of the alternate benchmarks are overly protective for some receptors and may not be applicable in some cases. For example, the ESLs for soil may be based on risks to small mammals. Therefore, an exceedance of that ESL does not necessarily indicate that potential risks to plants or invertebrates exist, so other more appropriate benchmarks were used to evaluate potential risks to those receptors. Use of these alternate benchmarks was case-specific.

In addition to the general Step 3a factors above, other factors were evaluated in Step 3a for each receptor group. The following sections discuss the other factors that may be used, including the specific alternate benchmarks that may be used in Step 3a.

Terrestrial Plants and Invertebrates: The alternate benchmarks that were used to further evaluate risks to plants and invertebrates are listed below. The ecological endpoint for each benchmark that was used in this step was provided in the ERA. For example, if a benchmark is based on a 25 percent reduction in growth to a lettuce plant, that information was presented.

- Canadian Soil Quality Guidelines (CCME, 1997).

- Oak Ridge National Laboratory (ORNL) Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision (Efroymson, et al., 1997a).

- ORNL Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision (Efroymson, et al., 1997b).

Additional sources of toxicity data from the literature were used to evaluate potential risks to terrestrial vegetation and invertebrates from contaminants in the surface soil not included in the above documents.

Sediment: In addition to the Step 3a factors presented above, additional evaluations for sediment included comparing the chemical concentrations in the sediment to higher effects levels to show the probability of a range of possible effects. The higher effects levels that were used to further evaluate risks to benthic invertebrates were from the same sources listed in order of preference in the sediment subsection. A description of what the higher effects levels that are used in this step represent is provided in the Step 3a. For example, the PECs were intended to identify contaminant concentrations above which harmful effects on sediment-dwelling organisms were expected to occur frequently (MacDonald et al., 2000).

Surface Water: In addition to the Step 3a factors presented above, additional evaluations for surface water include comparing the chemical concentrations in the surface water to acute water quality standards/criteria to show a range of possible effects. More emphasis was placed on the dissolved inorganics concentrations (compared to total inorganics concentrations) because dissolved inorganics are a better indicator of potential bioavailability than are total recoverable inorganics. Also, emphasis was placed on average concentrations because at least some aquatic organisms (i.e., fish and other aquatic invertebrates) are exposed to average chemical concentrations as they swim in the water or as the water is transported downstream.

8.4.1 Terrestrial Plants, Terrestrial and Aquatic Invertebrates, and Fish

Potential risks to terrestrial plants, terrestrial and aquatic invertebrates, and fish from exposure to chemicals initially selected as COPCs were further evaluated as discussed above. The following subsections discuss whether COPCs are retained for further evaluation for soil invertebrates and terrestrial vegetation (Section 8.4.1.1), benthic invertebrates (Section 8.4.1.2), and aquatic organisms (Section 8.4.1.3). COPCs based on risk to upper level receptors via the food-chain are discussed in Section 8.4.2.

8.4.1.1 Soil Invertebrates and Terrestrial Vegetation – Surface Soil Risk

Risks to terrestrial plants and invertebrates resulting from exposure to the COPCs in surface soil are evaluated using the methodologies described above (Section 8.4). Table 8-6 presents a summary of some of the common alternate benchmarks available for surface soil COPCs, along with a summary of the Step 3a evaluation. The toxicological basis of the alternate benchmarks is presented below.

Dioxins

Dioxins were initially selected as COPCs because the maximum total TEQ exceeded the 2,3,7,8-TCDD ESL. However, the ESL is based on risks to wildlife (i.e., the masked shrew) and not risks to invertebrates and plants; therefore alternate toxicological data was used to further evaluate risks to plants and soil invertebrates.

One study reported in the literature demonstrated that two species of earthworms showed no adverse effects when exposed for 85 days to soil containing levels of 5 mg/kg of 2,3,7,8-TCDD, but both species died at 10 mg/kg (Eisler, 1986). The reason dioxins are not harmful to invertebrates at dioxin levels considered “high”, is that many, if not all, invertebrates lack the aryl hydrocarbon (Ah) receptor, or a comparably sensitive receptor for dioxins. For example, in U.S. EPA (1993d), it is noted that the Ah receptor has not been detected in plants or nine species of invertebrates, representing eight classes of four phyla. The document further notes that aquatic invertebrates are much less sensitive to TCDD than fish, this is perhaps due to the absence of the Ah receptor, or a comparably sensitive receptor for dioxins U.S. EPA (1993d). The Ah receptor is important because the dioxins need to bind to the receptor in order to cause toxicity. Also, Van den Berg, (1998) states that “At this time, development of TEFs for invertebrates is not recommended because there is limited evidence for ligand activation of Ah receptor or for TCDD-like toxicity in invertebrates.” For this reason, the potential for risks to invertebrates from dioxins in the soil are unlikely. Also, because the Ah receptor has not been detected in plants, it is not likely plants at SWMU 16 will be impacted by the detected levels of dioxins in the soil. Therefore, risks to plants and invertebrates from dioxins in the soil are acceptable so dioxins are not retained as COPCs for risks to these receptors. However, because dioxins are bioaccumulative chemicals, risks to wildlife from dioxins are evaluated in Section 8.4.2 to be conservative.

Bis (2-ethylhexyl) phthalate

Bis (2-ethylhexyl) phthalate was initially selected as a COPC because the maximum detected surface soil concentration of 1.2 mg/kg at location 16SS014 exceeded the Region 5 screening level (0.925 mg/kg).

However, the ESL is based on risks to wildlife (i.e., the masked shrew) and not risks to invertebrates and plants; therefore, alternate benchmarks/toxicity information were used to further evaluate risks to plants and soil invertebrates:

- ORNL Plant – 100 mg/kg (Efroymson et al., 1997b)

The bis(2-ethylhexyl) phthalate ORNL benchmark for plants is based on an EC50 value of 134 mg/kg based on effects on the growth of lettuce from seedling to 14 days in loam soils. Even though the ORNL benchmark is based on an EC50 concentration, the maximum detected concentration is much lower than the ORNL plant benchmark so impacts to plants are not expected. Therefore, risks to plants from bis (2-ethylhexyl) phthalate are acceptable; bis(2-ethylhexyl) phthalate is not retained as a COPC for risks to plants.

No benchmarks are available for bis(2-ethylhexyl) phthalate to evaluate risks to earthworms; therefore, the ORNL earthworm benchmark for dimethylphthalate (200 mg/kg) was used because the toxicity of these two phthalates is anticipated to be generally similar in magnitude. The ORNL earthworm benchmark for dimethylphthalate was developed based on survival of adults of four earthworm species. After 14 days, a three-fold difference in sensitivity of the earthworms was observed. An LC50 value of 1,064 mg/kg was the lowest toxic concentration of the three reported. The ORNL earthworm value of 200 mg/kg for dimethylphthalate was obtained by dividing the LC50 (1,064 mg/kg) by a safety factor 5 (Efroymson et al., 1997a). Although there are uncertainties in comparing the maximum di-n-butylphthalate concentration to toxicity information available for dimethylphthalate, the maximum di-n-butylphthalate concentration is less than the ORNL earthworm benchmark for dimethylphthalate and impacts to invertebrates are not likely. The maximum detected concentration is less than the ORNL earthworm benchmark di-n-butylphthalate so risks to earthworms from bis (2-ethylhexyl) phthalate are acceptable; bis (2-ethylhexyl) phthalate is not retained as a COPC for risks to earthworms.

<u>Safrole</u>

Safrole was initially selected as a COPC because the maximum detected concentration of 15 mg/kg at location 16SS013 exceeded the Region 5 ESL (0.404 mg/kg). However, the ESL is based on risks to wildlife (i.e., the masked shrew) and not risks to invertebrates and plants; however, alternate toxicity information for safrole could not be located. Therefore, other factors were considered in evaluating site-related risks to plants and invertebrates from safrole in SWMU 16 surface soils.

Safrole is a naturally occurring compound found in sassafras trees, and is the principal component (80 percent) of sassafras oil (FNA, 1993). Sassafras trees were noted during the ecological site evaluation (see Appendix J.2 for the ecological checklist). The locations of all six samples in which this compound was detected near the site perimeter, where sassafras trees are abundant. Because sassafras trees exist at SWMU 16 the presence of safrole in surface soils at SWMU 16 is likely to be naturally occurring. Also, the use of safrole has not been documented at the site and sources of safrole at the base are not known.

Although the ESL is based on risks to wildlife and not plants and invertebrates, no alternate benchmarks are available for quantitatively evaluating risks to these receptors from safrole. Safrole was detected at only five locations and in six samples (safrole was detected in the duplicate at location 16SS023, see Table 3-6). These locations are located in the shrub/forest border in the southern portion of the SWMU boundary, which is consistent with the belief that safrole is present as a result of sassafras trees at the SWMU. Additionally, these samples were collected from areas not immediately surrounding the former ash piles, further supporting that its presence is due to natural conditions and not former SWMU activities. Also, the spatial distribution of the five detections (the samples were scattered across the southern shrub/forest boundary) suggests that safrole is not related to site activities. For these reasons, site-related potential risks from safrole are considered acceptable. Therefore, safrole is not retained as a COPC for risks to plants or invertebrates.

Aluminum

Aluminum was initially selected as a COPC because a Region 5 ESL is not available. According to the U.S. EPA Eco-SSL for aluminum, aluminum is only considered toxic when soil pH is less that 5.5 S.U. Although pH was less than 5.5 S.U. at one location collected for pH analysis, the average pH concentration in surface soil at SWMU 16 was 5.83 S.U. Therefore, risks to plants and soil invertebrates are acceptable and aluminum is not retained as a COPC.

Antimony

Antimony was initially selected as a COPC because the maximum detected soil concentration at location of 27.2 mg/kg at location 16SS014 exceeded the U.S. EPA ESL of 0.27 mg/kg. However, the ESL is based on risks to wildlife (i.e., the masked shrew) and not risks to plants and invertebrates. Therefore, antimony concentrations were compared to the following alternate benchmarks to evaluate risks to plants and invertebrates:

- Eco-SSL for soil invertebrates - 78 mg/kg (U.S. EPA, 2003e)
- Oak Ridge (ORNL) Plant – 5 mg/kg (Efroymson et al., 1997b)

The Eco-SSL for soil invertebrates is the geometric mean of the EC20 values reported for each of three test species (i.e., Enchytraeid, Springtail, and Earthworm) exposed under similar conditions. The maximum concentration of antimony at SWMU 16 is less than the Eco-SSL for soil invertebrates; therefore risks to soil invertebrates are acceptable.

An Eco-SSL for plants is not available; however there is an ORNL plant value. The ORNL plant value of 5 mg/kg is based on a report of unspecified toxic effects on plants grown in a surface soil with the addition of 5 mg/kg antimony. Antimony was detected in nine samples at concentrations exceeding the ORNL plant value. These samples were collected from areas surrounding the former ash piles. Vegetation in these areas is minimal and it is possible that vegetation has been adversely impacted by the former ash piles. However, SWMU 16 is heavily vegetated and antimony does not appear to be significantly impacting the plant community in other areas of the SWMU.

In summary, risks to plants from antimony in the surface soil are possible in areas surrounding the location of the former ash piles. Therefore, risks to plants are unacceptable; antimony is retained as a COPC for further evaluation in this area.

Arsenic

Arsenic was initially selected as a COPC because the maximum surface soil concentration of 12.7 mg/kg exceeded the ESL of 5.7 mg/kg. However, the ESL used in the conservative COPC screening is based on risks to wildlife and not risks to plants and invertebrates; therefore, arsenic concentrations were compared to the Canadian Soil Quality Guideline (SQG) for soil invertebrates and plants to evaluate risks to these receptors.

- Canadian SQG – 17.1 mg/kg (EC, 1999a)

The Canadian SQG for soil contact is the geometric mean of effects concentrations for reduction in spinach yields and is the 25th percentile of 46 data points (EC, 1999a). The maximum arsenic concentration is less than the SQG and so risks to plants and invertebrates are acceptable and arsenic is not retained as a COPC. However, because arsenic is a bioaccumulative chemical, risks to wildlife from arsenic in the surface soil are further evaluated in Section 8.4.2.

Cadmium

Cadmium was initially selected as a COPC because the maximum soil concentration of 2.8 mg/kg exceeded the U.S. EPA Eco-SSL for mammals of 0.38 mg/kg. Because the Eco-SSL used in the conservative COPC screening is based on risks to wildlife and not risks to plants and invertebrates, cadmium concentrations were compared to the U.S. EPA Eco-SSLs for soil invertebrates and plants to evaluate risks to these receptors.

- U.S. EPA Eco-SSL for soil invertebrates – 140 mg/kg (U.S. EPA, 2005a)
- U.S. EPA Eco-SSL for plants – 32 mg/kg (U.S. EPA, 2005a)

The U.S. EPA Eco-SSL for soil invertebrates of 140 mg/kg was developed after a review of over 239 technical studies. Of these, 10 studies were accepted for inclusion in the development of the Eco-SSL. The Eco-SSL is the geometric mean of the Maximum Acceptable Toxicant Concentration (MATC) or Effects Concentration for 10 percent of the test population (EC_{10}) values (based on growth, population, or reproduction) reported for each of three test species evaluated under six separate test conditions of pH (U.S. EPA, 2005a). The U.S. EPA Eco-SSL for plants (32 mg/kg) was developed after a review of over 716 technical studies. Of these, 14 studies were accepted for inclusion in the development of the Eco-SSL. The Eco-SSL is the geometric mean of the MATC (based on growth) reported for 14 test species under six separate test conditions of pH and percent organic matter (US EPA, 2005a).

The maximum cadmium detection is less than the Eco-SSLs for plants and soil invertebrates; therefore, risks to plants and invertebrates from cadmium are acceptable and cadmium is not retained as a COPC for risks to these receptors. However, because cadmium is a bioaccumulative chemical, risks to wildlife from cadmium are evaluated in Section 8.4.2 of this ERA.

Chromium

Chromium was initially selected as a COPC because the maximum soil concentration of 38.2 mg/kg exceeded the ESL of 0.4 mg/kg. However, even though the ESL is based on risks to invertebrates, the following alternate benchmark was used to further evaluate risks to plants and soil invertebrates:

- Canadian SQG – 64 mg/kg (EC, 1999b)

As presented in the supporting document for the Canadian SQG for chromium (EC, 1999b), the Canadian guideline for total chromium (64 mg/kg) is the geometric mean of the threshold effects concentration

(TEC) of 78 mg/kg for risks to plants and invertebrates and the nutrient and energy cycling check value (NECC) of 52 mg/kg. The TEC is the 6th of 22 data points associated with the no observable effects and observable effects data for plants and invertebrates and corresponds to the average radish germination EC25. As detailed in the supporting document, no effects concentrations for earthworms (235 mg/kg to 900 mg/kg) were greater than the no effects concentrations for plants (10 mg/kg to 230 mg/kg) indicating invertebrates are less sensitive to total chromium than plants. Additionally, the Canadian SQG is based on *total* chromium (for which soil samples at this site were analyzed). Chromium toxicity is due primarily to hexavalent chromium; other forms of chromium are much less toxic (ATSDR, 2000). It is unlikely that most, if any, chromium in SWMU 16 soil is hexavalent chromium. Trivalent chromium is the predominant form of this metal in most soils and is not bioavailable (ATSDR, 2000).

The maximum concentration of chromium is less than the SQG; therefore, risks to plants and invertebrates are acceptable overall and chromium is not retained as a COPC for these receptors. However, because chromium is a bioaccumulative chemical, risks to wildlife from chromium are evaluated in Section 8.4.2 of this ERA.

Cobalt

Cobalt was initially selected as a COPC because the maximum concentration of 25.9 mg/kg at location 16SS017 exceeded the screening level (based on the U.S. EPA Eco-SSL for plants) of 13 mg/kg. However, the maximum background concentration for soil group 3 is 27.1 mg/kg; therefore, site-related risks to plants and invertebrates from cobalt are acceptable and cobalt is not retained as a COPC.

Copper

Copper was initially selected as a COPC because the maximum detected soil concentration (413 mg/kg) at location 16SS015 exceeded the Region 5 ESL of 5.4 mg/kg. However, the ESL is based on risks to wildlife (i.e., the masked shrew) and not risks to plants and invertebrates. Therefore, the maximum copper concentration was compared to the SQG and ORNL values to evaluate risks to plants and invertebrates.

- Canadian SQG – 63 mg/kg (CCME, 1997)
- ORNL Plant – 100 mg/kg (Efroymson et al., 1997b)
- ORNL Earthworm – 60 mg/kg (Efroymson et al., 1997a)

The copper Canadian SQG of 63 mg/kg is the 25th percentile of effects and no effects data distribution for plants and invertebrates, which is the 17th of 69 data points and corresponds to an effect on radish seedling emergence. Therefore, some studies showed effects below 63 mg/kg but many more studies did not show effects at this concentration. Copper concentrations below the Canadian SQG of 63 mg/kg are expected to be protective of plants and invertebrates. However, there is some level of uncertainty in assuming that concentrations slightly greater than the SQG present unacceptable risks because the copper sulfate, copper nitrate, and copper chloride used in the toxicity studies are likely to be more bioavailable than the copper in the soils from the site. Copper in soil is likely to form relatively insoluble carbonates, oxides, and hydroxides. Also, as discussed above, although some studies demonstrated measurable effects to plants and invertebrates at copper concentrations less than 63 mg/kg, the effects concentrations in many other studies were much greater than 63 mg/kg.

The copper ORNL benchmark for plants (100 mg/kg) was based on toxicity data from three studies. Two of the studies demonstrated reductions in root and shoot weights of little bluestem grown in sandy soil to which 100 ppm copper (as copper sulfate) was added (Miles and Parker, 1979). The third study showed no effect on leaf and stem weights of bush beans grown in soil to which 100 ppm copper (as copper sulfate) was added, but leaf weight was reduced 26 percent when 200 ppm copper was added (Wallace et al., 1977).

The copper ORNL benchmark for invertebrates (60 mg/kg) was based on toxicity data from 10 to 20 studies. The endpoints for most of the studies cited in Efroymson et al., (1997b) are survival or impacts on reproduction (i.e., cocoon production, hatchling success). Because there were more than 10 studies, the benchmark was based on a 10th percentile lowest observed effects concentration (LOEC) value. However, a review of the data in Appendix A.1 of Efroymson et al., (1997b) shows that most of the studies cited in that document have no observed effects concentration (NOECs) that are greater than 60 mg/kg.

Copper was detected at 10 locations at concentrations exceeding the SQG. These samples were collected from areas surrounding the former ash piles. Vegetation in these areas is minimal and it is possible that vegetation has been adversely impacted by the former ash piles. However, SWMU 16 is heavily vegetated and copper does not appear to be significantly impacting the plant community in other areas of the SWMU. All other soil concentrations were less than the SQG. Copper concentrations were greater than the ORNL earthworm value at 11 locations within the former ash pile area. Therefore, risks to plants and invertebrates from copper in the surface soil are possible in areas surrounding the location of the former ash piles and copper is retained as a COPC for further evaluation in this area. Because

copper is a bioaccumulative chemical, risks to wildlife from copper are evaluated in Section 8.4.2 of this ERA.

Iron

Iron was initially selected as a COPC because no Region 5 screening level is available. According to the Ecological SSL for iron (U.S. EPA, 2003a), iron is essential for plant growth, and is generally considered to be a micronutrient. Because plants regulate its uptake, iron is not expected to be toxic to plants in well aerated soils with pH levels between 5 and 8 S.U. (U.S. EPA, 2003e). Measured pH levels ranged from 5.3 S.U. to 6.5 S.U. at SWMU 16. Therefore, iron is not expected to be toxic to plants at the site. No toxicity data was located to evaluate risks to invertebrates from iron; however because iron is generally considered a non-toxic metal, it is highly unlikely that soil invertebrates are being impacted by iron at the SWMU. For these reasons, any potential risks to plants and invertebrates from iron are acceptable and iron is not retained as a COPC for risks to these receptors.

Lead

Lead was initially selected as a COPC because the maximum soil concentration of 1,240 mg/kg exceeded the U.S. EPA Eco-SSL for birds of 16 mg/kg. Because the Eco-SSL used in the conservative COPC screening is based on risks to wildlife and not risks to plants and invertebrates, lead concentrations were compared to the U.S. EPA Eco-SSLs for soil invertebrates and plants to evaluate risks to these receptors.

- Eco-SSL for soil invertebrates – 1,700 mg/kg (U.S. EPA, 2005b)
- Eco-SSL for plants – 115 mg/kg (U.S. EPA, 2005b)

The Eco-SSL for soil invertebrates is the geometric mean of the MATC values for one test species (*Folsomia candida*) under three different test conditions (pH of 4.5 to 6.0) and is based on a reproductive endpoint. The maximum concentration is less than the Eco-SSL for soil invertebrates; therefore, risks to soil invertebrates are acceptable.

The Eco-SSL for plants is the geometric mean of the MATC values for four test species under three different test conditions (pH of 4.0 to 6.3). The ecological endpoint for the derivation of the Eco-SSL for plants was growth. Lead concentrations exceeded the Eco-SSL for plants at 13 locations. These samples were collected from areas surrounding and southeast of the former ash piles. Vegetation surrounding the former ash piles is minimal and it is possible that lead concentrations have impacted

vegetative growth. It is possible that the elevated concentrations southeast of the former ash piles are attributable to wind dispersion or run-off while the ash piles were still present. SWMU 16 is heavily vegetated and lead does not appear to be significantly impacting the plant community in other areas of the SWMU. All other soil concentrations were less than the Eco-SSL for plants.

In summary, risks to plants from lead in the surface soil are possible in areas surrounding the location of the former ash piles. Therefore, risks to plants are unacceptable; lead is retained as a COPC for further evaluation in this area. Because lead is a bioaccumulative chemical, risks to wildlife from lead are evaluated in Section 8.4.2 of this ERA.

Lithium

Lithium was initially selected as a COPC because no Region 5 ESL is available; therefore, lithium concentrations were compared to ORNL values to evaluate risks to plants and invertebrates.

- ORNL Plant – 2 mg/kg (Efroymson et al., 1997b)
- ORNL Soil Microorganisms and Microbial Processes – 10 mg/kg (Efroymson et al., 1997a)

The ORNL Plant value is based on undefined toxic effects on sweet orange seedlings grown in surface soil containing 2 ppm lithium for 6 months (Efroymson, et al., 1997b). An ORNL value for earthworms is not available, so the ORNL soil microorganisms and microbial processes value was used instead. The value is based on a study in which a lithium concentration of 17 ppm reduced respiration in soil microflora in small coniferous forest soil/littler microcosms. An effective concentration of 10 ppm was derived from the study (Efroymson et al., 1997a).

Lithium was detected in 24 of 25 samples collected at SWMU 16. Concentrations exceeded the ORNL plant value in all 24 samples, including samples not collected within the former ash piles (i.e., west of Building 146). The spatial distribution of these samples is different from other chemicals whose presences are believed to be associated with the former ash piles (i.e., antimony, copper, and lead). Elevated concentrations of these chemicals are centered around the former ash piles. Additionally, lithium concentrations in the site samples (3.4 to 21.5 mg/kg) were within the range of background detections for Soil Group 3, which ranged from 9.1 mg/kg to 29.9 mg/kg. For these reasons, site-related risks to plants and invertebrates are acceptable and lithium is not retained as a COPC for further evaluation.

Manganese

Manganese was initially selected as a COPC because no Region 5 ESL is available; therefore, manganese concentrations were compared to ORNL values to evaluate risks to plants and invertebrates.

- ORNL Plant – 500 mg/kg (Efroymson et al., 1997b)
- ORNL Soil Microorganisms and Microbial Processes – 100 mg/kg (Efroymson et al., 1997a)

An ORNL value for earthworms is not available, so the ORNL soil microorganisms and microbial processes value was used instead. The value is based on a 21-day study in which nitrification by native soil microflora (in a sandy loam soil) was severely inhibited at 100 ppm, added as a sulfate salt. The ORNL plant value is based on a 17-day study in which stem weight of bush beans grown in loam soil was reduced by 29 percent at a concentration of 500 ppm manganese sulfate.

Manganese was detected at a maximum concentration of 1,040 mg/kg at location 16SS013. Although the maximum manganese concentration at SWMU 16 is greater than the ORNL values, concentrations of manganese are within the range of background concentrations for Soil Group 3 (268 mg/kg to 3,040 mg/kg). Therefore, manganese in the surface soil at SMWU 16 does not appear to be related to historical activities and site-related risks to plants and soil invertebrates are acceptable. Manganese is not retained as a COPC for risks to these receptors.

Mercury

Mercury was initially selected as a COPC because the maximum soil concentration of 0.16 mg/kg exceeded the ESL of 0.1 mg/kg. The ESL of 0.1 mg/kg is based on risks to earthworms; however, even though the derivation of the ESL is based on earthworms, the following alternate benchmark was used to further evaluate risks to plants and soil invertebrates:

- Canadian SQG – 12 mg/kg (EC, 1999c)

As presented in the supporting document for the Canadian SQG for mercury (EC, 1999c), the Canadian guideline of 12 mg/kg for mercury is based on the 25th percentile of effects and no effects data distribution for plants and invertebrates. The 25th percentile is the 6th of 22 data points and corresponds to an EC50 for turnip seedling emergence (50 mg/kg). The EC50 value of 50 mg/kg was then divided by an uncertainty factor of 4 considering the importance of definitive effects data. In Appendix VIII of the

supporting document, NOECs for earthworm survival were reported at 96 mg/kg and 100 mg/kg in soils of pH 4.0 to 4.2 and 7.4, respectively.

The maximum detected mercury concentration is less than the SQG; therefore risks to plants and soil invertebrates are acceptable. Mercury is not retained as a COPC for risks to plants and invertebrates; however, because mercury is a bioaccumulative chemical, risks to wildlife from mercury are evaluated in Section 8.4.2.

Nickel

Nickel was initially selected as a COPC because the maximum concentration of 41.3 mg/kg at location 16SS017 exceeded the Region 5 ESL of 13.6 mg/kg. However, the ESL is based on risks to wildlife (i.e., the masked shrew) and not risks to plants and invertebrates. Therefore, the maximum copper concentration was compared to the Canadian SQG to evaluate risks to plants and invertebrates.

- Canadian SQG – 50 mg/kg (EC, 1999d)

The Canadian SQG (soil contact) is the 25th percentile (8th datum point of 31) of 50 mg/kg from a study where unspecified effects on onion growth were noted. The maximum concentration is less than the SQG and so risks to plants and invertebrates at SWMU 16 are acceptable; nickel is not retained as a COPC for risks to plants and invertebrates. However, because nickel is a bioaccumulative chemical, risks to wildlife from nickel are evaluated in Section 8.4.2.

Selenium

Selenium was initially selected as a COPC because the single detected surface soil concentration of 0.16 mg/kg exceeded the ESL of 0.0276 mg/kg. However, the ESL is based on risks to wildlife and not plants and invertebrates. Therefore, selenium concentrations were compared to alternate benchmarks to evaluate risks to these receptors.

- Canadian SQG – 1 mg/kg (EC, 2001)

The SQG is based on an approximately 60% reduction in sorgrass (*Sorghum vulgare*) shoot growth over 42 days. The detected concentration of selenium is less than the SQG and risks to plants and invertebrates are acceptable. Selenium is not retained as a COPC for risks to these receptors. Because selenium is a bioaccumulative chemical, risks to wildlife from selenium are evaluated in Section 8.4.2.

Strontium

Strontium was initially selected as a COPC because a Region 5 ESL is not available. Alternate toxicity information for strontium was not located; therefore, other Step 3a factors were used to evaluate risks to plants and invertebrates from strontium.

Strontium concentrations (6.8 to 145 mg/kg) were greater than the maximum background concentration for Soil Group 3 (63.2 mg/kg) at eight locations. However, strontium is not typically considered to be very toxic because of its similar physical and chemical properties to calcium (Irwin, 1997). In fact, only two instances where strontium is released to the environmental by artificial means were located. These include the release of produced water from the oil industry and pollution for cattle feedlots (Irwin, 1997). These activities are not associated with SWMU 16 and there is no reason to believe that strontium is present in surface soils as a result of former SWMU 16 activities. Although the paucity of data for strontium precludes a thorough risk evaluation, the uncertainties associated with strontium toxicity and the source of strontium at SWMU 16 do not warrant retaining strontium for further investigation. Site-related risks from strontium in the surface soil to plants and soil invertebrates are acceptable and strontium is not retained as a COPC.

Thallium

Thallium was initially selected as a COPC because the maximum concentration of 0.32 mg/kg at location 16SS011 was greater than the ESL of 0.0569 mg/kg. However, the ESL is based on risks to wildlife (i.e., masked shrew) and not risks to plants and invertebrates. Therefore, thallium concentrations at SWMU 16 were compared to the Canadian SQG to evaluate risks to these receptors:

- Canadian SQG – 1.4 mg/kg (EC, 1999e)

The SQG of 1.4 mg/kg is based on a study in which root and top development of soybean, wheat, buckwheat, alfalfa, and rye grass was observed. The maximum thallium concentration is less than the SQG so risks to plants and invertebrates are acceptable and thallium is not retained as a COPC.

Titanium

Titanium was initially selected as a COPC because a Region 5 ESL is not available. The only available toxicity information for titanium is the ORNL soil microorganisms and microbial processes value of

1,000 mg/kg. This value is based on a study in which aryl sulfatase activity was reduced by 1,198 ppm of titanium (as titanium sulfate). Soils were chosen with a varied range in pH, organic matter, and clay contents. Soil was air dried, sieved, and placed into flasks where titanium sulfate (as solution) was added. Samples were incubated until microbial activity ceased and aryl sulfatase activity was measured. Although there is some uncertainty in applying the ORNL soil microorganism value to the protection of earthworms, titanium toxicity to earthworms would not be expected to significantly differ from those of microorganisms. Therefore, because the maximum concentration of titanium (348 mg/kg at location 16SS011) is less than the ORNL microorganism value of 1,000 mg/kg, risks to soil invertebrates are also expected to be acceptable.

Toxicity information for plants is not available; however, titanium is considered generally poorly soluble, poorly bioavailable, and non-toxic. Additionally, there is no reason to suspect that titanium is present in media at SWMU 16 as a result of former activities at SWMU 16 (i.e., washdown and wastewater, and former incinerator). Although the paucity of data precludes a thorough risk evaluation of titanium in surface soil, the uncertainties are not great enough to warrant retaining titanium for further evaluation in a BERA and titanium is not retained as a COPC for plants.

Vanadium

Vanadium was initially selected as a COPC because the maximum concentration (65.2 mg/kg) exceeded the ESL of 1.59 mg/kg. However, the ESL is based on risks to wildlife (i.e., masked shrew) and not risks to plants and invertebrates. Therefore, vanadium concentrations at SWMU 16 were compared to the Canadian SQG to evaluate risks to these receptors:

- Canadian SQG – 130 mg/kg (EC, 1999f)

The Canadian SQG of 130 mg/kg corresponds to the 3rd datum point of 10 data points, which is the 25th percentile based on seedling emergence by lettuce. The maximum vanadium concentration is less than the SQG and so risks to plants and invertebrates from vanadium at SWMU 16 are acceptable; vanadium is not retained as a COPC.

Zinc

Zinc was initially selected as a COPC because the maximum soil concentration (1,840 mg/kg) exceeded the ESL of 6.62 mg/kg. However, even though the ESL is based on risks to invertebrates, the following alternate benchmarks were used to further evaluate risks to plants and soil invertebrates:

- Canadian SQG – 200 mg/kg (EC, 1999g)
- ORNL Plant – 50 mg/kg (Efroymson et al., 1997b)
- ORNL Earthworm – 100 mg/kg (Efroymson et al., 1997a)

The Canadian SQG of 200 mg/kg is the lowest LOEC of the plants and invertebrate data set and is based on an effect on seedling emergence for radish (EC, 1999g). The weight-of-evidence method was not used to develop the SQG because greater than 50 percent of the "effects" data were dominated by median effective or median lethal concentrations (EC, 1999g). As presented in Appendix VI of the Canadian SQG document (EC, 1999g), all of the earthworm effects and no-effects data (with the exception of one test in one study) were equal to or greater than 200 mg/kg, indicating that earthworms appear to be less sensitive to zinc than plants. As indicated in Efroymson et al., (1997a), the ORNL benchmark for invertebrates (100 mg/kg) is lower than concentrations at which effects have been observed. This is further supported by the toxicity test data presented in the Canadian SQG document for earthworms.

The ORNL plant value (50 mg/kg) was based on toxicity data from fewer plant studies than were used to develop the Canadian SQG. The majority of the studies had NOEC and LOEC values greater than 50 mg/kg, with many greater than 100 mg/kg and several greater than 200 mg/kg. Therefore, the ORNL plant benchmark appears to be somewhat conservative.

The maximum zinc detection of 1,840 mg/kg is above the Canadian SQG, as well as the ORNL plant and earthworm benchmarks. Although these benchmarks are likely conservative as discussed above, risks to terrestrial plants and invertebrates are possible. Therefore, risks to plants and invertebrates from zinc are unacceptable and zinc is retained for further evaluation. Because zinc is a bioaccumulative chemical, risks to wildlife from zinc are evaluated in Section 8.4.2.

Summary of Surface Soil Risk

In summary, the list of chemicals initially selected as COPCs were further evaluated in Step 3a, the first step of the BERA. After a review of alternate toxicity information (based on soil invertebrates and plants) for the initial COPCs was conducted, concentrations were compared to the alternate toxicity information, as appropriate.

Antimony, copper, lead, and zinc were retained as COPCs for further evaluation because concentrations were greater than alternate toxicity information at multiple locations, including those surrounding the

former ash piles. Vegetation in these areas is minimal and it is possible that vegetation has been adversely impacted by the former ash piles (see photographs in Appendix A). However, SWMU 16 is heavily vegetated and these inorganics do not appear to be significantly impacting the plant community in other areas of the SWMU.

8.4.1.2 Benthic Invertebrates – Sediment Risk

As presented in Sections 8.3.2.2 and 8.3.2.3, several sediment and surface water samples were collected in the intermittent drainage ditches/gullys leading from SWMU 13, and several chemicals detected in the samples were initially selected as COPCs because they were detected at concentrations that exceeded screening levels. Although surface water samples were collected from many of these locations, most of the samples were taken from small pools of standing water as recorded in the sample log sheets (see Appendix C) and the photographs (see Appendix A). In fact, during the Round 3 sampling event, many of the surface water locations were dry during the first attempt to collect samples so the water samples were collected after a rain event when water was present. Surface water and associated aquatic habitat is absent in these drainage ditches throughout most of the year (see photographs in Appendix A). Therefore, although some of the chemical concentrations in the sediment and surface water samples exceeded the screening levels for aquatic receptors, there is very little exposure so any risks would not be significant. For that reason, none of the chemicals in the drainage ditch/gulley samples are retained as COPCs for further evaluation for risks to aquatic organisms. However, the chemical data in these samples is qualitatively used, where appropriate, in the Step 3a evaluation of the main stream samples (in Sections 8.4.1.2 and 8.4.1.3) to determine whether the chemicals may be related to site activities.

Additionally, antimony, arsenic, beryllium, chromium, iron, nickel, titanium, and vanadium in the main stream sediment samples were detected at concentrations less than or similar to upgradient concentrations. Concentrations of these COPCs are not expected to be related to historical activities. For this reason, these chemicals are not retained as COPCs for further evaluation for risks to aquatic organisms.

Table 8-7 presents a summary of the common alternate benchmarks used in refining the list of COPCs in sediment, along with a summary of the Step 3a evaluation. The upgradient sediment concentration range is also presented.

Dichlorodifluoromethane

Dichlorodifluoromethane was initially selected as a COPC because an ESL was not available. Toxicological information regarding dichlorodifluoromethane in sediment is not available. However, dichlorodifluoromethane is typically not considered toxic to ecological receptors, particularly in sediments due to the volatility of the chemical. Analysis of dichlorodifluoromethane was conducted in only one of the samples collected from the main stream (16SD19), and dichlorodifluoromethane was detected in one of 10 gully sediment samples. Because the gully sediment samples were collected from locations across the SWMU, frequency of detections in these samples is a better indicator of surface soil run-off from the SWMU. If the SWMU was contributing significant quantities of dichlorodifluoromethane to the main stream, its presence would be more apparent in gully samples. Additionally, impacts to benthic invertebrates are not likely because the poor habitat would preclude their presence in the main stream except during and after heavy rain events. Although uncertainties exist regarding dichlorodifluoromethane toxicity to benthic invertebrates in the main stream because of a paucity of data, the uncertainties are not great enough to warrant further evaluation in a BERA. Therefore, dichlorodifluoromethane is not retained as a COPC for risks to benthic invertebrates.

Aluminum

Aluminum was initially selected as a COPC because an ESL is not available. The benchmark selected for aluminum is the Threshold Effects Level (TEL) of 25,500 mg/kg (Buchman, 1999). The TEL represents the concentration below which adverse effects on survival or growth of the amphipod *Hyalella azteca* are expected to occur only rarely in 28-day tests (MacDonald et al., 2000).

The maximum concentration of 10,500 mg/kg is less than the TEL; therefore, risks to sediment-dwelling biota are acceptable and aluminum is not retained as a COPC.

Barium

Barium was initially selected as a COPC because an ESL was not available. The only available alternate benchmark for barium is the Apparent Effects Threshold (AET) of 48 mg/kg (Buchman, 1999). Based on the Navy's agreement with U.S. EPA, if a chemical only has a higher effects level such as an AET, the chemical will not be eliminated as a COPC even if the maximum detection is below the higher effects level, unless other Step 3a factors can be used to justify the chemical's elimination as a COPC.

Barium was detected in all four Turkey Creek main stream sediment samples at SWMU 16 with concentrations ranging from 69.7 mg/kg to 110 mg/kg; the upgradient concentration was 62.5 mg/kg. The

maximum concentration was detected during Round 2 at location 16SD19. The detected concentration at this location during Round 3 was 88.9 mg/kg, which is similar to the upgradient concentration. Although it is possible that barium concentrations in main stream sediments are related to former SWMU activities (i.e., barium concentrations in surface soil were greater than the background concentration for soil group 3), impacts to benthic invertebrates are not likely because the poor habitat would preclude their presence at location 16SD19. Concentrations at locations 16SD24 and 16SD25 were similar to background (77.2 mg/kg and 69.7 mg/kg, respectively). Locations 16SD24 and 16SD25 are small pools of standing water; however, if benthic invertebrates are present in the main stream channel, they are more likely present at these locations than at location 16SD19 where barium concentrations were slightly elevated with respect to the upgradient location. Additionally barium was detected at a wide range of concentrations in gully samples and the maximum upgradient gully concentration was 454 mg/kg. Therefore, it appears that barium concentrations within the range of the concentrations detected in main stream sediments is attributable to background conditions at the SWMU.

The paucity of toxicity data inhibits a complete evaluation of risks posed by barium. However, barium is a common element in sediments and it is not generally associated with significant toxicity (ATSDR, 1997). Although potential risks may exist in the area of the maximum detection, the uncertainties associated with the source of barium concentrations and the actual exposure to benthic organisms do not warrant retaining barium as a COPC for further evaluation in a BERA.

Manganese

Manganese was initially selected as a COPC because an ESL is not available. Because an ESL and a consensus based TEC are not available for the screening, manganese concentrations are compared to the Canadian SQGs.

- Canadian Sediment Guidelines lowest effects level (LEL) – 460 mg/kg (OMOE, 1993)
- Canadian Sediment Guidelines severe effects level (SEL) – 1,100 mg/kg (OMOE, 1993)

The LEL indicates the level of sediment contamination which has no effect on and can be tolerated by the majority of sediment-dwelling organisms and the SEL is the level in which sediment is considered detrimental to the health of the majority of sediment-dwelling organisms. Manganese was detected in all four Turkey Creek mainstream sediment samples collected at SWMU 16. It should be noted; however, that upstream concentrations, although less than site sample concentrations, were also greater than the SEL. Concentrations were similar to or less than the upgradient location at locations 16SD24 and 16SD25. Manganese concentrations during Rounds 2 (1,900 mg/kg) and 3 (1,730 mg/kg) at location

16SD19 were greater than the concentrations at the upgradient location; however, this location is usually dry and does not likely support benthic invertebrates most days of the year. Impacts to benthic invertebrates are not likely because the poor habitat would preclude their presence at this location except during and after heavy rain events. Actual exposure to benthic invertebrates at this location is unknown for this reason.

Manganese was detected in surface soil samples at a maximum concentration of 1,040 mg/kg. The maximum background soil concentration for soil group 3 is 3,040 mg/kg. Therefore, manganese concentrations in the surface soil are attributable to background conditions and not to former SWMU activities. Any potential contamination in sediment samples that is related to the SWMU would be migrating surface soil run-off; therefore, manganese concentrations in main stream samples are not expected to be related to SWMU activities. Additionally manganese was detected at a wide range of concentrations in gully samples and the maximum upgradient gully concentration was 3,650 mg/kg. Therefore, it appears that manganese concentrations within the range of the concentrations detected in mainstream sediments is attributable to background conditions at the SWMU. Therefore, although impacts to benthic invertebrates are possible at this location, the uncertainties associated with the source of manganese concentrations and the actual exposure to benthic organisms do not warrant retaining manganese for further evaluation in a BERA and manganese is not retained as a COPC for benthic invertebrates.

Selenium

Selenium was initially selected as a COPC because an ESL is not available. No alternate benchmarks are available for selenium so other Step 3a factors, as discussed in Section 8.4.1, are used to evaluate risks to sediment invertebrates.

Selenium was detected at similar concentrations in three of the four Turkey Creek mainstream sediment samples at SWMU 16 ranging from 0.5 mg/kg to 0.8 mg/kg; selenium was not detected at location 16SD25. The concentration at the upgradient location was 0.5 mg/kg.

Selenium was only detected in one out of 35 surface soil samples at SWMU 16 at a concentration of 0.16 mg/kg. The maximum background soil concentration for soil group 3 is 0.64 mg/kg. Therefore, selenium concentrations in the surface soil are most likely attributable to background conditions and not to former SWMU activities. Therefore, although the paucity of data precludes a complete evaluation of selenium concentrations in sediment, the selenium in the sediment does not appear to be related to site

activities. For that reason, site-related risks to benthic invertebrates from selenium are acceptable so selenium is not retained as a COPC for risks to sediment dwelling invertebrates.

Zinc

Zinc was initially selected as a COPC because the maximum concentration of 206 mg/kg exceeded the ESL of 121 mg/kg which is based on the threshold effect concentration (TEC). Because the maximum concentration exceeds the TEC, zinc concentrations were compared to the probable effect concentration (PEC) to further evaluate risks to sediment invertebrates.

The consensus-based PEC is 459 mg/kg (MacDonald et al. 2000). Concentrations greater than the TEC but less than the PEC indicate that impacts to benthic invertebrates are possible, but actual risks are unknown. However, zinc concentrations are closer to the TEC than they are to the PEC.

Zinc was detected in all four Turkey Creek main stream sediment samples with concentrations ranging from 84.4 mg/kg to 206 mg/kg; the upgradient concentration was 92.5 mg/kg. The maximum concentration was detected during Round 2 at location 16SD19; however, the concentration at this location during Round 3 (84.4 mg/kg) was less than the upgradient concentration. Concentrations at the other two locations during Round 3 were also similar to the upgradient concentration (89.4 mg/kg and 114 mg/kg at locations 16SD24 and 16SD25, respectively). Although it is possible that zinc concentrations in main stream sediments are related to former SWMU activities (i.e., zinc concentrations in surface soil were greater than the background concentration for soil group 3), impacts to benthic invertebrates are not likely because of the poor habitat in the main stream. Therefore, risks to benthic invertebrates from zinc are acceptable and zinc is not retained as a COPC for these receptors.

Acid Volatile Sulfides/Simultaneously Extracted Metals

Three sediment samples in the drainage ditch/gully samples were analyzed for AVS and SEM. AVS binds, on a molar basis, a number of cationic metals of environmental concern (cadmium, copper, lead, nickel, silver, and zinc) (U.S. EPA, 2005). In sediment samples where the AVS molar concentrations are greater than SEM molar concentrations, the SEM metals are not expected to be bioavailable or directly toxic to benthic invertebrates. In sediment samples where the AVS molar concentrations are less than SEM molar concentrations, all of the SEM metals were not bound to AVS. However, the SEM metals are not necessarily bioavailable or directly toxic to benthic invertebrates because other parameters such as TOC may reduce the bioavailability and toxicity of metals in the sediment. Sediments that are anoxic typically have greater AVS concentrations than sediments that are well aerated.

The metals included in the SEM analysis at SWMU 16 included cadmium, copper, lead, mercury, nickel, and zinc. Silver was not included in the list of analytes because it was not expected to be a metal of concern, and is supported by the fact that it was detected in only one of 31 sediment samples.

As discussed above, because of the poor habitat in the drainage ditches/gullys, it is not likely that benthic invertebrates will be present for significant periods of time, if at all. Therefore, although the utility of the SEM/AVS measurements in samples from these areas may be somewhat limited, the results do provide some useful insight into the potential bioavailability of these metals in Turkey Creek. In all three sediment samples analyzed for AVS and SEM, the ratio of AVS to SEM was greater than 1.0, with values ranging from 50 S.U. to 220 S.U. (see Table G-3). The SEM metal with the greatest molar concentration in all the samples is zinc and to a lesser extent, copper and lead. The bulk sediment concentrations of these metals were elevated and because the sediment was from the gullys where the sediment is not anaerobic, the AVS values were low (i.e., less than 1 umol/g). Bulk sediment concentrations in main stream samples were much less than those in gully sediment samples; therefore, SEM/AVS ratios would also be expected to be lower. However, it is likely that the SEM concentrations may be greater than the AVS concentrations because the stream is dry for a majority of the year and so the AVS concentrations are expected to be similar to the concentrations in the gully samples. Additionally, the only SEM metal retained as a COPC in main stream sediments is zinc and the maximum zinc concentration was less than the upgradient concentration; therefore, the uncertainties with not having AVS and SEM data for the main stream samples is not that great.

Summary of Sediment Risk

In summary, the list of chemicals initially selected as COPCs were further evaluated in Step 3a, the first step of the BERA. After a review of alternate toxicity information (based on sediment invertebrates) and other step 3a factors for the initial COPCs was conducted, concentrations were compared to the alternate toxicity information, as appropriate. No chemicals initially selected as COPCs were retained as COPCs for further evaluation.

8.4.1.3 Aquatic Organisms – Surface Water Risk

Table 8-8 presents a summary of some of the common alternate benchmarks that were used in refining the list of COPCs in the main stream surface water samples, along with a Step 3a evaluation. The summary of upgradient surface water comparisons is presented in Appendix G.

Water-quality standards (WQS) for surface water have been developed for Indiana (IDEM, 1998). In addition, U.S. EPA has established AWQC for several contaminants (U.S. EPA, 2002b). The IDEM WQS and AWQC were reviewed; however, only the AWQC were used for further evaluating chemicals initially selected as COPCs, where appropriate, because the AWQC have been updated more recently than the WQS. Other, non-regulatory surface water screening values were also used to evaluate the data, where necessary. The following sections discuss these values, as appropriate.

HMX

HMX was initially selected as a COPC because no Region 5 surface water screening level is available. The maximum detections of HMX (0.32 µg/L) is less than the secondary chronic value (SCV) of 330 µg/L developed in Talmage et al. (1999). Therefore, HMX in the surface water is not likely to cause adverse effects to aquatic receptors and risks are considered acceptable; HMX is not retained as a COPC for risks to aquatic receptors.

Aluminum

Aluminum was initially selected as a COPC in unfiltered and filtered metal samples because maximum concentrations (822 µg/L and 119 µg/L, respectively) exceeded the screening level of 87 µg/L, which is the chronic U.S. EPA AWQC. Aluminum was not detected in the upgradient sample.

An emphasis is placed on the filtered samples instead of the unfiltered sample results because the filtered samples represent the bioavailable portion of the inorganics (US EPA, 1992); therefore, filtered surface water results are most indicative of the level of direct risk to aquatic receptors. The maximum filtered surface water concentration (119 µg/L) was detected at location 16SW24 which is a small pool of standing water (see photographs in Appendix A). Aluminum was not detected in the next downstream sample, which was collected from location 16SW25 and is approximately 325 feet downstream of location 16SW24. Location 16SW25 is also a small pool of standing water. The filtered aluminum concentration (90.1 µg/L) at location 16SW19 (farthest downstream) only slightly exceeded the chronic AWQC.

Although aluminum concentrations in unfiltered surface water samples are greater than the chronic AWQC, these concentrations do not represent true exposure concentrations to aquatic organisms; concentrations in filtered surface water samples are less than or similar to the chronic AWQC. Additionally aluminum was detected sporadically in gully samples and the maximum upgradient gully concentration in filtered samples was 164 µg/L. Therefore, it appears that aluminum concentrations within the range of the concentrations detected in main stream sediments is attributable to background

conditions at the SWMU overall. For these reasons, aluminum is not retained as a COPC for risks to aquatic organisms.

Cadmium

Cadmium was initially selected as a COPC in unfiltered and filtered metal samples because maximum concentrations (0.66 µg/L and 1.4 µg/L at location 16SW19, respectively) exceeded the Region 5 ESL of 0.15 µg/L. Typically, concentrations in filtered samples are less than concentrations in unfiltered samples because filtered samples represent only the dissolved portion of chemical concentrations in the surface water column while unfiltered samples represent the dissolved portion plus sediment particulate concentrations. The cadmium concentrations in filtered and unfiltered samples therefore, are somewhat perplexing because the filtered concentration was reported as greater than the unfiltered concentration by the analytical laboratory.

Additionally, cadmium was detected at location 16SW19, which is typically dry (see photographs in Appendix A) and not at locations 16SW24 and 16SW25 (which are small pools of standing water, where the presence of benthic invertebrates is possible). Therefore, overall risks to aquatic organisms from cadmium are acceptable because cadmium was not detected at locations where the presence of aquatic organisms is possible. Although risks to aquatic organisms are possible at the location of 16SW19 during and after heavy rain events, the potential risks are not great enough to warrant retaining cadmium as a COPC for risks to aquatic organisms. However, because cadmium is a bioaccumulative chemical, risks to wildlife from cadmium are evaluated in Section 8.4.2.

Copper

Copper was initially selected as a COPC in unfiltered and filtered metal samples because maximum concentrations (4.1 µg/L and 3.9 µg/L, respectively) exceeded the Region 5 ESL of 1.58 µg/L. As mentioned previously, an emphasis is placed on the filtered samples instead of the unfiltered sample results because the filtered samples represent the bioavailable portion of the inorganics (U.S. EPA, 1992). The maximum concentration of copper was detected at location 16SW19, which is typically dry (see photographs in Appendix A). Copper concentrations at the other two locations were less than the ESL. Therefore, overall risks to aquatic organisms from copper are acceptable because copper concentrations did not exceed the ESL at locations where the presence of aquatic organisms is possible. For these reasons, risks to aquatic organisms are acceptable and copper is not retained as a COPC for risks to aquatic organisms. However, because copper is a bioaccumulative chemical, risks to wildlife from copper are evaluated in Section 8.4.2.

Lead

Lead was initially selected as a COPC in unfiltered samples because the single detected concentration of 1.2 µg/L slightly exceeded the Region 5 ESL of 1.17 µg/L. Lead was not detected in filtered samples. Because the filtered samples represent the bioavailable portion of the inorganics (U.S. EPA, 1992), the filtered surface water results are most indicative of the level of direct risk to aquatic receptors. Therefore, risks to aquatic receptors from lead are considered acceptable and lead is not retained as a COPC for risks to aquatic organisms. However, because lead is a bioaccumulative chemical, risks to wildlife from lead are evaluated in Section 8.4.2.

Manganese

Manganese was initially selected as a COPC in unfiltered and filtered mainstream surface water samples because an ESL is not available. Because an ESL and AWQC are not available for manganese, concentrations in the surface water are compared to the following benchmark:

- ORNL SCV for aquatic life - 120 µg/L (Suter and Tsao, 1996)

Also, the U.S. EPA 1986 Quality Criteria for Water (the Gold Book) indicates that ions of manganese are found rarely at concentrations above 1 mg/L and, because the tolerance values reported range from 1.5 mg/L to over 1000 mg/L, manganese is not considered to be a problem in fresh waters (U.S. EPA, 1986).

For manganese in mainstream surface water samples, the maximum detected concentrations were 476 µg/L (unfiltered samples) and 1,970 µg/L (filtered samples). However, the manganese concentrations in filtered and unfiltered samples are somewhat perplexing because the maximum concentration in filtered samples is an order of magnitude greater than the maximum unfiltered concentration. As mentioned previously, this is unexpected because the filtered samples represent only the dissolved portion of chemical concentrations in the surface water column while unfiltered samples represent the dissolved portion plus sediment particulate concentrations. This raises some uncertainty in the actual concentrations of manganese that are bioavailable to aquatic organisms.

Concentrations at locations 16SW19 (7.7 µg/L) and 16SW24 (128 µg/L) were less than and similar to the ORNL SCV; which is considered a very conservative value by Suter and Tsao, 1996. Additionally, the maximum manganese concentration (1,040 mg/kg) was less than the maximum background

concentration for soil group 3 of 3,040 mg/kg indicating that manganese in the surface soil is attributable to background conditions and not former activities at the SWMU itself. Therefore, although potential impacts to aquatic organisms are possible at the location of the maximum concentration, the uncertainties associated with the manganese concentrations, the level at which manganese causes toxicity, and the actual source of manganese concentrations in the surface water indicate the potential risks are not great enough to warrant retaining manganese as a COPC for aquatic organisms.

Nitrite/Nitrate-N

Nitrite/Nitrate-N was initially selected as a COPC in unfiltered and filtered samples because an ESL is not available. The form of N that is present in surface waters is based on the amount of oxygen present (CCME, 2003). In well oxygenated (i.e., aerated) waters, anionic species of nitrogen such as nitrate are easily transported and stable (USGS, 1992). Nitrite, on the other hand, is considered unstable in well oxygenated (and shallow) surface waters (USGS, 1992). In fact, nitrite is rapidly oxidized to nitrate in well oxygenated waters, such as typical surface water bodies. DO concentrations ranged from 3.86 mg/L to 7.72 mg/L. These values are low in part because they were collected from small standing pools of water. In fact, the maximum concentration of DO was collected from location 16SW19, which is typically dry, but the sample was collected after a rain event. DO concentrations were greater in gully samples, where flowing water was more prominent during the field sample collection event and ranged from 5.66 mg/L to 10.65 mg/L. Therefore, the nitrite-nitrate-N concentration at 16SW24 was compared to the Canadian water quality guideline for nitrate.

The Canadian water quality guideline for freshwater aquatic life (CCME, 2003) for nitrate is 13 mg/L. This value is based on a 10-day chronic study where toxicity of nitrate as sodium nitrate to the Pacific treefrog (P. regilla) was studied. A significant decrease in larval weight was observed at 133 mg/kg. The water quality guideline for freshwater aquatic life of 13 mg/L was derived by multiplying the LOEC from this study by a safety factor of 0.1. Other literature studies based on other freshwater aquatic life were reviewed in deriving the water quality guideline (i.e., invertebrates, amphibians, and fish); however, amphibians were identified as the most sensitive species. The maximum concentration of 0.05 mg/L in Turkey Creek main stream samples is less than the Canadian water quality guideline for freshwater species. Although there is some uncertainty regarding which anion species predominates at location 16SW24, the uncertainties do not warrant retaining nitrite-nitrate-N as a COPC; therefore, risks to aquatic organisms are considered acceptable. Nitrate (and the N-complex) is not retained as a COPC for aquatic organisms.

Summary of Surface Water Risk

In summary, the list of chemicals initially selected as COPCs were further evaluated in Step 3a, the first step of the BERA. After a review of alternate toxicity information (based on aquatic organisms) for the initial COPCs was conducted, concentrations were compared to the alternate toxicity information, as appropriate. Other Step 3a factors as discussed in Section 8.4 were also considered for the initial COPCs, where appropriate. No chemicals initially selected as COPCs were retained as COPCs for further evaluation.

8.4.2 Food-Chain Modeling

The above-mentioned alternate benchmark values are not designed to evaluate risks to terrestrial wildlife via the ingestion of the soil, surface water, plants, and invertebrates. Therefore, a terrestrial intake model was used to estimate exposure of terrestrial receptors to COPCs. As presented in Figures 8-2 and 8-4, food chain modeling was conducted on chemicals that are considered to be bioaccumulative [i.e., included in the list of important bioaccumulative chemicals in U.S. EPA (2000)] and energetics (to be conservative) and also exceeded the Region 5 ESL, which do take into account risks to wildlife. If the chemical was less than the ESL or is not bioaccumulative, it was not carried through the food chain model. It was concluded that these chemicals are not causing an unacceptable risk to wildlife at SWMU 16. Tables 8-1 (surface soil) and 8-5 (surface water) list the chemicals that were retained for food chain modeling.

8.4.2.1 Food Chain Modeling Methodology

Risk to terrestrial receptors as a result of exposure to COPCs in the soil and surface water were determined by estimating the total chronic daily intake (CDI) (see below) and comparing the CDI to TRVs representing acceptable daily doses in mg/kg/day. The TRVs were developed from NOAELs and lowest-observed-adverse-effect levels (LOAELs) obtained from wildlife studies, when available. The majority of the TRVs came from the ORNL Toxicological Benchmarks for Wildlife: 1996 Revision (Sample, et al., 1996).

For avian species, the NOAEL (or LOAEL) for the test species was used as the NOAEL (or LOAEL) for the surrogate species in accordance with Sample et al. (1996) or other sources that were used. For mammalian species, the NOAEL (or LOAEL) from one species was adjusted to a NOAEL (or LOAEL) for the surrogate species using the following modified body weight scaling equation (from Sample et al., 1996):

$$NOAEL_w = NOAEL_t*(bw_t/bw_w)$$

Where: $NOAEL_w$ = no-observed-adverse-effect level for the surrogate wildlife species
$NOAEL_t$ = no-observed-adverse-effect level for the test species
bw_t = body weight of the test species
bw_w = body weight of the surrogate test species

Note that based on more recent publications [Sample, B. and C. Arenal 1999, Allometric Models for Interspecies Extrapolation of Wildlife Toxicity Data (Bull Environ Contam Toxicol 62: 653-663)], U.S. EPA Region 5 indicated that the use of the metabolic scaling factor may not be appropriate for toxicity/body weight extrapolation factors. Therefore, U.S. EPA recommended that the toxicity/body weight equation be performed without the use of the scaling factor of 0.25. The body weight scaling is performed because studies have shown that, for mammals, numerous physiological functions such as metabolic rate, as well as responses to toxic chemicals, are a function of body size (Sample et al., 1996).

Appendix J.5 presents the derivation of the TRVs. Table J.5-1 in Appendix J.5 presents the TRVs as they were used in the food-chain modeling. If a subchronic study was used to develop the TRV, the final value was multiplied by a factor of 0.1 to account for uncertainty between subchronic and chronic effects. If a LOAEL study was used to develop the NOAEL TRV, the LOAEL was multiplied by a factor of 0.1 to obtain the NOAEL.

Terrestrial soil invertebrates and plants are exposed to contaminants in surface soil through direct contact and/or ingestion. Aquatic organisms are exposed to contaminants in surface water and sediment through direct contact and/or ingestion.

COPC intake for wildlife exposed to the COPCs in surface soil and surface water were estimated as daily dose (mg/kg-day) using exposure equations. The contaminant concentrations in surface soil and surface water were used to calculate CDI doses. The following equations presents the CDI equations that were used in calculating a total daily dose for the surrogate species selected for modeling:

$$\text{Dose, surface soil (mg/kg - day)} = \frac{(SC * SI)}{BW}$$

$$\text{Dose, surface water (mg/kg - day)} = \frac{(SW * WI)}{BW}$$

$$\text{Dose, food (mg/kg - day)} = \frac{(FC * FI)}{BW}$$

$$\text{Total CDI (mg/kg - day)} = [\text{Dose (surface soil)} + \text{Dose (surface water)} + \text{Dose (food)}] * H$$

Where:

	FI	= Food ingestion rate (kg/day)
	FC	= Food concentration (mg/kg)
	WI	= Surface water ingestion rate (L/day)
	SW	= Surface water concentration (mg/L)
	BW	= Body weight (kg)
	SI	= Incidental soil ingestion rate (kg/day)
	SC	= Soil concentration (mg/kg)
	H	= Home Range/Contaminated Area (assume = 1 for maximum exposure)

For organic constituents and inorganics in surface soil, the contaminant concentration of prey items for the insectivorous and herbivorous species (e.g., earthworms and vegetation) is calculated using the following equation:

$$FC = SC * BAF$$

Where:

	FC	= Contaminant concentration in food (e.g., earthworms and vegetation, kg/day)
	SC	= Contaminant concentration in surface soil (mg/kg)
	BAF	= Soil to plant or soil to invertebrate bioaccumulation factor (unitless)

Contaminant concentrations in food items were calculated using BAFs from published sources. The following sources of BAFs were used in the SERA:

- Plant BAFs (Organics): Toxicity and Chemical-Specific Factors Database (ORNL, 2002).
- Plant BAFs (Inorganics): Empirical Model for the Uptake of Inorganic Chemicals from Soil by Plants (ORNL, 1998).
- Soil Invertebrate BAFs: Development and Validation of Bioaccumulation Models for Earthworms (Sample et al., 1998).

Table J.3-1 in Appendix J.3 presents chemical specific BAFs and other BAF data from the literature that were used in this SERA. A default value of 1.0 was used for the BAF if chemical-specific data were not available in the above sources.

The lower bound of the threshold effects is based on consistently conservative assumptions and NOAEL toxicity values (U.S. EPA, 1997c). This bound presents the greatest potential risks. The upper bound is based on observed impacts or predictions that ecological effects could occur and is developed using assumptions consistent with those used in the lower bound and LOAEL toxicity values (U.S. EPA, 1997c). This bound presents the average potential risk. These conservative and less conservative exposure scenarios were calculated, respectively, to provide the overall range of potential risks to all levels of potential ecological receptors.

The exposure assumptions (e.g., ingestion rates and body weight) were obtained from the Wildlife Exposure Factors Handbook (U.S. EPA, 1993c). Studies conducted in or surrounding states of Indiana were used, when available, to estimate the exposure factors. If only one value was available for a given exposure parameter, the value was used regardless of where the study was conducted in developing the value. The exposure parameters from U.S. EPA (1993) are wet weight values; however, the BAFs presented in the above sources estimate the tissue concentrations in dry weight. Therefore, the exposure parameters from U.S. EPA, 1993 were converted to dry weight values for the food chain model calculations. Table 8-9 presents the exposure parameters that were used in the SERA and Appendix J.4 presents the values that were used to calculate the exposure parameters and a discussion of how they were calculated.

An EEQ approach was used to characterize the risk to terrestrial receptors. This approach characterizes the potential effects by comparing exposure concentration with the effects data. An EEQ of greater than 1.0 is considered indicative of a potential risk. The EEQ is not an expression of probability, and the meaning of values greater than 1.0 must be interpreted in light of attendant uncertainties in risk management.

The EEQ for the terrestrial wildlife model was calculated as follows:

$$\text{EEQ} = \frac{\text{Total CDI}}{\text{TRV}}$$

Where:	EEQ	= Ecological effects quotient (unitless)
	Total CDI	= Total daily intake dose (mg/kg-day)
	TRV	= Toxicity reference value (NOAEL or LOAEL) (mg/kg-day)

8.4.2.2 Results and Discussion

Appendix J.6 presents the calculations of the food-chain modeling. Separate discussions are provided below for evaluations of potential risk to herbivorous and insectivorous receptors. Table 8-10 presents the EEQs under both the conservative and average exposure scenarios for herbivorous and insectivorous receptors. Table 8-11 presents a summary of the Step 3a evaluation for terrestrial wildlife.

Herbivorous Receptors

Under the conservative food-chain scenario, COPCs with EEQs greater than 1.0 for representative herbivorous receptors included arsenic for the vole, and lead, mercury, and zinc for the quail (Table 8-10). However, under the average food-chain scenario, all NOAEL-based EEQs were less than 1.0; therefore, risks to herbivorous receptors at SWMU 16 are acceptable.

Insectivorous Receptors

Under the conservative food-chain scenario, COPCs with EEQs greater than 1.0 for representative insectivorous receptors included arsenic, cadmium, lead, and zinc for the shrew, and cadmium, chromium, copper, lead, mercury, and zinc for the woodcock (Table 8-10). Under the average food-chain scenario, no NOAEL-based EEQs exceeded 1.0 for the shrew; therefore, risks to insectivorous small mammals are acceptable. However, NOAEL-based EEQs for lead, mercury, and zinc (NOAEL and LOAEL-based EEQs) exceeded 1.0 for the American woodcock under the average food-chain scenario.

The bird TRV for mercury was derived from a study using Mallard duck as the test species. Significant effects (fewer eggs and ducklings were produced) were observed at a dose level of 0.5 mg/kg. Because the study considered exposure over three generations, the dose was considered a chronic LOAEL and was multiplied by an uncertainty factor of 0.1 to develop a chronic NOAEL.

The avian NOAEL and LOAEL for lead were developed from a study in which no adverse effects were observed among Japanese quail consuming 10 mg/kg lead, but where reproduction was less impaired at 100 mg/kg (Sample et al., 1996). Because the study was greater than 12 weeks in duration and considered exposure during reproduction, the 10 mg/kg dose was considered a chronic NOAEL (1.13 mg/kg/day) and the 100 mg/kg dose was considered a chronic LOAEL (11.3 mg/kg-day). The EEQ

based on the NOAEL was slightly greater than 1 and the dose was closer to the NOAEL than the LOAEL so risks to birds are unlikely after consideration of other factors as discussed below.

The bird NOAEL and LOAEL for zinc were developed from a study in which no adverse effects were observed among hens consuming 48 and 228 mg/kg zinc, but where egg hatchability was less than 20 percent of controls among hens consuming 2,028 mg/kg zinc (Sample et al., 1996). Because the study was greater than 10 weeks in duration and considered exposure during reproduction, the 228 mg/kg dose was considered a chronic NOAEL (14.5 mg/kg/day) and the 2,028 mg/kg dose was considered a chronic LOAEL (131 mg/kg/day).

Since the majority of risks to insectivores were for the insectivorous bird (i.e., woodcock), the food-chain model was reevaluated considering an area use factor (AUF) of 20 percent for lead, mercury, and zinc. The AUF of 0.2 is expected to be a conservative number for the woodcock because the acreage of the contaminated area is estimated to be approximately 2 acres, compared to a woodcock's typical home range of approximately 61 acres. However, the AUF of 0.2 was selected to ensure protection of other insectivorous birds that may have a smaller home range than the woodcock, such as the American robin. For the reasons discussed below, it was assumed that birds would not obtain more than 20 percent of their food from the SWMU.

- Most insectivorous birds are not solely invertebrate feeders. For example, the American robin's diet consists of soft-bodied invertebrates and fruit (Sallabanks and James, 1999), and so the diet of this smaller bird is not adequately represented by 100 percent invertebrates, which is assumed in the woodcock food-chain model.

- The home ranges of the different insectivorous birds the woodcock is meant to be protective of varies. For example, some small insectivorous birds have home ranges less than the 2 acres that is assumed with the use of an AUF of 0.2, while others have home ranges greater than 2 acres. While assuming an AUF of 0.2 for species whose home ranges are greater than 2 acres is conservative because it assumes the maximum exposure possible for these species, the same assumption is not as conservative for species whose home ranges are less than 2 acres. However, the uncertainties are reduced because the ecological habitat at the site is not immediately surrounding the most contaminated areas of SWMU 16 (i.e., surrounding Building 146). For example, the American robin has a small home range (average of 0.61 acres); however, these small birds frequent forests, woodlands, and garden and breed where lawns and other short-grass areas are interspersed with shrubs and trees (Sallabanks and James, 1999). Therefore, although the American robin is likely present at SWMU 16, their presence is most likely surrounding the outer boundaries of SWMU 16

(i.e., along the forested boundaries) and not surrounding Building 146. It is possible that robins are feeding near the former ash piles, however, and would be exposed to elevated inorganics levels.

NOAEL and LOAEL-based EEQs were less than 1.0 for mercury after using an AUF of 20 percent (see Appendix J.6). The NOAEL-based EEQ for lead and zinc were still greater than 1.0 at 1.3 and 2.5, respectively. LOAEL-based EEQs were less than 1.0. Therefore, potential risks to insectivorous birds exist from lead and zinc, and these inorganics are retained as COPCs for further evaluation.

8.5 ECOLOGICAL RISK UNCERTAINTY ANALYSIS

This section discusses some of the uncertainties associated with the SWMU 16 ERA.

8.5.1 Measurement and Assessment Endpoints

Measurement endpoints are used to evaluate the assessment endpoints selected for the SERA. For the SERA, the measures of effects are not the same as the assessment endpoints. Therefore, the measures are used to predict effects to the assessment endpoints by selecting surrogate species that were evaluated. For example, a decrease in reproduction of a shrew is used to assess a decrease in reproduction of the small mammal population. However, predicting a decrease in reproduction of a shrew may either underprotect or overprotect the small mammal population based on differences in ingestion rates, toxicity, food preferences, home ranges, etc. between different species.

Risks to reptiles and amphibians are not quantitatively evaluated because exposure factors are not established for most species and toxicity data are very limited. Using aquatic organisms as a surrogate species, risks to amphibians exposed to sediment are possible; however, risks from surface water contaminants are expected to be low based on the Step 3a evaluations. Potential risks to reptiles cannot be evaluated in this ERA because of a lack of toxicity and exposure data (see below for a discussion of potential risks to the timber rattlesnake).

As discussed in Section 8.2.1.1, several endangered and threatened species or species of special concern are present at NSWC Crane, and potentially may inhabit SWMU 16. Risks to these species were not specifically calculated so the uncertainties of not calculating risks to these species are presented here. As discussed above, risks to carnivorous mammals and birds were not evaluated because the contaminated portions of SWMU 16 represent only a small portion of these receptors home range. For this reason, significant risks are not expected from exposure to chemicals at SWMU 16; therefore, unacceptable risks to the bobcat, bald eagle, Northern harrier, and osprey, and to carnivorous reptiles

such as the timber rattlesnake are also not expected, although there is uncertainty with this conclusion because risks were not quantitatively evaluated. Loggerhead shrikes and the sedge wren consume mostly aboveground insects such as caterpillars, beetles, spiders, and flies, as opposed to the worms that are consumed by the American woodcock in the food-chain model. Because worms are in direct contact with exposure to the soil, it is expected that they would have greater levels of contaminants at SWMU 16 than aboveground insects; therefore, risks to the woodcock from consuming worms are expected to be greater than risks to the loggerhead shrike and sedge wren from consuming aboveground insects. Risks to the worm eating American woodcock from chemicals in the surface soil and surface water were not acceptable for lead and zinc; therefore, risks to the loggerhead shrike and sedge wren are also considered possible if these species are present at SWMU 16. The American bittern is a marshland loving bird that feeds on fish, frogs, eels, insects, and water snakes. Although there is some aquatic habitat, it is not suitable for supporting piscivorous wildlife such as the bittern. As mentioned in Section 8.2.1.1, the presence of the Indiana bat has not been documented at or surrounding SWMU 16; therefore, risks to this endangered mammal from SWMU 16 are acceptable.

Finally, there are uncertainties in risks to reptiles because there is a lack of exposure factors for reptiles and a lack of reptile toxicity data for the detected chemicals. As discussed in Section 8.2.1.1, one threatened reptilian species is listed as potentially present at NSWC Crane. Based on the preferred habitat of the timber rattlesnake and the ecology of SWMU 16 (i.e., located on a ridge top), this species may potentially inhabit areas of SWMU 16. Risks to carnivorous reptiles were not specifically calculated; however, risks are unlikely when using carnivorous birds and mammals as surrogates, however there is uncertainty in this conclusion because risks to carnivorous birds and mammals were not quantitatively evaluated (see above).

8.5.2 Exposure Characterization

The contaminant dose to terrestrial wildlife is calculated using an equation that incorporates ingestion rates, body weights, BAFs, and other exposure factors. These exposure factors are obtained from literature studies or predicted using various equations. Ingestion rates and body weights vary among species, especially among species inhabiting different areas. This was taken into account when selecting exposure parameters from U.S. EPA (1993) and an attempt was made to minimize the uncertainties associated with the exposure characterization by selecting exposure parameters from studies conducted in and surrounding states of Indiana.

Bioaccumulation of contaminants into various biological media (e.g., plants, invertebrates, small mammals) depends on characteristics of the media such as pH, organic carbon, etc. Therefore, actual

BAFs at the sites may be different than those used in the SERA and obtained from the literature. BAFs for estimating concentrations of HMX and pentachlorophenol in earthworm tissue were not available so a BAF of 1.0 was used for the food chain models for the shrew and woodcock. As presented on Table 6-1, HMX has a relatively high water solubility value and low Koc value so it is not expected to accumulate to any significant degree in animal tissue. Therefore, using a BAF of 1.0 is likely causing the concentrations of HMX in the animal tissue to be overestimated in the food chain model.

Also, the bioavailability of contaminants reported in toxicity studies is typically greater than the contaminants in environmental media. Typically, highly bioavailable forms of the chemicals are used when conducting toxicity tests and/or conducting dosing studies for wildlife. For example, many of the toxicity tests used to develop screening levels for inorganics use highly bioavailable forms of the metal, such as metal salts, which in many cases are much more toxic than equivalent concentrations of the inorganics in field collected soils (Allen, 2002).

There is uncertainty in the chemical data collected at the site. Measured levels of chemicals are only estimates of the true site chemical concentrations. At SWMU 16, samples were deliberately biased toward known or suspected high concentrations so predicted doses are higher than actual doses. Whereas this is a conservative approach in predicting exposure concentrations, actual exposure of ecological receptors to chemical concentrations at SWMU 16 is likely overestimated, in particular, wildlife which typically roam over multiple sample locations and unlikely that wildlife will obtain all their food from within the most contaminated areas at SMWU 16. This overestimation of exposure was taken into account for wildlife by using AUFs in the food chain model calculations for insectivorous birds. Also, because the contaminated areas occupy only a very small portion of the overall ecological habitat at SWMU 16, a discussion of the overall risks to ecological receptors was included in the ERA.

The exposure of and potential risks to ecological receptors to chemicals in the gullys were only evaluated in the conservative COPC screening table. In the first part of the Step 3a refinement, it was determined that risks to aquatic receptors from chemicals in the gully were low because the intermittent nature of the gullys precludes a significant aquatic community from being present, and therefore exposed to chemicals. There is some uncertainty in not further evaluating risks to aquatic receptors in the gullys, but the overall conclusion of the ERA is not likely to be impacted because the lack of exposure would limit the ecological significance of any potential risks.

8.5.3 Ecological Effects Data

Toxicological data for a few of the chemicals are limited or do not exist. This occurred for several COPCs in the surface soil, sediment, and surface water but it did not affect the outcome of the risk assessment because the chemicals without toxicity data were evaluated using the other Step 3a factors discussed in Section 8.4.

Several alternative benchmark values were used to gain a better understanding of the relationship between the maximum concentration values of the selected COPCs to the overall ecological assessment of the site. There is some uncertainty involved when using these alternative benchmarks; however, attempts have been made to lessen the uncertainties by providing the toxicological basis of the alternate benchmarks when they were used.

8.5.4 Risk Characterization

Risks are possible if an EEQ is greater than or equal to 1.0 regardless of the magnitude of the EEQ. However, the magnitude of effects to ecological receptors cannot be inferred based on the magnitude of the EEQ. Rather, an EEQ greater than 1.0 simply indicates that the dose used to derive the toxicity reference value was exceeded.

Finally, there is uncertainty in how the predicted risks to a species at a site translate into risk to the population in the area as a whole.

8.6 ECOLOGICAL RISK SUMMARY AND CONCLUSIONS

A SERA was performed for SWMU 16, Cast High Explosives Fill/B146 Incinerator. Several chemicals were retained as COPCs in surface soil as a result of the initial screening of surface soil, sediment, and surface water. These chemicals were further evaluated and data were scrutinized as a part of the Step 3a refinement. Tables 8-6, 8-7, 8-8, and 8-11 present summaries of the Step 3a evaluation including the overall conclusion of whether chemicals initially selected as COPCs are retained as COPCs after the refined evaluation.

In summary, the list of chemicals initially selected as COPCs were further evaluated in Step 3a, the first step of the BERA. After a review of alternate toxicity information (based on soil invertebrates and plants) for the initial COPCs was conducted, maximum and average concentrations were compared to the alternate toxicity information, as appropriate. Several chemicals initially selected as COPCs were retained as COPCs for further evaluation for plants and invertebrates including antimony, copper, lead,

and zinc because concentrations were greater than alternate toxicity information for plants and soil invertebrates at multiple locations, including those surrounding the former ash piles. Additionally, NOAEL-based EEQs for lead and zinc were greater than 1.0 for insectivorous birds assuming an AUF of 0.2. Therefore, potential risks to insectivorous birds exist from lead and zinc, and these inorganics are retained as COPCs for further evaluation for these terrestrial receptors.

Similarly, the list of chemicals initially selected as COPCs in sediment and surface water were further evaluated in Step 3a, the first step of the BERA. After a review of alternate toxicity information (based on aquatic organisms) and other step 3a factors for the initial COPCs was conducted, maximum and average concentrations were compared to the alternate toxicity information, as appropriate. No chemicals initially selected as COPCs were retained as COPCs for further evaluation in sediment and surface water.

TABLE 8-1

ECOLOGICAL COPC SELECTION (SURFACE SOIL SAMPLES EXCLUDING THOSE UNDER BUILDING, PAVEMENT, AND GRAVEL)
ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration[1]	Average of Positive Detects	Sample of Maximum Detect	Region 5 ESL	Ecological Effects Quotient	Soil Invertebrates	COPC for Food Chain Modeling	Rationale
Dioxins (ng/kg)											
TEQ BIRD	23/23	0.0000790	2.86	0.520	0.520	16SS0270002	0.199	14.4	YES	YES	ASL/BIO
TEQ MAMMAL	23/23	0.0000790	3.30	0.704	0.704	16SS0270002	0.199	16.6	YES	YES	ASL/BIO
Volatile Organics (ug/kg)											
ACETONE	8/36	2 J	71 J	6.02	24.4	16SS0290002	2500	0.03	NO	NO	BSL
CIS-1,2-DICHLOROETHENE	1/38	23	23	1.16	23.0	16SS0390002	784	0.03	NO	NO	BSL
DICHLORODIFLUOROMETHANE	4/38	2 J	20 J	1.49	9.25	16SS0710102	39500	0.001	NO	NO	BSL
METHYLENE CHLORIDE	1/38	3 J	3 J	1.43	3.00	16SS0710102	4050	0.001	NO	NO	BSL
TOLUENE	1/38	1 J	1 J	0.578	1.00	16SS0160002	5450	0.0002	NO	NO	BSL
TRANS-1,2-DICHLOROETHENE	1/38	2 J	2 J	0.604	2.00	16SS0390002	784	0.003	NO	NO	BSL
TRICHLOROETHENE	3/38	2 J	86	3.18	33.7	16SS0390002	12400	0.01	NO	NO	BSL
TRICHLOROFLUOROMETHANE	23/38	1 J	3 J	1.52	2.17	5 SAMPLES	16400	0.0002	NO	NO	BSL
VINYL ACETATE	1/38	1 J	1 J	0.578	1.00	16SS0190002	12700	0.0001	NO	NO	BSL
Semivolatile Organics (ug/kg)											
2-METHYLNAPHTHALENE	1/25	4 J	4 J	2.06	4.00	16SS0200002	3240	0.001	NO	NO	BSL
ANTHRACENE	1/25	5 J	5 J	2.09	5.00	16SS0090002	1480000	0.000003	NO	NO	BSL
BENZO(A)ANTHRACENE	4/25	5 J	28 J	3.62	12.3	16SS0090002	5210	0.01	NO	NO	BSL
BENZO(A)PYRENE	5/25	4 J	32	3.95	11.8	16SS0090002	1520	0.02	NO	NO	BSL
BENZO(B)FLUORANTHENE	8/25	4 J	50 J	5.87	14.1	16SS0090002	59800	0.001	NO	NO	BSL
BENZO(G,H,I)PERYLENE	4/25	6 J	28	3.66	12.5	16SS0090002	119000	0.0002	NO	NO	BSL
BENZO(K)FLUORANTHENE	3/25	8 J	22	3.26	12.7	16SS0090002	148000	0.0001	NO	NO	BSL
BIS(2-ETHYLHEXYL)PHTHALATE	7/25	96 J	1200	144	272	16SS0140002	925	1.3	YES	NO	ASL/NONBIO
CHRYSENE	7/25	5 J	36	4.51	11.0	16SS0090002	4730	0.01	NO	NO	BSL
DIBENZO(A,H)ANTHRACENE	1/25	8	8	2.21	8.00	16SS0090002	18400	0.0004	NO	NO	BSL
FLUORANTHENE	7/25	4 J	64 J	5.83	15.7	16SS0090002	122000	0.001	NO	NO	BSL
INDENO(1,2,3-CD)PYRENE	4/25	5 J	23	3.30	10.3	16SS0090002	109000	0.0002	NO	NO	BSL
NAPHTHALENE	1/25	5 J	5 J	2.10	5.00	16SS0200002	99.4	0.1	NO	NO	BSL
PHENANTHRENE	3/25	4 J	28	3.30	13.0	16SS0090002	45700	0.001	NO	NO	BSL
PYRENE	8/25	5 J	60	5.87	14.1	16SS0090002	78500	0.001	NO	NO	BSL
SAFROLE	5/25	340 J	15000	937	4528	16SS0130002	404	37.1	YES	NO	ASL/NONBIO
Herbicides (ug/kg)											
PENTACHLOROPHENOL	2/25	2.5 J	8 J	0.665	5.25	16SS0300002	119	0.1	NO	NO	BSL
Inorganics (mg/kg)											
ALUMINUM	35/35	2510 J	34200 J	13417	13417	16SS0880002	NA	NA	YES	NO	NC/NONBIO
ANTIMONY	19/35	0.55 J	27.2 J	3.80	6.48	16SS0140002	0.29	93.8	YES	NO	ASL/NONBIO
ARSENIC	35/35	1.1 J	12.7 J	5.91	5.91	16SS0880002	5.7	2.2	YES	YES	ASL/BIO
BARIUM	35/35	33.7 J	303 J	120	120	16SS0130002	330	0.92	NO	NO	BSL
BERYLLIUM	15/35	0.23 J	1.4 J	0.450	0.677	16SS0170002	36	0.04	NO	NO	BSL
CADMIUM	14/35	0.2 J	2.8 J	0.624	1.20	16SS0150002	0.38	7.4	YES	YES	ASL/BIO
CALCIUM	32/35	219 J	63000 J	3412	3723	16SS0140002	NA	NA	NO	NO	NUT
CHROMIUM	35/35	6.7 J	38.2 J	18.2	18.2	16SS0880002	0.4	95.5	YES	YES	ASL/BIO
COBALT	35/35	1.4 J	25.9 J	8.11	8.11	16SS0170002	13	2.0	YES	NO	ASL/NONBIO
COPPER	35/35	5.1 J	413 J	66.0	66.0	16SS0150002	5.4	76.5	YES	YES	ASL/BIO
IRON	35/35	8870 J	43000 J	22070	22070	16SS0200002	NA	NA	YES	NO	NC/NONBIO
LEAD	34/35	8.1 J	1240 J	165	170	16SS0140002	16	77.5	YES	YES	ASL/BIO
LITHIUM	24/25	3.4 J	21.5 J	9.61	9.89	16SS0170002	NA	NA	YES	NO	NC/NONBIO
MAGNESIUM	35/35	687 J	3610 J	1713	1713	16SS0880002	NA	NA	NO	NO	NUT
MANGANESE	35/35	5.1 J	1040 J	354	354	16SS0130002	NA	NA	YES	NO	NC/NONBIO
MERCURY	27/35	0.015 J	0.16 J	0.0356	0.0451	16SS0110002	0.1	1.6	YES	YES	ASL/BIO
NICKEL	35/35	3.5 J	41.3 J	14.7	14.7	16SS0170002	13.6	3.04	YES	YES	ASL/BIO
POTASSIUM	35/35	360 J	2980 J	1117	1117	16SS0880002	NA	NA	NO	NO	NUT
SELENIUM	1/35	0.16 J	0.16 J	0.166	0.160	16SS0360002	0.0276	5.8	YES	YES	ASL/BIO
SODIUM	1/35	203 J	203 J	23.2	203	16SS0450002	NA	NA	NO	NO	NUT
STRONTIUM	25/25	6.8 J	145 J	49.8	49.8	16SS0130002	NA	NA	YES	NO	NC/NONBIO
THALLIUM	1/35	0.32 J	0.32 J	0.107	0.320	16SS0110002	0.0569	5.6	YES	NO	ASL/NONBIO
TIN	4/35	0.38 J	1.9 J	0.558	1.06	16SS0420002	7.62	0.25	NO	NO	BSL
TITANIUM	30/30	7.5 J	348 J	104	104	16SS0110002	NA	NA	YES	NO	NC/NONBIO

TABLE 8-1

ECOLOGICAL COPC SELECTION (SURFACE SOIL SAMPLES EXCLUDING THOSE UNDER BUILDING, PAVEMENT, AND GRAVEL)
ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Parameter		Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration(1)	Average of Positive Detects	Sample of Maximum Detect	Region 5 ESL	Ecological Effects Quotient	Soil Invertebrates	COPC for Food Chain Modeling	Rationale
VANADIUM		35/35	5.8 J	65.2 J	26.9	26.9	16SS0880002	1.59	41	YES	NO	ASL/NONBIO
ZINC		27/35	24.1 J	1840 J	418	477	16SS0420002	6.62	278	YES	YES	ASL/BIO
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY	(MEQ/1)	4/4	13	22	16.8	16.8	16SS0240002	NA	NA	NA	NA	NZ
PH	(S.U.)	4/4	5.3	6.5	5.83	5.83	16SS0240002	NA	NA	NA	NA	NZ
TOTAL ORGANIC CARBON	(mg/kg)	4/4	3800 J	6200 J	5125	5125	16SS0120002	NA	NA	NA	NA	NZ

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
NA = Not Applicable or Not Available
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.

Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NC = No Screening Level Available
BIO = Bioaccumulative Chemical
NONBIO = Nonbioaccumulative Chemical
NUT = Essential Nutrient
NZ = Miscellaneous Parameter not included in COPC Selection

TABLE 8-2

ECOLOGICAL COPC SELECTION -
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Upgradient Detects	Region 5 ESL	Ecological Effects Quotient	COPC Sediment Invertebrates	Rationale
Volatile Organics (ug/kg)											
ACETONE	6/10	3 J	69 J	14.1	21.8	16SD2201	5 J - 7 J	9.9	6.97	YES	ASL
CIS-1,2-DICHLOROETHENE	1/10	3 J	3 J	0.877	3.00	16SD1201	ND	654	0.005	NO	BSL
DICHLORODIFLUOROMETHANE	1/10	2 J	2 J	0.772	2.00	16SD2701	ND	NA	NA	YES	NC
TRICHLOROETHENE	2/10	2 J	19	2.61	10.5	16SD2901	ND	112	0.17	NO	BSL
Semivolatile Organics (ug/kg)											
2-METHYLNAPHTHALENE	1/10	5 J	5 J	2.51	5.00	16SD0301	NA	20.2	0.25	NO	BSL
ACENAPHTHENE	1/10	8 J	8 J	2.81	8.00	16SD0501	NA	6.71	1.19	YES	ASL
ACENAPHTHYLENE	3/10	4 J	8	3.30	5.67	16SD0301	NA	5.87	1.36	YES	ASL
ANTHRACENE	4/10	5 J	15	4.39	7.75	16SD0501	NA	57.2	0.26	NO	BSL
BENZO(A)ANTHRACENE	8/10	5 J	66	15.2	18.5	16SD0501	NA	108	0.61	NO	BSL
BENZO(A)PYRENE	6/10	7 J	84	18.4	29.2	16SD0501	NA	150	0.56	NO	BSL
BENZO(B)FLUORANTHENE	7/10	6 J	120	28.1	39.3	16SD0501	NA	10400	0.012	NO	BSL
BENZO(G,H,I)PERYLENE	7/10	5 J	65	27.5	38.3	16SD0501	NA	170	0.38	NO	BSL
BENZO(K)FLUORANTHENE	6/10	7 J	65	14.4	22.5	16SD0501	NA	240	0.27	NO	BSL
CHRYSENE	8/10	5 J	100	30.2	37.1	16SD0501	NA	166	0.60	NO	BSL
DI-N-BUTYL PHTHALATE	1/9	130 J	130 J	54.1	130	16SD0801	NA	1114	0.12	NO	BSL
DIBENZO(A,H)ANTHRACENE	1/10	18	18	3.81	18.0	16SD0501	NA	33	0.55	NO	BSL
DIPHENYLAMINE	2/9	140 J	170 J	69.9	155	16SD0301	NA	34.6	4.91	YES	ASL
FLUORANTHENE	9/10	5 J	160	32.8	36.2	16SD0501	NA	423	0.38	NO	BSL
FLUORENE	1/10	8 J	8 J	2.81	8.00	16SD0501	NA	77.4	0.10	NO	BSL
INDENO(1,2,3-CD)PYRENE	6/10	7 J	55	19.5	31.0	16SD0501	NA	200	0.28	NO	BSL
NAPHTHALENE	2/10	5 J	6 J	2.91	5.50	16SD0301	NA	176	0.034	NO	BSL
PHENANTHRENE	8/10	4 J	100	19.8	24.3	16SD0501	NA	204	0.49	NO	BSL
PYRENE	9/10	6 J	170	40.8	45.1	16SD0501	NA	195	0.87	NO	BSL
Energetics (mg/kg)											
2,6-DINITROTOLUENE	2/14	0.54 J	0.92 J	0.211	0.730	16SD1501	ND	0.0398	23.1	YES	ASL
RDX	1/14	0.27 J	0.27 J	0.135	0.270	16SD0301	ND	NA	NA	YES	NC
Herbicides (ug/kg)											
PENTACHLOROPHENOL	5/9	2.6 J	19 J	4.74	8.30	16SD1101	NA	23000	0.0008	NO	BSL
Inorganics (mg/kg)											
ALUMINUM	31/31	5560	19500 J	11885	11885	16SD0402	8710 J - 12800 J	NA	NA	YES	NC
ANTIMONY	30/31	0.65 J	174 J	30.9	31.9	16SD0601	1.3 J - 1.7 J	NA	NA	YES	NC
ARSENIC	31/31	2.5 J	34.1 J	10.9	10.9	16SD2601	24.4 J - 27.5 J	9.79	3.48	YES	ASL
BARIUM	31/31	56.6 J	2820 J	511	511	16SD0301	84.5 J - 454 J	NA	NA	YES	NC
BERYLLIUM	21/31	0.43 J	2.3 J	0.802	1.03	16SD1301	1.6 J - 3 J	NA	NA	YES	NC
CADMIUM	30/31	0.47 J	27.2 J	6.27	6.48	16SD0402	0.38 J - 0.62 J	0.99	27.5	YES	ASL
CALCIUM	31/31	395 J	98100 J	11620	11620	16SD0602	539 J - 846 J	NA	NA	NO	NUT
CHROMIUM	31/31	13.3 J	85.2 J	33.2	33.2	16SD1002	36.9 J - 85 J	43.4	1.96	YES	ASL
COBALT	31/31	2.5 J	41.2 J	16.2	16.2	16SD1201	29.7 J - 38.7 J	50	0.82	NO	BSL
COPPER	31/31	9.2 J	2570 J	468	468	16SD0601	14.8 J - 15 J	31.6	81.3	YES	ASL
IRON	31/31	16500 J	127000 J	40797	40797	16SD1002	74000 J - 141000 J	NA	NA	YES	NC
LEAD	31/31	13.6 J	15200 J	1730	1730	16SD0601	29.6 J - 73.2 J	35.8	425	YES	ASL
LITHIUM	9/9	2.9 J	10.4 J	6.53	6.53	16SD0401	NA	NA	NA	YES	NC
MAGNESIUM	31/31	470 J	6080 J	1786	1786	16SD0501	491 J - 916 J	NA	NA	NO	NUT
MANGANESE	31/31	54.6 J	2510 J	1005	1005	16SD2601	2270 J - 3650 J	NA	NA	YES	NC
MERCURY	26/31	0.023 J	4.6	0.437	0.518	16SD0402	0.026 J - 0.043 J	0.174	26.4	YES	ASL

TABLE 8-2

ECOLOGICAL COPC SELECTION -
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Parameter		Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Upgradient Detects	Region 5 ESL	Ecological Effects Quotient	COPC Sediment Invertebrates	Rationale
NICKEL		31/31	8.9 J	804 J	48.7	48.7	16SD0602	34.5 J - 39.2 J	22.7	35.4	YES	ASL
POTASSIUM		31/31	282 J	1530 J	958	958	16SD0902	739 J - 1120 J	NA	NA	NO	NUT
SELENIUM		18/31	0.33 J	1.5 J	0.488	0.700	16SD1301	0.7 J - 1.2 J	NA	NA	YES	NC
SILVER		1/31	1.5 J	1.5 J	0.136	1.50	16SD2901	ND	0.5	3	YES	ASL
SODIUM		8/31	33.8 J	283 J	44.5	117	16SD1102	40.3 J - 43.9 J	NA	NA	NO	NUT
STRONTIUM		9/9	51 J	2740 J	554	554	16SD0301	NA	NA	NA	YES	NC
TIN		20/31	0.4 J	19.6 J	4.80	7.26	16SD0602	ND	NA	NA	YES	NC
TITANIUM		14/14	9.4 J	156 J	73.8	73.8	16SD0401	39.5 J - 54.3 J	NA	NA	YES	NC
VANADIUM		31/31	12.8 J	71.7 J	33.7	33.7	16SD1301	43.7 J - 52.4 J	NA	NA	YES	NC
ZINC		30/31	68.3 J	23400 J	3669	3787	16SD0301	109 J - 131 J	121	193	YES	ASL
AVS/SEM Parameters (UMO/G)												
ACID VOLATILE SULFIDE	SEM	3/3	0.53	0.59	0.560	0.560	16SD0901	NA	NA	NA	NO	NZ
CADMIUM	SEM	3/3	0.024 J	0.145 J	0.0813	0.0813	16SD0601	NA	NA	NA	NO	NZ
COPPER	SEM	3/3	1.83	18.3	8.37	8.37	16SD0601	NA	NA	NA	NO	NZ
LEAD	SEM	3/3	2.6	16.3	7.68	7.68	16SD0601	NA	NA	NA	NO	NZ
MERCURY	SEM	3/3	0.0001	0.00015	0.000133	0.000133	16SD0901	NA	NA	NA	NO	NZ
NICKEL	SEM	3/3	0.028	0.068	0.0437	0.0437	16SD0601	NA	NA	NA	NO	NZ
SEM/AVS	SEM	3/3	50	220	107	107	16SD0601	NA	NA	NA	NO	NZ
ZINC	SEM	3/3	20.6 J	91 J	44.7	44.7	16SD0601	NA	NA	NA	NO	NZ
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY	(MEQ/1)	3/3	5.7 J	25 J	16.2	16.2	16SD2301	NA	NA	NA	NO	NZ
PH	(S.U.)	3/3	7.4	8	7.73	7.73	16SD0601	NA	NA	NA	NO	NZ
TOTAL ORGANIC CARBON	(MG/KG)	3/3	1600	8600	4700	4700	16SD2301	NA	NA	NA	NO	NZ

Notes:
NA - Not Applicable or Not Available
ND - Not Detected
(1) - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value
UMO/G

Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NC = No Screening Level Available
NUT = Essential Nutrient
NZ = Field parameters not selected as COPCs

TABLE 8-3

ECOLOGICAL COPC SELECTION -
TURKEY CREEK MAINSTREAM SEDIMENT SAMPLES ROUNDS 2 AND 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration(1)	Average of Positive Detects	Sample of Maximum Detect	Range of Upgradient Detects	Region 5 ESL	Ecological Effects Quotient	COPC For Sediment Invertebrates	Rationale
Volatile Organics (ug/kg)											
ACETONE	1/1	7 J	7 J	7.00	7.00	16SD1901	ND	9.9	0.71	NO	BSL
DICHLORODIFLUOROMETHANE	1/1	22	22	22.0	22.0	16SD1901	ND	NA	NA	YES	NC
Inorganics (mg/kg)											
ALUMINUM	4/4	8730 J	10500 J	9658	9658	16SD1902	8090 J	NA	NA	YES	NC
ANTIMONY	3/4	0.8 J	1.1 J	0.843	1.00	16SD1901, 16SD2501	1.2 J	NA	NA	YES	NC
ARSENIC	4/4	7 J	30.8 J	21.1	21.1	16SD1901	34.8 J	9.79	3.15	YES	ASL
BARIUM	4/4	69.7 J	110 J	86.5	86.5	16SD1901	62.5 J	NA	NA	YES	NC
BERYLLIUM	3/4	1.5 J	2.4 J	1.55	2.00	16SD1901	2.6 J	NA	NA	YES	NC
CADMIUM	3/4	0.54 J	0.79 J	0.534	0.633	16SD1901	0.54 J	0.99	0.80	NO	BSL
CALCIUM	4/4	539 J	973 J	808	808	16SD1901	362 J	NA	NA	NO	NUT
CHROMIUM	4/4	16.3 J	79.9 J	51.7	51.7	16SD2401	78.5 J	43.4	1.84	YES	ASL
COBALT	4/4	16.1 J	26.9 J	22.0	22.0	16SD1901	21.4 J	50	0.54	NO	BSL
COPPER	4/4	13.4 J	15.1 J	14.1	14.1	16SD1902	12.6 J	31.6	0.48	NO	BSL
IRON	4/4	15800 J	122000 J	74325	74325	16SD1901	124000 J	NA	NA	YES	NC
LEAD	4/4	23.3 J	32.9 J	28.0	28.0	16SD2501	28.1 J	35.8	0.92	NO	BSL
MAGNESIUM	4/4	400 J	916 J	687	687	16SD2501	292 J	NA	NA	NO	NUT
MANGANESE	4/4	398 J	1900 J	1337	1337	16SD1901	1370 J	NA	NA	YES	NC
MERCURY	1/4	0.022 J	0.022 J	0.0214	0.0220	16SD1901	0.025 J	0.174	0.13	NO	BSL
NICKEL	4/4	20.8 J	43.4 J	34.6	34.6	16SD1901	43 J	22.7	1.91	YES	ASL
POTASSIUM	4/4	462 J	1040 J	811	811	16SD2501	438 J	NA	NA	NO	NUT
SELENIUM	3/4	0.5 J	0.8 J	0.544	0.673	16SD2401	0.5 J	NA	NA	YES	NC
TITANIUM	1/1	50.6 J	50.6 J	50.6	50.6	16SD1901	56.4 J	NA	NA	YES	NC
VANADIUM	4/4	21.1 J	51.2 J	40.0	40.0	16SD2401	56.3 J	NA	NA	YES	NC
ZINC	4/4	84.4 J	206 J	123	123	16SD1901	92.5 J	121	1.70	YES	ASL

Notes:
Turkey Creek Mainstream sediment samples were only collected in rounds 2 and 3
NA - Not Applicable or Not Available
ND - Not Detected
(1) - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value

Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NC = No Screening Level Available
NUT = Essential Nutrient

TABLE 8-4

ECOLOGICAL COPC SELECTION -
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Upgradient Detects	Region 5 ESL	Ecological Effects Quotient	COPC for Aquatic Invertebrates	Rationale
Volatile Organics (ug/L)											
ACETONE	3/10	0.5 J	2.8 J	0.665	1.63	16SW2701	0.6 J	1700	0.0016	NO	BSL
CIS-1,2-DICHLOROETHENE	2/11	1.4	3.4	0.559	2.40	16SW2901	ND	970	0.0035	NO	BSL
TRICHLOROETHENE	5/11	0.8 J	26	4.51	9.74	16SW2901	ND	47	0.55	NO	BSL
Energetics (ug/L)											
2-AMINO-4,6-DINITROTOLUENE	1/7	0.29 J	0.29 J	0.149	0.290	16SW3001	ND	NA	NA	YES	NC
4-AMINO-2,6-DINITROTOLUENE	1/7	0.63	0.63	0.198	0.630	16SW3001	ND	NA	NA	YES	NC
HMX	3/7	0.27 J	4.8	0.869	1.86	16SW3001	ND	NA	NA	YES	NC
RDX	2/7	0.29 J	24	3.56	12.1	16SW3001	ND	NA	NA	YES	NC
Total Metals (ug/L)											
ALUMINUM	18/21	173 J	9510 J	1647	1913	16SW1501	485 J - 891 J	87	109	YES	ASL
ANTIMONY	8/21	4.2 J	14.2 J	3.25	7.71	16SW0301	ND	80	0.18	NO	BSL
ARSENIC	15/21	0.29 J	3.8 J	0.747	0.991	16SW1501	ND	148	0.026	NO	BSL
BARIUM	21/21	44.3 J	425 J	155	155	16SW0601	53.4 J - 57.3 J	220	1.93	YES	ASL
BERYLLIUM	12/21	0.02 J	0.5 J	0.115	0.148	16SW2801	ND	3.6	0.14	NO	BSL
CADMIUM	15/21	0.2 J	4.4	1.35	1.86	16SW0601	ND	0.15	29.3	YES	ASL
CALCIUM	21/21	6800 J	49600 J	20873	20873	16SW0601	16600 J - 38700 J	NA	NA	NO	NUT
CHROMIUM	11/21	1.4 J	11.8 J	2.30	4.00	16SW1501	0.78 J	11	1.07	YES	ASL
COBALT	18/21	0.11 J	4.6 J	1.10	1.26	16SW1501	ND	24	0.19	NO	BSL
COPPER	19/21	0.95 J	134 J	34.1	37.6	16SW0401	ND	1.58	84.8	YES	ASL
IRON	18/21	278 J	9990 J	1787	2078	16SW1501	263 J - 599 J	1000	9.99	YES	ASL
LEAD	17/21	4.8 J	281 J	48.4	59.8	16SW0401	ND	1.17	240	YES	ASL
MAGNESIUM	21/21	1310 J	9450 J	4576	4576	16SW1501	5820 J - 7810 J	NA	NA	NO	NUT
MANGANESE	18/21	4.9 J	443 J	71.1	82.4	16SW1501	19.2 J - 135 J	NA	NA	YES	NC
NICKEL	18/21	1.2 J	11.8	5.01	5.73	16SW2701	1.1 J - 2.3 J	28.8	0.41	NO	BSL
POTASSIUM	21/21	727	4520 J	2155	2155	16SW1101	1780 J - 2230 J	NA	NA	NO	NUT
SODIUM	16/21	1820 J	18900 J	4882	6208	16SW1101	9580 J - 15000 J	NA	NA	NO	NUT
THALLIUM	1/21	0.16 J	0.16 J	0.0487	0.160	16SW0601	ND	10	0.016	NO	BSL
TIN	2/21	0.47 J	0.84 J	0.147	0.655	16SW0401	ND	180	0.0047	NO	BSL
TITANIUM	4/4	2 J	156 J	46.3	46.3	16SW1501	3.4 J - 19.7 J	NA	NA	YES	NC
VANADIUM	15/21	0.63 J	19 J	3.37	4.51	16SW1501	0.85 J	12	1.58	YES	ASL
ZINC	19/21	16.9 J	1340 J	308	340	16SW0401	16.6 J	65.7	20.4	YES	ASL
Dissolved Metals (ug/L)											
ALUMINUM	8/21	21 J	124	37.2	69.8	16SW2701-F	164 J	87	1.43	YES	ASL
ANTIMONY	6/21	4.3 J	10.8 J	2.48	7.12	16SW0301-F	ND	80	0.14	NO	BSL
ARSENIC	3/21	0.26 J	0.65 J	0.117	0.407	16SW1101-F	ND	148	0.004	NO	BSL
BARIUM	21/21	43.2 J	335 J	123	123	16SW0601-F	46.6 J - 57.2 J	220	1.52	YES	ASL
BERYLLIUM	6/21	0.02 J	0.1 J	0.0267	0.0617	W1302-F, 16SW27	ND	3.6	0.028	NO	BSL
CADMIUM	15/21	0.12 J	3.7	1.13	1.57	16SW0901-F	ND	0.15	24.7	YES	ASL
CALCIUM	21/21	6570 J	49100 J	19534	19534	16SW1501-F	15700 J - 37400 J	NA	NA	NO	NUT
CHROMIUM	1/21	2.1 J	2.1 J	0.318	2.10	16SW3001-F	ND	11	0.19	NO	BSL
COBALT	17/21	0.09 J	2.9 J	0.646	0.787	16SW1301-F	2.7 J - 3.1 J	24	0.12	NO	BSL
COPPER	17/21	1 J	35.7 J	16.9	20.7	16SW1001-F	ND	1.58	22.6	YES	ASL
IRON	9/21	76.4 J	188 J	70.8	122	16SW2901-F	ND	1000	0.19	NO	BSL
LEAD	15/21	0.81 J	35.8 J	8.23	11.5	16SW0301-F	ND	1.17	30.6	YES	ASL

TABLE 8-4

ECOLOGICAL COPC SELECTION -
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Upgradient Detects	Region 5 ESL	Ecological Effects Quotient	COPC for Aquatic Invertebrates	Rationale
MAGNESIUM	21/21	1280 J	8870 J	4215	4215	16SW1501-F	5400 J - 7390 J	NA	NA	NO	NUT
MANGANESE	18/21	1.9 J	171 J	27.1	31.3	16SW1201-F	10.9 J - 29.8 J	NA	NA	YES	NC
MERCURY	1/21	0.04 J	0.04 J	0.0155	0.0400	16SW1501-F	ND	0.0013	30.8	YES	ASL
NICKEL	18/21	0.95 J	9.4	3.30	3.75	16SW1202-F	1.2 J	28.8	0.33	NO	BSL
POTASSIUM	21/21	647	4720	1907	1907	16SW1101-F	1550 J - 2140 J	NA	NA	NO	NUT
SODIUM	15/21	2030 J	19900 J	4878	6574	16SW1101-F	9010 J - 14000 J	NA	NA	NO	NUT
TITANIUM	2/4	1.4 J	1.6 J	0.956	1.50	16SW1301-F	1.5 J - 8.5 J	NA	NA	YES	NC
ZINC	18/21	3.1 J	421 J	133	149	16SW1601-F	18.1 J - 33.3 J	65.7	6.41	YES	ASL
Field Parameters (mg/L)											
DISSOLVED OXYGEN	17/17	5.66	10.65	8.27	8.27	16SW0301	NA	NA	NA	NO	NZ
DISSOLVED OXYGEN - METER	4/4	2.87	6.49	4.58	4.58	16SW1701	1.91 - 7.23	NA	NA	NO	NZ
OXIDATION REDUCTION POT (MV)	21/21	36.6	204	97.5	97.5	16SW1701	183.4 - 254.7	NA	NA	NO	NZ
PH (S.U.)	21/21	6.4	7.95	7.31	7.31	16SW2901	6.78 - 7.14	NA	NA	NO	NZ
SPECIFIC CONDUCTANCE (MS/CM)	21/21	0.056	0.84	0.167	0.167	16SW1302	0.184 - 0.299	NA	NA	NO	NZ
TEMPERATURE (^{O}C)	21/21	9.61	16.45	13.2	13.2	16SW0601	11.7 - 15.12	NA	NA	NO	NZ
TURBIDITY (NTU)	21/21	2	179	28.4	28.4	16SW2801	2.57 - 10.59	NA	NA	NO	NZ
Miscellaneous Parameters (mg/L)											
NITRITE/NITRATE-N	4/7	0.11	0.55	0.203	0.340	16SW1302	0.07 - 3.2	NA	NA	YES	NC

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
NA - Not Analyzed
ND - Not Detected
(1) - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.

Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NC = No Screening Level Available
NUT = Essential Nutrient
NZ = Field parameters not selected as COPCs

TABLE 8-5

ECOLOGICAL COPC SELECTION -
TURKEY CREEK MAINSTREAM SURFACE WATER SAMPLES
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration(1)	Average of Positive Detects	Sample of Maximum Detect	Range of Upgradient Detects	Region 5 ESL	Ecological Effects Quotient	Aquatic Invertebrates	Wildlife	Rationale
Energetics (ug/L)												
HMX	1/1	0.32 J	0.32 J	0.320	0.320	16SW2401	ND	NA	NA	YES	YES	NC/BIO
Total Metals (ug/L)												
ALUMINUM	2/3	146 J	822 J	331	484	16SW1901	ND	87	9.45	YES	NO	ASL/NONBIO
ARSENIC	1/3	0.37 J	0.37 J	0.177	0.370	16SW1901	ND	148	0.0025	NO	NO	BSL
BARIUM	3/3	48.1 J	95.7 J	74.1	74.1	16SW2401	23 J	220	0.44	NO	NO	BSL
BERYLLIUM	1/3	0.09 J	0.09 J	0.0383	0.0900	16SW1901	ND	3.6	0.025	NO	NO	BSL
CADMIUM	1/3	0.66 J	0.66 J	0.235	0.660	16SW1901	ND	0.15	4.4	YES	YES	ASL/BIO
CALCIUM	3/3	9360 J	17900 J	14820	14820	16SW2501	9930 J	NA	NA	NO	NO	NUT
COBALT	3/3	0.14 J	0.72 J	0.433	0.433	16SW2501	ND	24	0.03	NO	NO	BSL
COPPER	3/3	0.24 J	4.1 J	1.55	1.55	16SW1901	2.7 J	1.58	2.59	YES	YES	ASL/BIO
IRON	3/3	43.6 J	886 J	457	457	16SW1901	ND	1000	0.89	NO	NO	BSL
LEAD	1/3	1.2	1.2	0.470	1.20	16SW1901	ND	1.17	1.03	YES	YES	ASL/BIO
MAGNESIUM	3/3	3370	6340 J	5337	5337	16SW2501	2460 J	NA	NA	NO	NO	NUT
MANGANESE	3/3	21.5	476	200	200	16SW2501	30 J	NA	NA	YES	NO	NC/NONBIO
NICKEL	3/3	4.5 J	5.7	5.30	5.30	16SW2401, 16SW2501	ND	28.8	0.20	NO	NO	BSL
POTASSIUM	3/3	989 J	1680	1336	1336	16SW1901	790 J	NA	NA	NO	NO	NUT
SODIUM	3/3	3660 J	8600 J	6703	6703	16SW2401	8330 J	NA	NA	NO	NO	NUT
VANADIUM	1/3	1.5 J	1.5 J	0.880	1.50	16SW1901	ND	12	0.13	NO	NO	BSL
ZINC	3/3	6.9 J	18.7 J	11.1	11.1	16SW1901	ND	65.7	0.28	NO	NO	BSL
Dissolved Metals (ug/L)												
ALUMINUM	2/3	90.1	119 J	80.0	105	16SW2401-F	ND	87	1.37	YES	NO	ASL/NONBIO
BARIUM	3/3	43.7 J	98.3 J	77.6	77.6	16SW2401-F	48.2 J	220	0.45	NO	NO	BSL
BERYLLIUM	1/3	0.04 J	0.04 J	0.0200	0.0400	16SW1901-F	ND	3.6	0.011	NO	NO	BSL
CADMIUM	1/3	1.4	1.4	0.480	1.40	16SW1901-F	ND	0.15	9.33	YES	YES	ASL/BIO
CALCIUM	3/3	9910 J	17400 J	14503	14503	16SW2501-F	10100 J	NA	NA	NO	NO	NUT
COBALT	3/3	0.16 J	1.9	0.743	0.743	16SW2501-F	2.6 J	24	0.079	NO	NO	BSL
COPPER	3/3	0.22 J	3.9 J	1.49	1.49	16SW1901-F	ND	1.58	2.47	YES	YES	ASL/BIO
IRON	3/3	11.8 J	163	92.9	92.9	16SW2501-F	ND	1000	0.16	NO	NO	BSL
LEAD	1/3	0.54 J	0.54 J	0.230	0.540	16SW1901-F	ND	1.17	0.46	NO	NO	BSL
MAGNESIUM	3/3	3020 J	6450	5137	5137	16SW2501-F	3770 J	NA	NA	NO	NO	NUT
MANGANESE	3/3	7.7	1970 J	702	702	16SW2501-F	12.5 J	NA	NA	YES	NO	NC/NONBIO
NICKEL	3/3	4 J	8.6	6.50	6.50	16SW2501-F	ND	28.8	0.30	NO	NO	BSL
POTASSIUM	3/3	1030 J	1900 J	1523	1523	16SW2501-F	846 J	NA	NA	NO	NO	NUT
SODIUM	3/3	3840 J	8190 J	6530	6530	16SW2401-F	4360 J	NA	NA	NO	NO	NUT
ZINC	3/3	9.1 J	21.8 J	15.8	15.8	16SW2401-F	ND	65.7	0.33	NO	NO	BSL
Field Parameters												
DISSOLVED OXYGEN (mg/L)	3/3	3.86	7.72	5.45	5.45	16SW1901	NA	NA	NA	NA	NA	NZ
OXIDATION REDUCTION POTENTIAL (MV)	3/3	55.3	269	176	176	16SW2501	251.6	NA	NA	NA	NA	NZ
PH (S.U.)	3/3	6.35	7.53	6.82	6.82	16SW1901	6.39	NA	NA	NA	NA	NZ
SPECIFIC CONDUCTANCE (MS/CM)	3/3	0.081	130	85.4	85.4	16SW2401	0.108	NA	NA	NA	NA	NZ
TEMPERATURE (^{o}C)	3/3	11.21	15.83	13.3	13.3	16SW1901	12.88	NA	NA	NA	NA	NZ
TURBIDITY (NTU)	3/3	1	25	9.33	9.33	16SW1901	1	NA	NA	NA	NA	NZ
Miscellaneous Parameters (mg/L)												
NITRITE/NITRATE-N	1/1	0.05	0.05	0.0500	0.0500	16SW2401	ND	NA	NA	YES	NO	NC/NONBIO

Notes:
Field dups are excluded from these summaries because they are considered to be field QC
Turkey Creek Main Stream SW samples were collected in rnd 3
NA - Not Analyzed
ND - Not Detected
(1) - Means incorporate TV/2 for NDs where TV = threshold value

Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NUT = Essential Nutrient
BIO = Bioaccumulative Chemical
NONBIO = Nonbioaccumulative Chemical
NC = No Screening Level Available
NZ = Field parameters not selected as SOPCs

TABLE 8-6

STEP 3A EVALUATION FOR RISKS TO PLANTS AND INVERTEBRATES
SURFACE SOIL COPCs
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration	Screening Level	Maximum EEQ[1]	Number of Samples > Screening Level[2]	Step 3a Evaluation[4]						Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks					Other Step 3a Factors Considered in Evaluation		
						Eco-SSL		Canadian SQG[3]	ORNL Benchmarks[3]				
						Plant	Earthworm		Plant	Earthworm			
Dioxins (ng/kg)													
TEQ BIRD	23/23	2.86	0.199	14.4	14	NA	NA	NA	NA	NA	- A study in the literature found that two species of earthworms showed adverse effects from soil containing 5 mg/kg of 2,3,7,8-TCDD. - Dioxins are not harmful to invertebrates at "high" levels because they lack the aryl hydrocarbon (Ah)receptor; invertebrates are not likely to be impacted by dioxin concentrations in the soil. - Plants also lack the Ah receptors so they are not likely to be impacted concentrations of dioxins in the soil.	Acceptable	No
TEQ MAMMAL	23/23	3.30	0.199	16.6	17	NA	NA	NA	NA	NA			
Semivolatile Organics (ug/kg)													
BIS(2-ETHYLHEXYL)PHTHALATE	7/25	1200	925	1.30	1	NA	NA	NA	100	200[5]	-Maximum concentration is less than alternate benchmarks for plants and invertebrates.	Acceptable	No
SAFROLE	5/25	15000	404	37.1	4	NA	NA	NA	NA	NA	-Safrole is naturally occurring in sassafrass trees; use and disposal of safrole has not been documented at SWMU 16. -Samples containing safrole were collected distrant from the former ash piles.	Acceptable	No
Inorganics (mg/kg)													
ALUMINUM	35/35	34200	NA	NA	NA	pH[8]	pH[8]	NA	NA	NA	-Soil pH levels ranged from 5.3 S.U. to 6.5 S.U. with an average of 5.83 S.U. and aluminum levels are not expected to be toxic to plants and invertebrates.	Acceptable	No
ANTIMONY	19/35	27.2	0.29	93.8	19	NA	78	NA	5	NA	-Maximum concentration is less than Eco-SSL for earthworms. -Concentrations were greater than the ORNL plant value in nine samples surrounding former ash piles; vegetation is minimal and appears stressed in this area.	Unacceptable (plants)	Yes
ARSENIC	35/35	12.7	5.7	2.2	17	NA	NA	17.1	NA	NA	-Maximum concentration is less than alternate benchmarks for plants and invertebrates.	Acceptable	No
CADMIUM	14/35	2.8	0.38	7.4	13	32	140	NA	NA	NA	-Maximum concentration is less than alternate benchmarks for plants and invertebrates.	Acceptable	No
CHROMIUM	35/35	38.2	0.4	95.5	35	NA	NA	64	NA	NA	-Maximum concentration is less than alternate benchmarks for plants and invertebrates.	Acceptable	No
COBALT	35/35	25.9	13	2.0	4	13	NA	NA	NA	NA	-Concentrations were within the range of background concentrations (6 mg/kg to 27.1 mg/kg).	Acceptable	No
COPPER	35/35	413	5.4	76.5	34	NA	NA	63	100	60	-Concentrations exceeded the SQG at 10 locations and the ORNL earthworm value at 11 locations surrounding former ash piles; vegetation is minimal and appears stressed in this area.	Unacceptable	Yes
IRON	35/35	43000	NA	NA	NA	pH[6]	NA	NA	NA	NA	-Soil pH levels ranged from 5.3 S.U. to 6.5 S.U. and so iron levels are not expected to be toxic to plants. -Generally considered non-toxic.	Acceptable	No
LEAD	34/35	1240	16	77.5	28	115	1,700	NA	NA	NA	-Maximum concentration is less than Eco-SSL for earthworms. -Concentrations were greater than the ORNL plant value at 13 locations surrounding former ash piles; vegetation is minimal and appears stressed in this area.	Unacceptable (plants)	Yes

TABLE 8-6

STEP 3A EVALUATION FOR RISKS TO PLANTS AND INVERTEBRATES
SURFACE SOIL COPCs
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration	Screening Level	Maximum EEQ[1]	Number of Samples > Screening Level[2]	Step 3a Evaluation[4]						Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks							
						Eco-SSL		Canadian SQG[3]	ORNL Benchmarks[3]		Other Step 3a Factors Considered in Evaluation		
						Plant	Earthworm		Plant	Earthworm			
LITHIUM	24/25	21.5	NA	NA	NA	NA	NA	NA	2	10[7]	-Concentrations were within the range of background concentrations (9.1 mg/kg to 29.9 mg/kg).	Acceptable	No
MANGANESE	35/35	1040	NA	NA	NA	NA	NA	NA	500	100[7]	-Concentrations were within the range of background concentrations (268 mg/kg to 3,040 mg/kg).	Acceptable	No
MERCURY	27/35	0.16	0.1	1.60	1	NA	NA	12	NA	NA	-Maximum concentration is less than alternate benchmarks for plants and invertebrates.	Acceptable	No
NICKEL	35/35	41.3	13.6	3.04	19	NA	NA	50	NA	NA	-Maximum concentration is less than alternate benchmarks for plants and invertebrates.	Acceptable	No
SELENIUM	1/35	0.16	0.0276	5.80	1	NA	NA	1	NA	NA	-Maximum concentration is less than alternate benchmarks for plants and invertebrates.	Acceptable	No
STRONTIUM	25/25	145	NA	NA	NA	NA	NA	NA	NA	NA	-Typically considered non-toxic. -Not associated with SWMU 16 activities.	Acceptable	No
THALLIUM	1/35	0.32	0.0569	5.6	1	NA	NA	1.4	NA	NA	-Single detected concentration is less than SQG.	Acceptable	No
TITANIUM	30/30	348	NA	NA	NA	NA	NA	NA	NA	1,000[7]	-Maximum concentration is less than ORNL mircroorganism value. -Generally considered poorly soluble, poorly bioavailable, and non-toxic. -Not associated with SWMU 16 activities.	Acceptable	No
VANADIUM	35/35	65.2	1.59	41.0	35	NA	NA	130	NA	NA	-Maximum concentration is less than alternate benchmarks for plants and invertebrates.	Acceptable	No
ZINC	27/35	1840	6.62	278	27	NA	NA	200	50	100	-Concentrations exceeded the ORNL plant value in 22 samples. -Concentrations were greater than the range of background concentrations (24.4 mg/kg to 60.2 mg/kg).	Unacceptable	Yes

Footnotes:
1 Maximum EEQ = Maximum detection divided by the screening level.
2 Number of samples with concentrations greater than the screening level.
3 Canadian and ORNL benchmarks were used only in the absence of Eco-SSLs.
4 See Section 8.4.1.1 for a more detailed Step 3a evaluation.
5 Value is the ORNL earthworm benchmark for dimethylphthalate.
6 Value for iron is pH dependent where levels between 5 and 8 S.U. are not expected to cause toxicity.
7 Value is the ORNL benchmark for soil mircroorganisms and microbial processes.
8 Aluminum is only considerd a COPC when the soil pH is less than 5.5.

Acronyms:
COPC = Chemical of Potential Concern
Eco-SSL = U.S. EPA Ecological Soil Screening Level
EEQ = Ecological Effects Quotient
NA = Not Available or Not Applicable
ORNL = Oak Ridge National Laboratory
SQG = Soil Quality Guideline

TABLE 8-7

STEP 3A EVALUATION FOR RISKS TO BENTHIC INVERTEBRATES
SEDIMENT COPCs
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration	Screening Level	Maximum EEQ[1]	Number of Samples > Screening Level[2]	Step 3a Evaluation				Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks			Other Step 3a Factors Considered in Evaluation[3]		
						TEL	Canadian LEL	AET			
Volatile Organics (ug/kg)											
DICHLORODIFLUOROMETHANE	1/1	22	NA	NA	NA	NA	NA	NA	-Typically considered non-toxic to ecological receptors. -Detected in one of 10 gully sediment samples -Significant impacts to benthic invertebrates are not likely because the poor habitat would preclude their presence in the mainstream.	Acceptable	No
Inorganics (mg/kg)											
ALUMINUM	4/4	10500	NA	NA	NA	25500	NA	NA	-Maximum concentration is less than the TEL.	Acceptable	No
ANTIMONY	3/4	1.1	NA	NA	NA	NA	NA	NA	-Concentrations were similar to the upgradient location.	Acceptable	No
ARSENIC	4/4	30.8	9.79	3.15	3	NA	NA	NA	-Concentrations were similar to the upgradient location.	Acceptable	No
BARIUM	4/4	110	NA	NA	NA	NA	NA	48	-Concentrations at locations 16SD24 and 16SD25 were similar to the up-gradient concentration (62.5 mg/kg). -Maximum concentration was detected at location 16SD19 during Round 2; the barium concentration at this location during Round 3 (88.9 mg/kg) was similar to the upgradient concentration. -Significant impacts to benthic invertebrates are not likely because the poor habitat would preclude their presence in the mainstream. -Barium is a common element in sediments and is not generally associated with significant toxicity.	Acceptable	No
BERYLLIUM	3/4	2.4	NA	NA	NA	NA	NA	NA	-Concentrations were similar to the upgradient location.	Acceptable	No
CHROMIUM	4/4	79.9	43.40	1.84	2	NA	NA	NA	-Concentrations were similar to the upgradient location.	Acceptable	No
IRON	4/4	122000	NA	NA	NA	NA	NA	NA	-Concentrations were similar to the upgradient location.	Acceptable	No
MANGANESE	4/4	1900	NA	NA	NA	NA	460	NA	-All SWMU 16 sample concentrations, including the upgradient location, were greater than the SEL (1,100 mg/kg). -Concentrations at locations 16SD24 and 16SD25 were similar to the up-gradient concentration (1,370 mg/kg). -Concentrations at location 16SD19 were greater than the upgradient con-centration; however, the poor habitat at this location would preclude the presence of benthic invertebrates at this location. -Manganese was detected in surface soil samples at a maximum concen-tration of 1,040 mg/kg, which is less than the maximum background con-centration for soil group 3 (3,040 mg/kg); therefore, manganese in the sediment is not likely attributable to SWMU activities.	Acceptable	No
NICKEL	4/4	43.4	22.70	1.91	3	NA	NA	NA	-Concentrations were similar to the upgradient location.	Acceptable	No
SELENIUM	3/4	0.8	NA	NA	NA	NA	NA	NA	-Detected at similar concentrations ranging from 0.5 mg/kg to 0.8 mg/kg; upgradient location concentration was 0.5 mg/kg. -Selenium was detected in only 1 of 35 surface soil samples at a concen-tration of 0.16 mg/kg, which is less than the maximum background con-centration for soil group 3 (0.64 mg/kg); therefore, selenium in the sediment is not likely attributable to SWMU activities.	Acceptable	No
TITANIUM	1/1	50.6	NA	NA	NA	NA	NA	NA	-Concentrations were similar to the upgradient location.	Acceptable	No

TABLE 8-7

STEP 3A EVALUATION FOR RISKS TO BENTHIC INVERTEBRATES
SEDIMENT COPCs
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration	Screening Level	Maximum EEQ[1]	Number of Samples > Screening Level[2]	Step 3a Evaluation				Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks			Other Step 3a Factors Considered in Evaluation[3]		
						TEL	Canadian LEL	AET			
VANADIUM	4/4	51.2	NA	NA	NA	NA	NA	NA	-Concentrations were similar to the upgradient location.	Acceptable	No
ZINC	4/4	206	121	1.70	1	NA	NA	NA	-Concentrations are closer to the TEC than they are to the upper effects level PEC of 459 mg/kg. -Concentrations at locations 16SD24 and 16SD25 were similar to the up-gradient concentration (92.5 mg/kg). -Maximum concentration was detected at location 16SD19 during Round 2; the zinc concentration at this location during Round 3 (84.4 mg/kg) was less than the upgradient concentration.	Acceptable	No

Footnotes:
1 Maximum EEQ = Maximum detection divided by the screening level.
2 Number of samples with concentrations greater than the screening level.
3 See Section 8.4.1.2 for a more detailed Step 3a Evaluation.

Acronyms:
AET = Apparent Effects Threshold
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
LEL = Lowest Effects Level
NA = Not Available or Not Applicable

TABLE 8-8

COMPARISON OF COPCS IN SURFACE WATER TO EDQLS AND ALTERNATE BENCHMARKS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration	Screening Level	Maximum EEQ[1]	Number of Samples > Screening Level[2]	Step 3a Evaluation				Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						WQC		ORNL			
						Chronic	Acute	Aquatic	Other Step 3a Factors Considered in Evaluation[3]		
Energetics (ug/L)											
HMX	1/1	0.32	NA	NA	NA	NA	NA	NA	-Concentration is less than the SCV of 330 ug/L reported in Talmage et al, 1999.	Acceptable	No
Metals (ug/L)											
ALUMINUM	2/3	822	87	9.45	2	87	NA	NA	-Maximum filtered concentration was detected at location 16SW24; aluminum was not detected in the next downstream location 16SW25 and only slightly exceeded the AWQC at location 16SW19 (90.1 ug/L). -Average concentration in filtered samples is 80 ug/L, which is less than the AWQC.	Acceptable	No
ALUMINUM, FILTERED	2/3	119	87	1.37	2						
CADMIUM	1/3	0.66	0.15	4.4	1	NA	NA	NA	-Cadmium was detected at location 16SW19, which is typically dry and not at locations 16SW24 and 16SW25.	Acceptable	No
CADMIUM, FILTERED	1/3	1.4	0.15	9.33	1						
COPPER	3/3	4.1	1.58	2.59	1	NA	NA	NA	-Copper was detected at location 16SW19, which is typically dry and concentrations at locations 16SW24 and 16SW25 were less than the ESL.	Acceptable	No
COPPER, FILTERED	3/3	3.9	1.58	2.47	1						
LEAD	1/3	1.2	1.17	1.03	1	NA	NA	NA	-Lead was not detected in filtered samples which represents the bioavailable portion of metals.	Acceptable	No
MANGANESE	3/3	476	NA	NA	NA	NA	NA	120	-Concentrations in filtered samples is an order of magnitude greater than detected in unfilted samples; this is unexpected and raises uncertainties with the bioavailable portion of metals available to aquatic organisms. -Average concentration (750 ug/L) in filtered samples is greater than ORNL SCV but is significantly less than tolerance values reported in U.S. EPA Gold Book (1.5 mg/L to 1,000 mg/L).	Acceptable	No
MANGANESE, FILTERED	3/3	1970	NA	NA	NA						
Miscellaneous Parameters (mg/L)											
NITRITE/NITRATE-N	1/1	0.05	NA	NA	NA	NA	NA	NA	-Concentration is less than the Canadian water quality guideline of 13 mg/L.	Acceptable	No

Footnotes:
1 Maximum EEQ = Maximum detection divided by the screening level.
2 Number of samples with concentrations greater than the screening level.
3 See Section 8.4.1.3 for a more detailed Step 3a Evaluation.

Acronyms:
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
NA = Not Available or Not Applicable
ORNL = Oak Ridge National Laboratory
WQC = U.S. EPA Water Quality Criteria
SCV = Secondary Chronic Value
EDQL = Environmental Data Quality Level
AWQC = Ambient Water Quality Criteria

TABLE 8-9

EXPOSURE PARAMETERS FOR THE TERRESTRIAL WILDLIFE MODEL
SWMU 16(CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR)
NSWC CRANE, INDIANA

	Conservative Inputs		Average Inputs		
Species/Exposure Inputs	**Values**	**Units**	**Values**	**Units**	**Source**
Meadow Vole					
Body Weight = BW	3.290E-02	kg	3.663E-02	kg	USEPA, 1993
Food Ingestion Rate = If	3.840E-03	kg/day	3.570E-03	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	7.700E-03	L/day	6.400E-03	L/day	USEPA, 1993
Soil Ingestion Rate - Is (2.4%)	9.216E-05	kg/day	8.568E-05	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		1.640E-01	acres	USEPA, 1993
Short-Tailed Shrew					
Body Weight = BW	1.525E-02	kg	1.687E-02	kg	USEPA, 1993
Food Ingestion Rate = If	2.592E-03	kg/day	1.648E-03	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	4.300E-03	L/day	3.800E-03	L/day	USEPA, 1993
Soil Ingestion Rate - Is (13%)	3.370E-04	kg/day	2.142E-04	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		9.700E-01	acres	USEPA, 1993
American Woodcock					
Body Weight = BW	1.660E-01	kg	1.895E-01	kg	USEPA, 1993
Food Ingestion Rate = If	3.032E-02	kg/day	2.526E-02	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	1.900E-02	L/day	1.900E-02	L/day	USEPA, 1993
Soil Ingestion Rate - Is(11.74%,6.68%)	3.560E-03	kg/day	1.688E-03	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		6.133E+01	acres	USEPA, 1993
Bobwhite Quail					
Body Weight = BW	1.620E-01	kg	1.770E-01	kg	USEPA, 1993
Food Ingestion Rate = If	4.920E-03	kg/day	4.320E-03	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	2.310E-02	L/day	1.840E-02	L/day	USEPA, 1993
Soil Ingestion Rate - Is (8.2%)	4.034E-04	kg/day	3.542E-04	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		2.860E+01	acres	USEPA, 1993

TABLE 8-10

SUMMARY OF FOOD CHAIN MODEL EEQS USING CONSERVATIVE AND AVERAGE INPUTS
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

	Meadow Vole				Short-Tailed Shrew				American Woodcock				Bobwhite Quail			
	Conservative Inputs		Average Inputs		Conservative Inputs		Average Inputs		Conservative Inputs		Average Inputs		Conservative Inputs		Average Inputs	
Parameter	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**
Dioxins																
TEQ BIRD	NA	NA	NA	NA	NA	NA	NA	NA	8.3E-01	8.3E-02	5.5E-02	5.5E-03	5.3E-04	5.3E-05	7.8E-05	7.8E-06
TEQ MAMMAL	1.2E-03	1.2E-04	2.0E-04	2.0E-05	6.9E-01	6.9E-02	3.7E-02	3.7E-03	NA	NA	NA	NA	NA	NA	NA	NA
Energetics																
HMX	3.3E-05	1.3E-05	2.3E-05	9.1E-06	1.9E-05	7.7E-06	1.4E-05	5.4E-06	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organics																
ANTHRACENE	1.0E-06	1.0E-07	3.3E-07	3.3E-08	4.3E-06	4.3E-07	4.4E-07	4.4E-08	3.6E-04	3.6E-05	4.5E-05	4.5E-06	1.5E-05	1.5E-06	4.9E-06	4.9E-07
BENZO(A)ANTHRACENE	1.8E-04	1.8E-05	1.9E-05	1.9E-06	2.4E-03	2.4E-04	7.7E-05	7.7E-06	2.0E-03	2.0E-04	7.8E-05	7.8E-06	4.3E-05	4.3E-06	4.5E-06	4.5E-07
BENZO(A)PYRENE	1.7E-04	1.7E-05	1.6E-05	1.6E-06	2.8E-03	2.8E-04	8.4E-05	8.4E-06	2.3E-03	2.3E-04	8.5E-05	8.5E-06	4.5E-05	4.5E-06	4.5E-06	4.5E-07
BENZO(B)FLUORANTHENE	2.7E-04	2.7E-05	2.4E-05	2.4E-06	4.3E-03	4.3E-04	1.2E-04	1.2E-05	3.6E-03	3.6E-04	1.3E-04	1.3E-05	7.1E-05	7.1E-06	6.7E-06	6.7E-07
BENZO(G,H,I)PERYLENE	1.3E-04	1.3E-05	1.3E-05	1.3E-06	2.4E-03	2.4E-04	7.8E-05	7.8E-06	2.0E-03	2.0E-04	7.9E-05	7.9E-06	3.7E-05	3.7E-06	3.9E-06	3.9E-07
BENZO(K)FLUORANTHENE	9.5E-05	9.5E-06	1.1E-05	1.1E-06	1.9E-03	1.9E-04	6.9E-05	6.9E-06	1.6E-03	1.6E-04	7.0E-05	7.0E-06	2.9E-05	2.9E-06	3.4E-06	3.4E-07
CHRYSENE	2.4E-04	2.4E-05	2.3E-05	2.3E-06	3.1E-03	3.1E-04	9.6E-05	9.6E-06	2.6E-03	2.6E-04	9.7E-05	9.7E-06	5.5E-05	5.5E-06	5.6E-06	5.6E-07
DIBENZO(A,H)ANTHRACENE	3.4E-05	3.4E-06	7.5E-06	7.5E-07	7.0E-04	7.0E-05	4.7E-05	4.7E-06	5.7E-04	5.7E-05	4.8E-05	4.8E-06	1.0E-05	1.0E-06	2.3E-06	2.3E-07
FLUORANTHENE	6.2E-05	3.1E-05	4.4E-06	2.2E-06	4.5E-04	2.2E-04	9.9E-06	4.9E-06	4.6E-03	4.6E-04	1.3E-04	1.3E-05	1.3E-04	1.3E-05	9.7E-06	9.7E-07
INDENO(1,2,3-CD)PYRENE	1.0E-04	1.0E-05	1.2E-05	1.2E-06	2.0E-03	2.0E-04	7.0E-05	7.0E-06	1.7E-03	1.7E-04	7.1E-05	7.1E-06	3.1E-05	3.1E-06	3.5E-06	3.5E-07
PHENANTHRENE	4.5E-04	4.5E-05	4.2E-05	4.2E-06	2.4E-03	2.4E-04	7.0E-05	7.0E-06	2.0E-03	2.0E-04	7.1E-05	7.1E-06	7.0E-05	7.0E-06	6.6E-06	6.6E-07
PYRENE	9.6E-05	5.8E-05	7.4E-06	4.4E-06	7.0E-04	4.2E-04	1.7E-05	1.0E-05	4.3E-03	4.3E-04	1.3E-04	1.3E-05	1.2E-04	1.2E-05	9.8E-06	9.8E-07
Herbicides																
PENTACHLOROPHENOL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics																
ARSENIC	1.7E+01	1.7E+00	3.4E-01	3.4E-02	7.2E+00	7.2E-01	9.1E-01	9.1E-02	6.0E-01	2.0E-01	9.3E-02	3.1E-02	1.9E-01	6.2E-02	7.0E-03	2.3E-03
CADMIUM	1.4E-01	1.4E-02	4.5E-03	4.5E-04	1.2E+00	1.2E-01	2.7E-02	2.7E-03	1.4E+01	1.0E+00	4.5E-01	3.2E-02	2.0E-01	1.4E-02	7.0E-03	5.1E-04
CHROMIUM	1.6E-02	4.1E-03	3.7E-03	9.2E-04	3.6E-01	8.9E-02	1.1E-02	2.8E-03	2.3E+01	4.6E+00	9.0E-01	1.8E-01	1.9E-01	3.8E-02	5.4E-02	1.1E-02
COPPER	1.0E-01	8.1E-02	3.0E-03	2.3E-03	1.9E-01	1.5E-01	6.0E-03	4.6E-03	2.6E+00	2.0E+00	1.1E-01	8.3E-02	1.9E-01	1.4E-01	7.1E-03	5.4E-03
LEAD	9.9E-01	9.9E-02	1.3E-02	1.3E-03	2.4E+00	2.4E-01	3.9E-02	3.9E-03	3.3E+02	3.3E+01	6.5E+00	6.5E-01	1.8E+01	1.8E+00	4.3E-01	4.3E-02
MERCURY	2.4E-01	1.5E-01	5.7E-03	3.4E-03	7.2E-01	4.3E-01	7.1E-03	4.3E-03	9.5E+01	9.5E+00	1.3E+00	1.3E-01	3.9E+00	3.9E-01	1.0E-01	1.0E-02
NICKEL	1.9E-02	9.7E-03	1.6E-04	7.9E-05	4.7E-02	2.3E-02	2.1E-03	1.0E-03	4.7E-01	3.4E-01	2.9E-02	2.1E-02	2.4E-02	1.8E-02	4.6E-04	3.4E-04
SELENIUM	3.2E-02	1.9E-02	5.9E-03	3.6E-03	1.1E-02	6.6E-03	4.4E-03	2.6E-03	1.1E-01	5.3E-02	5.8E-02	2.9E-02	3.8E-02	1.9E-02	7.6E-03	3.8E-03
ZINC	2.8E-01	1.4E-01	1.0E-02	5.2E-03	1.4E+00	7.0E-01	4.1E-02	2.0E-02	3.0E+02	3.3E+01	1.3E+01	1.4E+00	7.3E+00	8.1E-01	3.2E-01	3.5E-02

Notes:
- Cells are shaded if the EEQ is greater than 1.0
NA - Not applicable
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level

TABLE 8-11

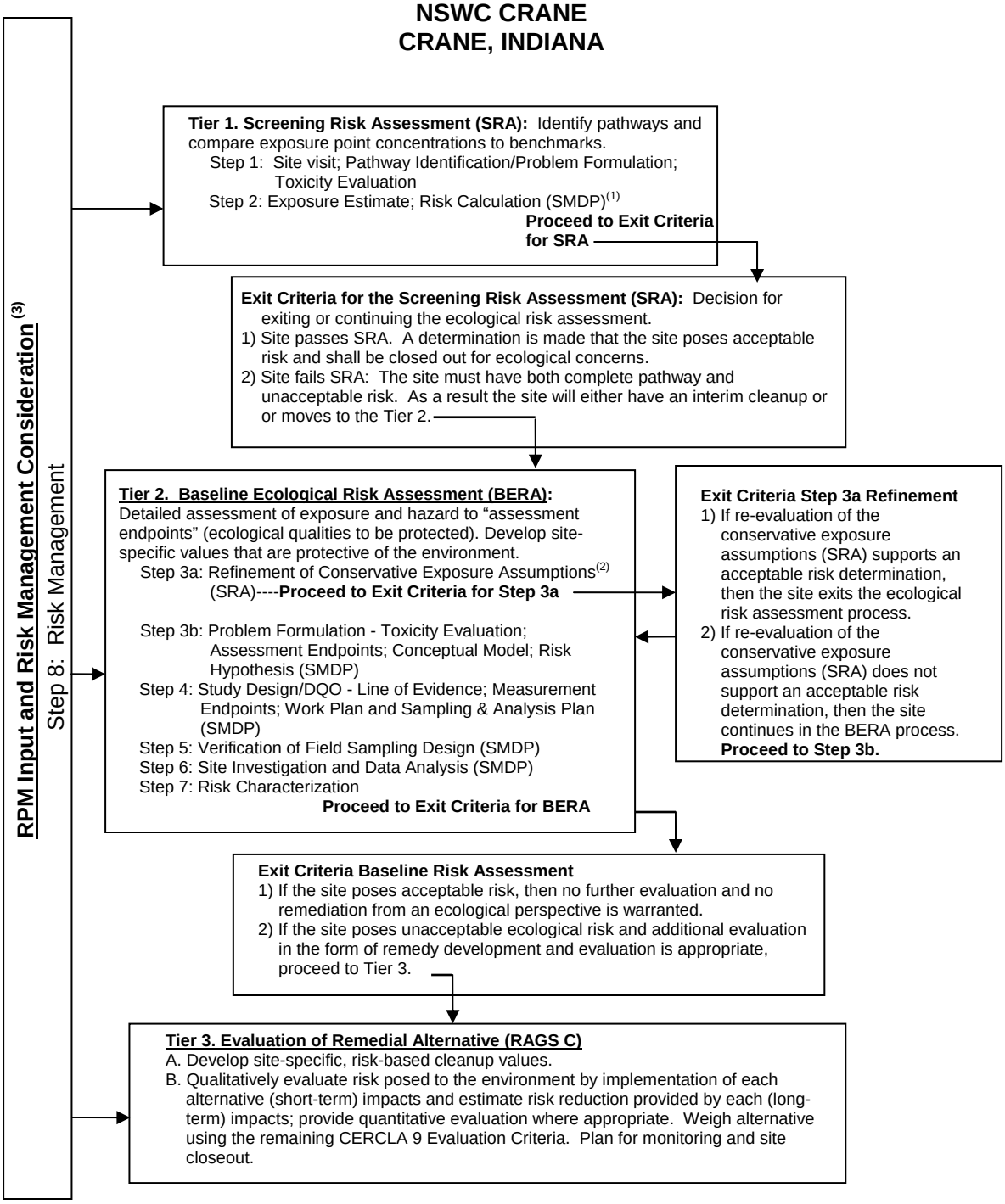
STEP 3a EVALUATION FOR RISKS TO WILDLIFE
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection[1]	Maximum Detected Concentration (mg/kg)[1]	Average Concentration (mg/kg)[1]	EEQs Using Average Exposure Values				Basis of Wildlife Toxicity Reference Value	Other Step 3a Factors Considered in Evaluation[2]	Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
				NOAEL		LOAEL					
				EEQ > 1.0	Species	EEQ > 1.0	Species				
Insectivorous/Herbivorous Wildlife											
Lead	34/35	1240	165	7	Woodcock	NO	NA	Reproduction not impaired at 10 mg/kg (NOAEL).	-NOAEL-based EEQ was greater than 1.0 when the woodcock food chain model was calculated using an area use factor of 0.2.	Unacceptable	Yes
Mercury	27/35	0.16	0.0356	1.3	Woodcock	NO	NA	Fewer eggs and ducklings were produced in mallard ducks fed 0.5 mg/kg/day dose (LOAEL). NOAEL was estimated by multiplying the chronic LOAEL by an uncertainty factor of 0.1.	-NOAEL-based EEQ was less than 1.0 when the woodcock food chain model was calculated using an area use factor of 0.2.	Acceptable	No
Zinc	27/35	1840	418	13.0	Woodcock	1.4	Woodcock	LOAEL based on egg hatchablity of hens which was <20% of controls.	-NOAEL-based EEQ was greater than 1.0 when the woodcock food chain model was calculated using an area use factor of 0.2.	Unacceptable	Yes

Footnotes:
1 - These columns present the Frequency of Detection and concentrations for soil.
2 - See Section 8.4.2.2 for a more detailed Step 3a evaluation.

Acronyms:
EEQ - Ecological Effects Quotient
NA - Not available or not applicable
NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level

FIGURE 8-1
NAVY ECOLOGICAL RISK ASSESSMENT TIERED APPROACH
SWMU 16
NSWC CRANE
CRANE, INDIANA



Notes: 1 See U.S. EPA's 8 Steps ERA Process for requirements for each Scientific Management Decision Point (SMDP).
2 Refinement Includes but is not limited to background, bioavailability, detection frequency, etc.
3 Risk management is incorporated throughout the tiered approach.

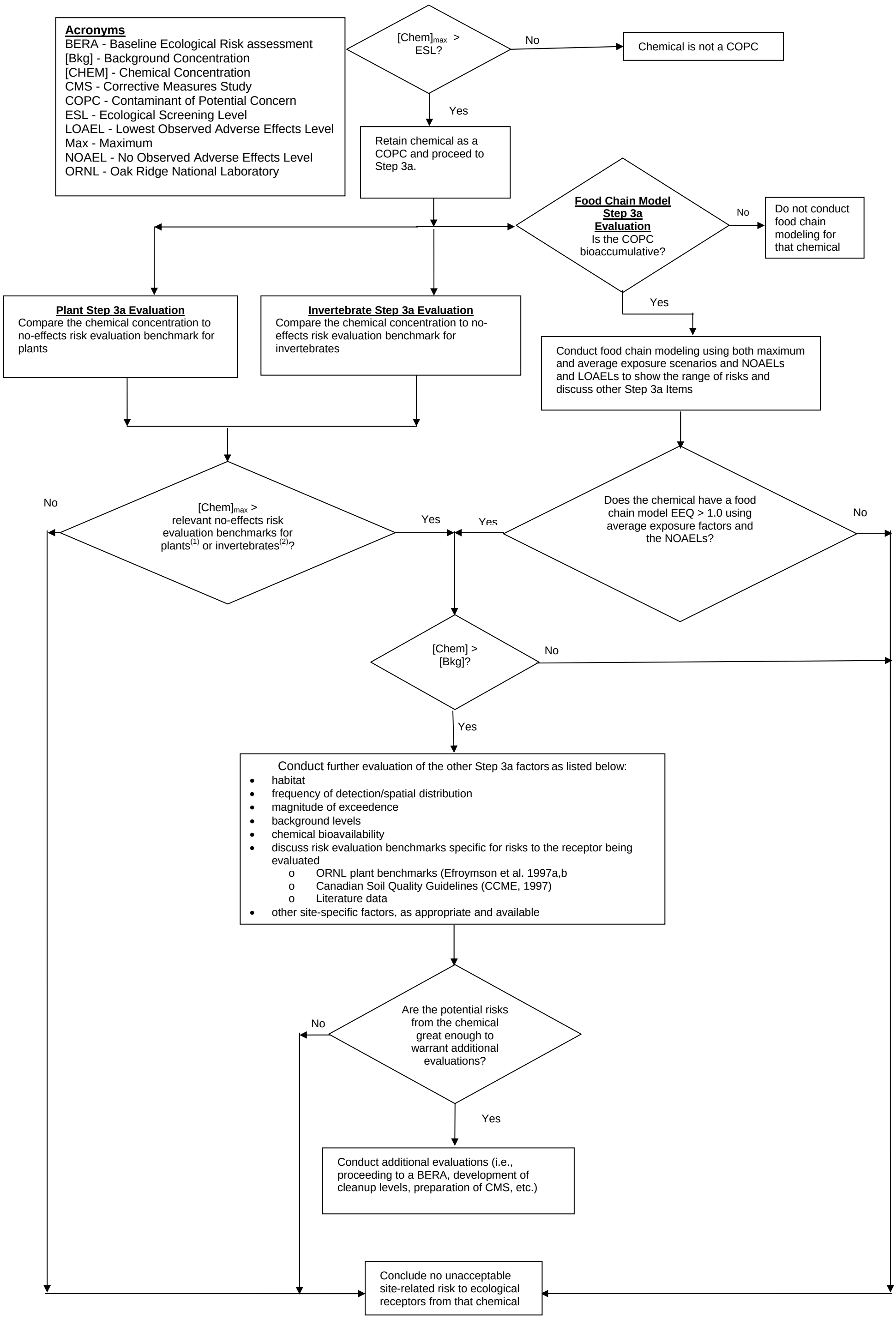


FIGURE 8-2

GENERAL ERA PROCESS FOR EVALUATION OF RISKS TO CHEMICALS IN SURFACE SOIL AT NSWC CRANE, INDIANA
SWMU 16
NSWC CRANE, CRANE, INDIANA

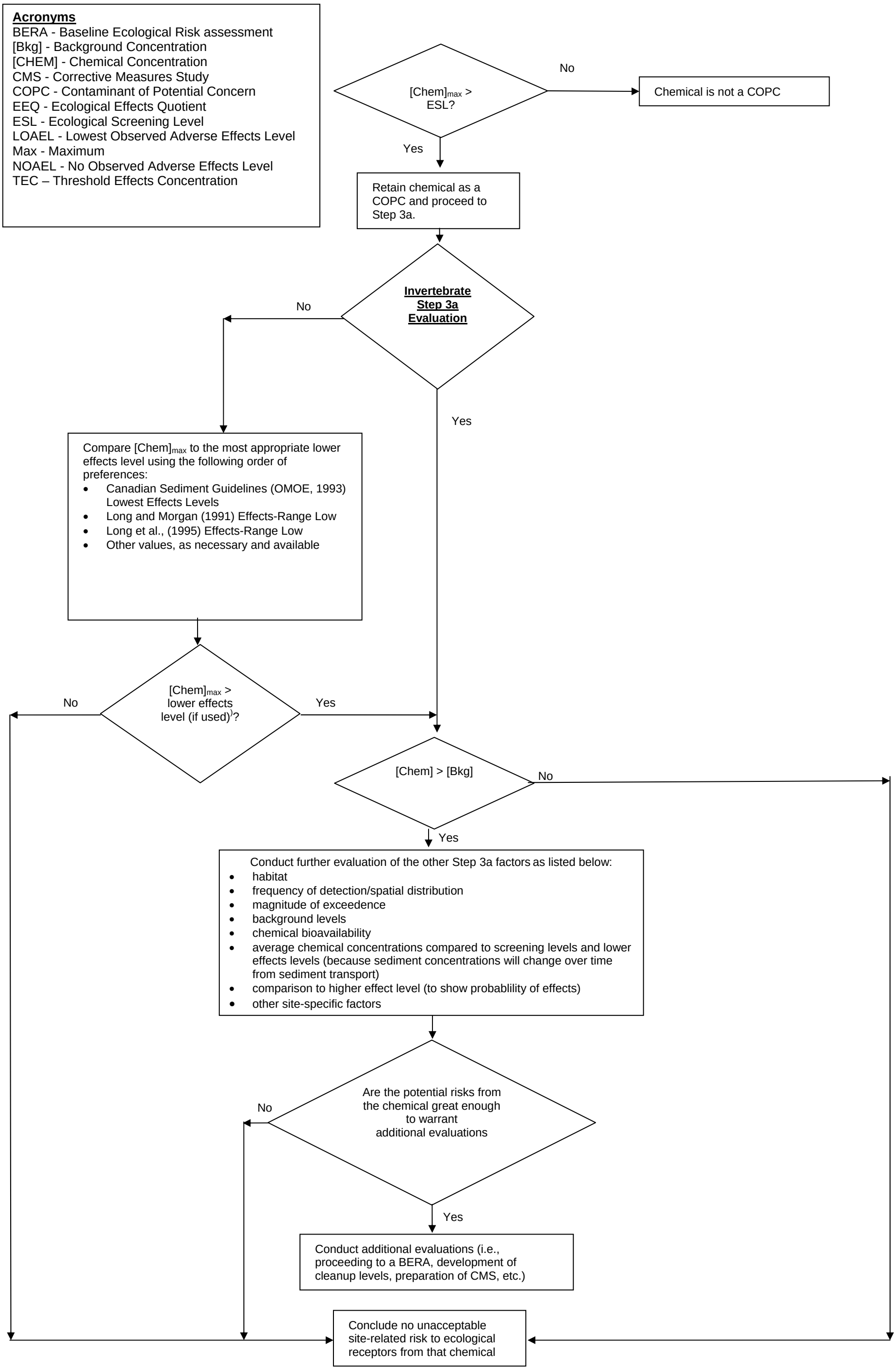
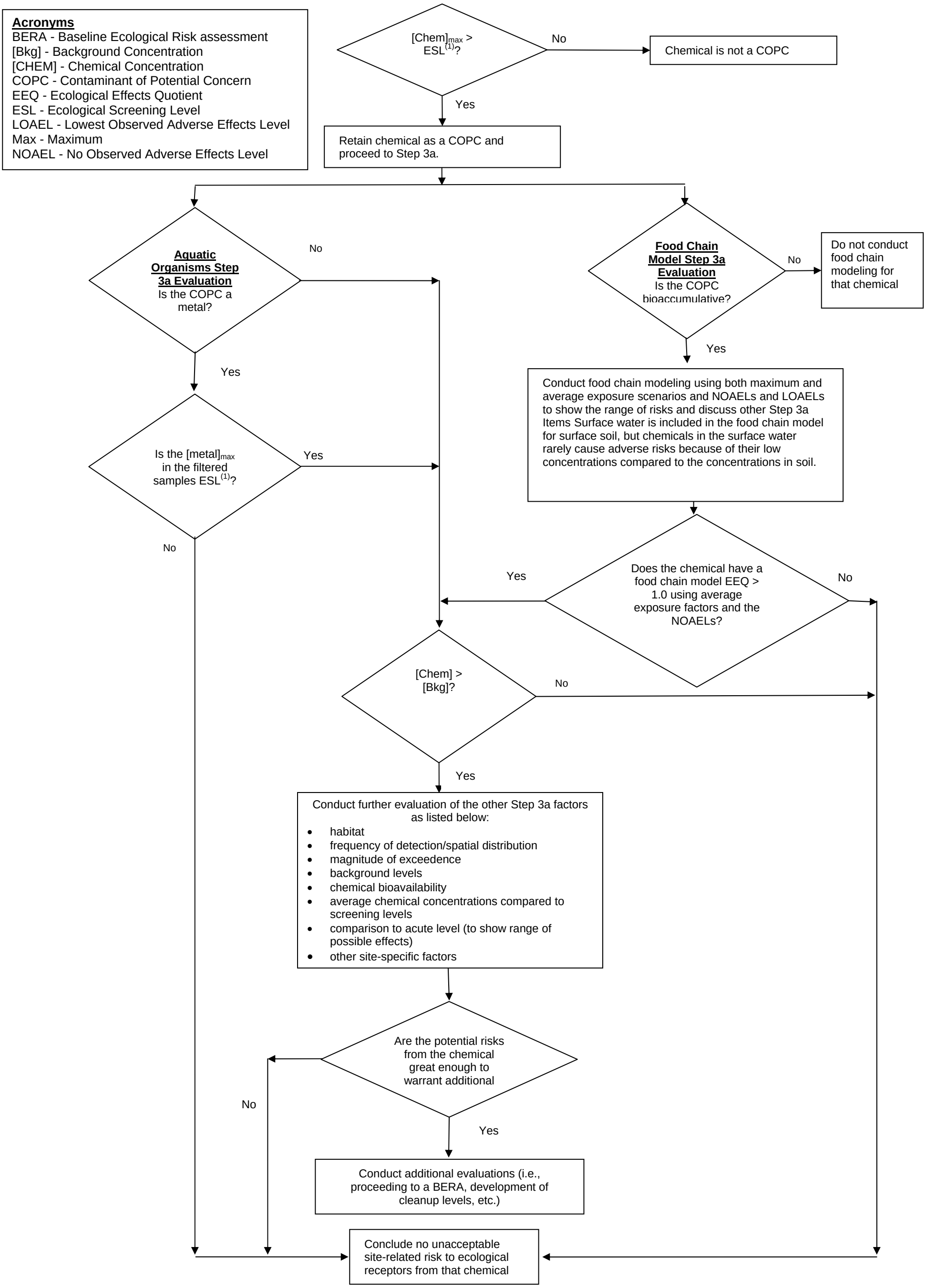


FIGURE 8-3

GENERAL ERA PROCESS FOR EVALUATION OF RISKS TO CHEMICALS IN SEDIMENT AT NSWC CRANE, INDIANA
SWMU 16
NSWC CRANE, CRANE, INDIANA



(1) If the ESL is the Minnesota water quality standard, it will be replaced with the USEPA water quality criteria or the Indiana water quality standard, whichever is most current. The screening levels for surface water will be adjusted for water hardness for metals whose criteria are hardness-dependent.

FIGURE 8-4

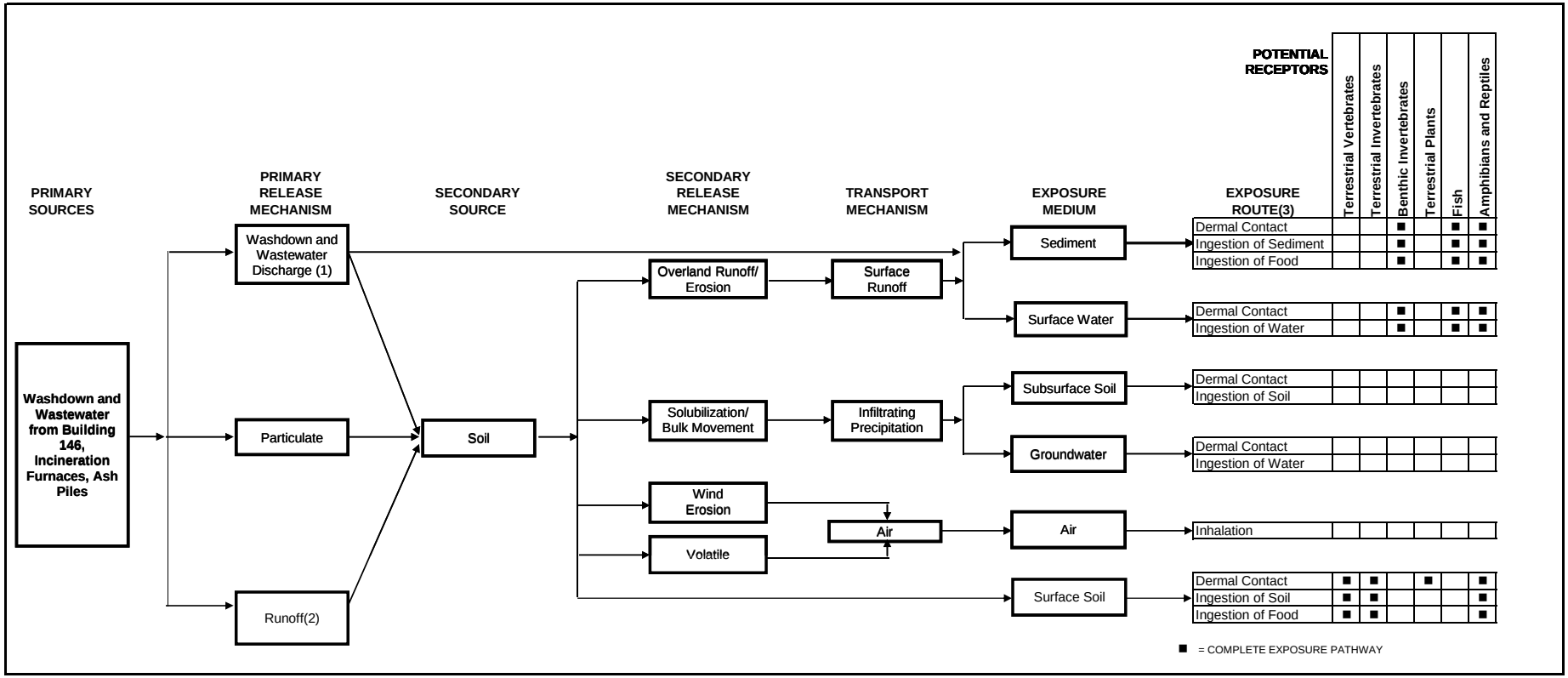
GENERAL ERA PROCESS FOR EVALUATION OF RISKS TO CHEMICALS IN SURFACE WATER AT NSWC CRANE, INDIANA
SWMU 16
NSWC CRANE, CRANE, INDIANA

P:\GIS\NSWC_CRANE\APR\SWMU16.APR SWMU16 AERIAL LAYOUT CF 3/24/05

DRAWN BY C. FOSTER	DATE 3/24/05	AERIAL PHOTOGRAPH - SWMU 16 BOUNDARY SWMU 16 CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR CRANE NWSC CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. Figure 8 - 5 REV 0

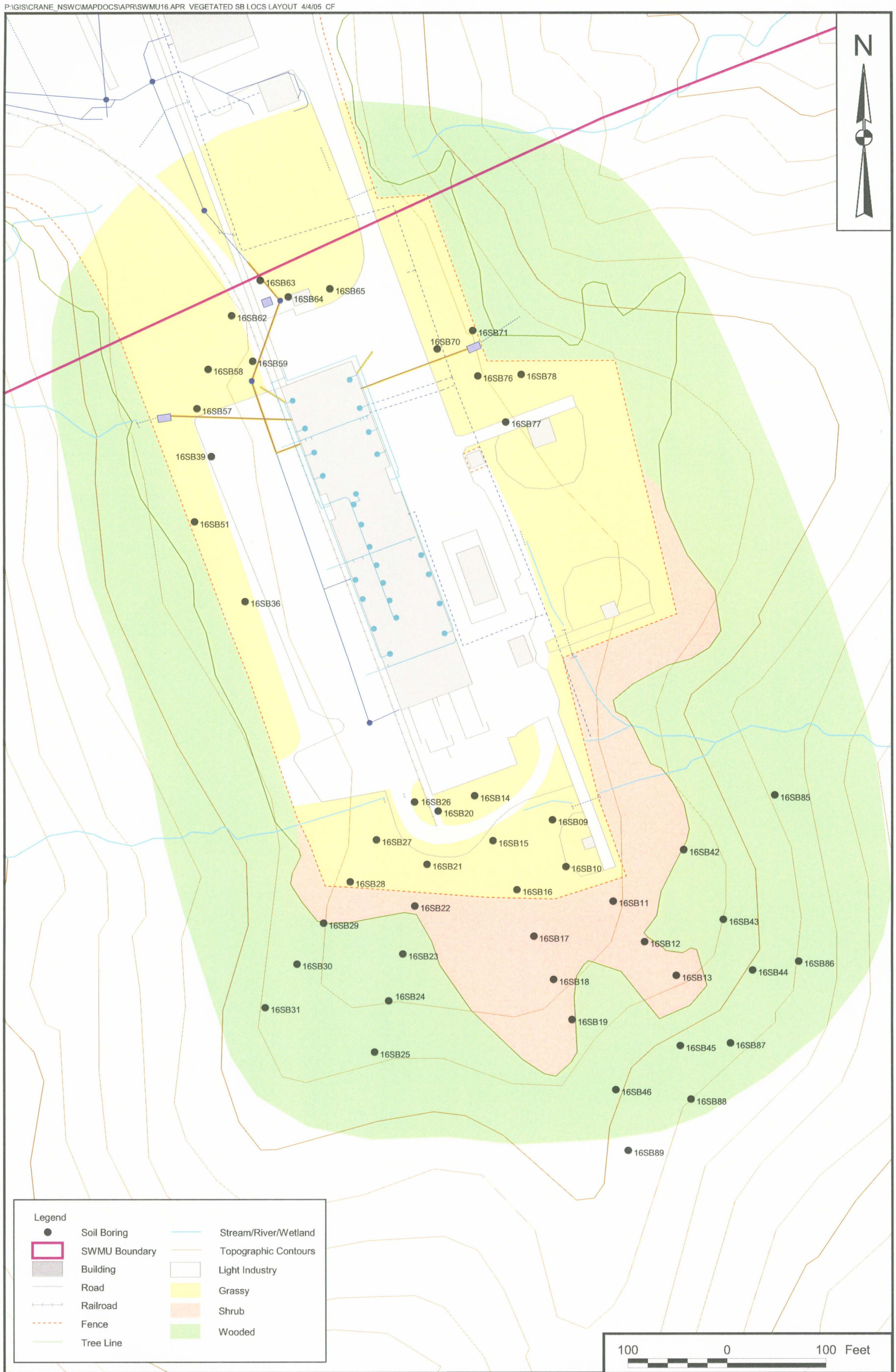
FIGURE 8-6

ECOLOGICAL CONCEPTUAL SITE MODEL
SWMU 16 - CAST HIGH EXPLOSIVE FILL / INCINERATOR BUILDING 146
NSWC CRANE, INDIANA



1. Washdown and washout wastewater were discharged through floor drains of Building 146 to sumps that emptied into the Boggs Creek watershed.
2. Runoff from incinerator ash piles.
3. Blank space indicates incomplete exposure pathway or relatively insignificant or not applicable potential exposure.

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU16.APR VEGETATED SB LOCS LAYOUT 4/4/05 CF



DRAWN BY C. FOSTER DATE 4/4/05	NAVFAC	SURFACE SOIL LOCATIONS INCLUDED IN THE ECOLOGICAL RISK ASSESSMENT SWMU 16 CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY R. YOUNG DATE 4/4/05			APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 8 - 7 REV 0

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APPENDIX A

SWMU 16 PHOTOGRAPHS AND PHOTOGRAPH DIRECTION FIGURES FOR ROUND 1, ROUND 2, ROUND 3

Figure A-1 Photographs
SWMU 16

Figure A-1a: 16SW/SD05 upstream (SW)

Figure 1b: 16SW/SD06 upstream (E)

Figure A-1c: 16SW/SD08 upstream (E)

Figure A-1-d: 16SW/SD08 6" conc discharge

Figure A-1 Photographs
SWMU 16

Figure A-1e: 16SW/SD09 upstream (E)

Figure A-1f: 16SW/SD10 upstream (W)

Figure A-1g: 16SW/SD11 upstream (SW)

Figure A-1h: 16SW/SD12 upstream (NE)

Figure A-1 Photographs
SWMU 16

Figure A-1i: 16SW/SD12 10-25-03

Figure A-1j: 16SW/SD13 10-25-03

Figure A-1k: 16SW/SD13 upstream (N)

Figure A-1l: 16SW/SD15 10-24-03

Figure A-1 Photographs
SWMU 16

Figure A-1m: 16SW/SD15 10-25-03

Figure A-1n: 16SW/SD17 10-24-03

Figure A-1o: 16SW/SD18 10-24-03

Figure A-1p: 16SW/SD19 10-24-03

Figure A-1 Photographs
SWMU 16

Figure A-1q: 16SW/SD19 upstream (NE)

Figure A-1r: 16SW/SD20 10-25-03

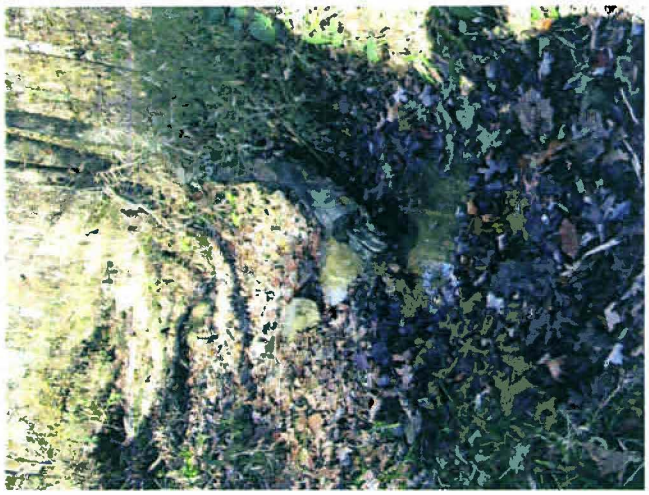


Figure A-1s: 16SW/SD21 10-24-03

Figure A-1t: 16SW/SD22 10-24-03

Figure A-1 Photographs
SWMU 16

Figure A-1u: 16SW/SD23 upstream (SW)

Figure A-1v: 16SW/SD24 upstream (N)

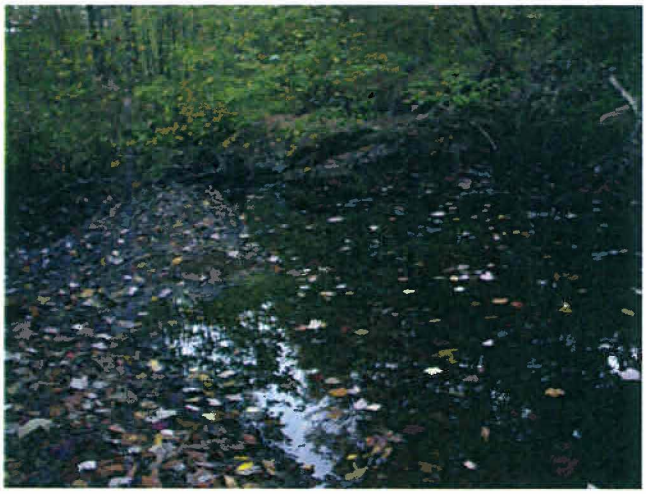


Figure A-1w: 16SW/SD25 upstream (NE)

Figure A-1x: 16SW/SD26 upstream (NW)

Figure A-1 Photographs
SWMU 16

Figure A-1y: 16SW/SD27 upstream (NE)

Figure A-1z: 16SW/SD28 upstream (NE)

Figure A-1aa: 16SW/SD29 upstream (NE)

Figure A-1bb: 16SW/SD30 upstream (W)

Figure A-2 Photographs
SWMU 16

Figure A-2a :View north showing rotosonic rig setting up at monitoring well location 16MWT02.

Figure A-2b: View north of drillers installing PVC at monitoring well location 16MWT03.

Figure A-2c: Soil cores from 16MWT03 showing yellow orange sandstone overlying gray shale.

Figure A-2d : View north showing drillers finishing up monitoring well installation at 16MWT03.

SWMU 16, Figure 2a Photographs

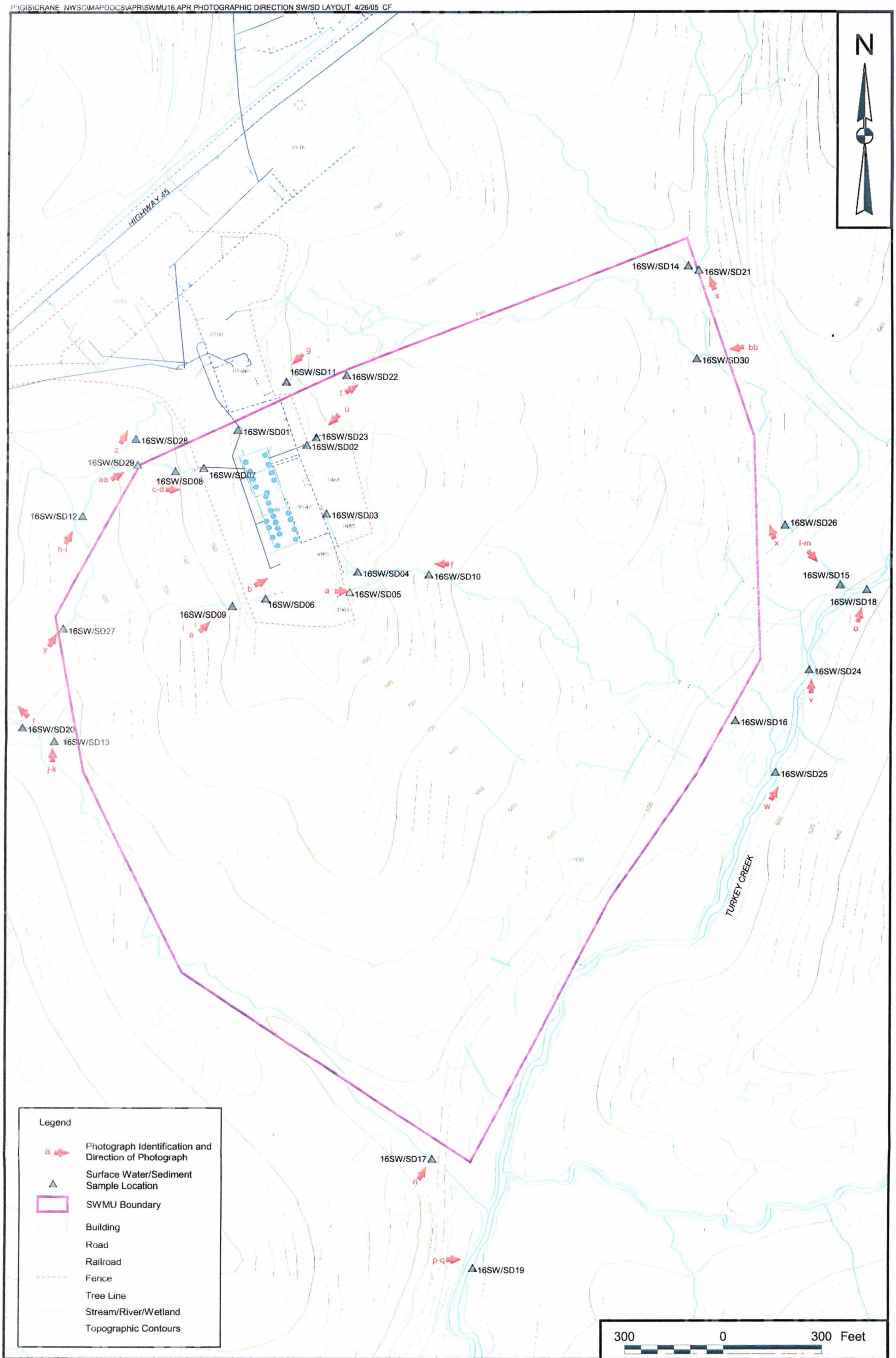
Figure A-2e:View northeast of the east sump where surface water sample 16SW02 was collected. Also shown are monitoring wells 16MWT01 (foreground and painted) and 16MWT06 (background and unpainted). Note that site restoration was completed at this location.

Figure A-2f : View southwest showing monitoring well 16MWT02 and the west sump where surface water sample 16SW07 was collected.

Figure A-2g: View SSE with monitoring well 16MWT02 and the west sump in the foreground, and monitoring well 16MWT03 in the background.

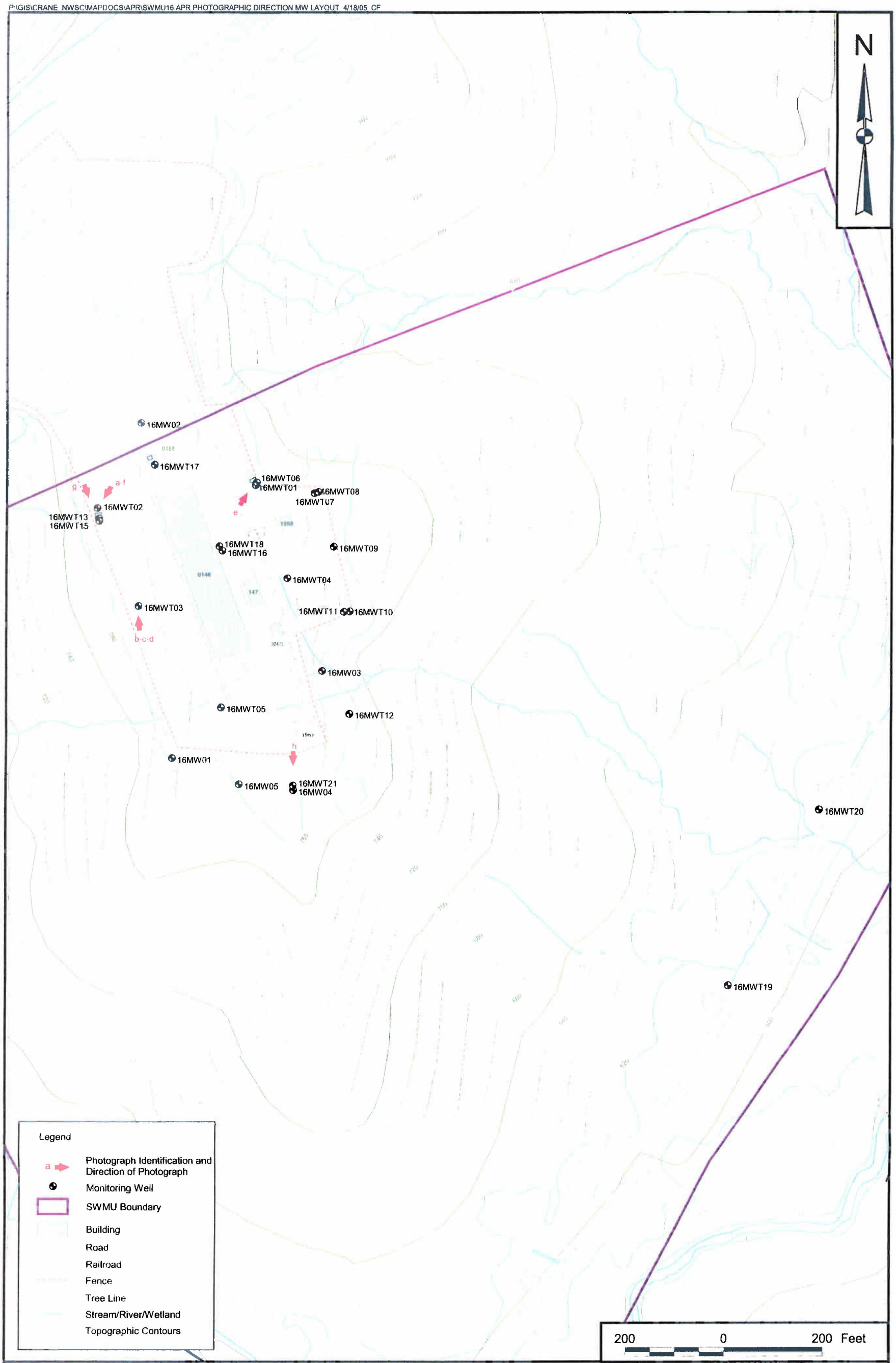
Figure A-2h: View south of the former location of the incinerator ash piles with existing monitoring well WES-14-04-83 in the background.

P:\GIS\CRANE_NWSC\MAPDOCS\APR\SWMU16.APR PHOTOGRAPHIC DIRECTION SW/SD LAYOUT 4/26/05 CF



DRAWN BY C. FOSTER	DATE 12/13/04	PHOTOGRAPH DIRECTION MARKERS SURFACE WATER / SEDIMENT LOCATIONS SWMU 16 CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. GOERDT	DATE 4/13/05		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE A-1 REV 0

P:\GIS\CRANE_NWSC\MAPDOCS\APR\SWMU16.APR PHOTOGRAPHIC DIRECTION MW LAYOUT 4/18/05 CF



DRAWN BY C. FOSTER	DATE 12/13/04	PHOTOGRAPH DIRECTION MARKERS MONITORING WELL LOCATIONS SWMU 16 CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. GOERDT	DATE 4/13/05		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE A-2 REV 0

APPENDIX B
SWMU 16
BORING LOGS, MONITORING WELL CONSTRUCTION DIAGRAMS, AND RELATED MATERIALS
ROUND 1, ROUND 2, ROUND 3

APPENDIX B.1.1
SWMU 16
BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS
ROUND 1

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: Roto Sonic

BORING NUMBER: 16MW701 / SB41
DATE: 4/8/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ
	1				MOIST + SOFT	BR	0.5' TOP SOIL	ML		0.0			
	2				MOIST +		0.5'-7' CLAY	CL					
	3				M. STIFF								
S-1 1024	4		3.9' / 4'										
	5				DRY +				MED PLASTICITY				
	6				M. STIFF				4'-7'	0.0			
	7												
	8					YELL OR	7'-8' SANDY CLAY		6" CASING TO 9'				
S-2 1040	9		4.9' / 5'		DRY + SOFT		SILTSTONE 8'-14'	DBR	THIN LAM				
	10				DRY +								
	11				M. STIFF					0.0			
	12					LT							
	13					BR							
S-3 1103	14		4.8' / 5'		DRY + HARD	LT GRAY	SHALEY 13'-14'						
	15				MOIST +	YELL	SANDY CLAY W/ 14'-18'		WEATHERED				
	16				M. STIFF	OR	S.S. FRAGS		SANDSTONE	0.0			
	17								POSS SATURATION				
	18								@ 16-16.5'				
S-4 1147	19		4.8' / 5'		WET +	LT GRAY	SHALEY SILTSTONE 18'-19'	MS					
	20					DK	SHALE 19'-24'	VBR					
	21					GRAY				0.0			
	22												
	23												
S-5 1400	24		4.9' / 5'										

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 6" 0-4' WELL SET @ 24' 10' SCREEN
5" 4'-24' SAND TO 12'
BENT TO 4' VER. CLAY TO 2'

Converted to Well: Yes X No _____ Well I.D. #: 16MW701

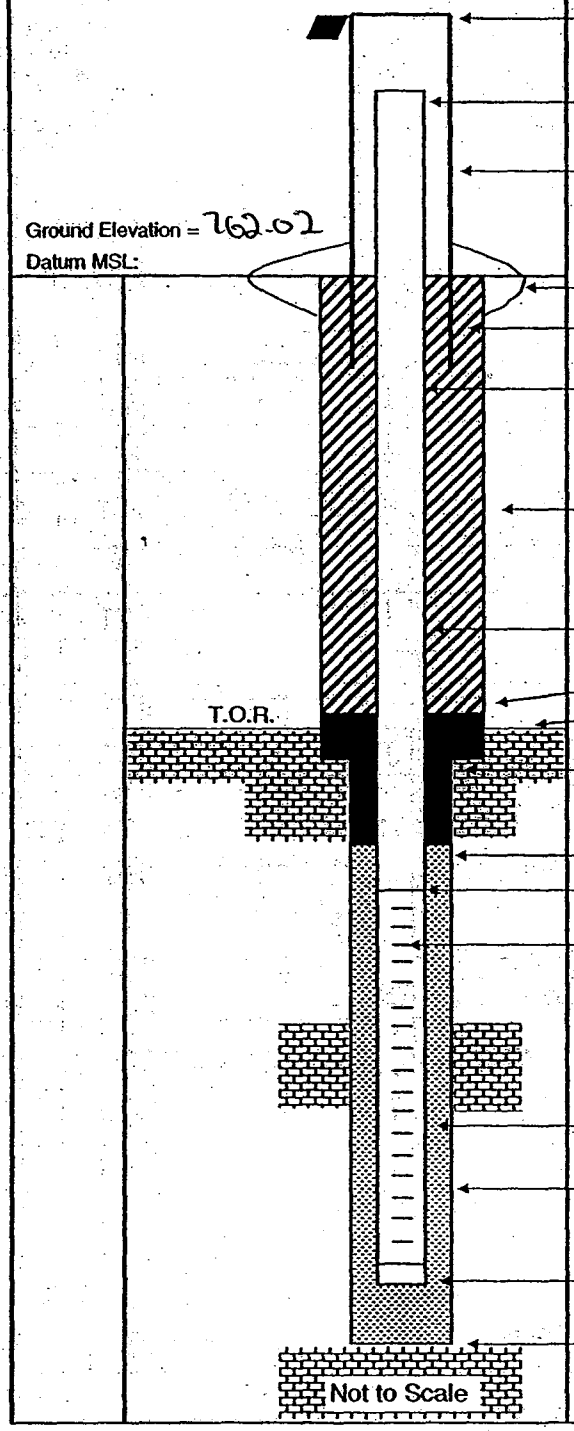
Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET

WELL No.: 16MW101

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	16MW101/SB41
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES	DATE COMPLETED:	4/9/03
SITE:	SWMU 16	DRILLING METHOD:	ROTOSONIC	NORTHING:	1371193.488
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERA	EASTING:	3032881.285



Elevation of Top of Casing: 765.00

Stick Up of Casing Above Ground Surface: 2.48

Elevation of Top of Riser: 764.5

I.D. of Surface Casing: 4" SQUARE

Type of Surface Casing: STEEL

Type of Surface Seal: 4"x4"x6" PAD

I.D. of Permanent Casing: NA

I.D. of Riser: 2"

Type of Riser: PVC

Borehole Diameter: 5"

Type of Backfill: VOL CLAY

Elevation / Depth Top of Seal: 752.02 / 10'

Elevation / Depth Top of Bedrock: 754.02 / 8'

Type of Seal: BENT CHIPS

Elevation / Depth of Top of Filter Pack: 750.02 / 12'

Elevation / Depth of Top of Screen: 748.02 / 14'

Type of Screen: PVC

Slot Size x Length: 20 x 10'

I.D. of Screen: 2"

Type of Filter Pack: No. 20-40 SAND

Diameter of Hole in Bedrock:
Core / Ream: 5"

Elevation / Depth of Bottom of Screen: 738.02 / 24'

Elevation / Total Depth of Borehole: 738.02 / 24'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 16MW102
DATE: 4/11/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ
	1				MOIST	BR	.5' TOP SOIL			0.0			
	2				MOIST		CLAYEY SILT	ML					
	3				M. STIFF								
S-1 0869	4		4' / 4'										
	5					BR	4.5-4.5 CLAYEY SILT			0.0	0.0	0.0	0.0
	6				SOFT	GRAY	4.5-8' SILTY CLAY	CL					
	7				MOIST				V. SOFT @ 7'-8'				
S-2 0811	8		4' / 4'										
	9				STIFF	YELL	8-10.5' SILTY SAND W/ SS		WEATHERED SS				
	10					GR	FRAGS		8'-13'				
	11			▼?	HARD		SAND SEAM 10.5-13'		POSS WATER @ 10.5'				
	12				STIFF								
S-3 0848	13		4.5' / 5'		MOIST								
	14					DK	SHALE 13'-18'	VFR					
	15					GRAY							
	16												
	17								WELL @ 0838				
S-4 0838	18		5' / 5'						WATER RUNNING				
				T.D. 18'			WELL SET @ 18 2" PVC		TIGHT HOLE				
							SCREENED 8'-18'						
							SAND 6'						
							BENTCHIPS TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 5" 0-18'

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No _____ Well I.D. #: 16MW102

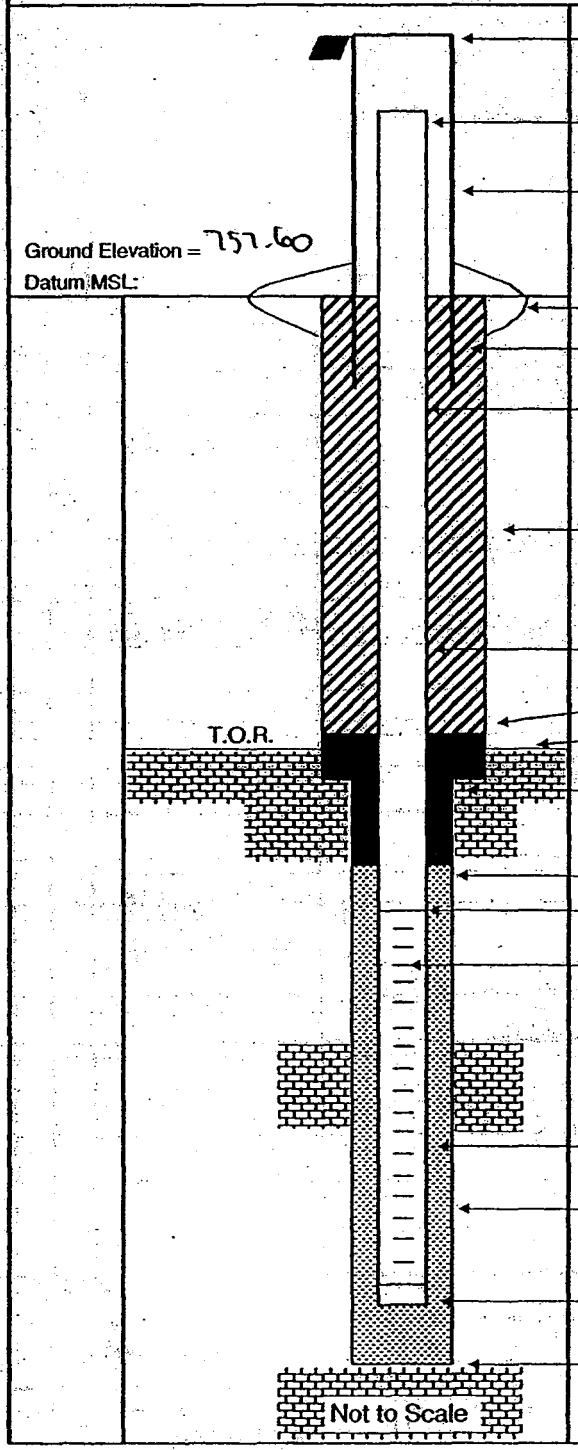
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 16MW702

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	16MW702
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES	DATE COMPLETED:	4/1/03
SITE:	SWMU 16	DRILLING METHOD:	ROTOSONIC	NORTHING:	1371146.42
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATERA	EASTING:	3032559.16



Elevation of Top of Casing:	760.98
Stick Up of Casing Above Ground Surface:	2.76
Elevation of Top of Riser:	760.36
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	CEMENT
Elevation / Depth Top of Seal:	755.6 / 2'
Elevation / Depth Top of Bedrock:	744.6 / 13'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	751.6 / 6'
Elevation / Depth of Top of Screen:	749.6 / 8'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	739.6 / 18'
Elevation / Total Depth of Borehole:	739.6 / 18'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 16MW103 / SB36
DATE: 4/10/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ
	1					LT.	CLAY 0-1'	CL	6" TO 3'	0-0			
	2					BR	SILTY SAND W/ SS FRAGS	SM		↓			
	3					↓	(1'-3')	↓		↓			
	4		0.034	4 FT = 3 FT = 4	HARD	YELL OR	3'-10.5' SANDSTONE	BR	THIN BEDDING	0-0			
	5							↓					
	6							MS	MASSIVE 5-8'				
C-1	7		71% RQD										
	8												
	9		5.5' 6'					BR					
	10				HARD	YELL OR	SANDSTONE			0-0			
	11				BRITTLE	DK GRAY	10.5'-16' SHALE	VBR	HIGHLY FRACTURED				
	12								V.BR				
	13												
	14		51% RQD										
C-2	15		0845										
	16												
	17				SOFT TO	GRAY	16'-21' CLAYEY SHALE						
	18				BRITTLE								
	19		9.7' 10'		DRY								
	20					DK GRAY	CLAYEY SHALE			0-0			
	21				V.SOFT								
	22		47% RQD		TO BRITTLE								
	23								V. WET FROM 24' TO 27'				
C-3	24												
	25				WET SOFT				WATER @ 25.5' AFTER BLOW OUT				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 6" 0-1' 5" 3'-34'

Drilling Area Background (ppm): 0-0

Converted to Well: Yes X No ____ Well I.D. #: 16MW103

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: 16MWT03 / SB36
DATE: 4/10/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	26		C0910	▼	WET	DK	CLAYEY SHALE	NAR	WET	0.0			
	27				SOFT	GRAY							
	28				MOIST	DK GRAY	27-29' SHALE						
	29		95" / 60"		STIFF	↓	↓						
	30						29-32 SHALE CLAYEY						
	31		46% RQD										
C-4	32		C0943			↓	↓						
	33					BLK	COAL SEAM 32-33'						
	34		4.0" / 5'			DK GRAY	SHALE	↓		↓			
				T.D. 34'			WELL SET @ 35 2" PVC		DRILLER SET				
							SCREENED 25-35'		WELL @ 35'				
							SAND TO 23'		OVERDRILLED				
							BENT CHIPS TO 20'		DURING CLEANOUT				
							VOL. CLAY TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No ____ Well I.D. #: 16MWT03

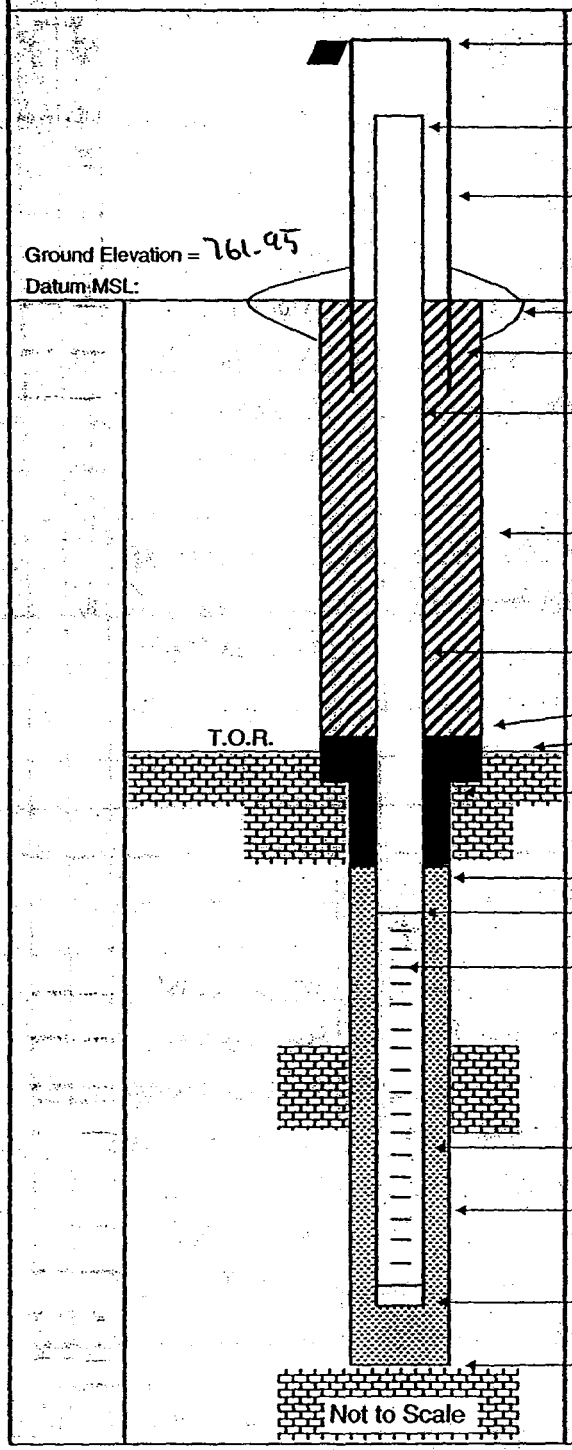
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 16MW103

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	16MW103/5036
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	4/10/03
SITE:	SWMU 16	DRILLING METHOD:	ROTOSONIC	NORTHING:	1320946.968
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERA	EASTING:	3032559.16



Elevation of Top of Casing:	764.96
Stick Up of Casing Above Ground Surface:	2.46
Elevation of Top of Riser:	764.41
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	VOL CLAY
Elevation / Depth Top of Seal:	741.95 / 20'
Elevation / Depth Top of Bedrock:	758.95 / 3'
Type of Seal:	BENT CHIPS
Elevation / Depth of Top of Filter Pack:	738.95 / 23'
Elevation / Depth of Top of Screen:	736.95 / 25'
Type of Screen:	PVC
Slot Size x Length:	.20 x 60'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	726.95 / 35'
Elevation / Total Depth of Borehole:	726.95 / 35'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 16MW704
DATE: 4/8/03 - 4/9/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	1				MOIST & SOFT	BR	.5' TOP SOIL	MH		0.0			/
	2				MOIST	LT GRAY	.5'-3' CLAY	CL					
	3				STIFF	& YELL OR							
S-1 1540	4		4' / 4'		DRY & SOFT		3'-8.5' SANDSTONE	BR	ROCK @ 3'				
S-2 1546	5		1' / 7'		HARD				REFUSAL @ 5'	0.0			
	6					RED	SANDSTONE		MODERATE WEATH.				
	7		64% RQD						VERT. FRACT.				
C-1	8		@1615										
	9				SOFT	REDDISH	SILTY SANDSTONE 8.5'-9'	HR	HIGHLY FRACTURED				
	10		47 / 5		HARD	GRAY	SANDSTONE 9'-18'						
	11				HARD &	RED			HIGHLY FRACT.				
4/8	12					& BR							
	13												
	14		47% RQD										
C-2	15		1628										
	16												
	17												
	18								POSS SAT @ 18'				
	19				SOFT	DK GRAY	SHALE 18'-25'		FLUSH OUT HOLE.				
	20		9.5 / 10'						LET SIT OVERNIGHT				
	21					DK	SHALE MATERIAL	BR	CUTTINGS TO 20'				
4/9	22					GRAY	IN CUTTINGS						
R-1	23								WL = 15' BGS				
	24								@ 0738.				
	25		0800	TD 25									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 6" 0-4' 5" CORE 4'-20' 5" REAM 20'-25'
WELL SET @ 25' SAND TO 13' BENT TO 12' VOLCLAY TO 2'

Converted to Well: Yes X No ___ Well I.D. #: 16MW704

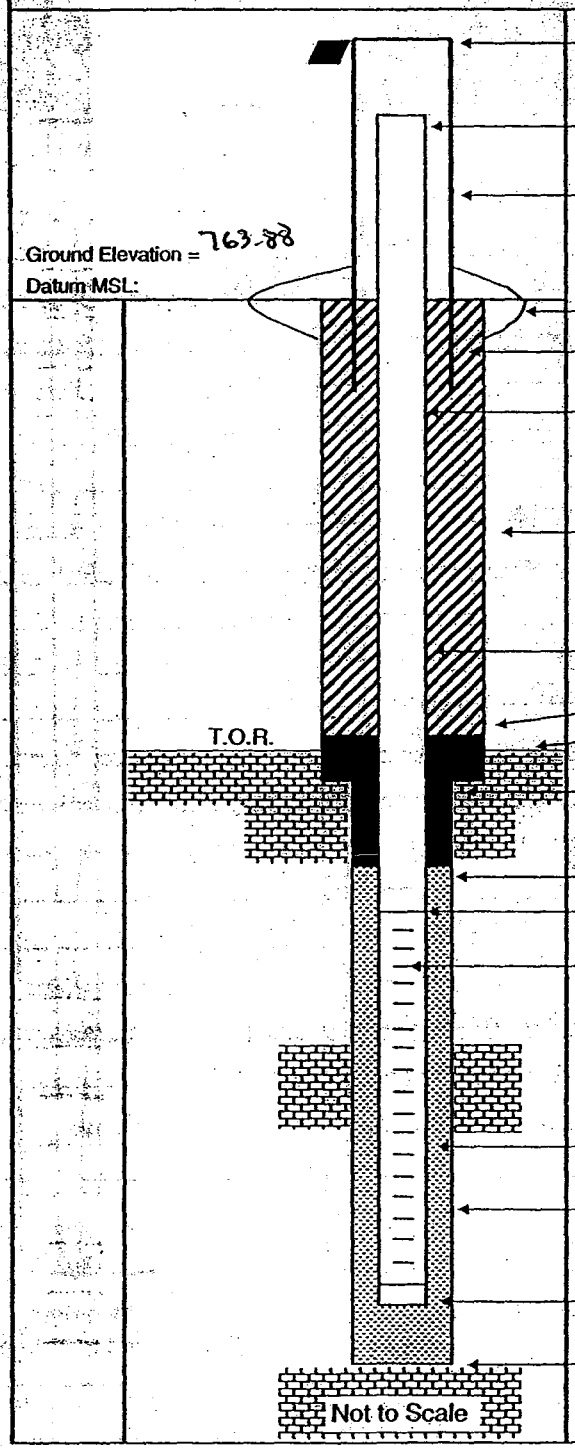
Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET

WELL No.: 16MWT04

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	16MWT04
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	4/9/03
SITE:	SWMU 16	DRILLING METHOD:	ROTOSONIC	NORTHING:	1321003.281
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERA	EASTING:	3032946.466



Elevation of Top of Casing: 766.71

Stick Up of Casing Above Ground Surface: 2.26

Elevation of Top of Riser: 766.14

I.D. of Surface Casing: 4" SQUARE

Type of Surface Casing: STEEL

Type of Surface Seal: 4'x4'x6" PAD

I.D. of Permanent Casing: NA

I.D. of Riser: 2"

Type of Riser: PVC

Borehole Diameter: 5"

Type of Backfill: CEMENT 0-2' VOLCLAY 2-12'

Elevation / Depth Top of Seal: 751.88 / 12'

Elevation / Depth Top of Bedrock: 760.88 / 3'

Type of Seal: BENT CHIPS

Elevation / Depth of Top of Filter Pack: 750.88 / 13'

Elevation / Depth of Top of Screen: 748.88 / 15'

Type of Screen: PVC

Slot Size x Length: .20 x 10'

I.D. of Screen: 2"

Type of Filter Pack: No. 20-40 SAND

Diameter of Hole in Bedrock: Core / Ream: 5"

Elevation / Depth of Bottom of Screen: 738.88 / 25'

Elevation / Total Depth of Borehole: 738.88 / 25'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: 16MW105 / SB26
DATE: 4/9/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ
	1				MOIST	BR	0-1' CLAY	CL		0.0			
	2				M. STIFF		1'-4' SILTY SAND W/	SM					
	3						SS FRAGS						
S1	4								6"-30"				
	5				HARD	LT BR	4'-6' SANDSTONE	BR		0.0			
	6				DRY								
C-1	7		60% RQD		HARD	LT	6'-8.5' SILTY STONE	LAM					
	8		C1320			GRAY							
	9		4.8' / 5'			GRAY	8.5'-9' SANDSTONE	MB					
	10				SOFT TO	LT	9'-12' CLAYEY SHALE	BR		0.0			
	11				STIFF	GRAY							
	12												
	13				LOOSE	BLK	COAL SEAM 12-12.5'						
C-2	14		C1335		HARD	LT GRAY	SANDSTONE 12.5'-14'	MB					
	15				SOFT TO	DK GRAY	SHALE (14'-40')	BR		0.0			
	16		47%		BRITTLE	BR	SANDY FROM 15'-16.5'						
	17		RQD										
	18					BLK	SHALE 16.5'-19'						
	19		9.8' / 10'			DK GRAY							
	20				SOFT TO	LT	19-25' SHALE & CLAYEY-19			0.0			
	21				BRITTLE	DK							
	22					GRAY							
	23												
C-3	24												
	25												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No

Well I.D. #: 16MW105

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 16MW105/SB26
DATE: 4/9/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample 2	Background	Background 2
	26		e1354		SOFT TO	GY/	SHALE 25'-30'	BR		00			
	27		37%		BRITTLE	DK							
	28		RQD			GRAY							
	29												
	30		42% / 40'										
	31				SOFT TO		SHALE:	BR	V-SOFT @ 31'				
	32				BRITTLE		- CLAYEY 30-32'		POSS WATER				
	33		45%						L-WET 30-40'				
	34		RQD										
C-4	35		e1445										
	36												
	37												
	38						THIN COAL SEAM 37'-37.4'						
	39							VBR					
	40		67% / 40'										
							WELL SET @ 35' 2" PVC						
							SAND TO 27'						
							BENT CHIPS TO 25'						
							VOL-CLAY TO						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No ____ Well I.D. #: 16MW105

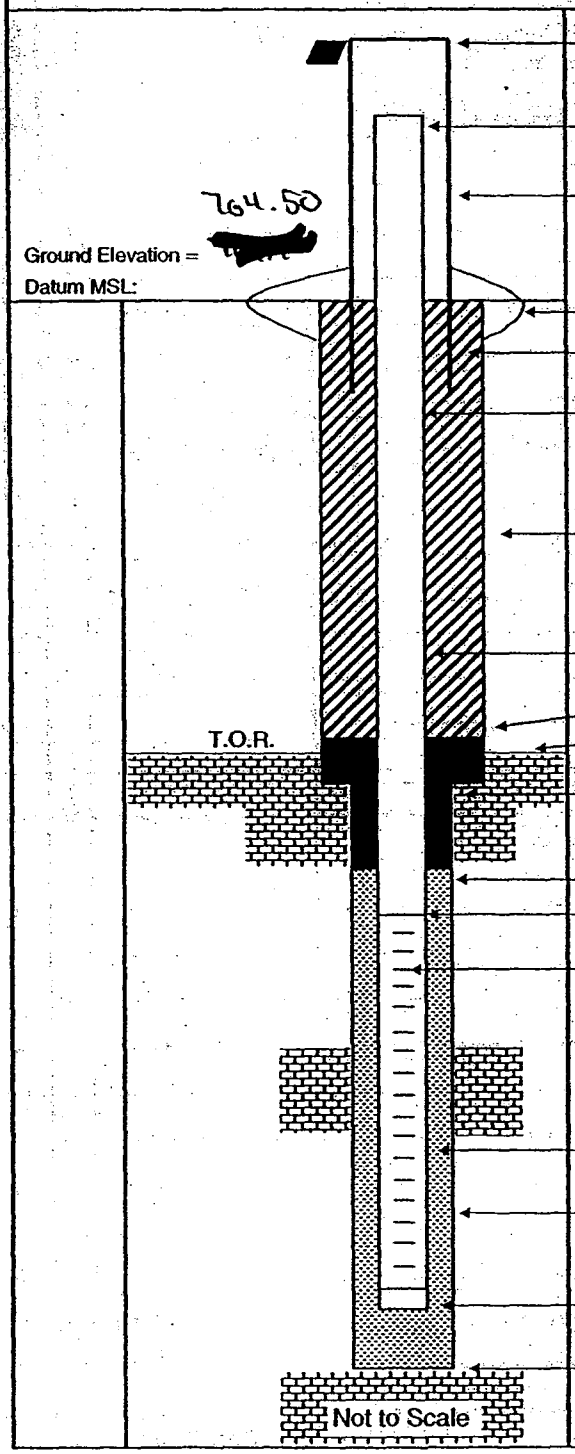
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 16MW105

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	16MW105/SB26
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES	DATE COMPLETED:	4/9/03
SITE:	SWMU 16	DRILLING METHOD:	ROTOSONIC	NORTHING:	[redacted] 1320741.793
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	[redacted] 1032812.77



Elevation of Top of Casing:	[redacted] 767.45
Stick Up of Casing Above Ground Surface:	2.38
Elevation of Top of Riser:	[redacted] 766.88
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	VOL CLAY (0-25')
Elevation / Depth Top of Seal:	739.5 / 25'
Elevation / Depth Top of Bedrock:	760.5 / 4'
Type of Seal:	BENT CHIPS
Elevation / Depth of Top of Filter Pack:	737.5 / 27'
Elevation / Depth of Top of Screen:	735.5 / 29'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	725.5 / 39'
Elevation / Total Depth of Borehole:	724.5 / 40'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: 16MW106
DATE: 4/24/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DENNIS SZAK

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth / Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Background**	Driller BZ**
	1						REFER TO 16MW101						
							FOR COMPLETE						
							LITH. DETAILS						
	5												
	10												
	15												
							16 FT U-WET						
							CUTTINGS						
	20						SET WELL @ 25' 2" PVC						
							SCREENED 15'-25'						
	25												

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes X No

Well I.D. #: 16MW106

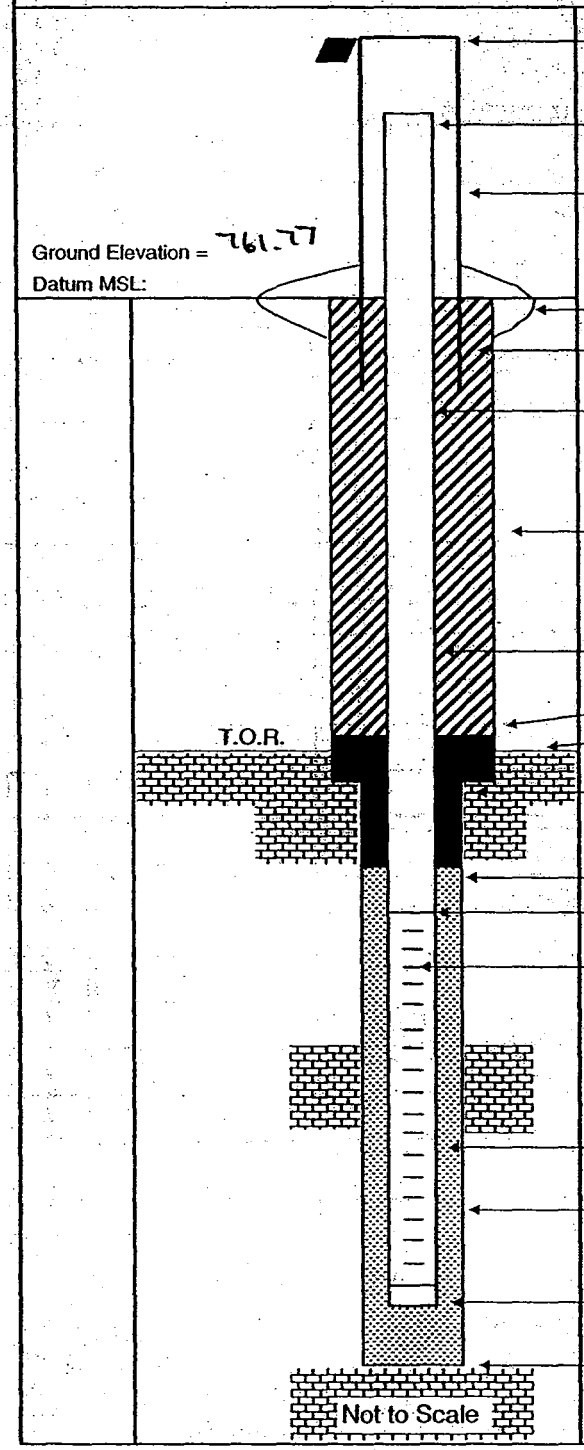
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 16MW06

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	16MW06
PROJECT No.:	9060 CTO 0279	DRILLER:	DENNIS SOUK	DATE COMPLETED:	4/24/03
SITE:	SWMU 16	DRILLING METHOD:	[redacted]	NORTHING:	1321199.519
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERA	EASTING:	3032883.373



Elevation of Top of Casing: 764.85

Stick Up of Casing Above Ground Surface: 2.67

Elevation of Top of Riser: 764.44

I.D. of Surface Casing: 4" SQUARE

Type of Surface Casing: NA

Type of Surface Seal: 4'x4'x6" PAD

I.D. of Permanent Casing: NA

I.D. of Riser: 2"

Type of Riser: PVC

Borehole Diameter: 6"

Type of Backfill: VOLCLAY 11'-2'

Elevation / Depth Top of Seal: 750.77 / 11'

Elevation / Depth Top of Bedrock: 753.77 / 8'

Type of Seal: BENT CHIPS

Elevation / Depth of Top of Filter Pack: 748.77 / 13'

Elevation / Depth of Top of Screen: 746.77 / 15'

Type of Screen: PVC

Slot Size x Length: .20 x 10'

I.D. of Screen: 2"

Type of Filter Pack: No. 20-40 SAND

Diameter of Hole in Bedrock: Core / Ream: 6"

Elevation / Depth of Bottom of Screen: 736.77 / 25'

Elevation / Total Depth of Borehole: 736.77 / 25'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB01
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole **	Driller BZ **
S1	1		1.0/1.0			BL	ASPHALT + GRAVEL			1.7	1.7	1.7	1.7
S2	2		2.8/			GR BRN	CLAYEY SILT		DAMP, FILL MOTTLED 2-4'	1.7	1.7	1.7	1.7
	3		3.0										
	4					BRN	CLAYEY SILT			1.7	1.7	1.7	1.7
S3	5												
	6						REFUSAL @ 6'						
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS010002 @ 0845						
						SAMPLED	16SB010406 @ 0900						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: GEOPROBE MACRO CORE

Drilling Area Background (ppm): 1.7

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB02
DATE: 3-27-03
GEOLOGIST: M G COCHRAN
DRILLER: J AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Drill Rig BZ
S1	1		3.7/	1.0		BL	ASPHALT			1.7	1.7	1.7	1.7
	2		4.0			BRN	CLAYEY SILT	ML	DAMP				
	3								FILL				
	4												
S2	5		2.6/			GR-BRN	SILTY SAND	SM	DAMP	1.7	1.7	1.7	1.7
	6		2.0						SS FRAG IN BTM				
	7						REFUSAL @ 6'		WEATHERED SS IN BTM				
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS02 0002						
						@	905						
						SAMPLED	16SB02 0406						
						@	915						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: GEO PROBE 54LT

Drilling Area Background (ppm): 1.7

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54L

BORING NUMBER: 16SB03
DATE: 3-27-03
GEOLOGIST: M G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Drilling BZ
S-1	1		1.7/			BL	ASPHALT		REFUSAL @ 2' FIRST TRY	1.7	1.7	1.7	1.7
	2		2.0			RD BRN	CLAYEY SILT		REFUSAL 2ND TRY. SS FRAG				
	3						TD 2.0		IN BTM - MOVE HOLE 2'				
	4								REFUSAL @ 2' DAMP @ BTM. FILL				
	5								NO SUB. SPL TAKEN				
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED @	16SS03000Z 940						
						SAMPLED @	NO SUB SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.7

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT
BORING NUMBER: 16SB04
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Bumper BZ	Borehole**	Driller BZ
S1	1		1.7/	1.0		BL	ASPHALT + GRAVEL			1.7	1.7	1.7	1.7
	2		2.5			BRN	CLAYEY SILT	ML	DAMP, FILL	↓	↓	↓	↓
	3						REFUSAL @ 2.5						
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS04000Z						
						@	1000						
						SAMPLED	NO SUB SURFACE						
						@	SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 1.7

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB05
DATE: 3-27-03
GEOLOGIST: M. G COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
SI	1			1.0		BL	ASPHALT		TOOK 2 CORES FOR	1.7	1.7	1.7	1.7
	2					RD BRN	CLAYEY SILT	ML	DAMP	↓	↓	↓	↓
	3						REFUSAL @ 2'						
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS050002						
						@	1035						
						SAMPLED	NO SUBSURFACE						
						@	SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 1.7

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB06
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole*	Drill Area**
S1	1			1.0		BL	ASPHALT		TOOK 3 CORES FOR SPL. VOL.	1.7	1.7	1.7	1.7
	2					BRN	CLAYEY SILT	ML	DAMP, FILL	↓	↓	↓	↓
	3						REFUSAL @ 2.5'						
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	1655 06.0002 @ 1055						
						SAMPLED	NO SUBSURFACE @ SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 1.7

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 16SB07
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Driller BZ**
S1	1		1.4/	1.0		BL	ASPHALT		TOOK 3 CORES FOR SPL. VOL.	1.7	1.7	1.7	1.7
	2		2.0			BRN	CLAYEY SILT	ML	DAMP. FILL	↓	↓	↓	↓
	3						REFUSAL @ 2.0						
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS070002						
						@	1100						
						SAMPLED	NO SUBSURFACE						
						@	SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 1.7

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB08
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Background	Borehole**	Driller BZ**
	1			1.0		GR.	GRAVEL.		TOOK 3 CORES FOR SPL. VOL	1.7	1.7	1.7	1.7
	2					BRN	SILTY SAND	SM	SS FRAGS IN SPL. DAMP,	↓	↓	↓	↓
	3						REFUSAL @ 1.5'		FILL				
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS080002						
						@	1330						
						SAMPLED	NO SUBSURFACE						
						@	SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.7

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 16SB09
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Driller BZ
	1		1.31	.5		DKBR	TOPSOIL		TOOK 4 CORES				
						RDBRN	CLAYEY SILT	ML	FOR SPL VOL	1.6	1.6	1.6	1.6
	2		2.0						SS FRAGS BTM	↓	↓	↓	↓
	3						REFUSAL @ 2'		DAMP, FILL				
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS090002						
						@	1355						
						SAMPLED	NO SUBSURFACE						
						@	SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.6

Remarks: FD032703 01 COLLECTED

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB10
DATE: 3-27-03
GEOLOGIST: MG COCHRAN
DRILLER: J AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Drill BZ
S1	1		1.3/	.5		DKBR	TOPSOIL		TOOK 3 CORES				
						RDBRN	CLAYEY SILT	ML	FOR SPL VOL.	1.6	1.6	1.6	1.6
	2		2.0						DAMP. FILL	↓	↓	↓	↓
									SS FRAG BTM.				
	3						REFUSAL @ 2'						
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS100002						
						@	1400						
						SAMPLED	NO SUBSURFACE						
						@	SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.6

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB11
DATE: 3-27-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ
	1		3.1/			RD BRN	CLAYEY SILT	ML	DAMP, FILL	1.5	1.5	1.5	1.5
S1	2		4.0							↓	↓	↓	↓
	3												
	4		0/						NO RECOVERY				
S2	5		1				REFUSAL @ 5						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 16SS140002							
						@ 1515							
						SAMPLED 16SB110204							
						@ 1520							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 1.5

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB12
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ*
	1		2.5/			DK BRN	CLAYEY SILT	ML	FILL, DAMP	0	0	0	0
	2		3.5			BRN	CLAYEY SILT			↓	↓	↓	↓
	3												
	4			T.D. 3.5'			REFUSAL @ 3.5						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS120002						
						@	820						
						SAMPLED	16SB120204						
						@	825						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT.
BORING NUMBER: 16SB13
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Background	Drill Area
	1			.5		DK BRN	TOPSOIL		DAMP, FILL	0	0	0	0
S1	2					DK BRN	CLAYEY SILT	ML		↓	↓	↓	↓
	3												
	4						REFUSAL @ 3.5'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS130002						
						@	800						
						SAMPLED	16SB130204						
						@	805						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT
BORING NUMBER: 16SB14
DATE: 3-27-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Barrier BZ	Borehole**	Driller BZ**
	1					DKBR BRN	TOPSOIL CLAYEY SILT		DAMP, FILL	1.6	1.6	1.6	1.6
	2												
	3			T.D. 2'			REFUSAL @ 2'						
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS140002						
						@	1500						
						SAMPLED	NO SUBSURFACE						
						@	SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 1.6

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB15
DATE: 3-27-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
S1	1		1.5/			DKGR BRN	TOPSOIL CLAYEY SILT	ML	TOOK 3 CORES SPL VOLUME	1.6	1.6	1.6	1.6
	2		1.5				REFUSAL @ 1.5'	↓	DAMP, FILL	↓	↓	↓	↓
	3												
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS150002						
						@	1440						
						SAMPLED	NO SPL						
						@	TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.6

Remarks: MS/MSD SAMPLE TAKEN

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB16
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample/BZ	Borehole**	Driller BZ*
S1	1		1.0	.5		DKBRN BRN	TOPSOIL, CLAYEY SILT	ML	TOOK 3 CORES FOR SPL VOL	1.5	1.5	1.5	1.5
	2		2.0					↓		↓	↓	↓	↓
	3						REFUSAL @ 2'						
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS160002						
						@	1415						
						SAMPLED	NO SUBSURF.						
						@	SPL TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 1.5

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16 SB 17
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sample BZ	Borehole**	Driller BZ**
S1	1		3.5/	.5		BL	TOPSOIL		TOOK 2 CORES				
						RD-BRN	CLAYEY SILT	ML	FOR SPL. VOL	1.5	1.5	1.5	1.5
	2		4.0	2.0				↓	DAMP, FILL	↓	↓	↓	↓
	3					RD BN	SHALY SILTSTONE		SOFT, WEATHERED				
	4												
	5						REFUSAL @ 4'						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	* 16SS170002						
						@	1540						
						SAMPLED	16SB170204						
						@	1545						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.5

Remarks: * DUPLICATE SPL.
FD 03 27 03 02

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB18
DATE: 3-28-03
GEOLOGIST: M G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Breathing Zone	Borehole	Driller's Zone
	1		2.9			BN	CLAYEY SILT	ML	DAMP, FILL	0	0	0	0
	2		3.5					↓					
	3			3.0									
	4			3.5		BL			BLACK SMEAR @ BTM .5'	0	0	0	0
	5						REFUSAL @ 3.5'		POSSIBLE WASTE MTL?				
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 16SS980002 @ 1030							
						SAMPLED 16SB180203 @ 1035							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT
BORING NUMBER: 16SB19
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Drill Rig BZ**
	1		2.31			GR. BRN	CLAYEY SILT	ML	DAMP, FILL	0	0	0	0
	2		3.5	2.0						↓	↓	↓	↓
	3					RED BRN			RK FRAGS IN SPL.				
	4						REFUSAL @ 3.5						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 16SS19 0002 @ 1040							
						SAMPLED 16SD19 0203 @ 1045							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB20
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness*	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Bkhole**	Borehole	Driller-BZ
	1			1.0		GR BRN	CLAYEY SILT + GRAVEL	ML	TOOK 2 CORES FOR SPL. VOL.	0	0	0	0
S-1	2						WEATHERED SS	↓	DAMP, FILL	↓	↓	↓	↓
	3												
	4						REFUSAL @ 2.5'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS200002						
						@	1140						
						SAMPLED	NO SPL						
						@	TAKEN						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16 SB 21
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1		2.1			BRN	CLAYEY SILT + GRAVEL	ML	TOOK 3 CORES FOR SPL. VOL	0	0	0	0
S1	2		2.5	2.0					DAMP FILL	↓	↓	↓	↓
	3			2.5		BRN	WEATHERED SS						
	4						REFUSAL @ 2.5						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED* 16SS21ODD2 @ 1100							
						SAMPLED No SUB SAMPLE @ Collected							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: * MS/MSD collected @ this location.

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 16SB22
DATE: 3/28/03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Bag Headspace	Borehole	Drill Area
S1	1		2.5/	.5		DK BR BRN	TOPSOIL CLAYEY SILT	ML	DAMP. FILL	0	0	0	0
	2		3.5					↓		↓	↓	↓	↓
	3					LT BRN	WEATHERED S. STONE						
	4						REFUSAL @ 3.5						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS220002						
						@	910						
						SAMPLED	16SB220203						
						@	915.						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB23
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler B2	Borehole**	Driller EZ**
	1		2.5'			DKBRN	TOPSOIL		TOOK 2 CORES				
						RDBRN	CLAYEY SILT	ML	FOR SPL. VOL	0	0	0	0
S1	2		3.5					↓	DAMP, FILL	↓	↓	↓	↓
	3												
	4						REFUSAL @ 3.5'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS230002 (1)						
						@	1000						
						SAMPLED	16SB230203						
						@	1005 (2)						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: (1) FD032803 01
(2) FD032803 02

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB24
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	1		2.2	.5		DKBRN	TOPSOIL						
						RD BRN	CLAYEY SILT	ML	DAMP, FILL	0	0	0	0
	2		3.5					↓		↓	↓	↓	↓
	3								SS. FRAG BTM				
	4						REFUSAL @ 3.5'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS240002						
						@	940						
						SAMPLED	16SB240203						
						@	945						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: GEOPROBE MACROCORE

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB25
DATE: 3/28/03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sample BZ	Borehole**	Drillers BZ**
	1		2.4/	.5		DK BRN	TOPSOIL						
						RD BRN	CLAYEY SILT	ML	DAMP, FILL	0	0	0	0
51	2		3.5						RK FRAGS IN SPL.	↓	↓	↓	↓
	3												
	4						REFUSAL @ 3.5						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS250002						
						@	930						
						SAMPLED	16SB250203						
						@	935						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG:

BORING NUMBER: 16SB26 / MW05
DATE: 4/4/03
GEOLOGIST: B Dalhover
DRILLER: Dave S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sample BZ	Borehole**	Drill Area**
	1					BR	1' CLAY	CL		00			
	2					YELL OR	1-4' SILTY SAND W/S.S	SM		↓			
	3					LT GRAY	FRAGS						
S1 1035	4		4" / 4"			↓	↓						
	5						Rock @ 4'						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 16SS260002 @ 1038			FD040903-02 MS/MSD				
						SAMPLED 16SB260004 @ 1045			FD040903-03 MS/MSD				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No X Well I.D. #:

NOT AT TIME OF INITIAL SAMPLING

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 165B27
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J AKERS

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness*	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Bumper/BZ	Borehole**	Drill Rig BZ**
	1		2.9'	.5		PKBR BRN	TOPSOIL CLAYEY SILT W	ML	DAMP, FILL	0	0	0	0
S1	2		3.5				GRAVEL FRAGS	↓		↓	↓	↓	↓
	3			2.5			WEATHERED SS						
	4			3.5									
	5						REFUSAL @ 3.5'						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 165S270002 @ 1120							
						SAMPLED 165B270203 @ 1125							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: MACROCORE

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB28
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Background	Drilling BZ**
	1			.5		DKBR	TOPSOIL						
						BRN	CLAYEY SILT	ML	DAMP, FILL	0	0	0	0
	2			1.5				↓		↓	↓	↓	↓
	3					BRN	SANDY SILT						
	4			3.5									
	5						REFUSAL @ 3.5						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS280002						
						@	1130						
						SAMPLED	16SB280203						
						@	1135						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 16SB29
DATE: 3/28/03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1		3.0/			DKBR	TOPSOIL						
						RDBR	CLAYEY SILT	ML	DAMP	0	0	0	0
	2		3.5					↓		↓	↓	↓	↓
	3												
	4						REFUSAL @ 3.5						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS290002						
						@	900						
						SAMPLED	16SB290203						
						@	905						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB30
DATE: 3-28-03
GEOLOGIST: MG COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ
	1		3.1	.5		DKBN	TOPSOIL						
						ROGN	CLAYEY SILT	ML	DAMP, FILL	0	0	0	0
	2		3.0							↓	↓	↓	↓
	3								SS FRAGS @ BTM.				
	4						REFUSAL @ 3'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS300002						
						@	840						
						SAMPLED	16SB300203						
						@	845						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPRODE 54LT

BORING NUMBER: 16SB31
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Bgrnd**	Driller BZ
S1	1		2.0/	.5		DKBR	TOPSOIL						
						RDBN	CLAYEY SILT	ML	DAMP	0	0	0	0
	2		3.0					↓		↓	↓	↓	↓
	3						REFUSAL @ 3'		SS FRAG @ 0.5m				
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS310002						
						@	830						
						SAMPLED	NO SPH						
						@	TAK						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG:

BORING NUMBER: 16SB32
DATE: 4/9/03
GEOLOGIST: B. BAUGUEZ
DRILLER: DAVES.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample Bz	Sample Hz	Driller Bz
	1				moist firm	BR	CLAY	CL		0.0			
	2				↓	↓	↓	↓		↓			
	3					↓	↓	↓					
S1 1010	4		3.5' / 4'		↓	Lt Gray	SANDY CLAY	CL		↓			
	5			T.D. 4'									
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 16SS320002 @ 1015			FD040403 01 For PCBs				
						SAMPLED 16SB320304 @ 1020							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTO SONIC

BORING NUMBER: 16SB33
DATE: 4/4/03
GEOLOGIST: R BALKOVEC
DRILLER: DAVES.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Chill BZ **
	1				MOIST SOFT	BR	.5' CLAY	CL		0.0			
	2				DRY	YELL OR	SILTY SAND W/	SM		↓			
	3				HARD	↓	S.S. FRAGS	↓		↓			
S1 0457	4		3.4-3.5	T.D. 3.5'									
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS330002						
						@	1000						
						SAMPLED	16SB330204						
						@	1005						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: Roto Sonic

BORING NUMBER: 16SB34
DATE: 4/9/03
GEOLOGIST: B. Balkovec
DRILLER: Dave S.

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample/BZ	Sample/BZR	Driller BZR
	1				MOIST + SOFT	BR	.5' CLAY	CL		0.0			
	2				DRY +	YELL OR	SILTY SAND	SM		↓			
S-1 0.0/5	3		3'/3'		STIFF	↓	W/S.S. FRAGS	↓		↓			
	4			T.D. 3'			REFUSAL @ 3'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS340002						
						@	0947						
						SAMPLED	16SB340203						
						@	0953						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB35
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample Bz	Borehole**	Driller Bz
	1		1.9/	1.0		LT GREY	CLAYEY SILT + GRAVEL		FILL, DAMP	0	0	0	0
	2		2.5			BRN	CLAYEY SILT	ML		↓	↓	↓	↓
	3												
	4						REFUSAL @ 2.5'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS350002						
						@	1440						
						SAMPLED	NO SPL.						
						@	TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTO SONIC

BORING NUMBER: 16SB36/MWT03
DATE: 4/9/03
GEOLOGIST: B. BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample Bz	Borehole**	Drillers Bz
	1				DRY & STIFF	BR	CLAY	CL		AW			
	2				↓	↓	↓	↓		↓			
S-1 0935	3		2.5'/3'		DRY	YELLOW	SILTY SAND W/ S.S. FRAGS	SM		↓			
	4						REFUSAL @ 3'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 16SS36 0002 @ 0930							
						SAMPLED 16SB360703 @ 0940							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No X

Well I.D. #:

NOT DURING INITIAL SAMPLING

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB37
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole **	Driller BZ
S1	1		2.1/			LT GREY	CLAYEY SILT+GRAVEL	ML-GP	DAMP, FILL	0	0	0	0
	2		2.5			OF BRN	CLAYEY SILT	ML		↓	↓	↓	↓
	3												
	4						REFUSAL @ 2.5'						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS370002						
						@	1435						
						SAMPLED	NO SPL						
						@	TAKEN						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ___ No ✓ Well I.D. #: ___

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB38
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Background	Drill Hole**
	1		3.3/	1.0		GREY	CLAYEY SILT +	ML-GP	DAMP, FILL	0	0	0	0
S1	2		3.5				GRAVEL	ML		↓	↓	↓	↓
	3					BR	CLAYEY SILT						
	4												
	5						REFUSAL @ 3.5'						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS380002						
						@	1410						
						SAMPLED	16SB380203						
						@	1415						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No ____ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT.
BORING NUMBER: 16SB39
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Simple	Burner BZ	Simple	Burner BZ
	1		2.91	1.0		BRN	CLAYEY SILT +	GP-ML	DAMP, FILL	0	0	0	0
S-1	2		3.5			BRN	GRAVEL FRAGS	ML		↓	↓	↓	↓
	3						CLAYEY SILT		BLACK SMEAR IN BTM, POSSIBLE WASTE				
	4												
	5						REFUSAL @ 3.5						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SS390002 @ 1400						
						SAMPLED	16SB390203 @ 1405						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT

BORING NUMBER: 16SB40
DATE: 3-28-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ
	1		1.1	1.0		DK BRN	TOPSOIL	ML	DAMP, FILL TO TD.	0	0	0	0
S1	2		4.0			BRN	CLAYEY SILT						
	3												
	4												
S2	5		2.0			BRN	CLAYEY SILT		DAMP-MOIST	0	0	0	0
	6		4.0						* TOOK 2 CORES FOR SPL.				
	7								VOL.				
	8								MOIST				
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED	16SB400506						
						@	1340						
						SAMPLED*	16SB400608						
						@	1345 DUP						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: H_2O LEVEL IN SUMP 5' BGS TD 8' BGS
* FD032803 03 DUPLICATE SPL.

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 16SB41
DATE: 3-27-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole **	Driller BZ
S1	1		3.1/	1.0		BL	TOPSOIL		DAMP	1.7	1.7	1.7	1.7
	2		4.0			BRN	CLAYEY SILT.	ML	BRICK MTL. IN SPL.				
	3							↓	FILL				
	4		1.8/						MOIST	1.7	1.7	1.7	1.7
S2	5		4.0										
	6			7.0									
	7					GREY	SILTY CLAY		SATURATED				
	8						TD 8.0						
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 16SB410305 @ 1010							
						SAMPLED 16SB410507 @ 1015							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks: HOLE NEAR SUMP. SUMP H2O LEVEL 4' BGS. SUMP BTM 8' BGS.

Converted to Well: Yes _____ No _____ Well I.D. #: _____

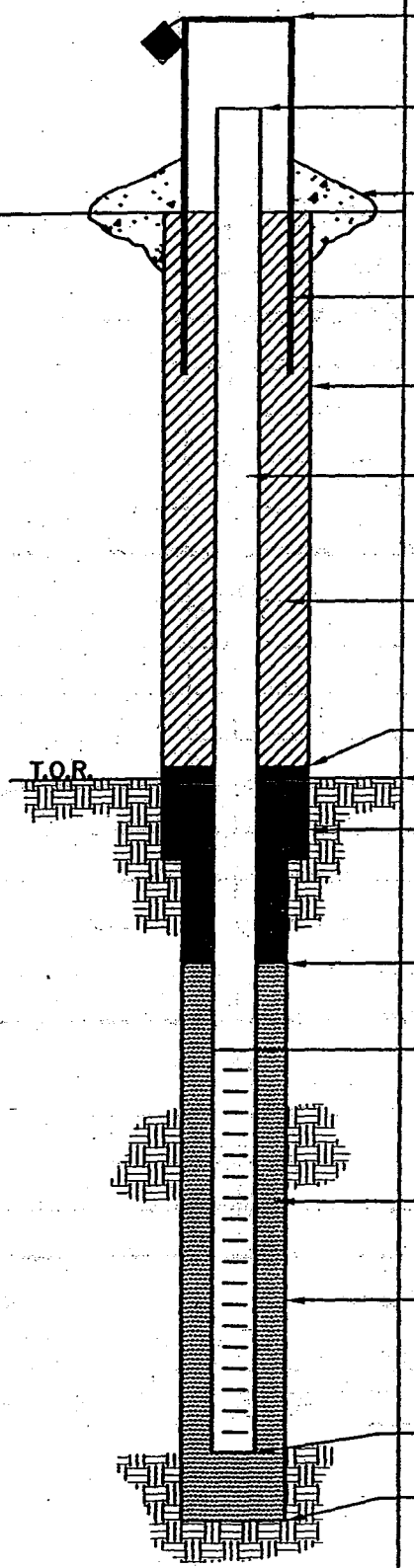
APPENDIX B.1.2
SWMU 16
BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS
ROUND 2

WELL NO.: 16MWT07

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT NSWC CRANE	LOCATION CRANE, IN	DRILLER J. WALSH
PROJECT NO. 9060	BORING 16MWT07	DRILLING METHOD HSA
DATE BEGUN 11-11-03	DATE COMPLETED 11-11-03	
FIELD GEOLOGIST M.G. COCHRAN		DEVELOPMENT METHOD SURGE/BAILER
GROUND ELEVATION 760.54	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 762.92.4

ELEVATION/HEIGHT TOP OF RISER: 762.82.3

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 8 1/2"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SLOTTED

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 757.54/3

ELEVATION/DEPTH TOP OF BEDROCK: 754.04/6.5

TYPE OF SEAL: CETCO PURE GOLD MEDIUM BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 747.54/13

ELEVATION/DEPTH TOP OF SCREEN: 745.54/15
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .020X10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 8 1/2"
CORE/REAM: —

ELEVATION/DEPTH BOTTOM SCREEN: 735.54/25
ELEVATION/DEPTH BOTTOM OF SAND: 735.04/25.5
ELEVATION/DEPTH BOTTOM OF HOLE: 735.04/25.5
BACKFILL MATERIAL BELOW SAND: N/A

ACAD:FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT07
DATE: 11-11-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							SEE BORING			—	—	—	—
							LOG OF						
							16MWT08 FOR						
							MATERIAL						
							DESCRIPTION						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 8 1/2" OD 4 1/4" ID TO TD
← PID DOWN, WOULD NOT START BACK UP.

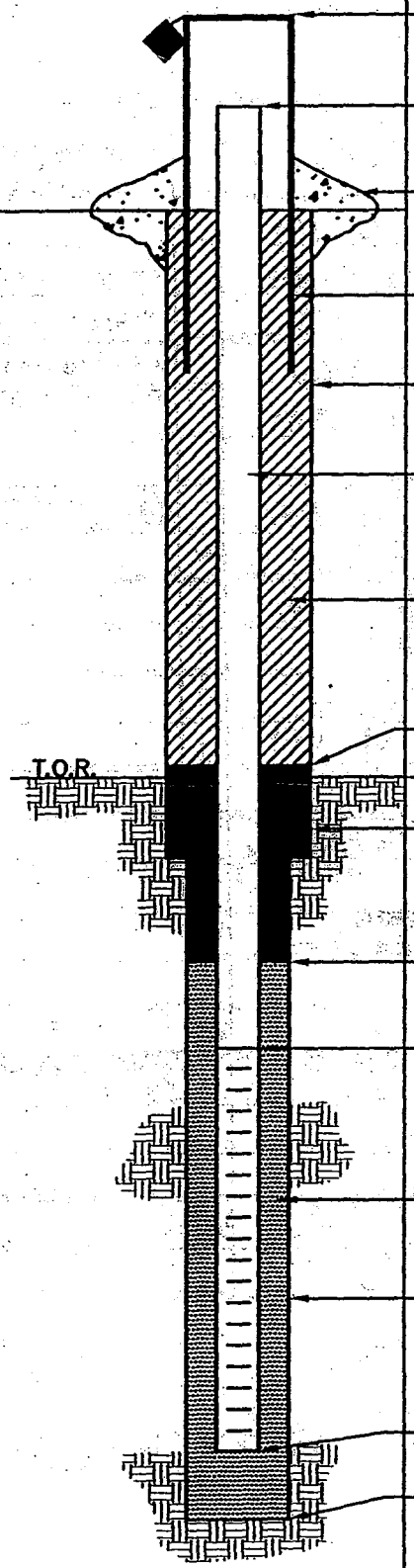
Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT07

WELL NO.: 16MWT08

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 16	DRILLER JON KEIFER
PROJECT NO. 9060	BORING 16MWT08	DRILLING METHOD ROTO SONIC
DATE BEGUN 11-7-03	DATE COMPLETED 11-9-03	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD SURGE/BAILER/WATERA
GROUND ELEVATION 759.57	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 761.17 2.1

ELEVATION/HEIGHT TOP OF RISER: 761.56/2.0

TYPE OF SURFACE SEAL: CONCRETE 4'x4'x6"

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 11"

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH.40 PVC

TYPE OF BACKFILL: BENTONITE "PURE GOLD" CHIPS CETCO

6" ISOLATION CASING GROUTED IN USING CEMENT/BENTONITE TO 38.5' BGS.

ELEVATION/DEPTH TOP OF SEAL: 754.57/5'

ELEVATION/DEPTH TOP OF BEDROCK: 753.07/6.5'

TYPE OF SEAL: BENTONITE PURE GOLD CHIP CETCO

ELEVATION/DEPTH TOP OF SAND: 677.57/82

ELEVATION/DEPTH TOP OF SCREEN: 674.57/85

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.02 x 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP / 18B

DIAMETER OF HOLE IN BEDROCK: 5"

CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 664.57/95

ELEVATION/DEPTH BOTTOM OF SAND: 660.57/99

ELEVATION/DEPTH BOTTOM OF HOLE: 660.57/99

BACKFILL MATERIAL BELOW SAND: NONE

ACAD: FORM_MWINBR.dwg 07/28/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 16MWT08
DATE: 11-7-03
GEOLOGIST: FRED W RAMSER
DRILLER: DENNIS SINK

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
							MOD BRN SILT + CLAY		TOP SOIL				
							↓ + f-g SAND		GRAVELS MOIST				
						BRN	GRADING TO			12			
							A DECOMPOSED		RELEC LAM.				
	5						SANDSTONE		W/SILTSTONE				0
							LGT YEL BRN		WEATHERED				
							W/GREY + BRN		SANDSTONE				
				TOP OF BD RK									
					MED SOFT		SANDSTONE - LAM. LO & FRAC		FE STAIN IN IRREGULAR LAM				
	10				SOFT	LT GREY	MUDSTONE W/	BR					
						BRN	STIFF CLAY			142			
						YEL BRN	10'-11'						
S-1		30%					SOFT TO MED STIFF						0
	15						CLAY+SILT						
							(STRONGLY WEATHERED MUDSTONE)						
			7.5/10							16			
					MED SOFT	YEL BRN	SANDSTONE - LAM FE STAIN	V					
	20				MED SOFT	GREY	SILT STONE	V.BR	FRIABLE				0
							GRADES TO BLK LAM. GREY + BLK		STRONGLY WEATHERED @ 20-20.5 V. SOFT				
					SOFT	DK GREY	MUD STONE						
S-2						YEL	SANDSTONE		WEATHERED	16			
						BRN	ABUNDANT FE STAIN LAM.	V.BR					
	25	10%											

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: SET CASING @ 38.5' BGS. USING 8" ID DRILLPIPE (11" OUTSIDE DIA)

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT08

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BAUSER MORNER
DRILLING RIG: VERSA SONIC

BORING No.: 16MWT08
DATE: 11-7-03
GEOLOGIST: FRED WRAMSER
DRILLER: DENNIS SINIC

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sample BZ	Borehole**	Driller BZ**
S-2					MED SOFT	YEL BRN	SANDSTONE		LESS WEATHERED				
									DOWNWARD				
			6.5/10							5			
					MED HARD	YEL	SANDSTONE	BR					
	30					BRN	ABUNDANT						0
							FUGS						
S-3							LAM. TO			48			
							THINLY						
		90%				DK BRN	BEDDED						0
	35					35-37	LOW FRAC.						
							TO HOR.						
							X-BEDDING						
			6.5/10							6			
	40				SOFT	LT GRAY	MUDSTONE	BL					0
							ROCK FRAG						
							OF CLAY + SILTSTONE						
					SOFT	DK GRAY	MUDSTONE			10			
S-4													
	NS	95%					ROCK FRAG.						
							OF CLAYSTONE						0
							+ SILTSTONE						
			10/10							12			
	50				SOFT	DK GRAY	CLAYEY SILTSTONE						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: BEGAN DRILLING BELOW CASING 11-8-04
START @ 39' → FINISH @ 79' 11-8-04

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT08

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 16MWT08
DATE: 11-8-03
GEOLOGIST: FRED W RAMSER
DRILLER: DENNIS SINK

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
					SOFT	DK GREY	CLAYEY SILTSTONE	V.BR					
							-FISSIL			10			
							-LAM. TO V. THIN BEDDED					0	
S5	55	0%					-PLANT FOSSILS (BLK) ABUNDANT						
					SOFT	MED GREY	SANDY SILTSTONE			8			
							-FISSIL						
			5/10				-LAM. TO V. THIN BEDS					0	
	60				SOFT	DK GREY	CLAYEY SILTSTONE	V.BR					
							-FISSIL						
							-LAM. TO V. THIN BEDS			13		0	
S-6		5%				DK GREY	SANDY SILTSTONE					0	
	65						VUGS						
							IRREGULAR LAM						
					SOFT	DK	CLAYEY SILTSTONE			14			
							LAM. (V. FINE)						
			5/10									0	
	70				SOFT	DK GREY	CLAYEY SILTSTONE	BL					
							BLOCKY W/ROCK FRAG.						
S-7						DK GREY	SILTSTONE	V.BR				0	
							LAM. TO V. THIN BEDDED			10			
	75												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT08

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 16MW108
DATE: 11-8-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON REIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
					SOFT	DK GREY	CLAYEY SILTSTONE	V.BR					
		30%					LAM. TO V.THINLY			12			
							BEDDED						
			9 / 10						HIT HARD SAND STONE @ 79'				
	80				HARD	LT GRY	SAND STONE	BR					
							MED BEDDED CLAYEY						
						DK GREY	SILTSTONE	V.BR		11			
							LAM. TO V.THIN BEDS						
S-8	85	2.5%											
					MED HARD	GREY	SILTY SANDSTONE	BR					
							LAM TO THIN BEDDED						
			9.5 / 10				PLANT FOSSIL		GRADES TO SANDY SILT STONE	12			
	90												
					SOFT	GREY	SANDY SILTSTONE	BR					
							LAM.						
					SOFT	DK GREY	SILTSTONE	V.BR					
							CLAYEY						
S-9	95	0%					LAM. V.THIN BEDDED						
	9												
					MED HARD	GREY	SANDY SILTSTON	BR					
			8.5 / 10				LAM. TO THIN BEDS						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: SCREEN 85-95 SAND 82-99. 11-9-03

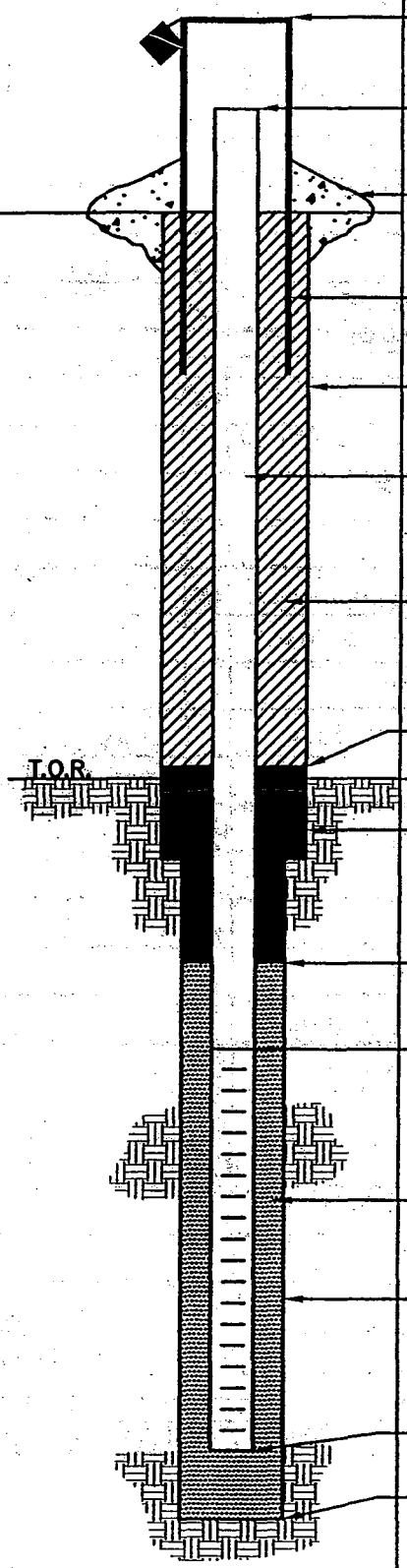
Converted to Well: Yes ✓ No _____ Well I.D. #: 16MW108

WELL NO.: 16MWT09

Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET WELL INSTALLED IN BEDROCK

PROJECT NSWC CRANE	LOCATION CRANE IN	DRILLER BOWSER-MORN.
PROJECT NO. 9060	BORING 16MWT09	DRILLING METHOD HSA
DATE BEGUN 11-8-03	DATE COMPLETED 11-8-03	
FIELD GEOLOGIST M.G. COCHRAN		DEVELOPMENT METHOD SURGE/BAILER
GROUND ELEVATION 762.43	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 764.47/2.1

ELEVATION/HEIGHT TOP OF RISER: 764.28/1.9

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ STEEL

DIAMETER OF HOLE: 8 1/2"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCHEDULE 40

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SEAL: 759.43/3

ELEVATION/DEPTH TOP OF BEDROCK: 755.43/7

TYPE OF SEAL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SAND: 749.43/13

ELEVATION/DEPTH TOP OF SCREEN: 747.43/15
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: .020 X 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: BEST MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 8 1/2"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 737.43/25
ELEVATION/DEPTH BOTTOM OF SAND: 737.43/25
ELEVATION/DEPTH BOTTOM OF HOLE: 737.43/25
BACKFILL MATERIAL BELOW SAND: NA

ACAD:FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT09
DATE: 11-8-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
0						BR	TOPSOIL			—	—	0	0
						BR	CLAY + SILT						
5													
				7.0		BR	SHALE BEDROCK						
15													
20													
25							TD 25'						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6-foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: HSA 4¼ ID, 8 1/2 OD TO TD

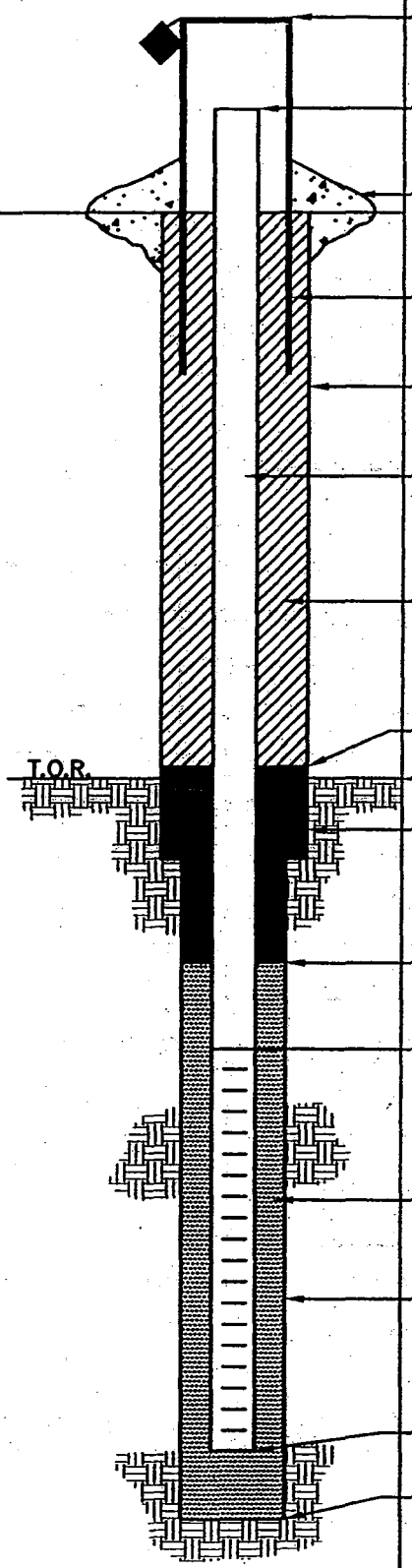
Converted to Well: Yes ✓ No ____ Well I.D. #: 16MWT09

WELL NO.: 16MWT10

Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET WELL INSTALLED IN BEDROCK

PROJECT: CRANE
LOCATION: CRANE IN
DRILLER: J. WALSH
PROJECT NO.: 9060
BORING: 16MWT10
DRILLING METHOD: HSA
DATE BEGUN: 11/9/03
DATE COMPLETED: 11-9-03
FIELD GEOLOGIST: M. G. COCHRAN
DEVELOPMENT METHOD: BAILER/SURGE/PUMP
GROUND ELEVATION: 761.93
DATUM: NAVD 88



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 764.98/ 2.5

ELEVATION/HEIGHT TOP OF RISER: 764.43/2.5

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ STEEL

DIAMETER OF HOLE: 8 1/2"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCH 40

TYPE OF BACKFILL: CETCO PURE GOLD BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 758.93/ 3

ELEVATION/DEPTH TOP OF BEDROCK: 753.43 8.5'

TYPE OF SEAL: CETCO PURE GOLD BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 749.93/ 12

ELEVATION/DEPTH TOP OF SCREEN: 747.93/ 14
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .020 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 8 1/2
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 737.93/ 24
ELEVATION/DEPTH BOTTOM OF SAND: 736.93/ 25
ELEVATION/DEPTH BOTTOM OF HOLE: 736.93/ 25
BACKFILL MATERIAL BELOW SAND: NA

ACAD:FORM_MWNBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT10
DATE: 11-9-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							SEE LOG					0	0
							16MWT11 FOR						
							DESCRIPTION						
							TD 25						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT10

WELL NO.: 16MW11

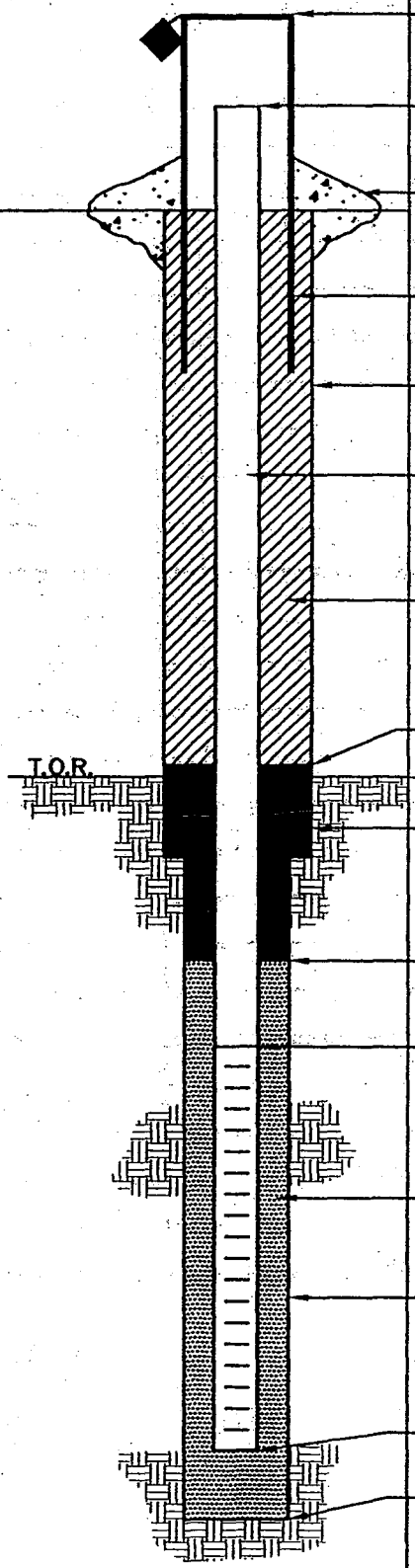
Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE
PROJECT NO. 9060
DATE BEGUN 11-8-03
FIELD GEOLOGIST FRED W RAMSER
GROUND ELEVATION 763.23

LOCATION SWMU 16
BORING 16MWT11
DATE COMPLETED 11-11-03
DATUM NAVD 88

DRILLER JON KELLEY
DRILLING METHOD ROTO-SONIC
DEVELOPMENT METHOD BAILER/PURGE



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 765.47/2.24

ELEVATION/HEIGHT TOP OF RISER: 765.24/2.0

TYPE OF SURFACE SEAL: CONCRETE 4'x4'x6"

I.D. OF SURFACE CASING: 4"x4" SQ

DIAMETER OF HOLE: 11"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: SCH. 40 PVC

TYPE OF BACKFILL: BENTONITE "PURE GOLD" CHIPS CETCO, 6" ISOLATION CASING GROUTED IN USING CEMENT/BENTONITE TO 38' BGS.

ELEVATION/DEPTH TOP OF SEAL: 758.23/5'

ELEVATION/DEPTH TOP OF BEDROCK: 754.73/8.5'

TYPE OF SEAL: BENTONITE PURE GOLD CHIPS CETCO

ELEVATION/DEPTH TOP OF SAND: 680.23/83

ELEVATION/DEPTH TOP OF SCREEN: 677.23/86
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 0.02 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP/18B

DIAMETER OF HOLE IN BEDROCK: 5"
CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 667.23/96
ELEVATION/DEPTH BOTTOM OF SAND: 665.23/98
ELEVATION/DEPTH BOTTOM OF HOLE: 665.23/98
BACKFILL MATERIAL BELOW SAND: NONE

ACAD:FORM_MWNBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA SONIC

BORING No.: 16MWT11
DATE: 11-8-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
					STIFF	MED BRN	CLAYEY SAND TOP SOIL	SC/SM	4" VIBRO CORE				
							f-g + SILT		SPL				
					LOOSE		SILT GRADES FROM						
S-1						MED BRN	DEC. BDRK TO						
	5						STRONGLY WEATHERED						
						YEL BRN	BDRK TO 7.5' SND STONE		MOTTLED:				
					MED SOFT		7.5' - 8.5'		Fe STAINING				
			8.5/8.5				WEATHERED BDRK SAND STONE		GREY, ORG.				
				TOP OF BDRK @ 8.5'					RELIC LAM.				
	10				VERY SOFT	YEL BRN	MUDSTONE	V.BR	UNCONSOLIDATED				
									DECOMPOSED?				
					VERY SOFT	GREY	MUDSTONE						
S-2		5%											
					SOFT	PALE RED	SANDSTONE f-g		WEATHERED				
	15				VERY		LAM. - V.F. BEDDING	V.BR					
					SOFT	GREYISH RED	SANDSTONE						
							F. GRAIN. LAM. - V.F. BEDDING						
			8/10										
	20				SOFT	GREY	SANDY SILTSTONE	V.BR					
						DK GREY	LAM.		GRADES				
S-3							V. FINE BEDDING		TO A				
		0%					ALT DK GREY		SILTSTONE				
							+ GREY		DOWNWARD				
	25						LAM.		TO A CLAYEY SILTSTONE				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: USED 4"Ø ID DRILL PIPE w/CORE BIT TO SPL. 10' RUNS
USED 8"Ø ID DRILL PIPE TO INSTALL 6" PSO. INTO A 11" HOLE
INSTALLED WELL 11-11-03

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT11

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA SONIC

BORING No.: 16MWT11
DATE: 11-8-03
GEOLOGIST: FRED WRAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
4-3 CONT					SOFT	DK GREY	CLAYEY SILT STONE	V. BR	(SHALE)				
					SOFT	DK GREY	MUD STONE						
	30				SOFT	DK GREY	CLAYEY SILT STONE	V. BR					
								BR					
							IRREGULAR LAM.						
5-4		5%											
									POOR REC.				
	35								MAY BE DUE				
									TO COAL BED.				
									OR V. BRITTLE				
	38		2.5/10						SHALE FALLING OUT OF DRILL				
								V. BR	PIPE				
	40				MED SOFT		SANDY SILT STONE		BLACK CUTTING				
					SOFT		MUD STONE LAM. DK GREY ALT LT GREY OCC. FOSSIL	BL	SEEN WHEN				
									DRILLING W/				
5-5		20%			MED SOFT	LT. GREY	SANDSTONE		8" PIPE				
							CROSS BEDDING	BL	BEGIN TO				
	45						OCC PLANT FOSSIL		DRILL BELOW				
							BLK ON LAM.		ISO CASING				
							F. BEDDED		11-11-03				
			7.0/10				LO ∆ FRAC.		OCC. VUGS.				
					SOFT	DK GREY	CLAYEY SILTSTONE	V. BR					
	50												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: STARTED WELL 11-8-03 INSTALLED 6" ISO CASING.
CONT. DRILLING BELOW CASING 11-11-03 @ 38' BGS
STEADY RAIN PID NOT USED. 11-11-03

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT11

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 16MWT 11
DATE: 11-11-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	50				SOFT	DK GREY	CLAYSILTSTONE	V.BR					
S6							FISSIL						
							LAM. TO						
		0%					V. FINEBED.						
	55												
			10/10										
					SOFT	DK GREY	AS ABOVE	V.BR					
	60												
		0%											
S7													
	65												
			10/10										
					SOFT	BLK	CLAYEYSILTSTONE	V.BR					
	70						FISSIL. LAM.						
							TO V.F. BEDDED						
S-8													
		20%			HARD	LT GREY	SANDSTONE	BI					
							POOR BEDDING						
	75						SMALL BEDS						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: STEADY RAIN PID NOT USED 11-11-03

Drilling Area Background (ppm): —

Converted to Well: Yes ✓ No ____ Well I.D. #: 16MWT 11

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA SOMIC

BORING No.: 16 MWT 11
DATE: 11-11-03
GEOLOGIST: FRED WRAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	75				HARD	LT GREY	SAND STONE	Bl					
			7.5 / 10										
					SOFT	DK	CLAYEY SILTSTONE	V.Br					
	80					GREY	LAM. TO V.F BEDDING						
							FISSIL						
S-9													
	85	0%											
					MED	GREY	SILTY SANDSTONE	Br					
					SOFT		LAM. THIN BEDDED						
							ALT. GREY & DK. GREY						
					MED SOFT	GREY	SAND STONE	Br					
	90						LAM TO						
							THIN BEDS						
							ALT. GREY &						
S-10		30%			MED HARD		BLK LAM.	Bl					
							OCC. IRREGULAR						
	95						LAM. VUGS						
							LOX FRAGS. (RARE)						
					SOFT	BLK	COAL	V.Br					
			10 / 10				BRITTLE						
	100												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: STEADY RAIN NO PID READINGS
SCREEN 86-96
SAND 83-98 BENTONITE 5' - 83'

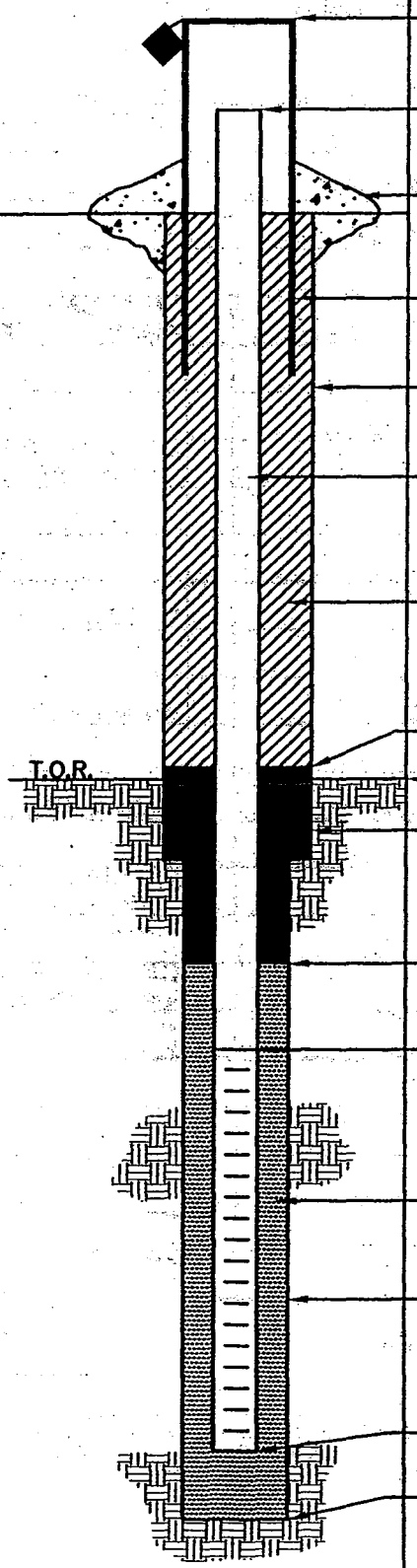
Converted to Well: Yes ✓ No _____ Well I.D. #: 16 MWT11

WELL NO.: 16MWT12

Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET WELL INSTALLED IN BEDROCK

PROJECT CRANE	LOCATION CRANE IN	DRILLER J. WALSH
PROJECT NO. 9060	BORING 16MWT12	DRILLING METHOD HSA
DATE BEGUN 11-7-03	DATE COMPLETED 11-7-03	
FIELD GEOLOGIST M.G. COCHRAN		DEVELOPMENT METHOD BAILER/SURGE/PUMP
GROUND ELEVATION 753.23	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 755.54 2.3

ELEVATION/HEIGHT TOP OF RISER: 755.45 2.2

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4"x4" SQ STEEL

DIAMETER OF HOLE: 8 1/2"

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC SCHEDULE 40

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SEAL: 750.23 3

ELEVATION/DEPTH TOP OF BEDROCK: 745.23 / 8

TYPE OF SEAL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SAND: 739.23 / 14

ELEVATION/DEPTH TOP OF SCREEN: 737.23 / 16

TYPE OF SCREEN: PVC SLOTTED

SLOT SIZE x LENGTH: .020 X 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30

DIAMETER OF HOLE IN BEDROCK: 8 1/2"

CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 727.23 / 26

ELEVATION/DEPTH BOTTOM OF SAND: 726.73 / 26.5

ELEVATION/DEPTH BOTTOM OF HOLE: 726.73 / 26.5

BACKFILL MATERIAL BELOW SAND: NA

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Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550

BORING No.: 16MWT12
DATE: 11-7-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
S1		3/7	1.4/		M.DENSE	DK BR	CLAYEY SILT		DAMP, FILL-8'	.5	.5	.5	.5
	2	6/6	2.0			LT BRN	CLAYEY SILT						
S2		6/8	1.7/		M.DENSE	LT BRN	CLAYEY SILT			.5	.5	.5	.5
	4	10/12	2.0										
S3		5/11	1.7/		M.DENSE	GR BRN	CLAYEY SILT		V.F. LAMS W GREY-BR STREAKS	.5	.5	.5	.5
	6	15/24	2.0										
S4		17/28	1.2/		V.DENSE	RD BRN	CLAYEY SILT			.5	.5	.5	.5
	8	50	2.0	8.0					BL. VF LAMS AT BTM. POSS. COAL				
S5		28/50/3	.4/		SOFT	PINK GREY	SHALE			.5	.5	.5	.5
	10		.8										
S5		50/5"	.4/			PINK GREY	SHALE		WEATHERED	.5	.6	.6	.6
	12												
S6		50/3"	.3/			DK GREY	SHALE		WEATHERED	.7	.7	.7	.7
	14		.8										
S7		50/4"	.3/			DK GREY	SHALE		WEATHERED	.7	.7	.7	.7
	16		.3										
S8		50/5"	.4/			DK GREY	SHALE		V.F. LAMS W LT GREY STREAKS	.6	.6	.6	.6
	18		.3										
S9		50/5"	.3/			DK GR	SHALE		VF LAMS W LT GREY STREAKS	.6	.6	.6	.6
	20		.3										
S10		50/5"	.5/			DK GR	SHALE			.6	.6	.6	.6
	22		.5										
S11		50/5"	.5/			DK GREY	SHALE			.6	.6	.6	.6
	24		.5										
S12			.5/			DK GREY	SHALE			.6	.6	.6	.6

* When rock coring, enter rock brokeness.

** Include monitor reading in 6-foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): .5

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT12

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550

BORING No.: 16MWT12
DATE: 11-7-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	26		.5			DK GREY	SHALE						
		50/5	.91							.5	.5	.5	.5
	28		.6			BL	COAL						
							TO 28.0						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): .5

Remarks: AUGURED TO 26.5'

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT12

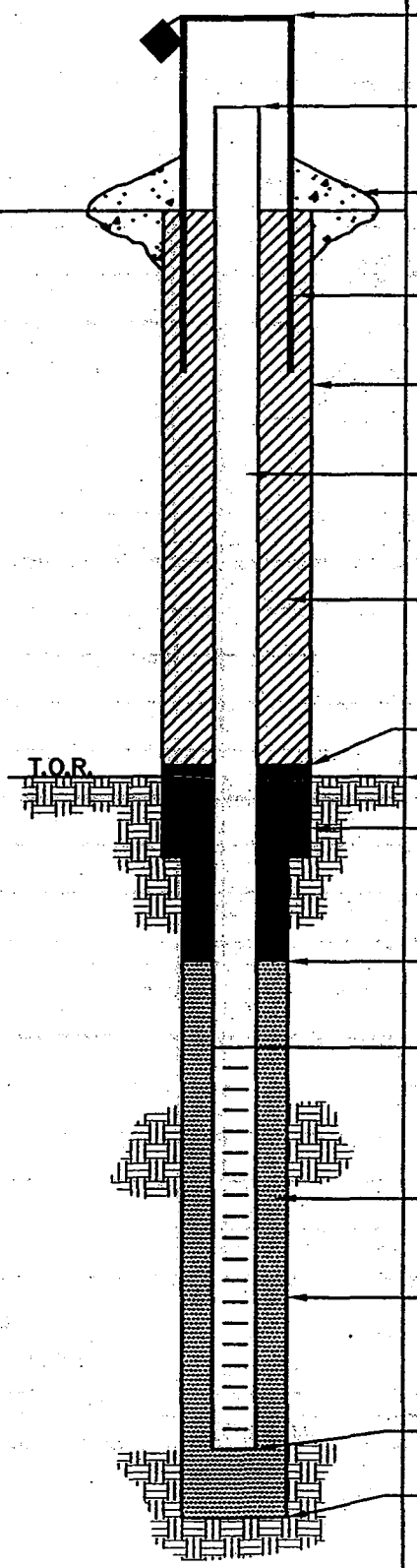
WELL NO.: 16MWT13

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: NWSC CRANE
LOCATION: CRANE, IN
PROJECT NO.: 90060
BORING: 16MWT13
DATE BEGUN: 11-11-03
DATE COMPLETED: 11-11-03
FIELD GEOLOGIST: M. G COCHRAN
GROUND ELEVATION: 757.62
DATUM: NAVD 88

DRILLER: BOWSER-MORNER
DRILLING METHOD: HSA
DEVELOPMENT METHOD: BAILER/SURGE



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 759.66/2.1

ELEVATION/HEIGHT TOP OF RISER: 759.57/2.0

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ STEEL

DIAMETER OF HOLE: 8 1/2"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM CHIP

ELEVATION/DEPTH TOP OF SEAL: 754.62/3'

ELEVATION/DEPTH TOP OF BEDROCK: 747.62/10

TYPE OF SEAL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SAND: 751.62/6

ELEVATION/DEPTH TOP OF SCREEN: 749.62/8
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .020 X 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 8 1/2"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 739.62/18
ELEVATION/DEPTH BOTTOM OF SAND: 738.62/19
ELEVATION/DEPTH BOTTOM OF HOLE: 738.62/19
BACKFILL MATERIAL BELOW SAND: NA

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Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550

BORING No.: 16MWT13
DATE: 11-11-03
GEOLOGIST: M. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						BRN	SANDY SILT	SM					
	3												
S1	4	2/3	1.2/		LOOSE	BRN	SANDY SILT	SM	DAMP, FILL	1.5	1.5	1.5	1.5
	5	2/2	2.0										
	8												
S2		3/10	.9/		V. DENSE	GR BRN	SANDY SILT		DAMP.	-	-	-	-
	10	27/50/5"	2.0	10.0					GRADING INTO SILTSTONE @ BTM				
	13												
S3		50/5"	.4/			LT GREY	SHALY SILTSTONE		V.F. LAMS, DRY STREAKED WHITE	-	-	-	-
	15		.4										
							TD 18'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.5

Remarks: - INSTRUMENT DOWN, WILL NOT START BACK UP

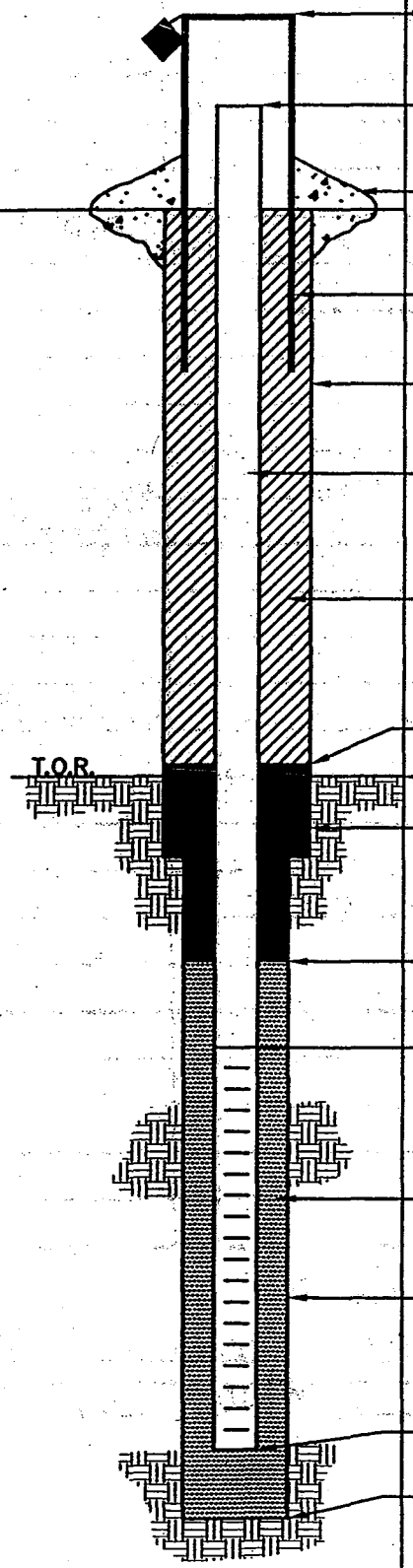
Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT13

WELL NO.: 16MWT14

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT NWSC CRANE	LOCATION CRANE, IN	DRILLER J. WALSH
PROJECT NO. 9060	BORING 16MWT14	DRILLING METHOD HSA
DATE BEGUN 11-7-03	DATE COMPLETED 11-7-03	
FIELD GEOLOGIST M.G. COCHRAN	DATE ABANDONED: 11-27-03	DEVELOPMENT METHOD NA
GROUND ELEVATION ~764.9	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: — / —
FLUSH MOUNT
* Abandoned

ELEVATION/HEIGHT TOP OF RISER: — / —

TYPE OF SURFACE SEAL: NONE - ABANDONED

I.D. OF SURFACE CASING: NONE - ABANDONED

DIAMETER OF HOLE: 8 1/2"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCHEDULE 40 - REMOVED 11-27-03

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SEAL: 13

ELEVATION/DEPTH TOP OF BEDROCK: 7'

TYPE OF SEAL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SAND: 13

ELEVATION/DEPTH TOP OF SCREEN: 15
TYPE OF SCREEN: PVC - REMOVED 11-27-03
SLOT SIZE x LENGTH: .020 X 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: BEST MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 8 1/2"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 25
ELEVATION/DEPTH BOTTOM OF SAND: 25
ELEVATION/DEPTH BOTTOM OF HOLE: 28
BACKFILL MATERIAL BELOW SAND: NA

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Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT14
DATE: 11-7-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
	1					BL GR	ASPHALT GRAVEL BASE		ODORS, ASPHALT BURNING FROM BIT				
S-1		10/18	1.1/		V. DENSE	LR BRN	SAND & GRAVEL	SP	FILL, DAMP FILL TO 4'	.3	.3	1.1	.3
	3	50/3"	1.3						SS. FRAG IN BTM				
				4.0					AUGURED THRU FRAG., LOOKS				
	5								NTL BELOW				
S2		10/10	.8/		V. DENSE	LT GREY	CLAYEY SILT	SM	DAMP. V. F. LAMINATED.	.3	.3	.3	.3
	7	15/50/1"	1.6'	7.0					HARD DRILLING POSSIBLE ROCK				
S3		50/5"	.4/	XXXX	SOFT	GR BRN	SHALE, WEATHERED		DAMP. V FINE LAM.	.3	.3	.3	.3
	9		.5										
S4		32/44	1.5/		SOFT	GREY	SHALE WEATHERED		V. FINE LAM. DAMP.	.3	.3	.3	.3
	11	48/50	2.0			RD BRN	SHALE, WEATHERED		FE STAINED ON LAMS.				
	13												
S5		16/22	1.3/		SOFT	DKGR BL	SHALE		V.F. LAM, FE STAINS ON LAMS	.3	.3	.3	.3
	15	50/5"	1.5						WEATHERED.				
S6		11/15	1.4/			DKGR BL	SHALE, WEATHERED		V.F. LAM. FE STAINS ON LAMS	.3	.3	.3	.3
	17	20/50/5"	2.0	16.5 / 17		BL	COAL		LT. GREY SHALE FRAG IN BTM				
S7		24/50/5	.2/			LT GR	SHALE		BLACK, LAMS, V.F., IN SHALE	.3	.3	.3	.3
	19		1.0						DAMP				
S8		50/5"	.6/			LT GR	SHALE		WEATHERED	.3	.3	.3	.3
	21		.6										
S9		50/5"	.4/			BRN GREY	SHALE,		V.F. LAMS. FE STAINED LAMS	.3	.3	.3	.3
	23		.6						WEATHERED				
S10		50/6"	.6/			RD BRN	SHALE		FE STAINED	.3	.3	.3	.3
	25		.6				TD 25.0						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): .3

Remarks: 4 1/4 ID, 8 1/2 OD HSA - WELL DRY ON 11-27-03. WELL ABANDONED ON 11-27-03 BY KNOCKING 5 FT. OF SCREEN OUT, FILLING W/CEMENT/BENT. GROUT, PULLING PVC, CEMENT TOP.

Converted to Well: Yes ✓ No ____ Well I.D. #: 16MWT14

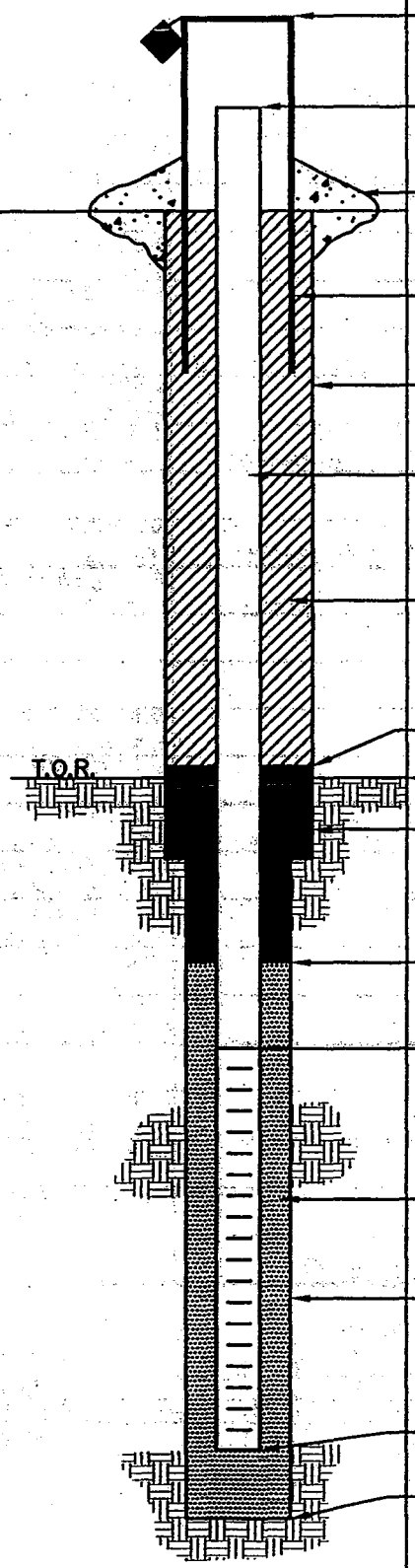
ABANDONED ON 11-27-03

WELL NO.: 16MWT15

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 16	DRILLER JON KEIFER
PROJECT NO. 9060	BORING 16MWT15	DRILLING METHOD ROTO SONIC
DATE BEGUN 11-7-03	DATE COMPLETED 11-9-03	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER/ WATERRA
GROUND ELEVATION 757.73	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 759.77 / 2.1

ELEVATION/HEIGHT TOP OF RISER: 759.69 / 2.0

TYPE OF SURFACE SEAL: CONCRETE 4' x 4' x 6"

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 11"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: SCH. 40 PVC

TYPE OF BACKFILL: BENTONITE "PURE GOLD" CHIPS CETCO. 6" ISOLATION CASING INSTALLED USING CEMENT/BENTONITE GROUT TO 38.5' BGS

ELEVATION/DEPTH TOP OF SEAL: 752.73 / 5'

ELEVATION/DEPTH TOP OF BEDROCK: 750.23 / 7.5'

TYPE OF SEAL: BENTONITE "PURE GOLD" CHIPS CETCO

ELEVATION/DEPTH TOP OF SAND: 679.73 / 78'

ELEVATION/DEPTH TOP OF SCREEN: 676.73 / 81'
TYPE OF SCREEN: PVC SCH. 40
SLOT SIZE x LENGTH: 0.02 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP / 18B

DIAMETER OF HOLE IN BEDROCK: 5"
CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 666.73 / 91
ELEVATION/DEPTH BOTTOM OF SAND: 665.73 / 92'
ELEVATION/DEPTH BOTTOM OF HOLE: 665.73 / 92'
BACKFILL MATERIAL BELOW SAND: NONE

ACAD: FORM_MWINBR.dwg 07/28/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA SONIC

BORING No.: 16MWT15
DATE: 11-7-03
GEOLOGIST: FRED W RAMSER
DRILLER: DENNIS SINKS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
						LT GREY	CLAYEY F-g SAND	SM/SC					
						OLIVE GREY	TR GRAVEL						
									POSSIBLE	8			
	5								FILL MATL.				
						YEL BRN	SILT + F-g SAND w/						
							ROCK FRAG. (SANDSTONE)		LOOKS LIKE REWORKED MATL.				
				TOP OF RK 25'		YEL BRN	SAND STONE		ON TOP OF ROCK				0
					SOFT		WEATHERED						
	10					GREY BLK	SANDSTONE	V.BR	ALT.	12			
						YEL BRN	V. THIN BEDDED		GRADES TO SILTSTONE ~10'				
							TO LAM. FE. STAIN						
S-1		10%				DK GREY LT. GREY							0
					VERY SOFT		CLAY w/ROCK FRAGS	BR	ANGULAR GRA. OF SS + SILTSTONE				
	15												
					VERY SOFT		MUD STONE		STRONGLY WEATHERED				
							W OCC ROCK FRAGS						
			20/10				OF SILTSTONE			14			
					SOFT	DK GREY	CLAYEY SILTSTONE	V.BR					
	20						-LAMS						0
S-2													
		10%			VERY SOFT	DK GREY	MUDSTONE		STRONGLY WEATHERED				
						DK	GREY SILTSTONE	V.BR					0
	25												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: INSTALLED 6" CASING TO 38.5' BGS USING 8" DRILL PIPE ~11" OD.

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT15

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA SONIC

BORING No.: 16MWT15
DATE: 11-7-03
GEOLOGIST: FRED W RAMSER
DRILLER: DENNIS SINKS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
					SOFT	DK GREY	SILTSTONE	V.BR		10			
							V. THIN BEDS TO LAM.						
	28		7/10										0
							COAL						
	30				MED	GREY	SAND STONE	BR		8			
					SOFT	LT GREY	LT. GREY						
							IRREGULAR LAM.		BIOTURB.?				0
S-3		15%					LO & FRAC						
	35						CROSS LAM.			4			
							OCC. VUGS						
							PLANT FOSSILS						
			8/10										
	40												
					SOFT	DK GREY	SANDY SILTSTONE	V.BR					
							ALT DK GREY LT GREY LAM.			2			
							V. THIN BEDDING						
S4		30%			SOFT	MED GREY	MUDSTONE	BL					0
	45												
			7/7							4			
						DK GREY	SILTSTONE	V.BR					
							LAM. TO V. THIN BEDDED						0
	50												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: INSTALLED 6" ISO. CASING TO 38.5' BGS USING 9" PIPE W/ 11" OUTSIDE DIA. INSTALLED PVC 2" WELL USING 9" CORE PIPE 5" OD.

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT15

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA SONIC

BORING No.: 16MWT15
DATE: 11-9-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1					SOFT	DK	GRADING TO A	VBr					
S-5		10%				GRY TO BLK	CLAYEY SILTSTONE			14			
							TO 53'						
						DK GRY	SILTSTONE	V.Br					0
	55						LAM.						
			9/10										
					SOFT	DK	CLAYEY SILTSTONE	V.Br		16			
						GRY	LAM TO V.F						
	60						BEDDING						0
S-6							FISSIL						
		5%								8			
	65						MUDSTONE	Bl					0
			9/10										
					SOFT	DK	CLAYEY SILTSTONE	V.Br		8			
						GRY	LAM.						
	70						FISSIL						
S-7													
		10%								12			
													0
	75												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): –

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT15

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA SONIC

BORING No.: 16MWT 15
DATE: 11-9-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
			1				CLAYEY SILTSTONE	BI					
	77		10 / 10				(MUDSTONE)			21			
						DK	CLAYEY SILTSTONE	V.BR					
						GREY	LAM.						0
	80												
						GREY							
S-8		59%			MED SOFT		SANDY SILTSTONE	V.BR		4.2			
							V.F BEDDING						
							(fg SAND)						
	86												0
						DK GREY	SILTSTONE	BR					
			10							56			
					MED HARD	MED GRY	SANDSTONE	BL					
S-9	90	40%					IRREGULAR LAM						
				TD									
	95												
							SCREEN 81'-91'						
							SAND 78'-92'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): —

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT15

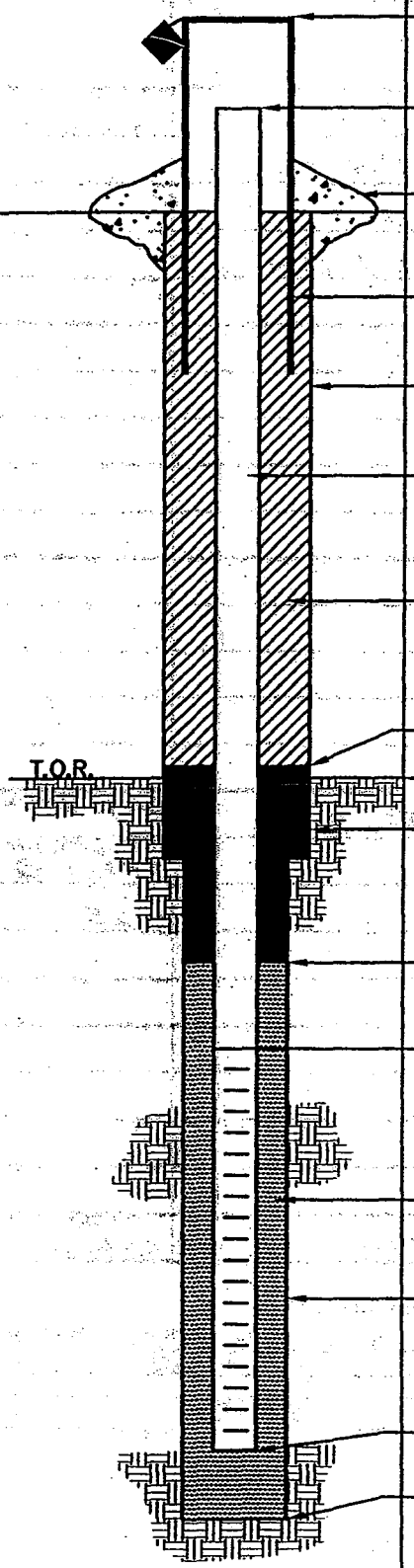
TNN
1111

WELL NO.: 16MWT16

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: CRANE	LOCATION: CRANE IN	DRILLER: BOWSER-MORNER
PROJECT NO.: 90600	BORING: 16MWT16	DRILLING METHOD: HSA/AR
DATE BEGUN: 11-9-03	DATE COMPLETED: 11-9-03	
FIELD GEOLOGIST: M.G. COCHRAN		DEVELOPMENT METHOD: BAILER/LUMTERA
GROUND ELEVATION: 764.98	DATUM: NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: NA / NA
FLUSH MOUNT

ELEVATION/HEIGHT TOP OF RISER: 764.74 (0.24)

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 12" DIA WELL COVER

DIAMETER OF HOLE: 8 1/2" TO 15', 4" TO TD

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC

TYPE OF BACKFILL: PURE GOLD MEDIUM BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 761.98 / 3'

ELEVATION/DEPTH TOP OF BEDROCK: 757.98 / 7'

TYPE OF SEAL: PURE GOLD MEDIUM BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 741.98 / 23

ELEVATION/DEPTH TOP OF SCREEN: 738.98 / 26
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .020 X 10'
I.D. SCREEN: 2 INCHES

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 4"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 728.98 / 36
ELEVATION/DEPTH BOTTOM OF SAND: / 36
ELEVATION/DEPTH BOTTOM OF HOLE: 724.98 / 40
BACKFILL MATERIAL BELOW SAND: PURE GOLD BENTONITE CHIPS

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Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT16
DATE: 11-9-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
0	0						SEE LOG		PET. ODOR - ASPHALT?	-	-	0	0
							16MWT14 FOR						
							MATERIAL						
							DESCRIPTION TO						
	5						15'						
	10												
	15												
					SOFT	LT GR	SILTSTONE		DRY, BROKEN	0	0	0	0
									FE STAINED FRACS @ 18.1				
									& 25'				
C1			6.0/										
5.1/ 10.0		51%	10.0										
				24									
	25				M HARD	RD BRN	SANDSTONE		GRADATIONAL CHANGE				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 8 1/2 OD 4 1/4 ID HSA TO 15', A.R. CORE TO T.D. (NY). HOLE DRY @ 25' AFTER 1 HOUR
MAIT

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT16

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550

BORING No.: 16MWT16
DATE: 11-9-03
GEOLOGIST: M. G. COCHRAN
DRILLER:

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	25				M HARD	LT GREY	SANDSTONE		V. BROKEN, FRACTS. FE STAINED ON FRACS	0	0	0	0
C2			5.6/										
10.0/		10%	10.0										
10									SATURATED @ 32', HIGH 9 FRACS @ 32', RED STAINING ON FRACS @ 30				
	35			35									
C3					M HARD	LT GREY	SHALY SILTSTONE		DRY, BROKEN	0	0	0	0
3.8/		38%	5.0/				SILTSTONE		NOT SHALY LIKE ABOVE				
5.0			5.0	39									
	46		39.2			DK GR	SHALE		COAL @ 39-39.2' MORE MASSIVE THAN ABOVE				
							TD 40'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No ____ Well I.D. #: 16MWT16

WELL NO.: 16MWT17

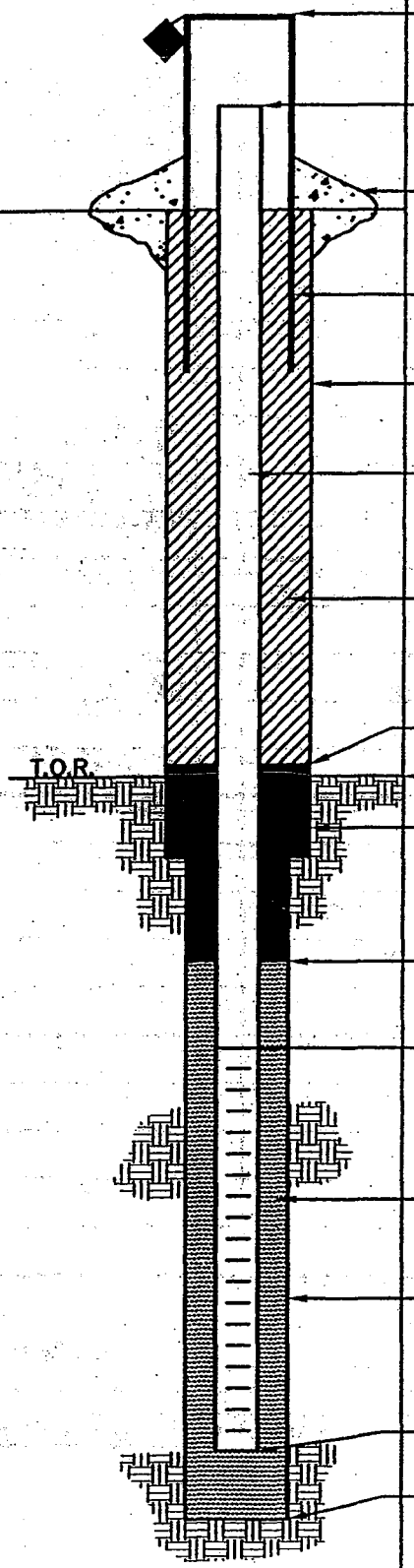
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET WELL INSTALLED IN BEDROCK

PROJECT: CRANE
PROJECT NO.: 9060
DATE BEGUN: 11-8-03
FIELD GEOLOGIST: M.G. COCHRAN
GROUND ELEVATION: 764.79

LOCATION: CRANE IN
BORING: 16MWT17
DATE COMPLETED: 11-8-03
DATUM: NAVD 88

DRILLER: BOWSER-MORNER
DRILLING METHOD: HSA
DEVELOPMENT METHOD: BAILER/SURGE



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 766.54/1.7

ELEVATION/HEIGHT TOP OF RISER: 766.53/1.7

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ. STEEL

DIAMETER OF HOLE: 8 1/2"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCHEDULE 40

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM PELLETS

ELEVATION/DEPTH TOP OF SEAL: 761.79/3

ELEVATION/DEPTH TOP OF BEDROCK: 755.79/9

TYPE OF SEAL: CETCO PURE GOLD MEDIUM PELLETS

ELEVATION/DEPTH TOP OF SAND: 752.79/12

ELEVATION/DEPTH TOP OF SCREEN: 750.79/14
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .020 X 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 8 1/2"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 740.79/24
ELEVATION/DEPTH BOTTOM OF SAND: 740.79/24
ELEVATION/DEPTH BOTTOM OF HOLE: 740.79/24
BACKFILL MATERIAL BELOW SAND: —

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Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 90600
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550

BORING No.: 16MWT17
DATE: 11-8-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
S1		4/10	1.2/		MDENSE	GR	SAND + GRAVEL	SP	FILL, DAMP	0	0	0	0
	2	4/4	2.0						FILL TO				
S2		3/4	1.6/		LOOSE	DK ORN	CLAYEY SILT	SM	FILL, DAMP. SS FRAG+BRICK	0	0	0	0
	4	3/5	2.0						IN SPOON, GREY MOTTLING				
S3		2/2	.4/		V. LOOSE	DK BRN	SILTY CLAY	SM	GREY MOTTLING, FILL	0	0	0	0
	6	2/2	2.0										
S4		2/5	.9/		LOOSE	DK BR	SILT,		RED-BR SS FRAG IN BTM	0	0	0	0
	8	18/27	2.0	8.0									
S5		11/15	.9/	9.0	V DENSE	GR	SILT		DAMP, LOOKS NAT.	0	0	0	0
	10	50/5"	1.4										
S6		50/5"	.3/		VI	RD BRN	SANDSTONE		FE STAINED	.6	0	.6	0
	12		.4										
S7		50/1"	.1/			RD BRN	SANDSTONE			.6	.6	.6	.0
	14		.1										
S8		50/1/2"	.1/			GR BR	SANDSTONE			1.3	1.3	1.3	1.3
	16		.2										
S9		11/15	.6/			GR	SANDSTONE		WEATHERED, SAT IN 4 IMA ZONE,	3.8	1.3	1.3	1.3
	18	50/3"	1.3						BLACK STREAKS IN SPL				
S10		50/1.5	.3/			RD	SANDSTONE		SHALY, FE STAINED	.9	.9	.9	.9
	20		.5						SAT. ALONG SPOON				
S11		50/1.3	.2/			GR	SHALE		V.F LAMS IN WHITE DAMP	0	0	0	0
	22		.3										
S12		50/.3	.3/			GR	SHALE		V F LAMS IN WHITE	0	0	0	0
	24		.3				TD 24'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: PID DRIFT IN MEAS.

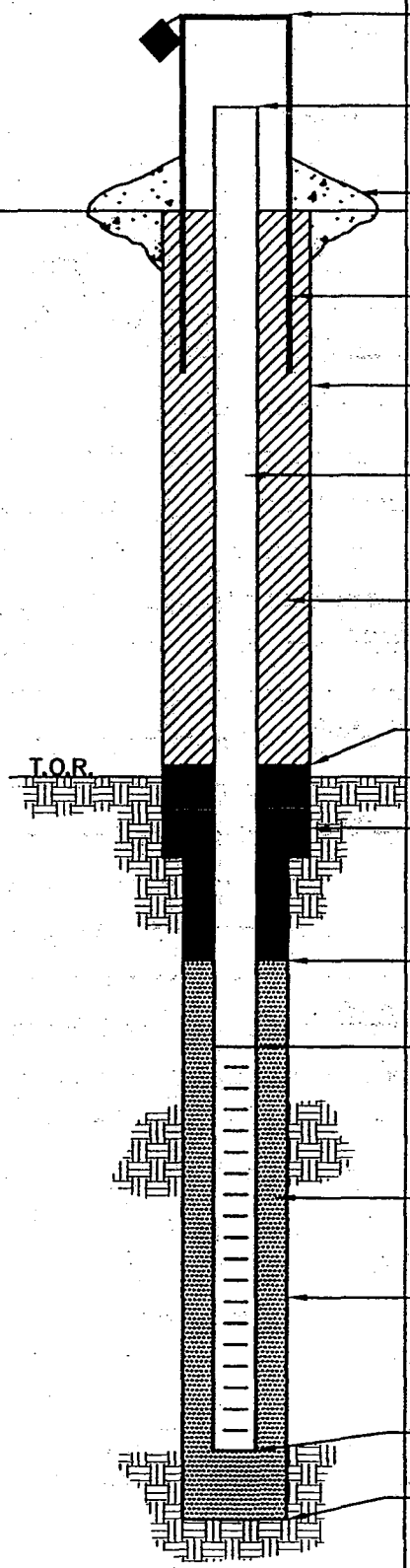
Converted to Well: Yes ✓ No ____ Well I.D. #: 16MWT17

WELL NO.: 16MWT18

Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET WELL INSTALLED IN BEDROCK

PROJECT NSWC CRANE	LOCATION SWMU 16	DRILLER JOE McCLOUD
PROJECT NO.	BORING 16MWT18	DRILLING METHOD ROTO-SONIC
DATE BEGUN 1-16-04	DATE COMPLETED 1-18-04	
FIELD GEOLOGIST FRED W RAMSER		DEVELOPMENT METHOD BAILER/WATERA
GROUND ELEVATION 764.99	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: NA / NA
FLUSH MT. COMPLETION

ELEVATION/HEIGHT TOP OF RISER: 764.44 (0.55)

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 6"
(ISOLATION CASING TO 40' BGS)

DIAMETER OF HOLE: 11"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCH 40

TYPE OF BACKFILL: BENTONITE CHIPS
"PURE GOLD" GEL.
ISOLATION CASING GROUT BENT/CEMENT SLURRY

ELEVATION/DEPTH TOP OF SEAL: 762.79 / 2'

ELEVATION/DEPTH TOP OF BEDROCK: 756.79 / 8'

TYPE OF SEAL: BENTONITE CHIPS
"PURE GOLD" GEL

ELEVATION/DEPTH TOP OF SAND: 673.79 / 91

ELEVATION/DEPTH TOP OF SCREEN: 670.79 / 94
TYPE OF SCREEN: PVC SCH 40
SLOT SIZE x LENGTH: 0.020 x 10
I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL QTZ SAND
17E' 10/20 MED/COARSE SAND

DIAMETER OF HOLE IN BEDROCK: 5"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 660.79 / 10
ELEVATION/DEPTH BOTTOM OF SAND: 659.79 / 105
ELEVATION/DEPTH BOTTOM OF HOLE: 659.79 / 105
BACKFILL MATERIAL BELOW SAND: NONE

ACAD:FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 16MWT18
DATE: 1-18-04
GEOLOGIST: FRED W RAMSED
DRILLER: JOE McCLOUD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
						GREY	~40' GROUT.		SEE WELL LOG				
					MED HARD	MED GREY	SILTY SANDSTONE	BR	16MWT16	1.2			
									FOR LITHOLOGIC DETAILS 0'-40'			0	
								V.BR					
S-1	45	5%			MED SOFT	DK GREY	MUD STONE			8			
							POORLY BEDDED					0	
					SOFT					1.5			
	50		10/10									0	
					MED SOFT		DK GREY SHALE	V.BR	V.F. LAMINATION				
							POOR REC.			1.5		0	
							* DIFFICULTIES						
							EXTRACTING			2.0		0	
S-2	55	5%					CORE MUCH						
							OF CORE WENT						
							INTO MUD						
							PAN LOOKED						0
							GREY/DK SHALE						
	60		3/10										
							AS ABOVE	V.BR					
							60-65						
							MUD STONE			52*			0
							POORLY LAM.						
S-3	65	0%											

* When rock coring, enter rock brokeness.

** Include monitor reading in 6-foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: * HIGH PID MAYBE DUE TO HIGH MOISTURE CONTENT. AND HEATED CORE CASING STEAM. NO ODDERS NOTICED
SONIC DRILLING BEYOND CASING 4½ DRILL PIPE = 5" HOLE

Converted to Well: Yes ✓ No ____ Well I.D. #: 16MWT18

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER/MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 16MWT18
DATE: 1-18-04
GEOLOGIST: FRED WRAMSER
DRILLER: JOE McCLOUD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sample BZ	Borehole**	Driller BZ**
	65				MED SOFT	DK GREY	SHALE	V.BR					
							(SILT STONE)			12			
													0
	70		10/10										
					MED HARD	LT GREY	SILTY SAND STONE	BR					
							- POORLY LAMINATED			12			
							- V.F. BEDDED						0
S-4	75	10/0			MED SOFT	MED GREY	MUD STONE	V.BR		14			
						TO DK GREY	MORE SILT THAN CLAY						
					SOFT	BLK	SHALE (CLAY STONE)	V.BR					0
							V.F. LAMINATIONS			20			
	80		10/10										
						BLK	SHALE	V.BR					
										21			0
					SOFT	DK GREY	MUDSTONE	BR					
S-5		6/0											
										14			
			5.0/8										0
	90				MED SOFT	DK GREY	SANDY SILTSTONE THIN LAMINATE	V.BR					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ~

Remarks: PHOTO LOG: #544 40' - 70'
545 70 - 105

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT18

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER/MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 16MWT 18
DATE: 1-18-04
GEOLOGIST: FRED WRAMSER
DRILLER: JOE McCLOUD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	90												
					MED SOFT	MED GREY	SANDY SILTSTONE	V.BT		12			
							LAMINATIONS					0	0
S6	95	0%					SANDY SILTSTONE			20			
							GRADES TO SILTY SANDSTONE VUGS						
			10/10				IRR LAM			22		0	0
					MED HARD								
	100												
					SOFT	BLK	COAL SEAM					0	0
S7		0%								4			
						WHT LT GREY GREY	CLAYEY SILTSTONE						
	101						TR c-g SAND					0	0
	105		10/10				SANDSTONE						
							SCREEN 94-104						
							SAND 91 — 105						
							BENTONITE 2' - 91'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): –

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT 18

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 16SB47
DATE: 12/5/03
GEOLOGIST: S. CRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density (Consistency) or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ*
	0					GR	GRAVEL + SANDY LOAM		Road Fill (Modified)				
						H.Br/G	SILTY CLAY W/ some GRAVEL + ORGANIC MTRL		Standing water in hole				
X	5												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 16SB48
DATE: ~~SWMU-16~~ 12/5/07
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ*
	0	0											
						Gr	SANDY LOAM + GRAVEL						
							SILTY CLAY W/ SOME GRAVEL + ORGANIC MATL		WATER STANDING IN HOLE				
	3												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 16SB49
DATE: 12/5/03
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample Bz	Ecobore	Drill Bz
	0					GR	GRAVEL + SANDY LOAM		SLIGHTLY MOIST				
						Lt. Br.	SILTY CLAY W/ GRAVEL + ORGANICS		WET + COHESIVE				
	5					Lt. Br.							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes _____ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 16 SB 50
DATE: 12/5/07
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0					Gr	GRAVEL + SANDY LOAM						
						Lt Br	SILTY CLAY W/ GRAVEL + ORGANIC MATRL		MOIST + COHESIVE				
	3												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

APPENDIX B.1.3
SWMU 16
BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS
ROUND 3

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-16
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT19
DATE: 7-28-04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Borehole BZ
S-1 @	0	3/4	2/2		M STIFF	GRAY BRN	4" TOPSOIL CLAYEY SILT - TR ROOTS	ML	MOIST	0			
1313	2	5/3				MOTTLED				0			
S-2 @		8/9	2/2			GRAY BRN	SILTY CLAY - CLAYEY SILT - TR ROOTS	ML	MOIST	0			
1315	4	10/10								0			
S-3 @		5/7	2/2	5	STIFF		CLAYEY SILT/	ML	MOIST	0			
1320	6	10/9					SILTY CLAY			0			
S-4 @		7/9	2/2		STIFF		SILTY CLAY/CLAYEY	CL/	MOIST	0			
1324	8	9/11		8'			SILT	ML		0			
S-5 @		3/5	1.8/2		M STIFF	BRN	CLAYEY SILT - TR SAND AND ROCKFRAGS	CL/	MOIST → WET	0			
1330	10	11/10		10'				ML	BOTTOM OF SHOE	0			
S-6 @		20/16	1.5/2		M DENSE	ORANGE BRN	SILTY SAND - TR CLAY AND ROCK FRAGS	SM	WAS WET - FEW SANDSTONE	0			
1336	12	13/13							PCS IN S-5 MOIST → WET	0			
S-7 @		8/10	1.6/2		DENSE	TO		SM	MOIST	0			
1342	14	16/22				BRN				0			
S-8 @		13/23		15'						0			
1348	15.5 / 1.0	50/5		15.5	M SOFT	GRAY	SHALE	VER.	DRY	0			
				16'									
							HSA TO 16'		NOT MUCH WATER AS YET 1400 HR WILL WAIT TO SEE IF HOLE MAKES WATER.				
							WELL 5-15						
							SAND 4-15.5		2.5' WATER @ 1430 DECIDE				
							CHIPS 2-4		TO SET WELL				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

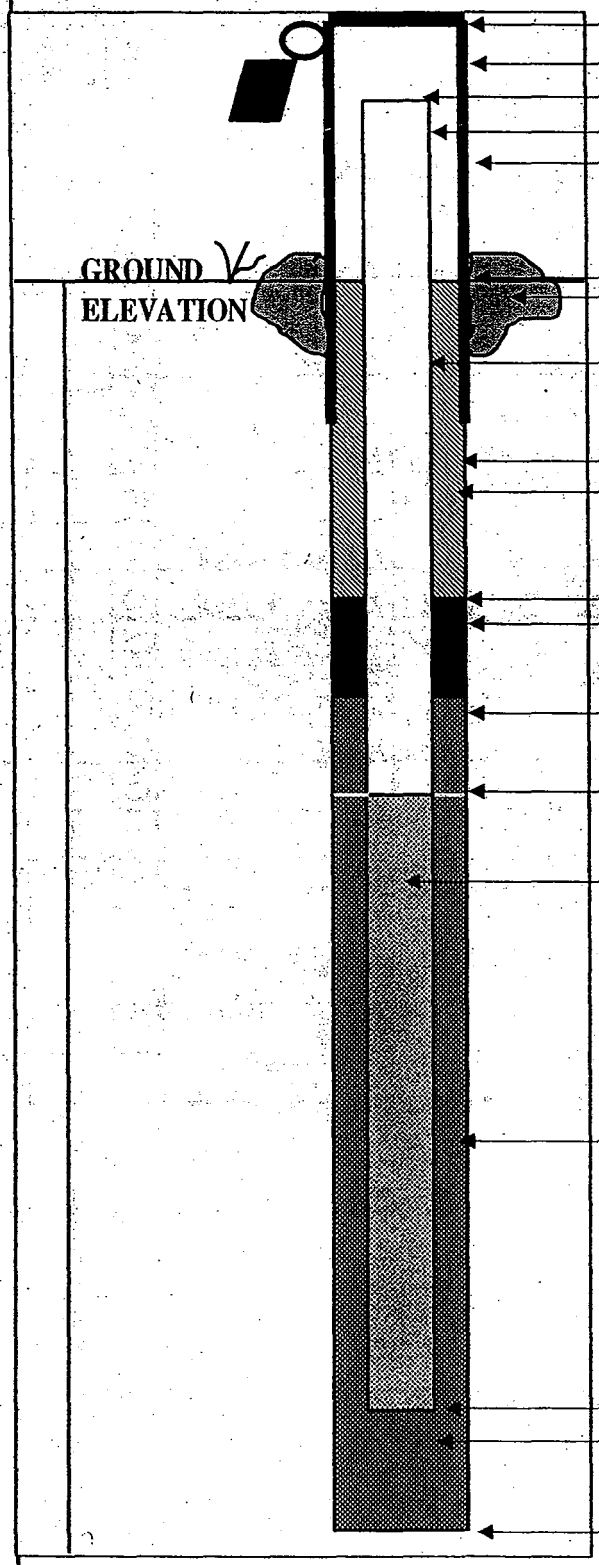
Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: 16MWT19

BORING NO.: 16MWT19

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	16MWT19
PROJECT No.:	N7448	DRILLER:	WALSH	DATE COMPLETED:	7/28/04
SITE:	16	DRILLING METHOD:	HSA	NORTHING:	1320172.28
GEOLOGIST:	CONTI	DEV. METHOD:		EASTING:	3033846.62



ELEVATION OF TOP OF SURFACE CASING: NA

STICK-UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 609.31

RISER STICK-UP ABOVE GROUND SURFACE: NA

I.D. OF SURFACE CASING:

TYPE OF SURFACE CASING: STEEL

GROUND ELEVATION: 606.73

TYPE OF SURFACE SEAL: CONCRETE PAD

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8 1/2"

TYPE OF SEAL: CONCRETE PAD

ELEVATION / DEPTH OF SEAL: 604.73/2

TYPE OF SEAL: BENTONITE CHIPS

ELEVATION / DEPTH TOP OF FILTER PACK: 602.73/4

ELEVATION / DEPTH TOP OF SCREEN: 601.73/5

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 20 SL x 10'

I.D. OF SCREEN: 2" Φ

TYPE OF FILTER PACK: GLOBAL #5 FILTER PACK

ELEVATION / DEPTH BOTTOM OF SCREEN: 591.73/15

ELEVATION / DEPTH BOTTOM OF FILTER PACK: 591.23/15.5

TYPE OF BACKFILL BELOW WELL: QUARTZ SAND

ELEVATION / DEPTH OF BOREHOLE: 590.73/16

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-16
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT20
DATE: 7-28-04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sample BZ**	Borehole	Drillers BZ**
S-1 e	0	0/2	1.5/2		SOFT	BRN	SILTY CLAY - TR ROOTS	CL	MOIST → WET	0			
1010	2	1/2				MOTTLD	TR ROCK FRG TR ROOTS			0			
S-2 e		2/5	1.5/2	3	M STIFF	GRAY BRN				0			
1015	4	11/7				YELLOW BRN	CLAYEY SILT - TR	CL	MOIST → WET	0			
S-3 e		2/3	1.6/2	5		MOTTLD	SAND TR ROCK FRAG	ML		0			
1020	6	6/6			M STIFF	YELLOW GRAY	CLAYEY SILT - TR SAND	ML	MOIST → WET	0			
S-4 e		6/8	1.6/2			BRN MOTTLD	TR ROCK FRAG			0			
1025 S-5	8	8/10			M STIFF	ORANGE GRAY	CLAYEY SILT - TR	ML	MOIST	0			
e 1030		3/14	1.5/2	9		BRN	SAND ROCK FRAG IN SHOE		PC TAN SANDSTONE AT ≈ 9.0'	0			
	10	9/12		▼	SOFT S	BRN	SILTY CLAY - TR ROCK FRAG	CL	MOIST ↓ WET SPOON WAS WET	0			
S-6 e		14/6	1.4/2	11						0			
1035	12	11/18			STIFF	GRAY BRN	CLAYEY SILT - TR. ROCK FRAGS		10-12	0			
S-7 e		7/21	.5/2				CLAY - TR ROCK FRAG		POOR REC - WET	0			
1041	14	44/50/5								0			
S-8 e		11/39	1.8/2	14.5 15	M SOFT	GRAY	SHALE	NRP		0			
1055	16	55/39							WL ≈ 12' BGS AT 1200				
				TD 16			WELL 5-15						
							SAND 4-15.5						
							CHIPS 2-4						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: HSA 4¼" ID - AUTO HAMMER - NO TEMP CASING.

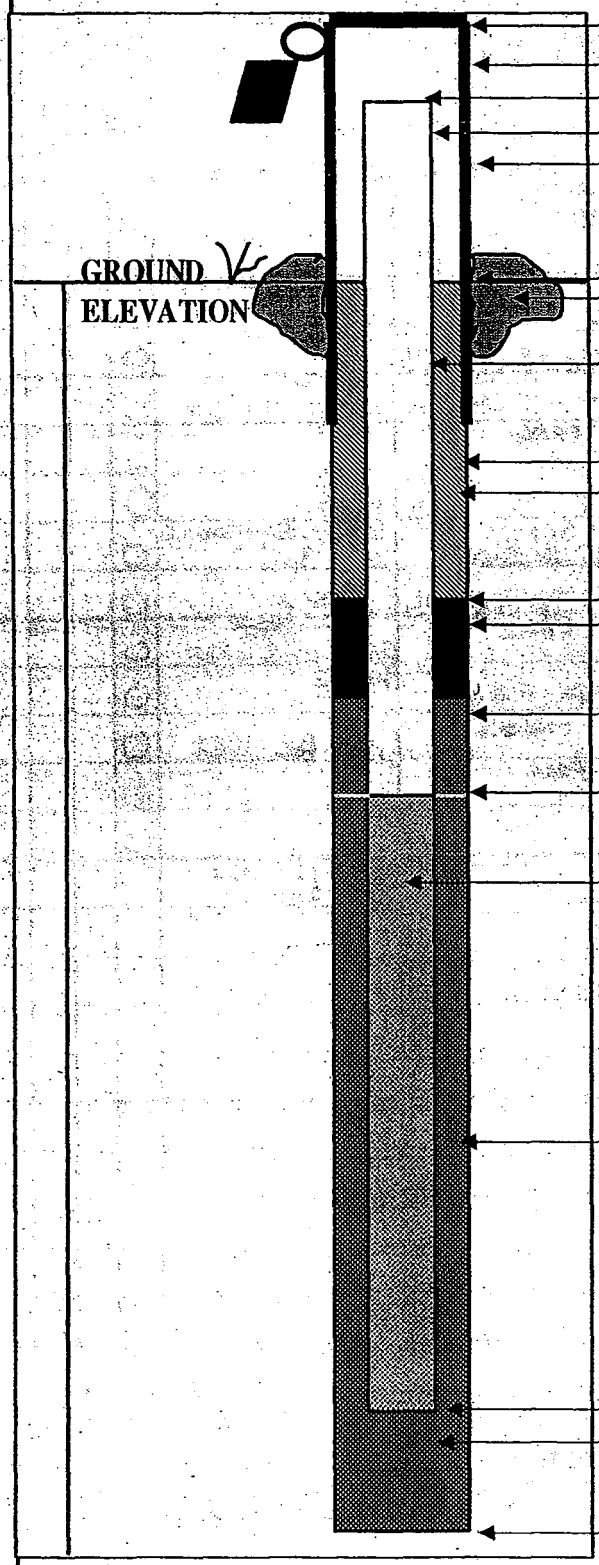
Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: 16MWT20

BORING NO.: 16MWT20

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	16MWT20
PROJECT No.:	N7448	DRILLER:	WALSH	DATE COMPLETED:	7-28-04
SITE:	16	DRILLING METHOD:	HSA	NORTHING:	1320532.68
GEOLOGIST:	CONTI	DEV. METHOD:		EASTING:	3034030.68



ELEVATION OF TOP OF SURFACE CASING: NA

STICK-UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 609.93

RISER STICK-UP ABOVE GROUND SURFACE: NA

I.D. OF SURFACE CASING:

TYPE OF SURFACE CASING: STEEL

GROUND ELEVATION: 607.43

TYPE OF SURFACE SEAL: CONCRETE PAD

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8 1/2

TYPE OF SEAL: CONCRETE PAD

ELEVATION / DEPTH OF SEAL: 605.43 / 2

TYPE OF SEAL: BENTONITE CHIPS

ELEVATION / DEPTH TOP OF FILTER PACK: 603.43 / 4

ELEVATION / DEPTH TOP OF SCREEN: 602.43 / 5

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 20SL X 10'

I.D. OF SCREEN: 2"

TYPE OF FILTER PACK: #5 QUARTZ
GLOBAL FILTER PACK

ELEVATION / DEPTH BOTTOM OF SCREEN: 592.43 / 15

ELEVATION / DEPTH BOTTOM OF FILTER PACK: 591.93 / 15.5

TYPE OF BACKFILL BELOW WELL: QUARTZ SAND

ELEVATION / DEPTH OF BOREHOLE: 591.43 / 16

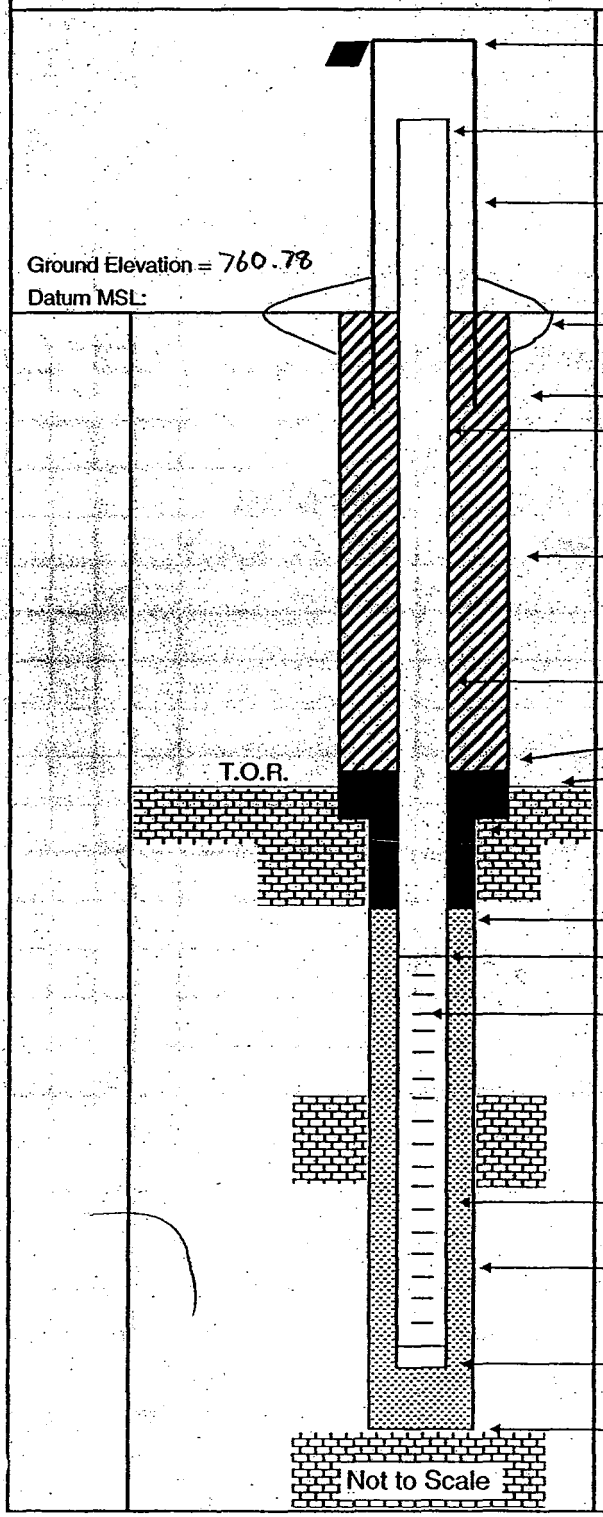
Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET

WELL No.: 16MWT21

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER-MORNER	BORING No.:	16MWT21
PROJECT No.:	N7448	DRILLER:	WALSH	DATE COMPLETED:	9-9-04
SITE:	SWMU-16	DRILLING METHOD:	HSA/ROT	NORTHING:	1320581.35
GEOLOGIST:	CONTI	DEV. METHOD:		EASTING:	3032960.08



Elevation of Top of Casing: NA

Stick Up of Casing Above Ground Surface: NA

Elevation of Top of Riser: 763.05

I.D. of Surface Casing:

Type of Surface Casing: steel

Type of Surface Seal: 6"Φ

I.D. and Depth of Permanent Casing: (if applicable) BGS 49'

I.D. of Riser: 2"

Type of Riser: PVC

Borehole Diameter: ≈ 10"

Type of Backfill: CEMENT/BENT GROUT

Elevation / Depth Top of Seal: 690.78 / ≈ 70'

Elevation / Depth Top of Bedrock: 755.78 / ≈ 5'

Type of Seal: BENTONITE CHIPS

Elevation / Depth of Top of Fine Sand: NA / NA

Elevation / Depth of Top of Filter Pack: 683.78 / 77

Elevation / Depth of Top of Screen: 680.78 / 80

Type of Screen: PVC

Slot Size x Length: 20 X 15

I.D. of Screen: 2"

Type of Filter Pack: GLOBAL #5

Diameter of Hole in Bedrock: Core / Ream: 5½"

Elevation / Depth of Bottom of Screen: 665.78 / 95

Elevation / Total Depth of Borehole: 664.78 / 96

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-16
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV.

BORING No.: 16MWT21
DATE: 8/17/04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample Pt.	Sample BZ	Borehole	Borehole BZ
	0						DEEP WELL NEXT				0		
							TO 16MW04 AKA -		WES WELL.				
							DRILL W/6¼" HSA		SET 8" TO				
	5						TO MAKE HOLE FOR				0		
							TEMP 8" CASING.						
							REAM W/ 8" BIT		SET 6" TO				
							TO 49 BGS		49' (1' S.U.)				
	10										0		
	15										0		
	20						SANDSTONE				0		
	25										0		

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: See-Above

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT21

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-16
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16 MWT 21
DATE: 8/17/04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample B/Z	Ex Probe	Driller B/Z
	25												
							SANDSTONE			0			
	30									0			
	35						SHALY SANDSTONE		HIT SOME WATER ≈ 35'±	0			
	40									0			
	45						MORE SHALE. (SANDY)			0			
	50									0			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT21

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-16
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT21
DATE: 9-9-04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ**	Borehole**	Driller BZ**
		50		50									
9/9				51	M HARD	GRAY	SANDSTONE	BR	SEVERAL	0	0		
					M SOFT		SHALE		BEDDING PLANE BREAKS IN				
									SHALE NOT MUCH WATER				
1.8/7	1	26%	7/7						NOTED				
									RUN 2 SAME		0		
									AS 1 SHALE				
	57								SEVERAL BEDDING				
0910									PLANE BREAKS				
									NOT MUCH WATER				
											0		
3.6/10	2	36	10/10										
								BR			0		
0910	67												
									RUN 3 SIMILAR				
									TO RUN 2				
											0		
									72.9 → 73.4				
2.3/10	3	22%	10/10	72.9									
				73.4	M HARD	GRAY	SILTSTONE SEAM		*.5'				
							SHALE				0		

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT21

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-16
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 16MWT21
DATE: 9-9-04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soft Density Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sample BZ	Borehole BZ	Drill Site BZ
	75												
					M SOFT	GRAY	SHALE - SILTY	BR			0		
1030	77			77'±				VBR	BECOMES CARBONACEOUS				
1045					M HARD	GRAY	FINE GR SANDSTONE		≈ 76→77 - POSSIBLE COAL				
							(SILTY) TR CLAY @ 77'	BR	NEAR ?				
				80					SOME H2O NOTICED WHILE		0		
				80-87									
					M	GRAY	DEC 78.3 LO 4JNT		CORING RUN (4) ≈ 77 - 78'				
2.5/10	(4)	25%	5.4/10		SOFT		SILTSTONE (VBR) 79.1 HARD	(VBR)	H1 4JNT @ 80' W/ H2O				
									POOR REC - NOT SURE WHERE CORE WAS LOST		0		
									PROB. BELOW 80'				
1120	87			87±					HIGH VOL H2O				
1230					M SOFT TO	GRAY	SILTY SHALE/ SHALY SILTSTONE		IN HOLE WHEN STARTING RUN (5) ≈ 20' PER DRILLER				
					M HARD						0		
									SEVERAL BEDDING				
1.4/10	(5)	14%	10/10						PLANE BREAKS TR WATER.				
											0		
				95									
1315	97												
				BOTM @ 97									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: REAM TO 96' W/ 5 1/2" Φ

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: 16MWT21

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16SB51
DATE: 8/13/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						GRASS COVER						
1	1		4'		STIFF	BRN	TOPSOIL (Ø-2") SANDY CLAY	CL		Ø.6	Ø	Ø	Ø
	2				"	ORG. BRN/ PUR. GRAY	CLAY	CL		Ø.6			
	3				"	"	"	CL		Ø.6			
	4				"	LT. ORG. BRN	SILTSTONE	RX		Ø.6			
	5		2				REFUSAL						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS51Ø1Ø2 collected @ 1Ø3Ø
16SB51Ø2Ø4 collected @ MIDPOINT @ 1Ø33

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16SB52
DATE: 8/12/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Gravel Cover						
1	1		4.5'		Stiff	ORG BRN	Gravel SAND (0-6") SANDY CLAY		} GP-CL	Ø	Ø	Ø	Ø
	2				"	"	SANDY CLAY	CL		Ø			
	3				Loose	Lt. Red. BRN	Very Fine SAND w/ Some compacted SAND Lenses		} SP	Ø.7			
	4				Loose	"	" "	SP		Ø.7			
	5				Stiff	"	" " REFUSAL	SP		Ø.7			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø.Ø

Remarks: 16SS52Ø1Ø2 collected @ 1515
16SB52Ø2Ø5 collected @ 1520

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SBS3
DATE: 8/12/Ø4
GEOLOGIST: Charles C. Lawey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Gravel Cover						
1	1		5'		Loose	Gray	Gravelly SAND (0-6")		GP-ML	Ø	Ø	Ø	Ø
					"	Brn	SILT.						
	2				"	"	"		ML-CL	Ø			
					Stiff	Org-Brn	CLAY						
	3				"	"	"	CL		Ø.3			
	4				Loose	Org Brn Gray	"		CL-SM	Ø3			
							Silty SAND, compacted						
	5				"	Dark Org-Brn	SAND Lenses, Tr. CLAY.		SM-~~RX~~	Ø3			
					Stiff		SANDSTONE						
2	6		Ø		←		REFUSAL		→				
	7												
	8												
	9												
	1Ø												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS53 Ø1Ø2 collected @ 1528
16SB53 Ø2Ø5 collected @ 1531

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16SB54
DATE: Ø8/13/Ø4
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Gravel Cover						
1	1		5'		Stiff	GRAY / ORG BRN	Gravel SAND (0-6") / SANDY CLAY		GP-CL	Ø.6	Ø	Ø	Ø
	2				"	ORG BRN MOT. GRAY	CLAY	CL		1.3			
	3				"	"	CLAY	CL		1.1			
	4				"	LT. ORG BRN	CLAY w/ Compacted Sand Lenses & SILT	CL		1.1			
	5				"	ORG BRN	SILTSTONE	RX		1.1			
							REFUSAL						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS54Ø1Ø2 collected @ 1ØSØ
16SB54Ø2ØS collected @ MIDPOINT along w/ MS/MSD @ 1ØS9

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 6
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB55
DATE: 8/12/Ø4
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Gravel Cover						
1	1		4'		Stiff	ORG BRN	Gravelly SAND (0-6") CLAY	CL		Ø.3	Ø	Ø	Ø
	2				Stiff	"	"	CL		Ø.3			
	3				"	BRN	Silty CLAY	CL		Ø.6			
	4				Loose	Lt. ORG BRN	Silty SAND w/ compacted SAND lenses, trace CLAY	SM		Ø.6			
	5				←		No Recovery	→		—			
2	6		2'		Loose	Lt. ORG BRN	SILT w/ some compacted SAND lenses	ML		Ø.7			
	7				"	"	" "	ML		Ø.7			
	8				←		REFUSAL	→		—			
	9												
	1Ø												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS55Ø1Ø2 collected @ 1545
16SB55Ø2Ø6 collected @ 1548
16SB55Ø6Ø7 collected @ 1555

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16 SB 56
DATE: 8/12/Ø4
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Gravel Cover						
1	1		5'		Loose	org BRN	Gravelly SAND (Ø-6") SANDY CLAY	GP-CL		Ø.4	Ø	Ø	Ø
	2				Stiff	BRN	" "	CL		Ø.4			
	3				"	"	" "	CL		Ø.4			
	4				"	"	SILTY CLAY	CL		Ø.4			
	5				"	BRN	SILTY CLAY w/ some Red Rocks.	CL		Ø.4			
2	6		3'		"	org BRN	SANDY CLAY	CL		8.2			
	7				"	"	" "	CL		8.2			
	8				"	lt. org BRN	Silty SAND w/ some Compacted SAND Lenses	SM		4.2			
	9				←		REFUSAL		→				
	1Ø												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS56 Ø1Ø2 collected @ 16ØØ
16SB56 Ø2Ø6 collected @ MIDPOINT @ 16Ø3
16SB56 Ø6Ø8 collected @ MIDPOINT @ 16Ø5

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB57
DATE: 8/13/04
GEOLOGIST: CHARLES C. LANEY III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		5'		Stiff	Brn	Topsoil (0-2"). Clayey Sand	SC		0.6	0	0	0
	2				"	Lt. orange Brown not clay	Clayey Sand w/ Some Black colored organic matter	SC		0.9			
	3				"	"	" "	SC-CL		0.3			
					"	"	Clay						
	4				"	"	"	CL		0.3			
	5				"	Dark orange Brn.	Silt w/ compacted Sand lenses + Black colored	ML	organic matter	0.3			
2	6		1'		"	"	Siltstone		RX	0.3	0	0	0
	7						Refusal						
	8												
	9												
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SS570102 collected @ 1010
16SB570206 collected @ midpoint @ 1013

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB58
DATE: 8/13/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Grass Cover						
1	1		5'		Stiff	Lt. Brn	Topsoil (Ø-2") Sandy Clay w/Some Roots	CL		Ø	Ø	Ø	Ø
	2				"	Org. Brn. Not. Gray	Sandy Clay	CL		Ø			
	3				"	"	Silty Clay	CL		1.1			
	4				"	"	" "	CL		1.1			
	5				"	"	Silt w/Some Sand & Some Black colored organic matter.	ML		1.1			
2	6		2'		Loose	Lt. Org Brn	Silt	ML		1.6			
	7				Stiff	Lt. Gray Not. Org. Brn	Siltstone	RX		1.6			
	8						REFUSAL						
	9												
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SSS8Ø1Ø2 collected @ Ø939
16SB58Ø2Ø6 collected from mid point @ Ø941 along w/ DUP 16FD8813Ø4-Ø1
16SB58Ø6Ø7 collected from mid point @ 1Ø01

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB59
DATE: 8/13/04
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover w/Gravels						
1	1		5'		Loose	Brn	Sandy CLAY w/ Gravels	CL		1.5	0	0	0
	2				"	Lt. Brn	" "	CL		1.0			
	3				Stiff	Lt. Gray Med. Brn	Silty CLAY w/some SAND, SOFT.	CL		1.4			
	4				"	"	" "	CL		1.4			
	5				"	"	SILT, w/trace SAND.	ML		1.4			
2	6		2.5'			"	SILT w/trace SAND & Some Gravels	ML		1.4	0	0	0
	7					"	" "	ML		1.4			
	8				Stiff	"	SILT STONE		→ RX	1.4			
					←		REFUSAL	→					
	9									–			
	10									–			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SS59 0102 collected @ 0846
16SB59 0206 collected from midpoint @ 0851
16SB59 0608 collected from midpoint @ 0900.

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16SB6Ø
DATE: 8/11/Ø4
GEOLOGIST: CHARLES C. LANCY III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ
	Ø						Asphalt Paved Cover						
1	1		5'		STIFF	OLIVE GRAY	Asphalt (Ø-6") Gravel SAND (6-8"); SILTY CLAY	GP-CL		Ø	Ø	Ø	Ø
	2				"	OLIVE GRAY MOT. ORG-BRN	CLAY	CL		Ø			
	3				"	"	"	CL		Ø			
	4				"	"	"	CL		Ø			
	5				LOOSE	BRN	SILTY CLAY	CL		Ø			
2	6		4'		MEDIUM	"	"	CL		Ø	Ø	Ø	Ø
	7				"	ORG-BRN MOT. GRAY	"	CL		Ø			
	8				"	"	"	CL		Ø			
	9				"	"	"		CL-RX	Ø			
					STIFF	ORG-BRN	SANDSTONE						
	1Ø						REFUSAL						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SB6ØØ1Ø2 collected @ 16Ø5
16SB6ØØ2Ø6 collected FROM MIDPOINT @ 1616
16SB6ØØ4Ø9 collected FROM MIDPOINT @ 1622

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU16
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB61
DATE: 8/11/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample Cut**	Sample Air**	Drilling Air**
	0						Asphalt Paved Cover						
1	1		5'		Loose	Gray	Asphalt (0-6") Gravelly SAND (6"-1')	GP		0	0	0	0
	2				Stiff	Orb. Brn. Mott. Gray	CLAY.	CL		0			
	3				"	BRN	"	CL		0			
	4				"	"	"	CL		0			
	5				Medium Stiff	BRN	Silty CLAY	CL		0			
2	6		2'		Loose	"	"	CL		0	0	0	0
	7				"	"	"		CL-RX	0			
					Hard	Orb. Brn	SANDSTONE						
	8						REFUSAL						
	9												
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SB61 0102 collected @ 1537
16SB61 0206 collected @ MIDPOINT @ 1545
16SB61 0607 collected @ MIDPOINT @ 1550

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB62
DATE: 8/13/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover w/Gravels						
1	1		4'		Loose	BRN	Sandy CLAY w/Gravels	CL		0	0	0	0
	2				Stiff	ORG BRN MOT. GRAY	Sandy CLAY, Soft.	CL		0			
	3				"	"	Silty CLAY w/some SAND, Soft	CL		0.6			
	4				"	"	" "	CL		0.6			
	5				←		No RECOVERY		→				
2	6		2'		Stiff	ORG BRN MOT. GRAY	SILTY CLAY	CL		0.6			
	7				"	DRK ORG BRN	SILTSTONE w/ large Red Rocks	RX		0.6			
	8				←		REFUSAL		→				
	9												
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SS62010 2 collected @ 0912
16SB62 0206 collected from midpoint @ 0917
16SB62 0607 collected from midpoint @ 0923

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16 SB63
DATE: 8/11/Ø4
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample**	Sample BZ**	Borehole**	Drill BZ**
	Ø						Grass Cover						
1	1		5'		STIFF	ORG. BRN	Topsoil (0-2") · SANDY CLAY	CL		Ø	Ø	Ø	Ø
	2				"	ORG. BRN MOTTLED GRAY	Sandy CLAY	CL		Ø			
	3				"	"	CLAY	CL		Ø			
	4				"	"	CLAY	CL		Ø			
	5				"	"	Silty CLAY	CL		Ø			
2	6		3'		"	BRN MOT. GRAY	" "	CL		Ø	Ø	Ø	Ø
	7				Hard	ORG. BRN. MOT. GRAY	CLAY	CL		Ø			
	8				"	"	"		CL-RX	Ø			
					"		SAND STONE						
	9						REFUSAL						
	1Ø												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SB63Ø1Ø2 collected @ 1456
16SB63Ø2Ø6 collected @ MIDPOINT @ 15Ø8
16SB63Ø6Ø8 collected @ MIDPOINT @ 1517

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB64
DATE: 8/11/04
GEOLOGIST: Charles C. Lanier III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample**	Sample BZ	Background**	Drilling Area
	0						Grass Cover						
1	1		5'		Stiff	Brn	Topsoil (0-2"). Sandy Clay	CL		0	0	0	0
	2				"	Org-Brn, Mt. Gray	Silty Sand w/ some Clay & Gravels	SM		0			
	3				"	Brn Mot. Gray	Clay.	CL		0			
	4				"	"	"	CL		0			
	5				"	"	"	CL		0			
2	6		3.5'		"	Brn Mot. Org-Brn	Silty Clay	CL		0	0	0	0
	7				"	"	" "	CL		0			
	8				Loose	Org-Brn	Sand w/ Sand Compacted layers	RX		0			
	9				Tight	Light Brn	Compacted Sand (Sandstone)	RX		0			
							Refusal						
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 16SB64010 collected @ 1423
16SB64020 collected @ midpoint @ 1435
16SB64060 collected @ midpoint @ 1441

Background (ppm): 0.0

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB65
DATE: 8/11/04
GEOLOGIST: Charles C. Lanzy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole	Drill Rig BZ
	0						Grass & Gravel Cover						
1	1		5'		Loose	Dark Gray	Topsoil (0-2"), Gravelly SAND (2"-1')	GP		0.7	0	0	0
	2				Stiff	Dark Brn	Clayey SAND, some large Gravels	SC		0.4			
	3				Stiff	"	CLAY.	CL		0.4			
	4				Stiff	Brown Mottled Gray	Sandy CLAY.	CL		0.4			
	5				"	"	" "	CL		0.4			
2	6		3.5'		Loose	Olive Gray	Silty SAND	SM		0.6	0	0	0
	7				Loose	"	" "		} SM	0.6			
	8				Stiff	Dark Brn	Compacted SAND w/ Some Silt						
	9				Hard	"	Sandy CLAY.	CL		0.6			
							Sandstone	RX					
							REFUSAL			0.6			
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 16SB65010 collected @ 1348
16SB65026 collected in middle @ 1356
16SB65060 collected in middle @ 1405

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Φ343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16SB66
DATE: 8/12/Φ4
GEOLOGIST: CHARLES C. Lawey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole BZ	Drill BZ
	Φ						Asphalt Paved Cover						
1	1		5'		Loose	BRN	Asphalt (0-6"). Sandy CLAY (6"-1') w/Gravelly SAND	CL		1.6	Φ	Φ	Φ
	2				Stiff	ORG. BRN. MOTTLED	CLAY	CL		1.6			
	3				"	"	"	CL		1.4			
	4				"	"	"	CL		2.5			
	5				Semi-Loose	"	Silty CLAY	CL		2.5			
2	6		3.5'		Loose	LT. ORG. BRN	Silt w/some CLAY.	ML		1.1	Φ	Φ	Φ
	7				"	"	" "	ML		1.1			
	8				"	DRK. ORG BRN	Silt w/ some compacted SAND Lenses.	ML		1.1			
	9				Loose	ORG. BRN	SANDSTONE	RK		1.1			
							REFUSAL						
	1Φ												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Φ.Φ

Remarks: 16SS66Φ1Φ2 collected @ Φ815
16SB66Φ2Φ6 collected from middle @ Φ823
16SB66Φ6Φ8 collected from midhill @ Φ828

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16SB67
DATE: 8/12/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Asphalt Paved Cover						
1	1		2.5'		Loose	Gray	Asphalt (Ø-6"), Gravelly SAND (6"-1').	GP		1.6	Ø	Ø	Ø
	2				Stiff	Org. Brn. Mot. Gray	CLAY	CL		Ø.6			
	3				"	"	"	CL		Ø.6			
	4						NO RECOVERY			—			
	5						No Recovery			—			
2	6		4'		Stiff	Org. Brn. Mot. Gray	Silty CLAY	CL		Ø.6	Ø	Ø	Ø
	7				"	"	" "	CL		Ø.6			
	8				"	"	" "		CL-ML	Ø.6			
	9				Loose	Org. Brn	Silt w/ Some compacted SAND LAYERS		ML-RX	Ø.6			
					Stiff	"	SANDSTONE						
	1Ø						REFUSAL						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø Ø

Remarks: 16SS67 Ø1Ø2 collected @ Ø912
16SB67 Ø2Ø6 collected from 2.5 & 5-6' Range along w/MS/MSD @ Ø917
16SB67 Ø6 Ø9 Collected from middle @ Ø936

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16 SB68
DATE: 8/12/Ø4
GEOLOGIST: CHARLES C. LANEY III
DRILLER: JOSH DUTTON

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample Int.	Sample Brz.	Background	Background Brz.
	Ø						Asphalt Paved Cover						
1	1		5'		Loose	BRN	Asphalt (0-6") - Gravelly SAND (6"-1')	GP		Ø.9	Ø	Ø	Ø
	2				STIFF	OLIVE BRN. Not Gray	CLAY	CL		Ø.9			
	3				"	"	"	CL		1.3			
	4				"	"	"	CL		1.7			
	5				Semi Loose	"	SILTY CLAY	CL		1.7			
2	6		4'		STIFF	"	" "	CL		1.7	Ø	Ø	Ø
	7				"	"	" "	CL		1.2			
	8				"	"	" "	CL		1.2			
	9				Loose	"	SILT w/some compacted SAND LENSES	ML		Ø.7			
	1Ø				←		REFUSAL			→			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16 SS Ø1Ø2 collected @ Ø842
~~16 SB Ø2Ø6 collected from midpoint @ Ø854~~ along w/ Duplicate 16 FD Ø812Ø4Ø1
~~16 SB Ø6Ø9 collected from midpoint @ Ø859~~

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB69
DATE: 8/12/04
GEOLOGIST: Charles C. Lowey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Asphalt Cover						
1	1		5'		Loose	GRAY	Asphalt (0-6"). Gravelly SAND (6"-1').	GP		0.6	0	0	0
	2				Stiff	ORG. BRN. MOT. GRAY	CLAY	CL		0.6			
	3				Stiff	"	"	CL		0.6			
	4				Stiff	"	"	CL		0.6			
	5				Semi-Loose	"	Silty CLAY	CL		0.6			
2	6		2'		Stiff	"	" "	CL		0.6			
	7				"	"	" "		CL-RX	0.6			
					Stiff	"	SANDSTONE			0.6			
	8						Refusal						
	9												
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SS69 0102 collected @ 0946
16SB69 0206 collected from midpoint @ 0954
16SB69 0607 collected from midpoint @ 1007

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU16
PROJECT NUMBER: N7448, CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB70
DATE: 8/12/09
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		5'		STIFF	ORG-BRN-NOT-GRAY	TOPSOIL (0-2") Gravelly SAND (2"-6"); CLAY w/ROOTS		GP-CL	0	0	0	0
	2				"	"	CLAY.	CL		0			
	3				"	"	"	CL		0			
	4				SOFT	"	SILTY CLAY	CL		0			
	5				SOFT	GRAY	" "	CL		0			
2	6		2'			ORG-BRN	V. FINE SAND W/ SILT & Red ROCKS	SP		0			
	7					LT. ORG-BRN	SILTY SAND / SILT STONE		SM-RX	0			
	8				←		REFUSAL		→				
	9												
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SS70 0102 collected @ 1427
16SB70 0206 collected @ 1435
16SB70 0607 collected @ 1440

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 16SB71
DATE: 8/12/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Grass Cover						
1	1		5'		STIFF	ORG. BRN. MOT. GRAY	Topsoil (Ø-2") SANDY CLAY	CL		Ø.2	Ø	Ø	Ø
	2				"	"	" "	CL		Ø.4			
	3				"	"	" "	CL		Ø			
	4				"	"	" "	CL		Ø			
	5				med Stiff	DRK GRAY	SILTY CLAY w/ Trace organic Material	CL		Ø			
2	6		1'		"	ORG. BRN MOT. GRAY	SILT STONE	RK		Ø			
	7						REFUSAL						
	8												
	9												
	1Ø												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SB71Ø1Ø2 collected @ 1413
16SB71Ø2Ø6 collected @ MS/MSD @ 1418

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB72
DATE: 8/12/Ø4
GEOLOGIST: Charles C. Lanier III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Asphalt Cover						
	1		8'		Loose	GRAY	Asphalt (Ø-6"); Gravelly SAND (6"-1')	GP		3.3	Ø	Ø	Ø
	2				Med. Stiff	BRNISH GRAY	CLAY w/ some Gravels	CL		1.7			
	3				Stiff	BRN TO DKBROWN	CLAY	CL		1.1			
	4				"	"	"	CL		1.1			
	5				"	ORG. BRN	CLAY w/ a lot of SILT.	CL		1.1			
2	6		2'		"	"	SILTY CLAY	ML		Ø.5	Ø	Ø	Ø
	7				"	"	" "		3ML-RX	Ø.5			
					"	"	SANDSTONE						
	8		←				REFUSAL		→				
	9												
	1Ø												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS72 Ø1Ø2 collected @ 1Ø22
16SB72 Ø2Ø6 collected @ MIDPOINT @ 1Ø33
16SB72 Ø6Ø7 collected @ MIDPOINT @ 1Ø37

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB73
DATE: 8/12/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Asphalt Cover						
1	1		4'		Loose	Gray	Asphalt (0-6") Gravelly SAND (6"-1')	GP		2.8	0	0	0
	2				Stiff	Brnish Gray	CLAY w/ Some Gravels	CL		2.8			
	3				"	Org Brn.	CLAY	CL		2.2			
	4				Loose	"	V. Fine SAND, Micaceous		} SP- RX	2.2			
					Stiff	"	SANDSTONE						
	5			←			REFUSAL		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SS73 0102 Collected @ 1046
16SB73 0204 Collected @ 1050

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: TtNUS
DRILLING RIG: Hand Auger
BORING No.: 16SB74
DATE: 8/17/04
GEOLOGIST: Charles C. Lancy III
DRILLER: Tom Dickson

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Drill BZ
	0						Gravel SAND COVER						
	1				Loose	GRAY	Gravelly SAND (0-6")		GP-CL				
					FIRM	ORG.BRN MOT.GRAY	SILTY CLAY (6"-1')			6.7	0	0.3	0
	2				"	ORG.BRN	SILTY CLAY	CL		4.7	0	2.6	0
	3				"	ORG.BRN MOT GRAY	" "	CL		11.3			
	4				Semi Loose	ORG BRN	SILTY CLAY w/ TRACE ROCKS	CL		9.8			
	5				"	"	SILTY CLAY	CL		9.6			
	6				"	"	SILTY CLAY w/ TRACE SILTSTONE	CL		6.4			
←							REFUSAL			→			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.7

Remarks: Boring was Hand Augered
16SS74 0102 collected @ 0816 along w/ Dup: 16F 080174 01
16SB74 0206 collected @ 0842 along w/ MS/MSD

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB75
DATE: 8/12/Ø4
GEOLOGIST: CHARLES C. LANEY III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Asphalt Cover						
1	1		3'		Loose	Gray	Asphalt (Ø-6") Gravelly SAND (6"-1')	GP		Ø.6	Ø	Ø	Ø
	2				Stiff	OCG. BRN. MOT. GRAY	Silty CLAY, soft.	CL		Ø.6			
	3				Stiff	"	V. fine SAND, micas.	SP		Ø.1			
	4				←		REFUSAL		→				
	5												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SB75Ø1Ø2 collected @ 11Ø2
16SB75Ø2Ø3 collected @ 11Ø6

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16 SB 76
DATE: 8/12/Ø4
GEOLOGIST: CHARLES C. LONEY III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Grass Cover						
1	1		5'		STIFF	ORG. BRN MOT. GRAY	Topsoil (Ø-2") SANDY CLAY	CL		Ø	Ø	Ø	Ø
	2				"	"	" "	CL		Ø			
	3				"	"	" "	CL		Ø			
	4				"	GRAY	CLAYEY SAND W/SILT		SC				
					"	ORG. BRN MOT. GRAY	" "			Ø			
	5				"	ORG. BRN	CLAYEY SAND	SC		Ø			
2	6		1.5'		"	"	" "		SC-SM	Ø			
					LOOSE	LIGHT BRN	SILTY SAND						
	7				"	"	SILTSTONE		RX	Ø			
							REFUSAL						
	8												
	9												
	1Ø												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS76 Ø1Ø2 collected @ 1348
16SB76 Ø2Ø6 collected @ MIDPOINT @ 1357
16SB76 Ø6Ø7 collected @ MIDPOINT @ 1402

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16 SB 77
DATE: 8/12/Ø4
GEOLOGIST: CHARLES C. LANEY III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Grass Cover						
1	1		5'		Loose	ORG. BRN	TOPSOIL (0-24") Clayey SAND	SC		Ø	Ø	Ø	Ø
	2				"	"	Clayey SAND w/ some Gravels	SC		Ø			
	3				"	ORG. BRN MOT-GRAY	" "	SC		Ø			
	4				STIFF	"	" "	SC		Ø			
	5				SOFT	"	Silty CLAY w/ some SAND	CL		Ø			
2	6		5'		STIFF	"	" "	CL		Ø	Ø	Ø	Ø
	7				STIFF	"	" "	CL		Ø			
	8				"	"	" "	CL		Ø			
	9				STIFF	GRAY	SILTSTONE FRAGMENTS	RK		Ø			
	1Ø				STIFF	"	SILTSTONE FRAGMENTS	RK		Ø			
3	11		4'		"	ORG. BRN. GRAY	SILTSTONE	RK		Ø	Ø	Ø	Ø
	12				"	"	" "	RK		Ø			
	13				"	"	" "	RK		Ø			
	14				"	DRK GRAY	SHALE	RX		Ø			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16 SB 77 Ø1Ø2 collected @ 124Ø
16 SB 77 Ø2Ø6 collected @ midpoint @ 1249 along with duplicate 16FD Ø812Ø4-Ø2
16 SB 77 Ø61Ø collected @ midpoint @ 13Ø4

Converted to Well: Yes ✱ CCL No X Well I.D. #:

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16 SB 78
DATE: 8/12/Ø4
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						GRASS COVER						
1	1		5'		STIFF	ORG BRN	TOPSOIL (Ø-2") CLAYEY SAND	SC		Ø	Ø	Ø	Ø
	2				"	ORG BRN MOT. GRAY	CLAYEY SAND	SC		Ø			
	3				"	DRK BRN MOT. GRAY	" "	SC		Ø			
	4				"	"	" "	SC		Ø			
	5				"	GRAY MOT. BRN	SILTY CLAY	CL		Ø			
2	6		3.5'		"	"	" "	CL		Ø	Ø	Ø	Ø
	7				LOOSE	ORG BRN	SILTY SAND W/ COMPACTED SAND LENSES + RED COLORED ROCKS	SM		Ø			
	8				"	LT. ORG BRN	VERY FINE SAND W/ SILT	SP		Ø			
	9				LOOSE	ORG BRN	SANDSTONE		2 RX	Ø			
							REFUSAL						
	1Ø												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS78Ø1Ø2 collected @ 1317
16SB78Ø2Ø6 collected from MIDPOINT along w/MS/MSD @ 1323
16SB78Ø6Ø9 collected from MID POINT @ 1338

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: Tetra Tech NUS
DRILLING RIG: Hand Auger

BORING No.: 16SB85
DATE: 8/14/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Terry Rosan

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						Leaves covering Bare Soil						
	1		4'		Firm	Brn	Clay, soft, moist.	CL		Ø	Ø	Ø	Ø
	2				"	"	" "	CL		Ø			
	3				Semi Loose	Dk. Brn. Mott. Gray	Sandy Clay	CL		Ø			
	4				"	"	" "	CL		Ø			
	←						Boring Terminated		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: Oak overstory somewhat mature, site location is in a depression, herbaceous layer sparse, some shrubs & saplings. 16SSB50002 collected @ 1024; 16SB85Ø2Ø4 collected @ 1027

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO 0343
DRILLING COMPANY: Tetra Tech NUS, Inc.
DRILLING RIG: Hand Auger

BORING No.: 16SB86
DATE: 8/14/04
GEOLOGIST: Charles C. Laney III
DRILLER: Terry Rojas

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Leaves Covering Bare Soil						
	1		4'		Loose	Brn	Silty CLAY w/ Roots	CL		1.2	0	3.9	0
	2				Med. Stiff	Org Brn	Sandy CLAY w/Roots	CL		1.2			
	3				"	Org Brn not Gray	Sandy CLAY	CL		0			
	4				"	"	Sandy CLAY, Trace Sandstone Fragments	CL		0			
	←						Boring Terminated		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: EDGE OF ~~Coniferous Mature~~ OAK & HICKORY TREE CANOPY (NORTH) & OPEN SHRUBS (SOUTH) w/ RUBUS
16SS860002 collected @ 1055; 16SB860204 collected @ 1110

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448, CTO 0343
DRILLING COMPANY: Tetra Tech NUS, INC
DRILLING RIG: Hand Auger

BORING No.: 16SB87
DATE: 8/14/04
GEOLOGIST: Charles C. Laney III
DRILLER: Terry Rojas

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density / Consistency / Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample Bag	Borehole**	Drilling Area
	0						Grass & Bramble Cover						
	1		4'		Med. Stiff	Org Brn	Sandy CLAY w/ some Roots	CL		0	0	0	0
	2				"	"	" "	CL		0			
	3				"	Brn. Mot Gray	Sandy CLAY	CL		0			
	4				"	"	SANDY CLAY w/ some wood fragments & trace Sandstone fragments	CL		0			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SS870002 collected @ 1120
16SB870204 collected @ 1130

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: Tetra Tech NUS
DRILLING RIG: Hand Auger

BORING No.: 16SB88
DATE: 8/14/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Terry Rojan

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample B2	Borehole	Drill Rig
	Ø						Grass & Bramble Cover						
	1		4'		Med. Stiff	BRN	Sandy CLAY W/some ROOTS, MOIST.	CL		Ø	Ø	Ø	Ø
	2				"	ORG-BRN.	" "	CL		Ø			
	3				"	ORG. BRN. MOT. GRAY	Sandy CLAY	CL		Ø			
	4				"	"	" "	CL		Ø			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS88ØØØ2 collected @ 121Ø
16SB88Ø2Ø4 collected @ 1229

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448; CTO Ø343
DRILLING COMPANY: Tetra Tech NUS
DRILLING RIG: Hand Auger

BORING No.: 16SB89
DATE: 8/14/Ø4
GEOLOGIST: Charles C. Caney III
DRILLER: Terry Rowan

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample B2	Borehole	Drill B2
	Ø						Shrubbery Cover						
	1		41		Med Stiff	Brn	Sandy Clay w/ Roots.			Ø	Ø	Ø	Ø
	2				"	Org Brn.	" "			Ø			
	3				"	Org Brn. mot. Gray	" "			Ø			
	4				"	"	" "			Ø			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SS89ØØØ2 collected @ 125Ø
16SB89Ø2Ø4 collected @ 13ØØ

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: DPT
BORING No.: 16SBØØ
DATE: 8/16/ØØ
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						CONCRETE COVER						
1	1		Ø.6"		Loose	GRAY	Concrete w/ Rebar (Ø-8") Large Gravels & SAND (8"-12")	GP		—	Ø	2.6	Ø
	2				←		NO RECOVERY	→		—			
	3				←		NO RECOVERY	→		—			
	4				←		NO RECOVERY	→		—			
2	5		4'		Stiff	ORG-BRN	SILTY CLAY	CL		3.5			
	6				"	"	" "	CL		3.5			
	7				"	"	" "	CL		7.2			
	8				" / Loose	GRAY / ORG-BRN	SILTY CLAY / SILT w/ SILTSTONE		CL-RX	7.2			
			←				REFUSAL	→					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 16SBØØ ØØ4Ø6 collected @ 1211 Refusal @ 8'
16SBØØ ØØ6Ø8 collected @ 1219

Drilling Area Background (ppm): Ø.Ø

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: DPT

BORING No.: 16SB91
DATE: 8/16/Ø4
GEOLOGIST: Charles C. Lanier III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole	Ambient BZ
	Ø						Concrete Cover						
1	1		Ø.6"		Loose	Gray	Concrete w/ Rebard (Ø-8") Large Gravels + SAND (8'L 12")		GP	—	Ø	5.6	Ø
	2				←		NO RECOVERY		→	—			
	3				←		NO RECOVERY		→	—			
	4				←		NO RECOVERY		→	—			
2	5		4'		Stiff	Org Brn	Silty Clay	CL		34.1	Ø	4.8	Ø
	6				"	"	" "	CL		34.1			
	7				"	Org Brn Mt. Gray	" "	CL		31.1			
	8				"	Org. Brn	Silty CLAY w/ Trace Gravels	CL		4.7			
3	9				"	"	" "	CL					
					"	Gray	Silty CLAY						
	1Ø		←				REFUSAL		→				
	11												
	12												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SB91Ø4Ø6 collected along w/ DUP: 16FDØ8161Ø4Ø1 collected @ 1335.
16SB91Ø6Ø9 collected @ 1342 Refusal @ 9'

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: DPT

BORING No.: 18SB92
DATE: 8/16/Ø4
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						CONCRETE COVER						Ø
1	1		Ø.6"		LOOSE	GRAY	Concrete w/Rebarb (Ø-8") Large Grauls + SAND (8"-12")		GP	—	Ø	21	Ø
	2				←		NO RECOVERY		→				
	3				←		NO RECOVERY		→				
	4				←		NO RECOVERY		→				
2	5		4'		STIFF	ORG. BROWN NOT GRAY	SILTY CLAY	CL		Ø.3	Ø	Ø	Ø
	6				"	"	" "	CL		Ø.4			
	7				"	"	" "	CL		Ø.4			
	8				"	"	SILTY CLAY w/ Some Red Rocks.	CL		Ø.6			
3	9				"	GRAY	SILTY CLAY	CL		Ø.6			
				←			REFUSAL		→				
	1Ø												
	11												
	12												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 1137 Collect 18SB92Ø4Ø6 Refusal @ 8.5'
1158 Collect 18SB92Ø6Ø8

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSNC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: DPT

BORING No.: 16SB93
DATE: 8/16/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						CONCRETE COVER						
1	1		Ø.6"		Loose	GRAY	Concrete w/Rebar (Ø-8") Large Gravels + SAND (8"-12")	GP		—	Ø	Ø3	Ø
	2						NO RECOVERY			—			
	3						NO RECOVERY			—			
	4						NO RECOVERY			—			
2	5		3'		Stiff	ORG BRN FOT GRAY	SILTY CLAY	CL		6.Ø	Ø	Ø	Ø
	6				"	"	" "	CL		14.1			
	7				"	BRN	" "	CL		12.3			
	8				"	ORG BRN	" "	CL		12.3			
							REFUSAL						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 16SB93 Ø4Ø6 collected @ 1458 Refusal @ 7'6"
16SB93 Ø6Ø8 collected @ 1505

Drilling Area Background (ppm): Ø

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: DPT
BORING No.: 16SB94
DATE: 8/16/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Concrete Cover						
1	1		0.6"		Hard	Gray	Concrete w/ Rebarb (0-8") Large Gravels & SAND (8"-12")	GP		0	0	0.9	0
	2				←		NO RECOVERY	→					
	3				←		NO RECOVERY	→					
	4				←		NO RECOVERY	→					
2	5		0.6"		Loose	GRAY	GRAVEL SAND	GP	FALL BACK	0	0	2.1	0
	6				"	"	" "	GP		0			
	7				"	"	" "	GP		0			
	8				Loose	ORG BRN	SILTY CLAY w/ some Gravels	CL		0.6			
							REFUSAL						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SB94 0708 collected @ 1410

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: DPT

BORING No.: 16SB95
DATE: 8/16/ØY
GEOLOGIST: CHARLES C. LANEY III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						CONCRETE COVER						
1	1		1.Ø'		Hard	GRAY	CONCRETE w/Rebarb (Ø-8") Large Gravels & SAND (8"-1'6")	GP		Ø	Ø	Ø	Ø
	2				"	"	Large Gravels & SAND						
					←		NO RECOVERY		→	–			
	3				←		NO RECOVERY		→	–			
	4				←		NO RECOVERY		→	–			
2	5		3'		Stiff	ORG BRN MOT GRAY	Silty CLAY	CL		S23	Ø	Ø	Ø
	6				"	"	" "	CL		S23			
	7				"	ORG BRN	Silty CLAY with Red Stones.	CL		SSS			
	8			←			REFUSAL		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SB95 Ø4Ø6 collected @ 1435 alng w/MS/MSD
16SB95 Ø6Ø7 collected @ 1445 Refusal @ 7'

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: DPT

BORING No.: 16SB96
DATE: 8/16/04
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						CONCRETE COVER						
1	1		0.6"		Loose	GRAY	Concrete w/Rebarb (0-8") Large Gravels & SAND (8"-12")	GP		–	0	1.2	0
	2		←				NO RECOVERY		→	–			
	3		←				NO RECOVERY		→	–			
	4		←				NO RECOVERY		→	–			
2	5		4'		STIFF	ORG BRN NOT GRAY	SILTY CLAY	CL		5.7	0	0.9	0
	6				"	"	" "	CL		15.5			
	7				"	"	" "	CL		4.3			
	8				"	"	" "	CL		9.9			
3	9		←				REFUSAL		→				
	10												
	11												
	12												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 16SB960406 collected @ 1520
16SB960608 collected @ 1525

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: DPT
BORING No.: 16SB97
DATE: 8/16/Ø4
GEOLOGIST: Charles C. Lancy III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						CONCRETE COVER						
1	1		Ø.6"		Loose	GRAY	Concrete w/ Rebarb (Ø-8") Large Gravels w/ SAND (8"-12")	GP		—	Ø	Ø	Ø
	2				←		NO RECOVERY		→	—			
	3				←		NO RECOVERY		→	—			
	4				←		NO RECOVERY		→	—			
2	5		3'		STIFF	ORG-BRN MOT. GRAY	Silty CLAY	CL		22.4	Ø	Ø	Ø
	6				"	"	" "	CL		22.4			
	7				"	ORG BRN	Silt w/ Siltstone Fragments	ML-RX		1.9			
	8			←			REFUSAL		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: 16SB97Ø4Ø6 collected @ 1545 along w/ms/MSD
16SB97Ø6Ø7 collected @ 1555 along w/ DUP: 16FDØ816Ø4Ø2
Refusal @ 7'

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 16SB98
DATE: 8/16/Ø4
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						CONCRETE SLAB						
1	1		2'		Loose	GRAY	Concrete w/Rebarb (Ø-8") Large Gravels & SAND (8"-12")	GP		5.8	Ø	3.2	Ø
	2				Stiff	ORG BRN MOT. GRAY	SILTY CLAY	CL		5.8			
	3						NO RECOVERY						
	4						NO RECOVERY						
2	5		2.5'		Stiff/ Dense	ORG. BRN MOT. GRAY	SILTY CLAY	CL		6.7			
	6				"	"	"	CL		2.1			
	7				Loose	ORG BRN	V. Fine SAND w/ SANDSTONE FRAGMENTS & Large Gravels (SAND) RX			2.1			
							REFUSAL						
	8												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: Boring located inside Bldg. 146 Refusal @ 6.5'
16SS98ØØ42 collected @ 1Ø34 16SB98Ø6Ø7 collected @ 1Ø5Ø
16SB98ØØØ6 collected @ 1Ø42

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 16
PROJECT NUMBER: N7448 CTO Ø343
DRILLING COMPANY: EFS
DRILLING RIG: DPT
BORING No.: 16SB99
DATE: 8/16/Ø4
GEOLOGIST: Charles C. Lawey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	Ø						CONCRETE SAAB						
1	1		2'		LOOSE	GRAY	CONCRETE W/REBAR (Ø-8") LARGE GRAVELS & SAND (8"-12")	GP		Ø3	Ø	3.3	Ø
	2				STIFF	ORG. BRN-MOT. GRAY	SILTY CLAY	CL		3.2			
	3			←			NO RECOVERY		→				
	4			←			NO RECOVERY		→				
2	5		3.5'		STIFF	ORG. BRN-MOT. GRAY	SILTY CLAY	CL		3.5	Ø	3.2	Ø
	6				"	"	" "	CL		3.5			
	7				"	"	" "	CL		7.6			
	8				"	"	" "	CL		7.6			
							REFUSAL						

* When rock coring, enter rock brokeness.

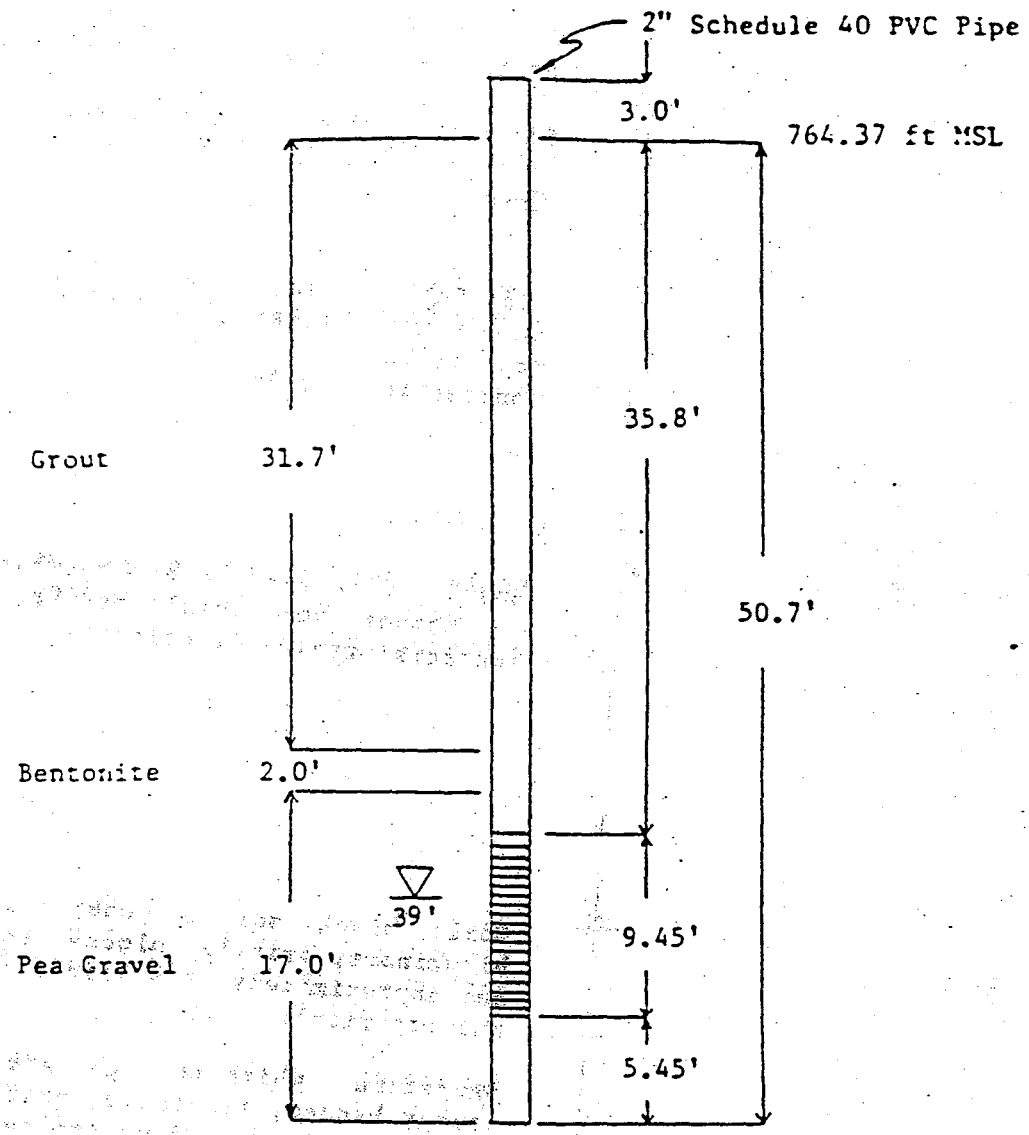
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): Ø

Remarks: Boring located inside Bldg. 146. Refusal @ 7.5'
16SS99Ø1Ø2 collected @ 1Ø59
16SB99Ø2Ø6 collected @ 1116
16SB99Ø6Ø8 collected @ 1113

Converted to Well: Yes ____ No X Well I.D. #: ____

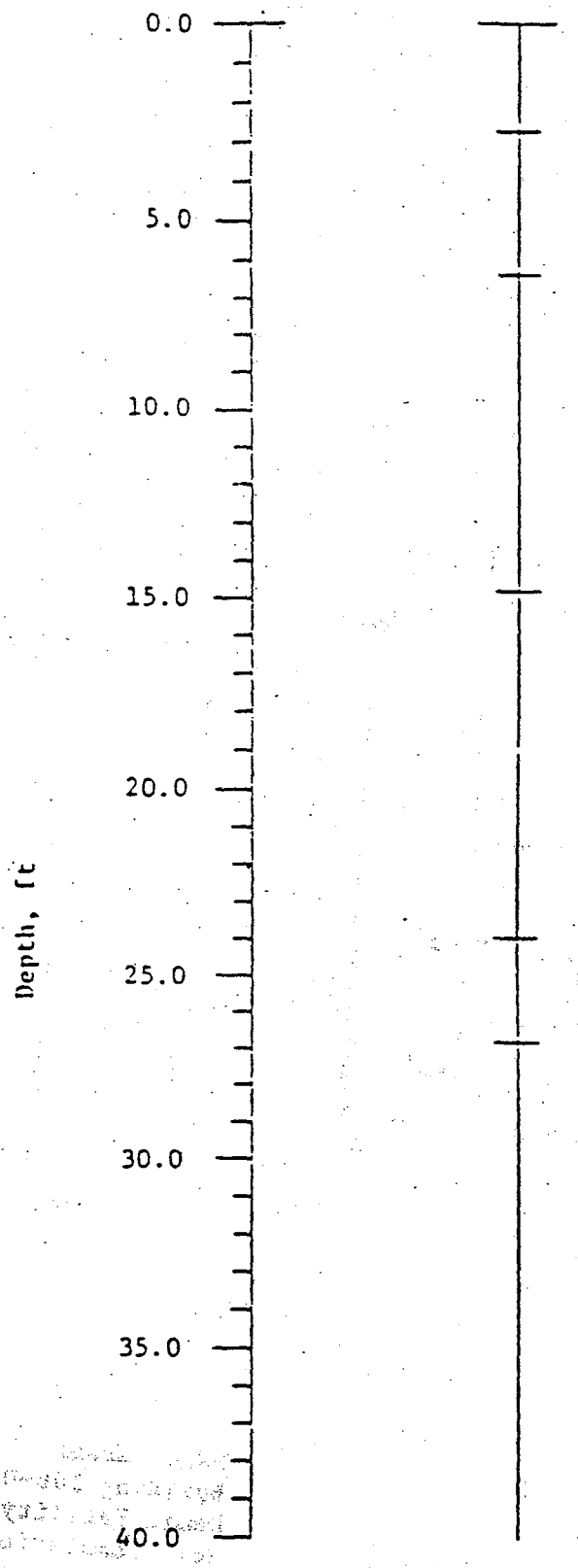
APPENDIX B.1.4
SWMU 16
BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS FROM THE CORPS OF ENGINEERS



Water Depth at Time of Drilling

Well Screen

NWSC, Crane, Indiana
Building 146-Ordnance
Demil Facility
Well Completion
Boring Number: WES-14-1-



764.37 ft MSL

Sandy clay(CL): brown, soft, damp, very fine-grained sand, gravelly (sandstone).

Siltstone: brown to light grey, uniform, composition (quartz), soft to stiff, highly weathere damp.

Clay Shale: red, brown, black, orange brown, very thinly bedded (1/16"-1/4") highly weathered soft to very stiff, brittle, and contains iron concreations or lenses.

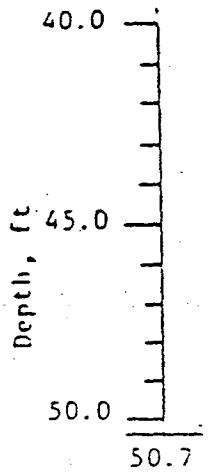
Shale: dark grey to black, weathered and oxidiz in regions, very thinly bedded, contains micro subhedral grains of calcite.

Coal: black, soft to moderately hard, earth bituminous, brittle, blocky, contains limoni and approximately 5% sulfides (pyrite and chalcopyrite).

Sandstone: white to light grey, red, and brown thinly bedded, fractured, oxidized, uniform, predominantly very fine-grained quartz sand, moderately to slightly friable, bedding dips approximately 15 degrees from horizontal with cross-bedding visible.

continued

NWSC, Crane, Indiana
Building 146-Ordnance Demil Facility
Lithology
Boring Number: WES-14-1-83

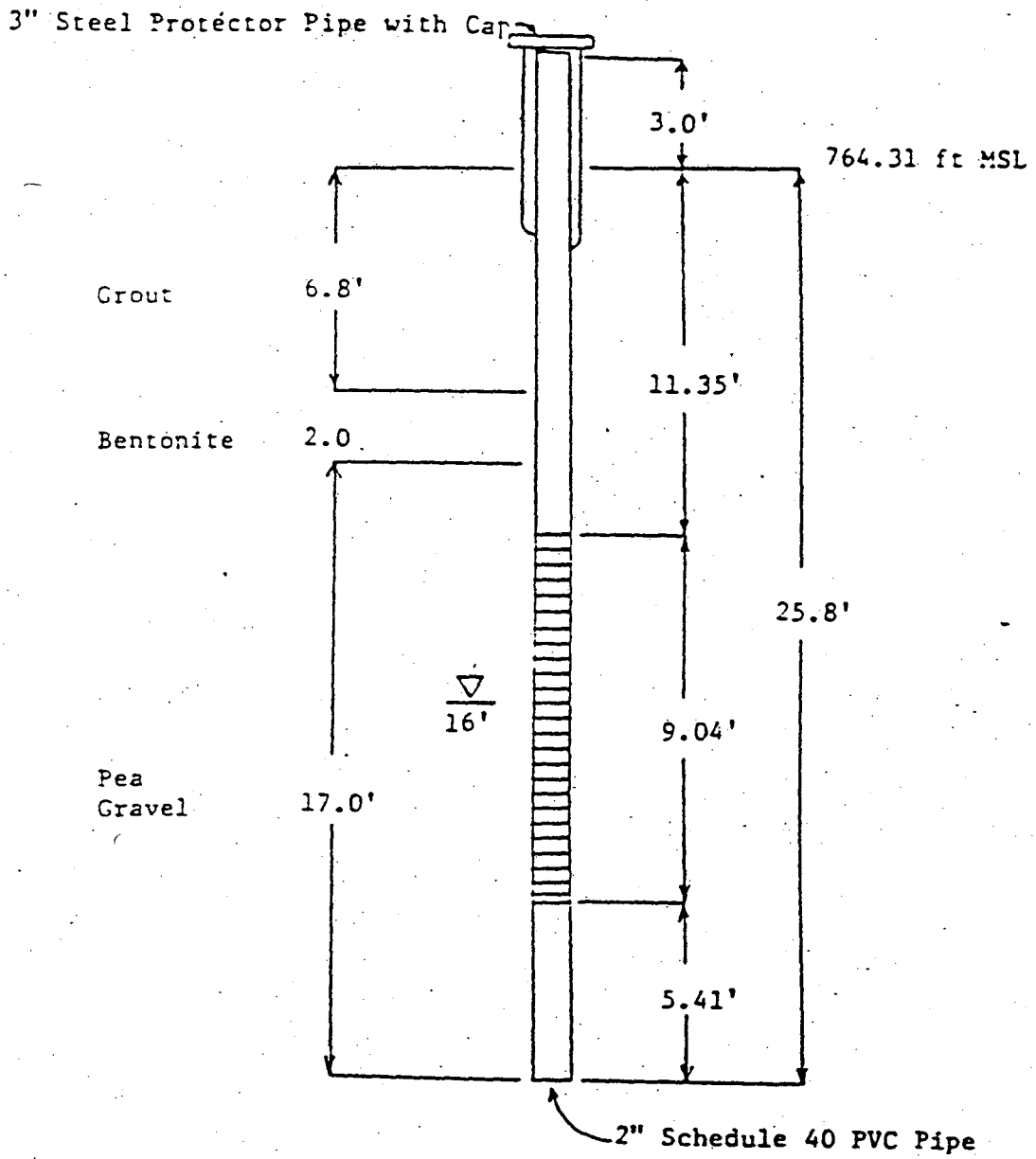


724.37 ft MSL

Sandstone (60%) and shale (40%): very f
sandstone interbedded with black soft sh
ding consists of very fine lamina, rando
displaying irregular near shore depositi

Shale: dark grey, sandy, uniform, soft

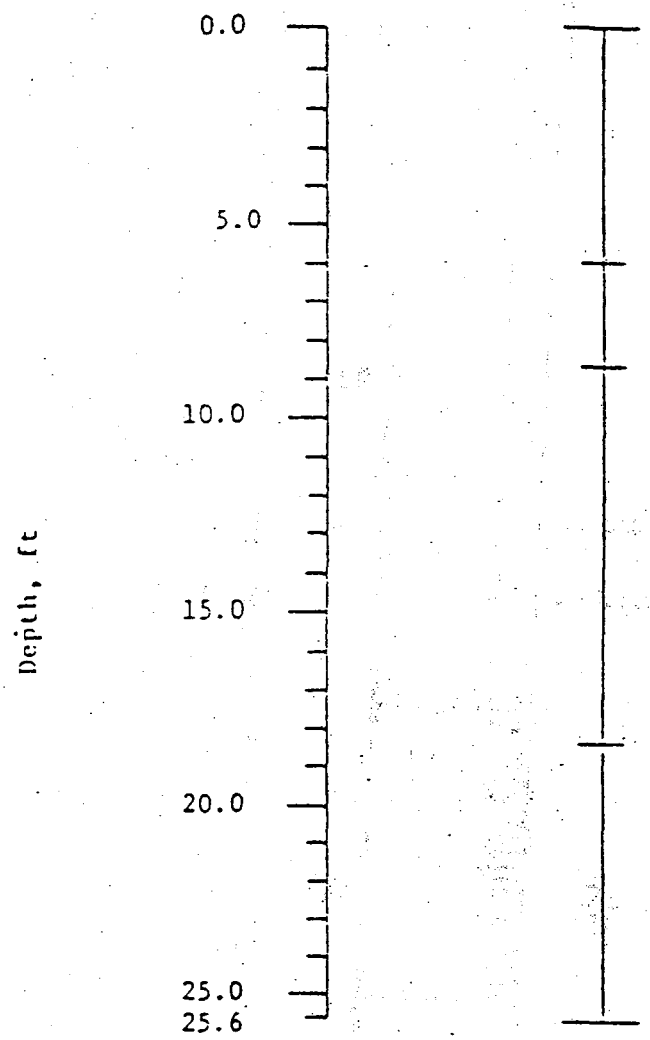
NWSC, Crane, Indiana
Building 146 Ordnance Demil F
Lithology
Boring Number: WES-14-1-83



Water Depth at Time of Drilling

Well Screen

NWSC, Crane, Indiana
Building 146-Ordnance
Demil Facility
Well Completion
Boring Number: WES-14-2-



764.31 ft MSL

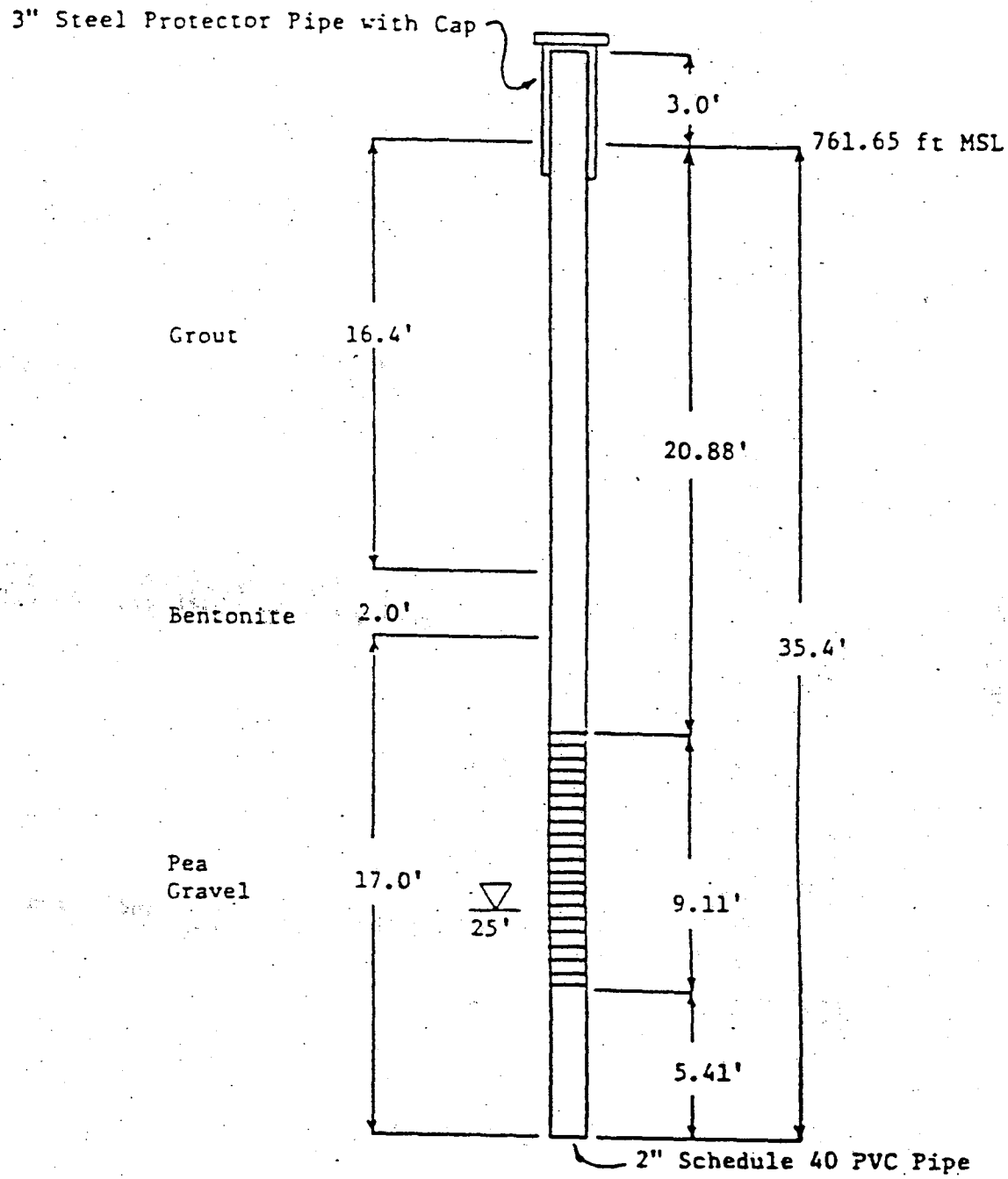
Clay(CL): brown, soft, damp, organic mat

Clayey sand(SC): brown, soft to stiff, v
fine-grained sand, uniform, slightly damp

Sandstone: brown, dark brown, very fine-
grained sand (quartz), wet from 15 to 16

Shale: dark grey and brown, soft.

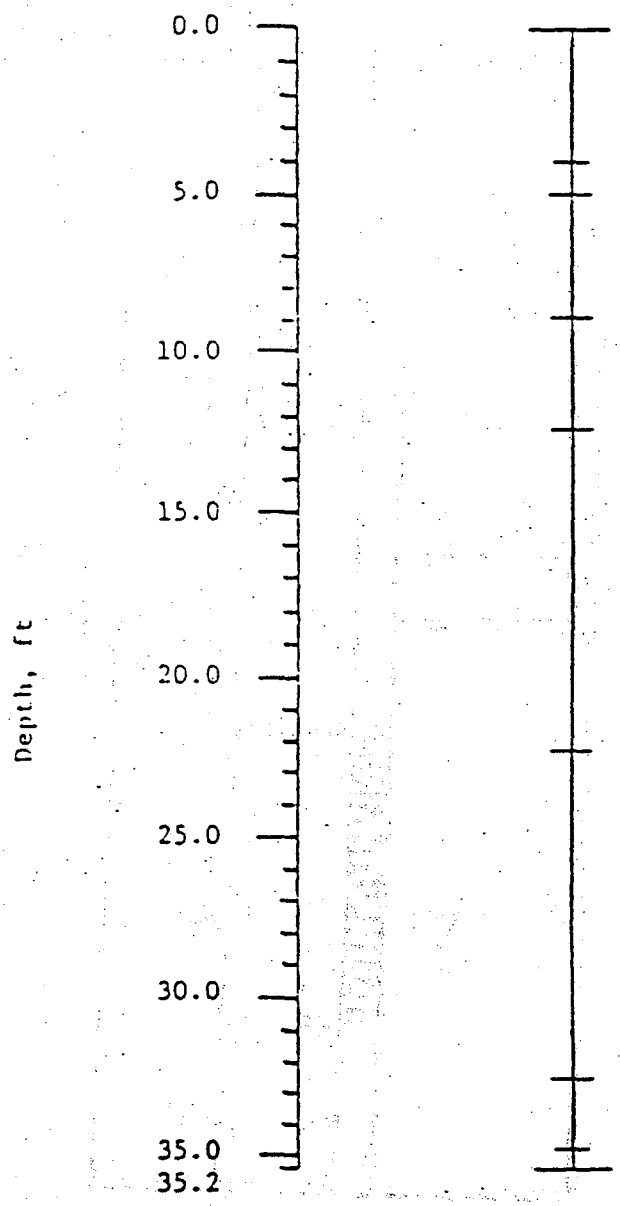
NWSC, Crane, Indiana
Building 146-Ordnance Demil Facilit
Lithology
Boring Number: WES-14-2-83



Water Depth at Time of Drilling

Well Screen

NWSC, Crane, Indiana
Building 146-Ordnance
Demil Facility
Well Completion
Boring Number: WES-14-3-83



761.65 ft MSL

Clay (CL): brown, soft, sandy, damp, organic matter (roots)

Clay (CL): greenish grey, very soft

Sandstone: brown, soft, very fine-gr clay lenses

Shale: brown, weathered, hard from 11 ft (iron)

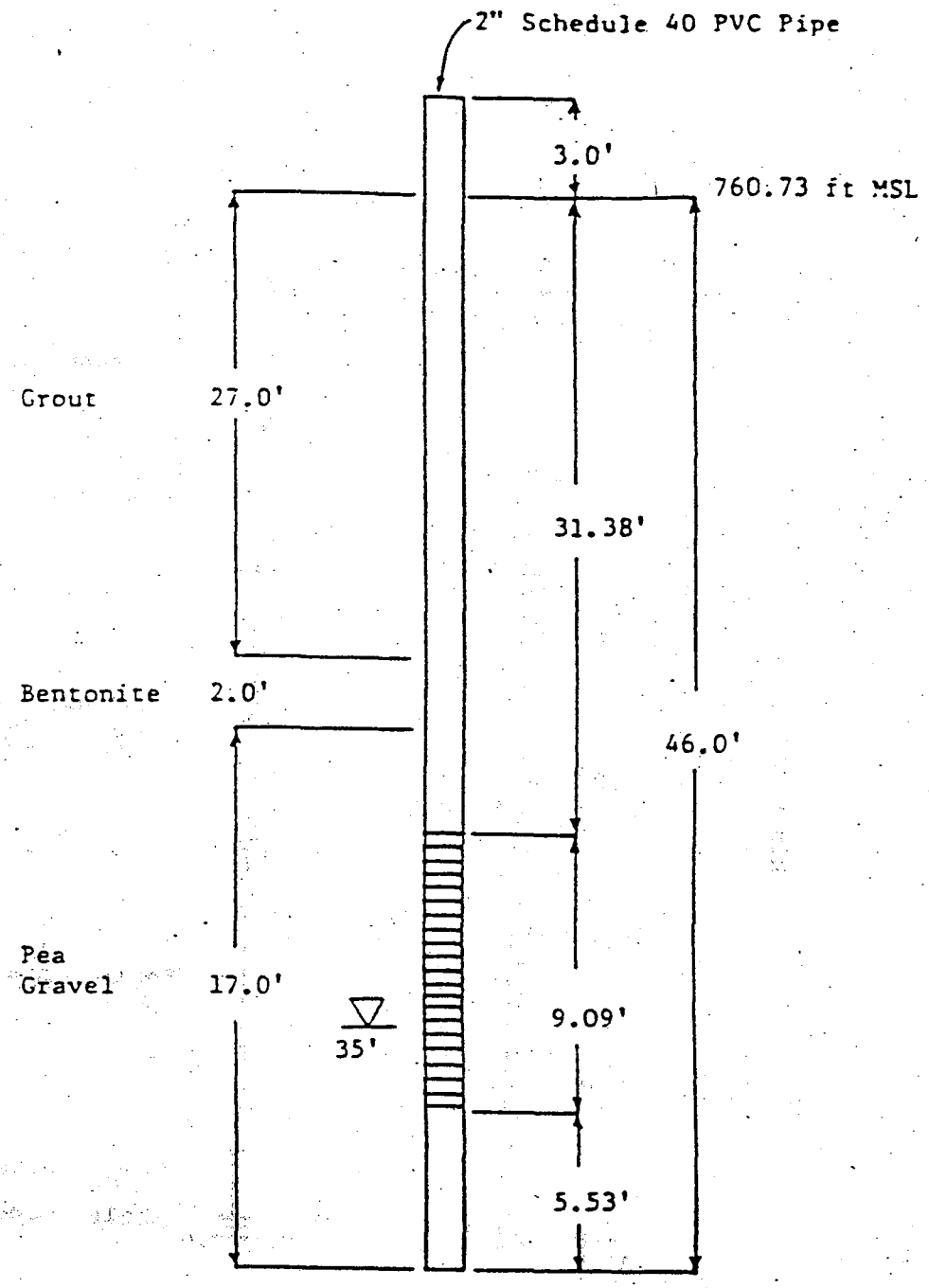
Sandstone: brown, grey (beginning a 15 ft), very fine-grained, soft

Shale: grey, dark grey, soft, water 25 ft

Coal: black, soft (bituminous)

Shale: see above

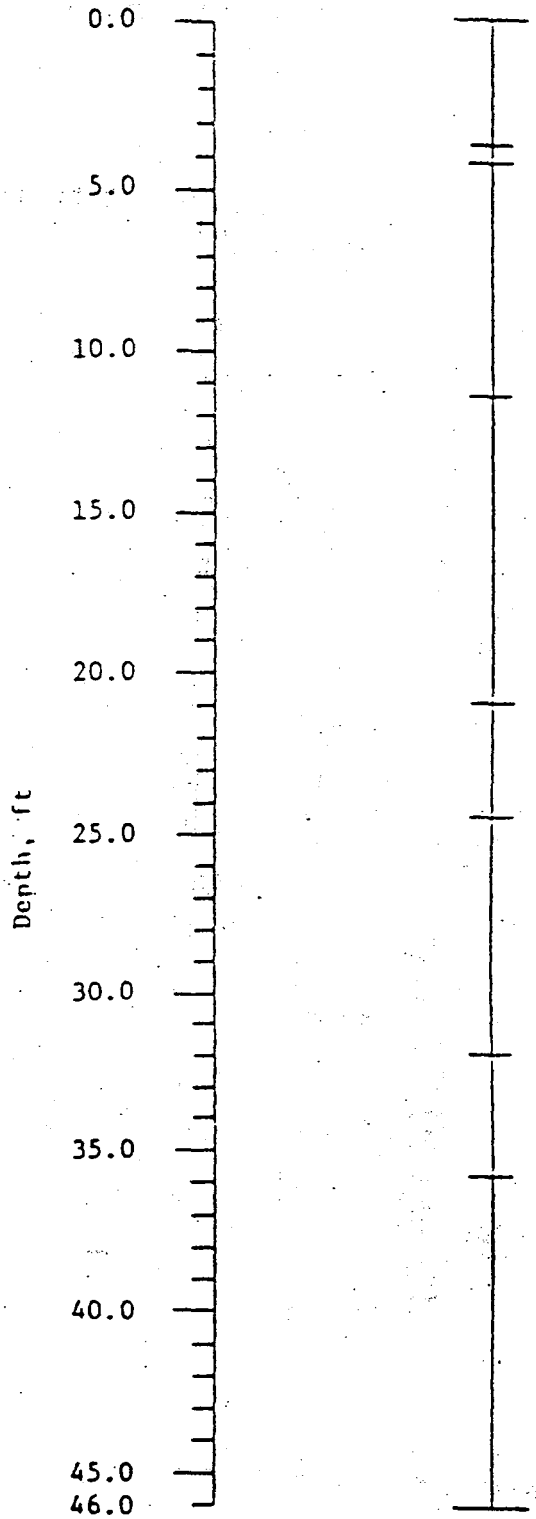
NWSC, Crane, Indiana
Building 146-Ordnance Demil
Lithology
Boring Number: WES-14-3-83



Water Depth at Time of Drilling

Well Screen

NWSC, Crane, Indiana
Building 146-Ordnance
Demil Facility
Well Completion
Boring Number: WES-14-4-83



760.73 ft MSL

Sandy silt (ML): brown with grey streaks, soft, damp, very fine-grained sand.

Coal: black, soft, earthy

Siltstone: light to dark grey, light brown, soft.

Shale: grey, red (13.3 - 13.8 ft), soft

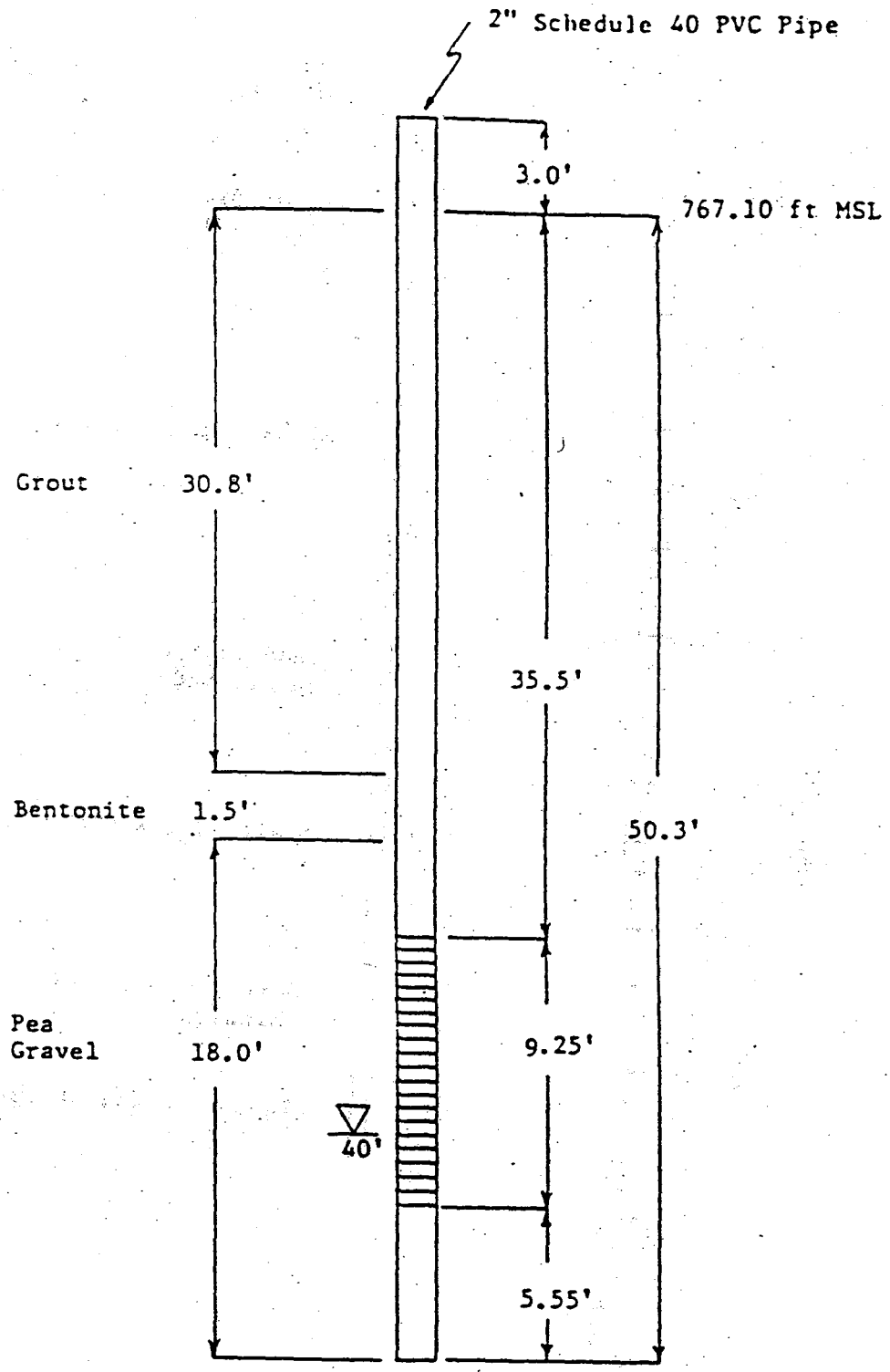
Sandstone and shale: grey to dark grey, thinly bedded, soft.

Shale: dark grey, soft

Coal: black, soft, wet between 35-36 ft (bituminous)

Sandstone and/or shale (?)- no cuttings, very wet

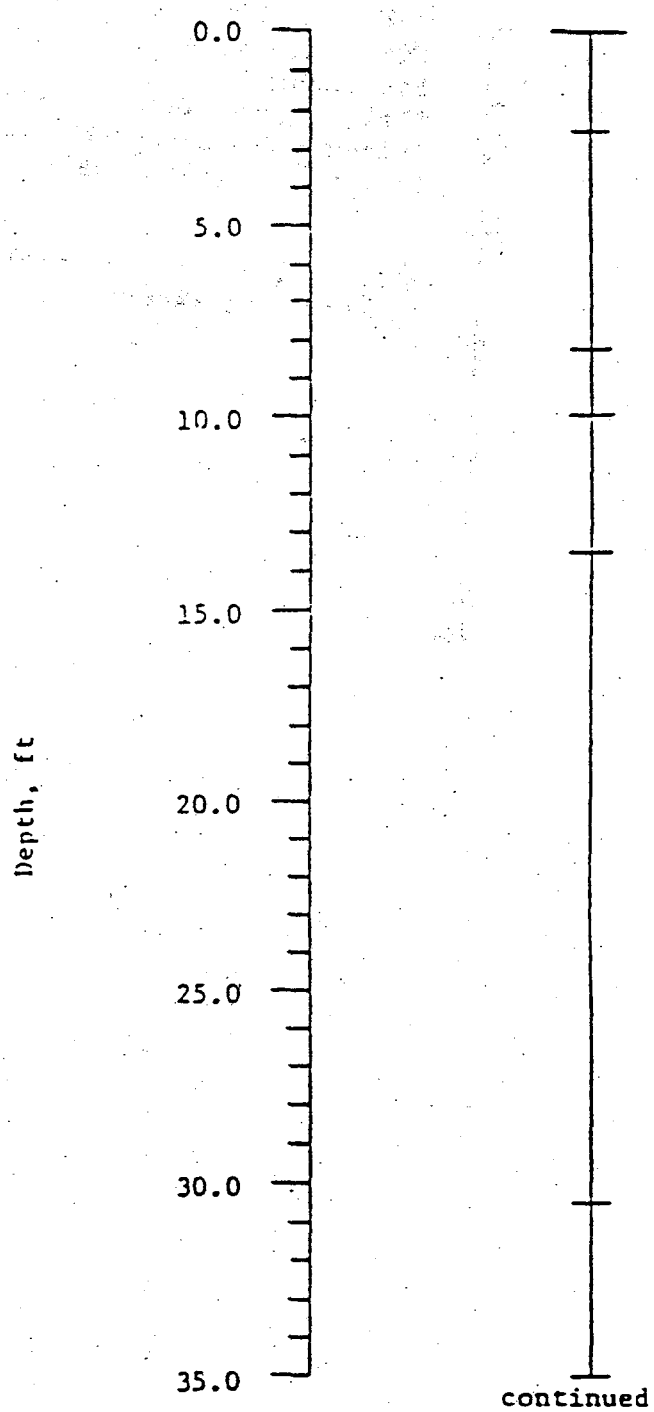
NWSC, Crane, Indiana
Building 146-Ordnance Demil Facility
Lithology
Boring Number: WES-14-4-83



Water Depth at Time of Drilling

Well Screen

NWSC, Crane, Indiana
Building 146-Ordnance
Demil Facility
Well Completion
Boring Number: WES-14-5-83



767.10 ft MSL

Sandy clay(CL): brown, soft to very sti
dry, sandy- very fine-grained sand.

Sandstone and clay: brown, reddish brou
thinly bedded, weathered, soft, very fir
grained sandstone.

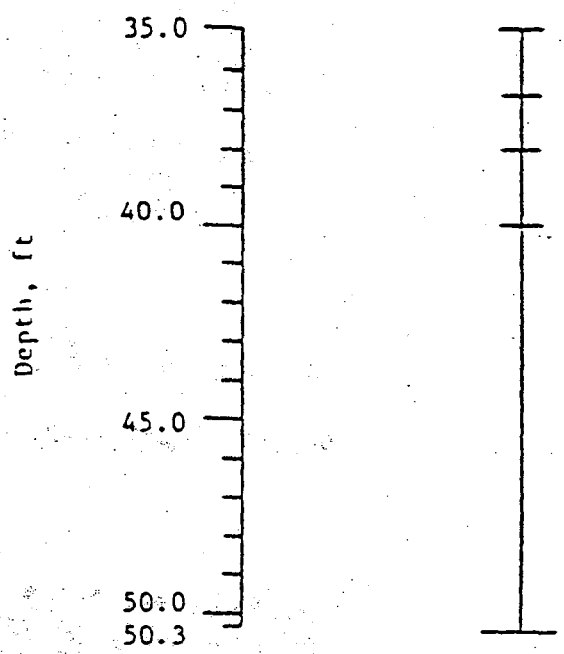
Coal: black, soft

Shale: light grey, soft, uniform

Sandstone and shale: light brown to br
and light grey to dark grey thinly bedd
very fine-grained sandstone, soft.

Shale: grey, soft, uniform, sandy - f:
grained.

NWSC, Crane, Indiana
Building 146-Ordnance Demil Facility
Lithology
Boring Number: WES-14-5-83



732.10 ft MSL

Coal: black, soft, brittle, uniform - bituminous.

Shale: grey, soft, thinly bedded with ver fine-grained sandstone.

Sandstone: grey, shaley, very fine-graine

Shale: grey, soft, thinly bedded with ver fine-grained sandstone.

NWSC, Crane, Indiana
Building 146-Ordnance Demil Facility
Lithology
Boring Number: WES-14-5-83

APPENDIX B.2
SWMU 16
DIGGING PERMITS
ROUND 1, ROUND 2, ROUND 3

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4061

REQUESTED BY: Tetra Tech NUS, Inc. / Terry Rogahn 412-921-8857

DATE: 3/25/03

WORK REQUEST ON E/S NO.: 68285

SWMU 16-East High Expl Fill / B-146

RK WILL BE PERFORMED BY: Tetra Tech NUS, INC.

DATE (Start - on or about): 3/20/03

WORK DESCRIPTION: Drilling for soil samples for surface & subsurface samples. Install groun water monitoring wells. Soil borings 16SB01-07 marked with white paint & mason nail with pink ribbon. All other locations marked

EQUIPMENT TYPE

[ ] HAND TOOLS [ ] CORE DRILL [ ] TRENCHER [ ] BACKHOE [ ] HEAVY EQUIPMENT

Faxed zz 3/5/03

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR zz	N/A			PN 3-6-03
HIGH VOLTAGE ELECTRICAL	YES	YES		3-18-03
FIRE ALARM zz	N/A			3/10/03 BZ
GROUNDING zz	YES	YES		3/6/03 WDM
Fax 3/25 NATURAL GAS 03606143	YES	YES		3-6-03 W.H.
SECURITY ALARM zz J. Hasemann	N/A			3/10/03
SEWER	YES	MARKED		3-24-03 JCR
STEAM	NA			BKW 3-7-03
TELEPHONE Faxed 3/5/03	NA			3-18-03
WATER	YES	MARKED		3-24-03 JCR
SECOND ELECTRICAL zz	N/A			3/10/03 BZ
GENERAL DYNAMICS/NMCI	N/A			2/21/03

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

* Exp 4/13 0393002

PERMIT HOLDER SIGNATURE: [signature] DATE: 3-24-03

PERMIT APPROVED BY: [signature] DATE: 3/24/03

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4572

REQUESTED BY: Tetra Tech NUS Inc/Ralph Basiwski 412-921-8308	DATE: 7/9/04
WORK REQUEST ON E/S NO.: 153704	B-1998 & B-1996 on Hwy 7
WORK WILL BE PERFORMED BY: Tetra Tech NUS, Inc.	DATE (Start - on or about):

WORK DESCRIPTION
2 Soil borings & monitoring wells along Hwy 77 between Magazines 1998 & 1996. Sites are marked & drawing is Attached.

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed 22 7/9/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR	N/A			7/9/04 dg
HIGH VOLTAGE ELECTRICAL	N/A			7/9/04 LHW
FIRE ALARM 22				7-14 MAH
GROUNDING 22	N/A			
NATURAL GAS	N/A			7/9/04 dg
SECURITY ALARM 22	N/A			7-14 MA
SEWER	N/A			7/9/04 dg
STEAM	N/A			7/9/04 dg
TELEPHONE	N/A			7/9/04 LHW
WATER	N/A			7/9/04 dg
SECOND ELECTRICAL	N/A			7/9/04 LHW
GENERAL DYNAMICS/NMCI	N/A			7/9/04 dg

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE: Tay Rogal	DATE: 7/22/04
DIGGING PERMIT APPROVED BY: Donna L. Zollman	DATE: 7/22/04

DISTRIBUTION:
ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4341

REQUESTED BY: Tetra Tech NUS, Inc. / Ralph Basinski	DATE: 10/15/03
WORK REQUEST ON E/S NO.: 107995	Bldg 146 Area – SWMU 16
WORK WILL BE PERFORMED BY: Tetra Tech (Terry Rojahn 412-337-0460)	DATE (Start - on or about): 10/21/03

WORK DESCRIPTION
Soil borings to obtain surface & subsurface samples & installation of ground water monitoring wells. See attached drawing. Area is marked with white flags.

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed 22 10/15/03 UNDERGROUND UTILITIES LOCATED IN WORK SITE Remarked

UTILITY	PRESENT	MARKED	~~NOT LOCATED~~	REMARKS
COMPRESSED AIR 22	N/A			per J. Beasley 10/16/03 dg
K HIGH VOLTAGE ELECTRICAL	YES	YES	25 Marked 1-13	11-6-03 A. Taylor
* FIRE ALARM 22	YES	YES	*WDM Jan 13, 04	10/21/03 WDM
GROUNDING 22	N/A			10/22/03 BK
NATURAL GAS	N/A			dg 10/15/03
SECURITY ALARM 22 J. Hasemann	N/A		JRH Jan 13, 04	10/20/03 JRH
K SEWER	YES	YES	25 N/A 1/13 WMW	10-17-03
STEAM	NA According to Dwg		25 NA cmg-1-13-04	10-17-03
TELEPHONE Faxed 10/15/03	N/A			RBP 10-20-03
K WATER	YES	YES	25 YES Marked 1/13	10-17-03
* SECOND ELECTRICAL 22	Yes	Yes	25 marked 1/13/04	11-6-03 BK
GENERAL DYNAMICS/NMCI	N/A			dg 10/15/03

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

Include an area of 10' around each sample location if possible.

PERMIT HOLDER SIGNATURE: [signature]	DATE: 11/6/03
DIGGING PERMIT APPROVED BY: [signature]	DATE: ~~11/6/03~~ 1/13/04

DISTRIBUTION:
ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4341

REQUESTED BY: Tetra Tech NUS, Inc. / Ralph Basinski	DATE: 10/15/03
WORK REQUEST ON E/S NO.: 107995	Bldg 146 Area – SWMU 6
WORK WILL BE PERFORMED BY: Tetra Tech (Terry Rojahn 412-337-0460)	DATE (Start - on or about): 10/21/03

WORK DESCRIPTION: Soil borings to obtain surface & subsurface samples & installation of ground water monitoring wells. See attached drawing. Area is marked with white flags.

EQUIPMENT TYPE: ☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed 22 10/15/03

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR 22	N/A			per J. Beasley 10/16/03 dg
HIGH VOLTAGE ELECTRICAL	YES	YES		11-6-03 H. Taylor
FIRE ALARM 22	YES	YES		10/21/03 WPM
GROUNDING 22	N/A			10/22/03 BK
NATURAL GAS	N/A			dg 10/15/03
SECURITY ALARM 22 J. Hasman	N/A			10/20/03 RH
SEWER	Yes	Yes		10-17-03 MW
STEAM	NA according to drwg			10-17-03
TELEPHONE Faxed 10/15/03	N/A			RBP 10-20-03
WATER	Yes	Yes		10-17-03 MW
SECOND ELECTRICAL 22	Yes	Yes		11-6-03 BK
GENERAL DYNAMICS/NMCI	N/A			dg 10/15/03

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

Include an area of 10' around each sample location if possible.

PERMIT HOLDER SIGNATURE: [signature]	DATE: 11/6/03
DIGGING PERMIT APPROVED BY: Donna L. Zoldman	DATE: 11/6/03

DISTRIBUTION:
ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4594

REQUESTED BY: Tetra Tech NUS, Inc. Ralph Basinski 412-921-8308	DATE: 8/2/04
WORK REQUEST ON E/S NO.: 158106	Bldg 146 Area
WORK WILL BE PERFORMED BY: Tetra Tech NUS, Inc	DATE (Start - on or about): 8/9/04

WORK DESCRIPTION

Soil borings to obtain surface & subsurface samples. Locations are marked with wooden stakes with pink/orange flagging & the corresponding number on the attached drawings (solid circles). All are inside fence except 1 at the south end of area near the treeline.

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed ZZ 8/2/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR ZZ	N/A			per phone J. Beasley 8/10/04
HIGH VOLTAGE ELECTRICAL	Yes			S.A. 8-10-04
FIRE ALARM ZZ	Yes	Yes		8-9-04 MH
GROUNDING ZZ	N/A			8-6-04 BL
NATURAL GAS 8/23 0408033044	YES	YES		8-5-04 RKH
SECURITY ALARM ZZ	NA			8-9-04 MH
SEWER MW 8/11/04	Yes	yes		8-4-03 - MJ
STEAM ZS	N/A			8-3-04
TELEPHONE Faxed 8/2/04	Yes	Yes		8-3-04
WATER MW 8/11/04	Yes	yes		8-4-03 - MJ
SECOND ELECTRICAL ZZ	N/A			8-6-04 BL
GENERAL DYNAMICS/NMCI Faxed 8/2/04	N/A	N/A		8-11-04

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE: Terry Lopez	DATE: 8/11/04
DIGGING PERMIT APPROVED BY: Donna L. Zollmann	DATE: 8/11/04

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

APPENDIX B.3.1
SWMU 16
MONITORING WELL MATERIALS
CERTIFICATES OF CONFORMANCE
ROUND 1

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	16MWT01	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 16 CAST HIGH	Drilling Company:	BOWSER MORNER
Date Installed:	4/8/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	16MWT02	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 16 CAST HIGH	Drilling Company:	BOWSER MORNER
Date Installed:	4/11/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow, Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	16MWT03	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 16 CAST HIGH	Drilling Company:	BOWSER MORNER
Date Installed:	4/10/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow, Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	16MWT04	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 16 CAST HIGH	Drilling Company:	BOWSER MORNER
Date Installed:	4/9/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow, Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	16MWT05	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 16 CAST HIGH	Drilling Company:	BOWSER MORNER
Date Installed:	4/9/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	No
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow, Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	16MWT06	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 16 CAST HIGH	Drilling Company:	BOWSER MORNER
Date Installed:	4/24/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

APPENDIX B.3.2
SWMU 16
MONITORING WELL MATERIALS
CERTIFICATES OF CONFORMANCE
ROUND 2

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT07
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/11/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred Ullauer FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT08
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/09/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JOHN KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT09
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/08/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred Ullauser FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT10
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/09/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred W Rauser FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT11
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/11/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT12
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/07/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred Ullander FOR MATT C.

Tetra Tech NUS, Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT13
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/11/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred Ullauser FOR MATT C.

Tetra Tech NUS, Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT14
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/07/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Ramsey FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT15
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/09/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred A Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT16
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/09/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: [illegible] FOR MATT C.

Tetra Tech NUS, Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT17
Site Name: SWMU 16 CAST HIGH
Date Installed: 11/08/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Greg M. Lauser FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 16MWT18
Site Name: SWMU 16 CAST HIGH
Date Installed: 01/18/04
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JOE McCLOUD
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred Ramser

APPENDIX B.3.3
SWMU 16
MONITORING WELL MATERIALS
CERTIFICATES OF CONFORMANCE
ROUND 3

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: 16 MW T 21, 20, 19
Site Name: SWMU 16
Date Installed: AUG - SEPT 2004
Project Name: NSWC CRANE

Site Geologist: CONTI
Drilling Company: BOWSER-MORNER
Driller: J. WALSH
Project Number: N7448

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	JOHNSON PVC - 2"	GLOBAL WELL SUPPLIES	N
Well Screen	" PVC - 10 SLOT 2"	"	N
End Cap	" PVC	"	N
Drilling Fluid	POTABLE WATER	BLDG 3245	Y
Drilling Fluid Additives	NA	—	—
Backfill Material	NA	—	—
Annular Filter Pack	GLOBAL FILTER PACK # 5	GLOBAL WELL SUPPLIES	N
Bentonite Seal	CETCO PURE GOLD MED CHIPS	" " "	N
Annular Grout	PORTLAND CEMENT	" " "	N
Surface Cement	SAKRETE (CONCRETE MIX)	LOWES	N
Protective Casing	STEEL 6" SQUARE PIPE	GLOBAL WELL SUPPLIES	N
Paint	HIGHWAY YELLOW	LOWES	N
Rod Lubricant	NA	—	—
Compressor Oil	NA	—	—

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: SJ Conti

APPENDIX C
SWMU 16
SAMPLE LOG SHEETS AND OTHER FIELD FORMS
ROUND 1, ROUND 2, ROUND 3

APPENDIX C.1.1
SWMU 16
SOIL SAMPLE LOG SHEETS
ROUND 1

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 01 0002
Sample Location: 16SB 01
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0959

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 845 Method: DPT Monitor Reading (ppm): 1.7	0 - 2'	GREY BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 010406
Sample Location: 16SB
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 959

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 0900 Method: DPT Monitor Reading (ppm): 1.7	4-6'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/No	
VOCs (8015B)	(2) Encore Samplers	Yes/No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	TK - Yes/No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	TK - Yes/No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Terry Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 02 0002
Sample Location: 16SB 02
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0959

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 905 Method: DPT Monitor Reading (ppm): 1.7	0 - 2'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 020406
Sample Location: 16SB 02
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0959

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 915 Method: DPT Monitor Reading (ppm): 1.7	4'-6'	BROWN	SILTY SAND, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 030002
Sample Location: 16SB 03
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0959

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 940 Method: DPT Monitor Reading (ppm): 1.7	0 - 2'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 04 0002
Sample Location: 16SB 04
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0959

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 1000 Method: DPT Monitor Reading (ppm): 1.7	0 - 2'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

T. Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 05 0002
Sample Location: 16SB 05
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0960

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 1035 Method: DPT Monitor Reading (ppm): 1.7	0 - 2'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 060002
Sample Location: 16SB 06
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0959 & 0962

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-27-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1055	0 - 2'	BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 1.7			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. DS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 07 0002
Sample Location: 16SB 07
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0959 & 0962

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 1100 Method: DPT Monitor Reading (ppm): 1.7	0 - 2'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No: PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Terry Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 08 0002
Sample Location: 16SB 08
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0959 & 0962

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 1330 Method: DPT Monitor Reading (ppm): 1.7	0 - 2'	BROWN	SILTY SAND, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Terry Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 09 0002
Sample Location: 16SB 09
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0959 & 0962
Dup - 0960

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-27-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1355	0 - 2'	RED BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 1.6			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD0327 0301

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 10 0002
Sample Location: 16SB 10
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0960 & 0962

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-27-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1400	0 - 2'	RED BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 1.6			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 11 0002
Sample Location: 16SB 11
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0960 & 0962

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 1515 Method: DPT Monitor Reading (ppm): 1.5	0 - 2'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 11 0204
Sample Location: 16SB 11 0 [illegible]
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0960

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-27-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1520	2-4'	RED BROWN	CLAYEY SILT
Method: DPT			
Monitor Reading (ppm): 1.5			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 12 0002
Sample Location: 16SB 12
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0972 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 820 Method: DPT Monitor Reading (ppm): 0	0 - 2'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 12 0204
Sample Location: 16SB 12
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0972

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 0825 Method: DPT Monitor Reading (ppm): 0	2-3.5'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 13 0002
Sample Location: 16SB 13
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0972 & 0967

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 800 Method: DPT Monitor Reading (ppm): 0	0 - 2'	DARK BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Taylor

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 130204
Sample Location: 16SB 13
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0972

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 805 Method: DPT Monitor Reading (ppm): 0	2-3.5'	DARK BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 14 0002
Sample Location: 16SB 14
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0960 & 0962

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-27-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1500	0 - 2'	BROWN	CLAYEY SILT
Method: DPT			
Monitor Reading (ppm): 1.6			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 15 0002
Sample Location: 16SB 15
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0960 E 0962

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-27-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1440	0 - 2'	DARK BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 1.6			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD ✓

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 16 0002
Sample Location: 16SB 16
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0960 & 0962

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-27-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1415	0 - 2'	L BROWN	CLAYEY SILT DAMP
Method: DPT			
Monitor Reading (ppm): 1.5			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 17 0002
Sample Location: 16SB 17
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0960 & 0962

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-27-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1540 Method: DPT Monitor Reading (ppm): 1.5	0 - 2'	REDDISH BROWN	CLAYEY SILT

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD0327030Z

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 170204
Sample Location: 16SB 17
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0960

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 1545 Method: DPT Monitor Reading (ppm): 1.5	2-4'	RED BROWN	SHALY SILTSTONE, WEATHERED

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 18 0002
Sample Location: 16SB 18
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0961 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1030 Method: DPT Monitor Reading (ppm): 0	0 - 2'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 180203
Sample Location: 16SB 18
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0961

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1035 Method: DPT Monitor Reading (ppm): 0	2-3'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Taylor

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 19 0002
Sample Location: 16SB 19
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0961 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1040 Method: DPT Monitor Reading (ppm): 0	0 - 2'	GREY BROWN	CLAYEY SILT

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Terry Rojah

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 190203
Sample Location: 16SB 19
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0961

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1045 Method: DPT Monitor Reading (ppm): 0	2-3'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 20 0002
Sample Location: 16SB 20
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0981E0971

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1140	0 - 2'	GREY BROWN	CLAYEY SILT + GRAVEL
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Terry Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 21 0002
Sample Location: 16SB 21
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0961 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1100			DAMP
Method: DPT	0 - 2'	BROWN	CLAYEY SILT + GRAVEL
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Terry Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 22 0002
Sample Location: 16SB 22
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0972 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 910	0 - 2'	DARK BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/No	
VOCs (8015B)	(2) Encore Samplers	Yes/No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

Soil Group No.: PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 220203
Sample Location: 16SB 22
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0972

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 915 Method: DPT Monitor Reading (ppm): 0	2-3'	LIGHT BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 23 0002
Sample Location: 16SB 23
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0961 & 0967 DUP 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1000 Method: DPT Monitor Reading (ppm): 0	0 - 2'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/No	
VOCs (8015B)	(2) Encore Samplers	Yes/No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: FD 0328 0301

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 230203
Sample Location: 16SB 23
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0961 & 0951 (pap)

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1005 Method: DPT Monitor Reading (ppm): 0	2'-3'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD 03280302

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 240002
Sample Location: 16SB 24
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0961 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 940	0 - 2'	RED BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020); Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 240203
Sample Location: 16SB 24
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0961

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 945 Method: DPT Monitor Reading (ppm): 0	2-3'	RED BROWN	CLAYEY SILT, DAMP.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Terry Lopat

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 250002
Sample Location: 16SB 25
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0972 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 930	0 - 2'	RED BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 250203
Sample Location: 16SB 25
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0961

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 935 Method: DPT Monitor Reading (ppm): 0	2-3'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 26 0002
Sample Location: 16SB26
Sampled By: ~~M. Cochran~~/ T. Rojahn/ B. Balkovic
C.O.C. No.: 0986 & 0985

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 4/9/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1038	0 - 2'	BROWN + YELLOW ORANGE	CLAY + SILTY SAND W/ S.S. FRAGS
Method: ~~DPT~~ RUTSONDE			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) (3) Encore Samplers	(Yes)/No	
VOCs (8015B)	(3) (2) Encore Samplers	(Yes) No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	~~(3)~~ (7) (1) 8oz. Glass Jar	Yes/(No)	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(3) (1) 8oz. Glass Jar	(Yes) No	
Metals (6020) & Hg (7471A)	(3) (1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes (No)	
Dioxins/Furans	(1) _oz. Glass Jar	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PS - 3

MAP:

See Figure 3-3 in the QAPP

Circle If Applicable:

MS/MSD ALL

Duplicate ID No.: ALL
FD04090302

Signature(s):

Robert Balkovic

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 260204
Sample Location: 16SB 26
Sampled By: ~~M. Cochran~~ / T. Rojahn / R. Falkove
C.O.C. No.: 0986

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/9/03	2'-4'	YELLOW & LT. GRAY	SILTY SAND W/ SS. FRAGS
Time: 0945			
Method: ~~DPT~~ PUROSONIC			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/No	
VOCs (8015B)	(2) Encore Samplers	Yes/No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

Soil Group No. PBS-9

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.: FD040903 03

Signature(s):

Robert Falkove

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 27 0002
Sample Location: 16SB 27
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0961 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1120	0 - 2'	BROWN	DAMP CLAYEY SILT W/ RK FRAGS
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 27 0203
Sample Location: 16SB 27
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0961

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03			
Time: 1125			
Method: DPT	2-3'	BROWN	CLAYEY SILT, DAMP
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 28 0002
Sample Location: 16SB 28
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0961 & 0971

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1130	0 - 2'	BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 280205
Sample Location: 16SB 28
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1135 Method: DPT Monitor Reading (ppm): 0	2-3'	BROWN	SANDY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 29 0002
Sample Location: 16SB 29
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0972 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 900	0 - 2'	RED BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 290203
Sample Location: 16SB 29
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0972

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 905 Method: DPT Monitor Reading (ppm): 0	2-3'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 30 0002
Sample Location: 16SB 30
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0972 & 0967

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-28-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 840	0 - 2'	RED BROWN	CLAYEY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP.

Circle if Applicable:

MS/MSD ____ Duplicate ID No.: ____

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 30 0203
Sample Location: 16SB 30
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0972

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 845 Method: DPT Monitor Reading (ppm): 0	2-3'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 31 0002
Sample Location: 16SB 31
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0972 & 0967

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 830 Method: DPT Monitor Reading (ppm): 0	0 - 2'	RED BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 32 0002
Sample Location: 16SB 32
Sampled By: M. Cochran/ T. Rojahn/B.B. Hoover
C.O.C. No.: 0986 & 0985

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/9/03 Time: 1015 Method: ~~DPT~~ Row Sonde Monitor Reading (ppm): 0.0	0 - 2'	BROWN	CLAY

COMPOSITE SAMPLE DATA:

Date:	Time:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes No	
VOCs (8015B)	(2) Encore Samplers	Yes No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082) Dup on PCBs ONLY	(1) 8oz. Glass Jar	Yes No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	F004090301 on PCBs only

Signature(s): Robert Bellmore

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 32 0204
Sample Location: 16SB 32
Sampled By: M. Cochran / T. Rojahn / B. Balkovec
C.O.C. No.: 0986

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/9/03 Time: 1020 Method: ~~DPT~~ Low Surface Monitor Reading (ppm): 10.0	2'-4'	Brown L-Gray	Sandy Clay

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/No	
VOCs (8015B)	(2) Encore Samplers	Yes/No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

Soil Group No. PBC-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert Balkovec

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SS 33 0002
Sample Location: 16SB 33
Sampled By: M. Cochran/T. Rojahn B. Blankovec
C.O.C. No.: 0986 & 0985

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 4/9/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1000	0 - 2'	BROWN + YELLOW ORANGE	CLAY + SILTY SAND W/ S.S FRAGS
Method: ~~DPT~~ ROTOSONIC			
Monitor Reading (ppm): 0-0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/No	
VOCs (8015B)	(2) Encore Samplers	Yes/No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Beltrey

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 330204
Sample Location: 16SB 33
Sampled By: M. Cochran / T. Rojahn / B Balkovec
C.O.C. No.: 0986

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/9/03 Time: 1005 Method: ~~DPT~~ RotoSonic Monitor Reading (ppm): 0.0	2'-4'	Yellow Orange	Silty Sand w/ S.S Frags

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBS-9

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 34 0002
Sample Location: 16SB 34
Sampled By: M. Cochran/ T. Rojahn / B Balkovec
C.O.C. No.: 0986

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: ~~4/4/03~~ 4/9/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0447	0 - 2'	BR + YELLOW ORANGE	CLAY + SILTY SAND. W/S.S FRAGS
Method: DPT Power Screw			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	(Yes) No	
VOCs (8015B)	(2) Encore Samplers	(Yes) No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	(Yes) No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes) No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes (No)	
Dioxins/Furans	(1) _oz. Glass Jar	Yes (No)	

OBSERVATIONS / NOTES:

Soil Group No. PS / [redacted] - 3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 340203
Sample Location: 16SB 34
Sampled By: M. Cochran / T. Rojahn / B Balkovic
C.O.C. No.: 0986

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 4/9/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0953	2'-3'	YELLOW ORANGE	SILTY SAND W/ S.S. FRAGS
Method: ~~DPT~~ PUROSONIC			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/No	
VOCs (8015B)	(2) Encore Samplers	Yes/No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

Soil Group No. PBS-9

MAP:

See Figure 3-3 in the QAPP

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovic

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 35 0002
Sample Location: 16SB 35
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1440 Method: DPT Monitor Reading (ppm): 0	0 - 2'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 36 0002
Sample Location: 16SB 36
Sampled By: M. Cochran/ T. Rojahn/B. Bankovich
C.O.C. No.: 0936

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/8/03 Time: 0930 Method: ~~DPT~~ Roto Sonic Monitor Reading (ppm): 0-0	0 - 2'	BROWN	CLAY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	(Yes) No	
VOCs (8015B)	(2) Encore Samplers	(Yes) No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	(Yes) No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes) No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes (No)	
Dioxins/Furans	(1) _oz. Glass Jar	Yes (No)	

OBSERVATIONS / NOTES:

Soil Group No. PS - 3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Bellhouse

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB36-0203
Sample Location: 16SB36
Sampled By: M. Cochran / T. Rojahn / B. DALHOVER
C.O.C. No.: 0986

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/9/03 Time: 0940 Method: ~~DPT~~ RUTOSONIC Monitor Reading (ppm): 0.0	2'-3'	YELLOW ORANGE	SILTY SAND W/ S.S FRAGMENTS

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBS-9

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Robert Balkura

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 37 0002
Sample Location: 16SB 37
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1435 Method: DPT Monitor Reading (ppm): 0	0 - 2'	DARK BROWN	DAMP CLAYEY SILT + GRAVEL

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 38 0002
Sample Location: 16SB 38
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1410 Method: DPT Monitor Reading (ppm): 0	0 - 2'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 380203
Sample Location: 16SB 38
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03			
Time: 1415			
Method: DPT			
Monitor Reading (ppm): 0	2-3'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 39 0002
Sample Location: 16SB 39
Sampled By: M. Cochran/ T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1400 Method: DPT Monitor Reading (ppm): 0	0 - 2'	BROWN	CLAYEY SILT + GRAVEL FRAGS. DAMP

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 3 90203
Sample Location: 16SB 39
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1405 Method: DPT Monitor Reading (ppm): 0	2-3'	BROWN	CLAYEY SILT

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 400506
Sample Location: 16SB 40
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1340 Method: DPT Monitor Reading (ppm): 0	5-6	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 40 06 08
Sample Location: 16SB 40
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0981

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-28-03 Time: 1345 Method: DPT Monitor Reading (ppm): 0	6-8	BROWN	CLAYEY SILT, MOIST

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD032803 03

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SB 41 0305
Sample Location: 16SB 41
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0959

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 1010 Method: DPT Monitor Reading (ppm): 1.7	3-5'	BROWN	CLAYEY SILT, DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/ No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/ No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 410507
Sample Location: 16SB 41
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0959

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 3-27-03 Time: 1015 Method: DPT Monitor Reading (ppm): 1.7	5-7'	BROWN	CLAYEY SILT, MOIST

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/No	
VOCs (8015B)	(2) Encore Samplers	Yes/No	
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
SVOCs (8270C, SIM & 8151A), Explosives (8330 & Picrates) & PCBs (8082)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC & pH	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Figure 3-3 in the QAPP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

APPENDIX C.1.2
SWMU 16
SOIL SAMPLE LOG SHEETS
ROUND 2

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16 SS 420002
Sample Location: SWMU 16
Sampled By: SG + TR
C.O.C. No.: 4829

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03			
Time: 1155	0-2'	LT. BR/GREY	SILTY ~~SANDY~~ CLAY, 50% SILT ~~50% FINE SAND~~ W/ FILL MATRL + ORGANIC DEBRIS
Method: HAND AUGER			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0-1'	BLACK/BR	BLACK DETRITUS MTRL W/BR LOAN (SANDY)
NA		1'-2'	LT. BR/GREY	SILTY ~~SANDY~~ CLAY, 50% FINE SAND
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Hg (7471A)	(1) 4oz Jar	YES	
Volatiles SW-846 8260B	(3) Encore Samplers	—	
Volatiles SW-846 8015B	(3) Encore Samplers	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Scott Brin

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type: MS/MSD

Sample ID No.: 16SS430002
Sample Location:
Sampled By: SG+TR
C.O.C. No.: 4829

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03			
Time: 1210	0'-2'	LT. BR/BLACK	~~SANDY~~ SILTY CLAY W/ ~~SILT~~ TRACE SAND + ORGANIC MATTER
Method: HAND AUGER			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0'-1'	BLACK	~~SANDY~~ SILTY LOAM + ORGANIC DETRITUS
NA		1'-2'	LT. BR	~~SANDY~~ SILTY CLAY, WET + COHESIVE
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Hg (7471A)	(1) 4oz Jar	YES	
Volatiles SW-846 8260B	(3) Encore Samplers	—	
Volatiles SW-846 8015B	(3) Encore Samplers	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Scott Brian

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16 SS 440002
Sample Location: SWMU 16
Sampled By: SG + TR
C.O.C. No.: 4829

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03			
Time: 1225	0-2	BR	SILTY CLAY, MOIST + COHESIVE
Method: HAND AUGER			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0-1'	BLACK	SILTY LOAM W/ ORGANIC MATTER
NA		1-2'	BR	SILTY CLAY, 40% SILT
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Hg (7471A)	(1) 4oz Jar	YES	
Volatiles SW-846 8260B	(3) Encore Samplers	—	
Volatiles SW-846 8015B	(3) Encore Samplers	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): S. Grier

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16 SS 450002
Sample Location: SWMU 16
Sampled By: SG+TR
C.O.C. No.: 4829

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03			
Time: 1237	0'-2'	LT. BR/GREY/BL	SILTY CLAY W/ORGANIC DETRITUS MAT'RL + FILL.
Method: HAND AUGER			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0'-1'	BLACK	DETRITUS + SILTY LOAM
NA		1'-2'	LT. BROWN/GR	SILTY CLAY W/ FILL MAT'RL
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Hg (7471A)	(1) 4oz Jar	YES	
Volatiles SW-846 8260B	(3) Encore Samplers	—	
Volatiles SW-846 8015B	(3) Encore Samplers	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.: 16FD12050302

Signature(s): Scott Brin

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16 SS 46 0002
Sample Location: SWMU 16
Sampled By: SG + TR
C.O.C. No.: 4829

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03			
Time: 1255	0'-2'	BLK/BR/GREY	SILTY CLAY W/ ORGANIC DETRITIS MAT'RL + FILL MAT'RL
Method: HAND AUGER			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0-1'	BLACK/GR	ORGANIC DETRITIS W/ SILTY CLAY
NA		1'-2'	LT. BR/GR	SILTY CLAY W/ FILL
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Hg (7471A)	(1) 4oz Jar	YES	
Volatiles SW-846 8260B	(3) Encore Samplers	—	
Volatiles SW-846 8015B	(3) Encore Samplers	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Scott Grier

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

Sample ID No.: 16SB470405
Sample Location: SWMU 16
Sampled By: SG+TR
C.O.C. No.: 4829

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03			
Time: 0940	04-05	LT BR/GR	SILTY CLAY 60-70% clay w/ TRACE GRAVEL + ORGANIC DETRITIS WET + COHESIVE
Method: HAND AUGER			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0'-1'	GREY	GRAVEL + SANDY LOAM
NA		1'-5'	LT.BR./GR	SILTY CLAY w/TRACE GRAVEL+ORGANICS
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020	(1) 4oz Jar	—	
Volatiles SW-846 8260B	(3) Encore Samplers	YES	
Volatiles SW-846 8015B	(3) Encore Samplers	YES	

OBSERVATIONS / NOTES:

STANDING WATER IN HOLE

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Scott Sirin

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16 SB 480203
Sample Location: 16 SWMU
Sampled By: SG + TR
C.O.C. No.: 4829

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03			
Time: 1015	02'-03'	LT BR./GREY	SILTY CLAY, 70% clay w/ TRACE GRAVEL + ORGANICS WET + COHESIVE
Method: HAND AUGER			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0'-1'	GREY	GRAVEL + SANDY LOAM
NA		02'-03'	LT. BR./GR.	SILTY CLAY w/ TRACE GRAVEL + ORGANICS
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020	(1) 4oz Jar	—	
Volatiles SW-846 8260B	3X (3) Encore Samplers	YES	
Volatiles SW-846 8015B	3X (3) Encore Samplers	YES	

OBSERVATIONS / NOTES:

WATER STANDING IN HOLE

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Scott Grier

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB490405
Sample Location: 16 SWMU
Sampled By: SG + TR
C.O.C. No.: 4829

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03	04'-05'	LT BR./GR	SILTY CLAY 70% clay w/ TRACE GRAVEL + ORGANICS
Time: 1050			
Method: HAND AUGER			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0'-1'	GREY	GRAVEL + SANDY LOAM
NA		1'-5'	LT. BR./GR	SILTY CLAY W/TRACE GRAVEL+ORGANICS
Monitor Readings				WET + COHESIVE
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020	(1) 4oz Jar	—	
Volatiles SW-846 8260B	(3) Encore Samplers	Yes	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes	

OBSERVATIONS / NOTES:

STANDING WATER IN HOLE

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Scott Brei

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB500103
Sample Location: 16SWMU
Sampled By: SG+TR
C.O.C. No.: 4829

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/5/03			
Time: 1115	01'-03'	LT. BR./GR.	SILTY CLAY - 70% clay w/ TRACE GRAVEL + ORGANICS WET + COHESIVE
Method: HAND AUGER			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:		0'-1'	GREY	GRAVEL + SANDY LOAM
NA		1'-3'	LT. BR./GR	SILTY CLAY - TRACE GRAVEL + ORGANICS
Monitor Readings				MOIST + COHESIVE
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020	(1) 4oz Jar	—	
Volatiles SW-846 8260B	(3) Encore Samplers	YES	
Volatiles SW-846 8015B	(3) Encore Samplers	YES	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: 16FD12050301

Signature(s): Scott Grier

APPENDIX C.1.3
SWMU 16
SOIL SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS1Φ1Φ2
Sample Location: 16SB S1
Sampled By: CCL/JG
C.O.C. No.: 0068

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Φ4 Time: 1Φ3Φ Method: Disposable Trowel Monitor Reading (ppm): Φ.6	1-2'	ORANGE BROWN MOTTLED GRAY	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Chris C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB51Ø2Ø4
Sample Location: 16SB 51
Sampled By: CCL/JG
C.O.C. No.: 0068

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: 1Ø33 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	2-4'	ORANGE BROWN MOTTLED GRAY	CLAY W/ SILT STONE.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS52Ø1Ø2
Sample Location: 16SB 52
Sampled By: CCL/JG
C.O.C. No.: 0065

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1515 Method: Disposable Trowel Monitor Reading (ppm): Ø	1-2'	Orange Brown	Sandy CLAY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (8) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chuck C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB52Ø2Ø5
Sample Location: 16SB 52
Sampled By: CCL/JG
C.O.C. No.: 0065

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/04 Time: 152Ø Method: Disposable Trowel Monitor Reading (ppm): Ø.7	2-5'	Light Orange Brown	Very Fine SAND with some compacted SAND lenses.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Gaddis III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS53Φ102
Sample Location: 16SB 53
Sampled By: CCL / JG
C.O.C. No.: 0065

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/04 Time: 1528 Method: Disposable Trowel Monitor Reading (ppm): Φ	1-2'	Brown	SILT.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chris C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 53Ø2Ø5
Sample Location: 16SB 53
Sampled By: CCL/JG
C.O.C. No.: 0065

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/04 Time: 1531 Method: Disposable Trowel Monitor Reading (ppm): Ø.3	2-5'	ORANGE BROWN TO GRAY	CLAY w/ Some SILTY SAND.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Andre C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS54Ø1Ø2
Sample Location: 16SB54
Sampled By: CL/JTG
C.O.C. No.: 0068

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: 1Ø5Ø Method: Disposable Trowel Monitor Reading (ppm): 1.3	1-2'	ORANGE BROWN MOTTLED GRAY	Sandy CLAY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Tyson III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB54Ø2ØS
Sample Location: 16SB 54
Sampled By: ecl / JG
C.O.C. No.: 0068

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/04 Time: 1059 Method: Disposable Trowel Monitor Reading (ppm): 1.1	2-5'	ORANGE BROWN MOTTLED GRAY	CLAY w/ COMPACTED SAND LENSES + SOME SILTSTONE

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes)/No	3x3=9
Volatiles SW-846 8015B	2 (4) Encore Samplers	(Yes)/No	3x2=6
Percent Moisture	(1) 4oz Jar	(Yes)/No	1
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MS/MSD Collected.

MAP:

See Figure 3-2

Circle if Applicable:

(MS/MSD)

Duplicate ID No.:

Signature(s):

Clark C. Smith III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS55Φ1Φ2
Sample Location: 16SB55
Sampled By: CCL/JG
C.O.C. No.: 0065

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Φ4 Time: 1545 Method: Disposable Trowel Monitor Reading (ppm): Φ.3	1-2'	Orange Brown	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B55Ø2Ø6
Sample Location: 16SB 55
Sampled By: CCL / JG
C.O.C. No.: 0065

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1548 Method: Disposable Trowel Monitor Reading (ppm):	2-6'	Light orange Brown	Silty SAND w/ compacted SAND lenses and trace CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 (●) Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Carl C. Griffith

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB55Ø6Ø7
Sample Location: 16SB 55
Sampled By: CLL/JG
C.O.C. No.: 0065

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1555 Method: Disposable Trowel Monitor Reading (ppm): Ø.7	6-7'	Light Orange Brown	SILT with Some compacted SAND lenses.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Lyle III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS56Ø1Ø2
Sample Location: 16SB 56
Sampled By: CCL / JG
C.O.C. No.: 0065

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 16ØØ Method: Disposable Trowel Monitor Reading (ppm): Ø.4	1-2'	Brown	Sandy CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (●) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB56Φ2Φ6
Sample Location: 16SB 56
Sampled By: CCL/JG
C.O.C. No.: 0066

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Φ4 Time: 16Φ3 Method: Disposable Trowel Monitor Reading (ppm): Φ.4	2-6'	Brown	Silty CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

ircle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Chuck C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B 56 0608
Sample Location: 16SB 56
Sampled By: CCL / JG
C.O.C. No.: 0066

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/12/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1615	6-8'	Orange Brown	Sandy CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): 8.2			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS57Ø1Ø2
Sample Location: 16SB 57
Sampled By: CCL / JG
C.O.C. No.: 0067

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: 1Ø1Ø Method: Disposable Trowel Monitor Reading (ppm): Ø.9	1-2'	Light Orange Brown Mottled Gray	Clayey SAND w/ Some Black Colored organic Matter.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chuck C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB57Ø2Ø6
Sample Location: 16SB 57
Sampled By: CCL/JG
C.O.C. No.: 0068

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: 1Ø13 Method: Disposable Trowel Monitor Reading (ppm): Ø.3	2-6'	ORANGE BROWN MOTTLED GRAY	CLAY w/ SILT and compacted SAND lenses & Black colored organic matter.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Andrew C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS 58Φ1Φ2
Sample Location: 16SB 58
Sampled By: CCL / JG
C.O.C. No.: 0067

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Φ4 Time: Φ938 Method: Disposable Trowel Monitor Reading (ppm): Φ	1-2'	ORANGE BROWN MOTTLED GRAY	SANDY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Clark C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB58Ø2Ø6
Sample Location: 16SB 58
Sampled By: CCL/JG
C.O.C. No.: 0067 & 0068

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: Ø941 Method: Disposable Trowel Monitor Reading (ppm): 1.1	2-6'	ORANGE BROWN MOTTLED GRAY	SILTY CLAY, Some SAND & Black colored organic Matter.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	3x2=6
Volatiles SW-846 8015B	2 (2) Encore Samplers	Yes/No	2x2=4
Percent Moisture	(1) 4oz Jar	Yes/No	1x2=2
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

Duplicate Sample Obtained Here

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: 16FDØ813Ø4-Ø1

Signature(s):

Charles C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 58 0607
Sample Location: 16SB 58
Sampled By: CCL/JG
C.O.C. No.: 0067

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/04 Time: 1001 Method: Disposable Trowel Monitor Reading (ppm): 1.6	6-7'	Light Gray Mottled Orange Brown	SILT w/ SILTSTONE.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes)/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	(Yes)/No	
Percent Moisture	(1) 4oz Jar	(Yes)/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/(No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS59Ø1Ø2
Sample Location: 16SB 59
Sampled By: CCL / JG
C.O.C. No.: 0067

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: Ø846 Method: Disposable Trowel Monitor Reading (ppm): 1.Ø	1-2'	Light Brown	Sandy CLAY w/ Gravels.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB59Ø2Ø6
Sample Location: 16SB 59
Sampled By: CCL / JG
C.O.C. No.: 0067

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: Ø851 Method: Disposable Trowel Monitor Reading (ppm): Ø1.4	2-6'	Light Gray mottled Orange Brown	Silty CLAY w/ Some SAND,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Rick C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB59Ø6Ø8
Sample Location: 16SB 59
Sampled By: CCL / JG
C.O.C. No.: 0067

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: Ø9ØØ Method: Disposable Trowel Monitor Reading (ppm): 1.4	6-8'	Light Gray mottled Orange Brown	SILT w/ Trace SAND & Some Gravels.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Carla C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS60Ø1Ø2
Sample Location: 16SB 6Ø
Sampled By: CCL / JG
C.O.C. No.: 0062

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 16Ø5 Method: Disposable Trowel Monitor Reading (ppm): Ø	1-2'	Olive Gray mottled Orange Brown	CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Griffith III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 60062
Sample Location: 16SB 60
Sampled By: CCL/JG
C.O.C. No.: 0062

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/04 Time: 1616 Method: Disposable Trowel Monitor Reading (ppm): 0.0	2-6'	Olive Gray Mottled Orange Brown	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB06Ø6Ø9
Sample Location: 16SB 6Ø
Sampled By: CCL/JG
C.O.C. No.: 0062

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 1622 Method: Disposable Trowel Monitor Reading (ppm): Ø	6-9'	Orange Brown Mottled Gray	Silty CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS61Ø1Ø2
Sample Location: 16SB61
Sampled By: CCL/JG
C.O.C. No.: 0060

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/11/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1537	1-2'	Orange Brown mottled Gray	CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): Ø			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (2) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB61Ø2Ø6
Sample Location: 16SB 61
Sampled By: CCL / JG
C.O.C. No.: 0060

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 1545 Method: Disposable Trowel Monitor Reading (ppm): Ø	2-6'	Brown	Silty Clay.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 (Ø) Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB61Ø6Ø7
Sample Location: 16SB 61
Sampled By: CCL / JG
C.O.C. No.: 0062

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 155Ø Method: Disposable Trowel Monitor Reading (ppm): Ø	6-7'	Brown	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS62Φ1Φ2
Sample Location: 16SB62
Sampled By: CCL/JG
C.O.C. No.: 0067

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Φ4 Time: Φ912 Method: Disposable Trowel Monitor Reading (ppm): Φ	1-2'	ORANGE BROWN MOTTLED GRAY	SANDY CLAY, SOFT.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Jr III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB62Ø2Ø6
Sample Location: 16SB 62
Sampled By: CCL / JG
C.O.C. No.: 0067

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: Ø917 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	2-6'	Orange Brown mottled Gray	Silty CLAY w/ Some SAND.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Mark C. Ryan III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB62Ø6Ø7
Sample Location: 16SB 62
Sampled By: CCL/JG
C.O.C. No.: 0067

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/13/Ø4 Time: Ø923 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	6-7'	Dark Orange Brown	Silty CLAY & Siltstone w/ Some Red colored Rocks.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SSS63Ø1Ø2
Sample Location: 16SB 63
Sampled By: CCL / JG
C.O.C. No.: 0060

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 1456 Method: Disposable Trowel Monitor Reading (ppm): Ø	1-2'	Orange Brown Mottled Gray.	Sandy CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ingram III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B63Ø2Ø6
Sample Location: 16SB 63
Sampled By: CCL / JG
C.O.C. No.: 0060

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø6 Time: 15Ø8 Method: Disposable Trowel Monitor Reading (ppm): Ø	2-6'	Orange Brown mottled Gray	Silty CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Clark C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B63Ø6Ø8
Sample Location: 16SB 63
Sampled By: CCL / JG
C.O.C. No.: 0060

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/04 Time: 1517 Method: Disposable Travel Monitor Reading (ppm): Ø	6-8'	Orange Brown Mottled Gray	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (~~1~~) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16S S64Ø1Ø2
Sample Location: 16SB 64
Sampled By: CCL / JG
C.O.C. No.: 0060

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/11/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1423	1-2'	Orange Brown mottled Gray	Silty SAND w/ some CLAY & Gravels.
Method: Disposable Trowel			
Monitor Reading (ppm): Ø			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (2) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Lee III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB64Ø2Ø6
Sample Location: 16SB64
Sampled By: CCL/JG
C.O.C. No.: 0060

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 1435 Method: Disposable Trowel Monitor Reading (ppm): Ø	2-6'	Brown mottled Gray	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (2) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Cox III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16S S 65 Ø 1Ø2
Sample Location: 16SB 65
Sampled By: CCL / JG
C.O.C. No.: 0060

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 1348 Method: Disposable Trowel Monitor Reading (ppm): Ø.4	1-2'	Orange Brown	Clayey SAND.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Tyndall

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB64Ø6Ø8
Sample Location: 16SB 64
Sampled By: CCL/JG
C.O.C. No.: 0060

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 1441 Method: Disposable Trowel Monitor Reading (ppm): Ø	6-8'	Orange Brown	SAND w/ compacted SAND lenses.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS65Ø1Ø2
Sample Location: 16SB 65
Sampled By: CCL / JG
C.O.C. No.: 0060

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 1348 Method: Disposable Trowel Monitor Reading (ppm): Ø.4	1-2'	Orange Brown	Clayey SAND.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2(~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Tyler

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B6S0206
Sample Location: 16SB 65
Sampled By: CCL/JG
C.O.C. No.: 0060

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/04 Time: 1356 Method: Disposable Trowel Monitor Reading (ppm): 0.4	2-6'	Orange Brown mottled Gray	Sandy CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Arb C. Tr III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB65Ø6Ø8
Sample Location: 16SB 65
Sampled By: CCL / JG
C.O.C. No.: 0060

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/11/Ø4 Time: 14Ø5 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	6–8'	Orange Brown	SANDY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS66Φ1Φ2
Sample Location: 16SB 66
Sampled By: CCL/JG
C.O.C. No.: 0063

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/04 Time: Φ815 Method: Disposable Trowel Monitor Reading (ppm): 1.6	1-2'	Orange Brown Mottled Gray	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes)/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	(Yes)/No	
Percent Moisture	(1) 4oz Jar	(Yes)/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/(No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chuck C. [illegible] III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB66Ø2Ø6
Sample Location: 16SB 66
Sampled By: CCL/JG
C.O.C. No.: 0063

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: Ø823 Method: Disposable Trowel Monitor Reading (ppm): 2.5	2-6'	Orange Brown Mottled Gray	Silty CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB66Φ6Φ8
Sample Location: 16SB 66
Sampled By: CCL/JG
C.O.C. No.: 0063

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Φ4 Time: Φ828 Method: Disposable Trowel Monitor Reading (ppm):	6-8'	orange Brown	SILT w/ some compacted SAND Lenses.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Lee III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16S S67Ø1Ø2
Sample Location: 16SB 67
Sampled By: CCL / JG
C.O.C. No.: 0063

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: Ø912 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	1-2'	Orange Brown Mottled Gray	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB67Ø2Ø6
Sample Location: 16SB 67
Sampled By: CCL / JG
C.O.C. No.: 0063

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: Ø917 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	2-6'	ORANGE BROWN MOTTLED GRAY	SILTY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	3x3=9
Volatiles SW-846 8015B	2 (2) Encore Samplers	(Yes) No	3x2=6
Percent Moisture	(1) 4oz Jar	(Yes) No	1
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

MS/MSD Collected Here.

MAP:

See Figure 3-2

Circle if Applicable:

(MS/MSD)

Duplicate ID No.:

Signature(s):

Clark C. Jr III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 67 0609
Sample Location: 16SB 67
Sampled By: CCL/JG
C.O.C. No.: 0063

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/04 Time: 0936 Method: Disposable Trowel Monitor Reading (ppm): 0.6	6-9'	Orange Brown Mottled Gray	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Clark C. Smith III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16S S68 Ø1Ø2
Sample Location: 16SB 68
Sampled By: CCL/JG
C.O.C. No.: 0063

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: Ø842 Method: Disposable Trowel Monitor Reading (ppm): Ø.9	1-2'	Orange Brown mottled Gray	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 (●) Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chris C. [illegible] III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B 68 Ø2Ø6
Sample Location: 16SB 68
Sampled By: CCL / JG
C.O.C. No.: 0063 E
0066

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/12/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: Ø854	2-6'	Orange Brown mottled Gray	Silty CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): 1.7			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	3x2=6
Volatiles SW-846 8015B	2 (2) Encore Samplers	Yes/No	2x2=4
Percent Moisture	(1) 4oz Jar	Yes/No	1x2=2
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

Duplicate Sample Collected Here

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: 16FDØ812Ø4Ø1

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 68 0609
Sample Location: 16SB 68
Sampled By: CCL/JG
C.O.C. No.: 0063

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/04 Time: 0859 Method: Disposable Trowel Monitor Reading (ppm): 1.2	6-9'	Orange Brown Mottled Gray	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Gray III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[✓] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S569Ø1Ø2
Sample Location: 16SB 69
Sampled By: CCL / JG
C.O.C. No.: 0063

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: Ø946 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	1-2'	Orange Brown Mottled Gray	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (2) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Mark C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B69Ø2Ø6
Sample Location: 16SB 69
Sampled By: CCL/JG
C.O.C. No.: 0063

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: Ø954 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	2-6'	Orange Brown mottled Gray	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert C. Lyttle III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[✓] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB69Ø607
Sample Location: 16SB 69
Sampled By: CCL/JG
C.O.C. No.: 0063

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1ØØ7 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	6-7'	Orange Brown Mottled Gray	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Lyle III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS70Φ1Φ2
Sample Location: 16SB 7Φ
Sampled By: CCL/JG
C.O.C. No.: 0066

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Φ4 Time: 1427 Method: Disposable Trowel Monitor Reading (ppm): Φ	1-2'	Orange Brown mottled Gray	CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chak C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 70Ø2Ø6
Sample Location: 16SB 7Ø
Sampled By: CCL / JG
C.O.C. No.: 0066

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1435 Method: Disposable Trowel Monitor Reading (ppm): Ø	2-6'	Orange Brown mottled Gray	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (~~4~~) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Gy III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB70 0607
Sample Location: 16SB70
Sampled By: CLL/JG
C.O.C. No.: 0066

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/04 Time: 1440 Method: Disposable Trowel Monitor Reading (ppm): 0	6-7'	Light Orange Brown	Silty SAND w/ SILTSTONE

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Charles C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16S S71Ø1Ø2
Sample Location: 16SB 71
Sampled By: CCL / JG
C.O.C. No.: 0065

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1413 Method: Disposable Trowel Monitor Reading (ppm): Ø.4	1-2'	Orange Brown Mottled Gray	Sandy CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (2) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB71Ø2Ø6
Sample Location: 16SB 71
Sampled By: CCL/JG
C.O.C. No.: 0065

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1418 Method: Disposable Trowel Monitor Reading (ppm): Ø	2-6'	Dark Gray	Silty CLAY w/ trace organic materials

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chuck C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS72 0102
Sample Location: 16SB 72
Sampled By: CCL / JG
C.O.C. No.: 0064

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/04 Time: 1022 Method: Disposable Trowel Monitor Reading (ppm): 1.7	1-2'	Brownish Gray	CLAY w/ some Gravels,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB72Ø2Ø6
Sample Location: 16SB 72
Sampled By: CCL/JG
C.O.C. No.: 0064

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1Ø33 Method: Disposable Trowel Monitor Reading (ppm): 1.1	2-6'	Orange Brown	CLAY w/ a lot of SILT.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2(~~3~~) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B72Ø6Ø7
Sample Location: 16SB 72
Sampled By: CCL/JG
C.O.C. No.: 0064

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1Ø37 Method: Disposable Trowel Monitor Reading (ppm): Ø.5	6-7'	Orange Brown	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS73Ø1Ø2
Sample Location: 16SB 73
Sampled By: CCL / JG
C.O.C. No.: 0064

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1Ø46 Method: Disposable Trowel Monitor Reading (ppm): 2.8	1-2'	Brownish Gray	CLAY w/some Gravels,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clyde C. Griffith III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB73Φ2Φ4
Sample Location: 16SB 73
Sampled By: CCL/JG
C.O.C. No.: 0064

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Φ4 Time: 1Φ5Φ Method: Disposable Trowel Monitor Reading (ppm): 2.2	2-4'	Orange Brown	CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16S S74Ø1Ø2
Sample Location: 16SB 74
Sampled By: CCL / TD
C.O.C. No.: 0082
~~0082~~ (T4)

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/17/Ø4 Time: Ø816 Method: Hand Auger Monitor Reading (ppm): 4.7	1'-2'	Orange Brown	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	3x2=6
Volatiles SW-846 8015B	2 (3) Encore Samplers	(Yes) No	2x2=4
Percent Moisture	(1) 4oz Jar	(Yes) No	1x2=2
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

Duplicate Sample Taken Here.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD: —

Duplicate ID No.: 16FDØ817Ø4Ø1

Signature(s):

Charles C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B74Ø2Ø6
Sample Location: 16SB 74
Sampled By: CCL / TD
C.O.C. No.: 0082

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/17/Ø4 Time: Ø842 Method: Hand Auger Monitor Reading (ppm): 11.3	2'-6'	ORANGE BROWN SOME GRAY	SILTY CLAY w/ trace Rocks + SILTSTONE.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	3x3=9
Volatiles SW-846 8015B	2 (2) Encore Samplers	(Yes) No	3x2=6
Percent Moisture	(1) 4oz Jar	(Yes) No	1
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

MS/MSD Collected Here

MAP:

See Figure 3-2

Circle if Applicable:

(MS/MSD)

Duplicate ID No.:

Signature(s): Charles C. [illegible] III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS75Ø1Ø2
Sample Location: 16SB75
Sampled By: CCL / JG
C.O.C. No.: 0064

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/12/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 11Ø2	1-2'	Orange Brown mottled Gray	Silty CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): Ø.6			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Arch C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B75 Ø2Ø3
Sample Location: 16SB 75
Sampled By: CCL/JG
C.O.C. No.: 0064

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 11Ø6 Method: Disposable Trowel Monitor Reading (ppm): Ø.1	2-3'	Orange Brown mottled Gray	Very Fine SAND w/micas.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 ~~(2)~~ Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS76Ø1Ø2
Sample Location: 16SB 76
Sampled By: CCL / JG
C.O.C. No.: 0065

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1348 Method: Disposable Trowel Monitor Reading (ppm): Ø	1-2'	Orange Brown mottled Gray	Sandy CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ford III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B76Ø2Ø6
Sample Location: 16SB 76
Sampled By: CCL/JG
C.O.C. No.: 0065

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1357 Method: Disposable Trowel Monitor Reading (ppm): Ø	2-6'	Orange Brown	CLAYEY SAND.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (2) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB76Ø6Ø7
Sample Location: 16SB76
Sampled By: CCL/JG
C.O.C. No.: 0065

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 14Ø2 Method: Disposable Trowel Monitor Reading (ppm): Ø	6-7'	Light orange Brown	Silty SAND w/ some SILTSTONE.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clyde C. Lyle III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS77Ø1Ø2
Sample Location: 16SB 77
Sampled By: CCL / JG
C.O.C. No.: 0064

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 124Ø Method: Disposable Trowel Monitor Reading (ppm): Ø	1-21	Orange Brown	Clayey SAND w/ Some Gravels.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chad C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB77Ø2Ø6
Sample Location: 16SB 77
Sampled By: CCL/JG
C.O.C. No.: 0064 & 0066

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/12/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1249	2-6'	Orange Brown Mottled Gray	Silty CLAY w/ Some SAND.
Method: Disposable Trowel			
Monitor Reading (ppm): Ø			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	3x2=6
Volatiles SW-846 8015B	2 (4) Encore Samplers	Yes No	2x2=4
Percent Moisture	(1) 4oz Jar	Yes No	1x2=2
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

Duplicate Sample Collected Here

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: 16FDØ8124-Ø2

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB77Φ6 1Φ
Sample Location: 16SB 77
Sampled By: CCL / JG
C.O.C. No.: 0064

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Φ4 Time: 13Φ4 Method: Disposable Trowel Monitor Reading (ppm): Φ	6 - 1Φ'	ORANGE BROWN MOTTLED GRAY	SILTY CLAY W/ SOME SAND.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Light III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS 78 Ø1Ø2
Sample Location: 16SB 78
Sampled By: CCL/JG
C.O.C. No.: 0064

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1317 Method: Disposable Trowel Monitor Reading (ppm): Ø	1-2'	Orange Brown Mottled Gray	Clayey SAND.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B 78 Ø2Ø6
Sample Location: 16SB 78
Sampled By: CCL / JG
C.O.C. No.: 0069

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1323 Method: Disposable Trowel Monitor Reading (ppm): Ø	2-6'	Gray Mottled Brown	SILTY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	3x3=9
Volatiles SW-846 8015B	2 ~~(3)~~ Encore Samplers	(Yes) No	3x2=6
Percent Moisture	(1) 4oz Jar	(Yes) No	1
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A. MS/MSD collected Here.

MAP:

See Figure 3-2

Circle if Applicable:

(MS/MSD) Duplicate ID No.:

Signature(s):

Chad C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB78Ø6Ø9
Sample Location: 16SB 78
Sampled By: CCL/JG
C.O.C. No.: 0064

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/12/Ø4 Time: 1338 Method: Disposable Trowel Monitor Reading (ppm): Ø	6-9'	Light Orange Brown	Very Fine SAND w/ SILT.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS85ØØØ2
Sample Location: 16SB85
Sampled By: TR; CCL
C.O.C. No.: 0073

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/4/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1024	Ø - 2'	BROWN	CLAY, SOFT, MOIST.
Method: Hand Auger			
Monitor Reading (ppm): Ø.Ø			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16SB85

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Peter C. Ry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB85Ø2Ø4
Sample Location: 16SB85
Sampled By: CCL/TR
C.O.C. No.: 0073

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/Ø4 Time: 1Ø27 Method: Hand Auger Monitor Reading (ppm): Ø	2-4'	ORANGE BROWN Mottled Gray	Sandy CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16SB85

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [illegible] III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16S S 8600 02
Sample Location: 16SB 86
Sampled By: CEL/TR
C.O.C. No.: 0073

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/4/04 Time: 1055 Method: Hand Auger Monitor Reading (ppm): 1.2	0-2'	BROWN TO ORANGE BROWN	SILTY and SANDY CLAYS w/ some ROOTS,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16 SB 86.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Tyson III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16S586 0002
Sample Location: 16SB86
Sampled By: T. ROJAHN
C.O.C. No.: 0122

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/16/04 Time: 1000 Method: Dis Trowel Monitor Reading (ppm): —	0.5-2'	BRN	Clayey silt to sand Moist; Roots

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

RE sample

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD: —

Duplicate ID No.: —

Signature(s):

Tony Gale

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB8602Ø4
Sample Location: 16SB 86
Sampled By: TR/CCL
C.O.C. No.: 0073

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/Ø4 Time: 1110 Method: Hand Auger Monitor Reading (ppm): Ø.Ø	2-4'	ORANGE BROWN MOTTLED GRAY	SANDY CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16SB86.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS87ØØØ2
Sample Location: 16SB87
Sampled By: TR/CCL
C.O.C. No.: 0073

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/Ø4 Time: 112Ø Method: Hand Auger Monitor Reading (ppm): Ø	Ø - 2'	ORANGE BROWN	SANDY CLAY W/ SOME ROOTS,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16SB87

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Eric C. Lo III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB87Ø2Ø4
Sample Location: 16SB 87
Sampled By: CCL/TR
C.O.C. No.: 0073

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/Ø4 Time: 113Ø Method: Hand Auger Monitor Reading (ppm): Ø.Ø	2-4'	ORANGE BROWN MOTTLED GRAY	SANDY CLAY w/ some Wood Fragments & trace Sandstone Fragments.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16SB 87

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Chuck C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS88ØØØ2
Sample Location: 16SB 88
Sampled By: TR/CCL
C.O.C. No.: 0073

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/14/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1210	Ø-2'	BROWN / ORANGE BROWN	SANDY CLAY W/ SOME ROOTS, MOIST.
Method: Hand Auger			
Monitor Reading (ppm): Ø.Ø			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16 SB88

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 88Ø2Ø4
Sample Location: 16SB 88
Sampled By: TR/CCL
C.O.C. No.: 0073

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/Ø4 Time: 122Ø Method: Hand Auger Monitor Reading (ppm): Ø.Ø	2-4'	ORANGE BROWN MOTTLED GRAY	SANDY CLAY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16SB88

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[✓] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SS 89ØØØ2
Sample Location: 16SB 89
Sampled By: CCL/TR
C.O.C. No.: 0073

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/Ø4 Time: 125Ø Method: Hand Auger Monitor Reading (ppm): Ø.Ø	Ø-2'	BROWN/ ORANGE BROWN	Sandy CLAY w/ Roots.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/(No)	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/(No)	
Percent Moisture	(1) 4oz Jar	Yes/(No)	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	(Yes)/No	

OBSERVATIONS / NOTES:

See Boring Log 16SB89.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB8904Ø4
Sample Location: 16SB89
Sampled By: TR/CCL
C.O.C. No.: 0073

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/04 Time: 13ØØ Method: Hand Auger Monitor Reading (ppm): Ø.Ø	2-4'	ORANGE BROWN MOTTLED GRAY	Sandy CLAY w/ Roots,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

See Boring Log 16SB89

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B90 0406
Sample Location: 16SB 90
Sampled By: CCL/JG
C.O.C. No.: 0080

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/04 Time: 1211 Method: Disposable Trowel Monitor Reading (ppm): 3.5	4-6'	ORANGE BROWN	SILTY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (4) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Clark C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 90608
Sample Location: 16SB 90
Sampled By: CCL/JG
C.O.C. No.: 0080

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/04 Time: 1219 Method: Disposable Trowel Monitor Reading (ppm): 7.2	6-8'	ORANGE BROWN TO GRAY	SILTY CLAY with some SILT + SILTSTONE.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Chris C. Fox III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB91Ø4Ø6
Sample Location: 16SB91
Sampled By: CCL/JG
C.O.C. No.: 0080 & 0081

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1335 Method: Disposable Trowel Monitor Reading (ppm): 34.1	4-6'	ORANGE BROWN	SILTY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	3x2=6
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	2x2=4
Percent Moisture	(1) 4oz Jar	Yes/No	1x2=2
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

Duplicate Sample Obtained Here.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: 16FDØ816Ø4Ø1

Signature(s):

Charles C. Z III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB91Ø6Ø9
Sample Location: 16SB91
Sampled By: CCL/JG
C.O.C. No.: 0080

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1342 Method: Disposable Trowel Monitor Reading (ppm): 31.1	6-9'	ORANGE BROWN TO GRAY	Silty CLAY w/ trace Gravels

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clyde C. Jr

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB92Ø4Ø6
Sample Location: 16SB 92
Sampled By: CLL/JG
C.O.C. No.: 0080

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1137 Method: Disposable Trowel Monitor Reading (ppm): Ø.4	4-6'	ORANGE BROWN mot. Gray	SILTY CLAY,

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes)/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	(Yes)/No	
Percent Moisture	(1) 4oz Jar	(Yes)/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Clark C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B 92Ø6Ø8
Sample Location: 16SB 92
Sampled By: CCL / JG
C.O.C. No.: 0080

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1158 Method: Disposable Trowel Monitor Reading (ppm): Ø.6	6-8'	ORANGE BROWN TO GRAY	Silty CLAY w/ Some Red Colored Rocks.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB93Ø4Ø6
Sample Location: 16SB93
Sampled By: CCL / JG
C.O.C. No.: 0081

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1458 Method: Disposable Trowel Monitor Reading (ppm): 14.1	4-6'	ORANGE BROWN MOTTLED GRAY	SILTY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Ty III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB93Ø6Ø8
Sample Location: 16SB93
Sampled By: CCL/JG
C.O.C. No.: 0081

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 15Ø5 Method: Disposable Trowel Monitor Reading (ppm): 12.3	6-8'	BROWN	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B 94 Ø7Ø8
Sample Location: 16SB 94
Sampled By: CCL / JG
C.O.C. No.: 0080

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 141Ø Method: Disposable Trowel Monitor Reading (ppm): Ø.6	7-8'	ORANGE BROWN	SILTY CLAY w/ Some Gravels.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	(Yes) No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	(Yes) No	
Percent Moisture	(1) 4oz Jar	(Yes) No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes (No)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD ✓

Duplicate ID No.: ✓

Signature(s):

Charles C. Lyle III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 95Ø4Ø6
Sample Location: 16SB 95
Sampled By: CCL/JG
C.O.C. No.: 0081

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1435 Method: Disposable Trowel Monitor Reading (ppm): 52.3	4-6'	ORANGE BROWN MOTTLED GRAY	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	3x3=9
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	3x2=6
Percent Moisture	(1) 4oz Jar	Yes/No	1
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

MS/MSD Collected Here.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 95Ø6Ø7
Sample Location: 16SB 95
Sampled By: CCL/JG
C.O.C. No.: 0081

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1445 Method: Disposable Trowel Monitor Reading (ppm): 55.5	6-7'	ORANGE BROWN	Silty CLAY with Red colored stones.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Clark C. Griffith

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB 96Ø4Ø6
Sample Location: 16SB 96
Sampled By: CCL / JG
C.O.C. No.: 0081

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 152Ø Method: Disposable Trowel Monitor Reading (ppm): 15.5	4-6'	ORANGE BROWN MOTTLED GRAY	Silty CLAY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB96Ø608
Sample Location: 16SB96
Sampled By: CCL/JG
C.O.C. No.: 0081

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1525 Method: Disposable Trowel Monitor Reading (ppm): 9.9	6-8'	ORANGE BROWN MOTTLED GRAY	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16S B97Ø4Ø6
Sample Location: 16SB 97
Sampled By: CCL / JG
C.O.C. No.: 0081

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/Ø4 Time: 1545 Method: Disposable Trowel Monitor Reading (ppm): 22.4	4-6'	ORANGE BROWN MOTTLED GRAY	Silty CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	3x3=9
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes No	3x2=6
Percent Moisture	(1) 4oz Jar	Yes No	1
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

MS/MSD collected Here.

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles C. Gray III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SB 97Ø6Ø7
Sample Location: 16SB 97
Sampled By: CCL/JG
C.O.C. No.: 0081

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/16/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1555	6-7'	ORANGE BROWN	SILT W/ SILTSTONE FRAGMENTS.
Method: Disposable Trowel			
Monitor Reading (ppm): 1.9			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	3x2=6
Volatiles SW-846 8015B	2 (6) Encore Samplers	Yes No	2x2=4
Percent Moisture	(1) 4oz Jar	Yes No	1x2=2
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

Duplicate Sample Obtained Here

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: 16FDØ816 Ø4Ø2

Signature(s):

Clark C. Jones III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SS98 01 02
Sample Location: 16SB 98
Sampled By: CCL/JG
C.O.C. No.: 0080

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/04 Time: 1034 Method: Disposable Trowel Monitor Reading (ppm): 5.8	1-2'	ORANGE BROWN MOTTLED GRAY	SILTY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (~~3~~) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB98Ø2Ø6
Sample Location: 16SB98
Sampled By: CCL/JG
C.O.C. No.: 0080

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/04 Time: 1042 Method: Disposable Trowel Monitor Reading (ppm): 6.7	2-6'	ORANGE BROWN MOTTLED GRAY	SILTY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes/No	
Percent Moisture	(1) 4oz Jar	Yes/No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes/No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Gatt III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SB980607
Sample Location: 16SB 98
Sampled By: CCL / JG
C.O.C. No.: 0080

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/04 Time: 1050 Method: Disposable Trowel Monitor Reading (ppm): 2.1	6-7'	ORANGE BROWN	Very Fine SAND w/ SANDSTONE Fragments & Large Gravels.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Volatiles SW-846 8260B	(3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	2 (3) Encore Samplers	Yes No	
Percent Moisture	(1) 4oz Jar	Yes No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes No	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Chuck C. Ly III

APPENDIX C.2.1
SWMU 16
SEDIMENT SAMPLE LOG SHEETS
ROUND 1

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD 02 0004
Sample Location: 16SD 02
Sampled By: T. Rojahn
C.O.C. No.: 6982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/1/03 Time: 1045 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	BRN	clayey silt w/root material

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD03 0004
Sample Location: 16SD 03
Sampled By: T. Rojahn
C.O.C. No.: 0982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/1/03 Time: 1315 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	Dark Brown	Silty Sand Moist

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): T. Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD~~X~~40004
Sample Location: 16SD04
Sampled By: T. Rojahn
C.O.C. No.: 0982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/1/10 Time: 1110 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	BRN	Clayey silt little Gravel moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD050004
Sample Location: 16SD05
Sampled By: T. Rojahn
C.O.C. No.: 0982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/1/03 Time: 1120 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	BRN	Silty Sand Sed.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: FD04010302 (TR)

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD06 0004
Sample Location: 16SD06
Sampled By: T. Rojahn
C.O.C. No.: 0982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/1/03 Time: 1305 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	Yellow Brn	Clayey silt Sat.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.: FD04010302

Signature(s): T. Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD050004
Sample Location: 16SD08
Sampled By: T. Rojahn
C.O.C. No.: 0982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/1/03 Time: 1235 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	BN	Clayey silt little gravel moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Tony Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD090004
Sample Location: 16SD09
Sampled By: T. Rojahn
C.O.C. No.: 0982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/1/03 Time: 1250 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	BRW	Clayey silt w/root mat. Moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD 10 0004
Sample Location: 16SD 10
Sampled By: T. Rojahn
C.O.C. No.: 0982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/1/03 Time: 1105 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	BRN	Gravely sand little silt saturated

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD11 0004
Sample Location: 16SD11
Sampled By: T. Rojahn
C.O.C. No.: 0982

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/01/03 Time: 1035 Method: Disposable Trowel Monitor Reading (ppm): —	0 - 4"	DARK BRN	Clayey silt - Damp Root material

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
SVOCs (8270C, SIM & 8151A) & Explosives (8330 & Picrates)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD (72)

Duplicate ID No.: FD0401 0301

Signature(s):

APPENDIX C.2.2
SWMU 16
SEDIMENT SAMPLE LOG SHEETS
ROUND 2

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD120004
Sample Location: 16SD12
Sampled By: FW / MC
C.O.C. No.: 4811

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-25-03			
Time: 0945	0-4"	BROWN	SILTY SAND WET
Method: DISP. TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	NO	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	✓	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	✓	

OBSERVATIONS / NOTES:

PHOTO # 0336

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): FW

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD130004
Sample Location: 16SD13
Sampled By: FW/MC
C.O.C. No.: 4811

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-25-03			
Time: 1050	0-4"	BROWN	COURSE SAND + GRAVEL
Method: DIS. TROWEL			WET
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	NO	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	✓	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	✓	

OBSERVATIONS / NOTES:

PHOTO # 0338

MAP:

Circle if Applicable:

MS/MSD: —

Duplicate ID No.: 16FD10250301

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 165014 0004
Sample Location: 165014
Sampled By: MC
C.O.C. No.: 4807

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/24/03			
Time: 1310	4"	BRN	Silty Coarse Sand & Gravel Saturated
Method: Dis Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	NO	
Volatiles SW-846 8260B	(1) 4oz Jar or ~~(3) Encore Samplers~~	✓	
Volatiles SW-846 8015B	(1) 4oz Jar or ~~(2) Encore Samplers~~	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD15 0004
Sample Location: 16SD15
Sampled By: MC
C.O.C. No.: 4807

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/24/03			
Time: 1420	4"	BLK	Clay & Coarse Sand (WET)
Method: Dis. Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	—	
Volatiles SW-846 8260B	(1) 4oz Jar or ~~(3) Encore Samplers~~	✓	
Volatiles SW-846 8015B	(1) 4oz Jar or ~~(3) Encore Samplers~~	✓	

OBSERVATIONS / NOTES:

PHOTO # (0331) MATT IN PHOTO

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 165D160004
Sample Location: 165D16
Sampled By: MC
C.O.C. No.: 4807

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/24/03			
Time: 1330	4"	BRH	Clayey Silt
Method: Dis Trowel			Dry
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	NO	
Volatiles SW-846 8260B	~~(1) 4oz Jar or~~ (3) Encore Samplers	✓	
Volatiles SW-846 8015B	~~(1) 4oz Jar or~~ (3) Encore Samplers	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 165D170004
Sample Location: 165D17
Sampled By: FWI
C.O.C. No.: 4807

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/24/03			
Time: 1100	4"	BRN	Silt Sand & Gravel Root Mat. Saturated
Method: Dis Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	3 x (1) 4oz Jar	YES	
Metals SW-846 6020 & Mercury SW-846 7471A	3 x (1) 4oz Jar	YES	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	NO	
Volatiles SW-846 8260B 3x	(1) 4oz Jar or ~~(3) Encore Samplers~~	YES	
Volatiles SW-846 8015B 3x	(1) 4oz Jar or ~~(3) Encore Samplers~~	YES	

OBSERVATIONS / NOTES:

PHOTO 0329

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
YES	16FD1024030 2

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD 180004
Sample Location: 16SD18
Sampled By: FW/MC/TR
C.O.C. No.: 4807

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/24/03			
Time: 1410	4"	BRN	Coarse Sand & Gravel Saturated
Method: Dis Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	NO	
Volatiles SW-846 8260B	(1) 4oz Jar or ~~(3) Encore Samplers~~	✓	
Volatiles SW-846 8015B	(1) 4oz Jar or ~~(3) Encore Samplers~~	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s): Terry Ryan

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 165D190004
Sample Location: 165D19
Sampled By: FW
C.O.C. No.: 4807

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/24/03			
Time: 1020	4"	BRN	FINE → COARSE SAND & GRAVEL
Method: Direct			DAMP
Monitor Reading (ppm): --			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	NO	
Volatiles SW-846 8260B	~~(1) 4oz Jar or~~ (3) Encore Samplers	✓	
Volatiles SW-846 8015B	~~(1) 4oz Jar or~~ (3) Encore Samplers	✓	

OBSERVATIONS / NOTES:

PHOTO #0328

MAP:

Circle if Applicable:

MS/MSD ✓

Duplicate ID No.: ——

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 165D200004
Sample Location: 165D20
Sampled By: FW/MC
C.O.C. No.: 4811

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/25/03			
Time: 1110	4"	BROWN	CLAY, SAND, + GRAVEL
Method: DLS TROWEL			WET
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	NO	
Volatiles SW-846 8260B	~~(1) 4oz Jar or (3)~~ Encore Samplers	✓	
Volatiles SW-846 8015B	~~(1) 4oz Jar or (3)~~ Encore Samplers	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): FW

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 165D210004
Sample Location: 165D21
Sampled By: MC/EW/TR
C.O.C. No.: 4807

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/24/03 Time: 1525 Method: Dis Trowel Monitor Reading (ppm): –	4"	BRN	Coarse Sand Fine Gravel (Saturated)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	✓	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	✓	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	—	
Volatiles SW-846 8260B	(1) 4oz Jar or ~~(3) Encore Samplers~~	✓	
Volatiles SW-846 8015B	(1) 4oz Jar or ~~(3) Encore Samplers~~	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 165022 0004
Sample Location: 165022
Sampled By: FW/TK
C.O.C. No.: 4807

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/24/03			
Time: 1611	4"	BRN	Silt some Sand
Method: Dis. trowel			Root MAT. Damp
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar	No	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	No	
Selected Ion Monitoring - PAHs	(1) 4oz Jar	YES	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	No	

OBSERVATIONS / NOTES:

PHOTO 334

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

TJ Mpal

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060, CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 165D220004
Sample Location: 165D22
Sampled By: EW/TC
C.O.C. No.: 4820

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 11/11/03			
Time: 1400	4"		
Method: Dis Trawl			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) 4oz Jar		
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar		
Selected Ion Monitoring - PAHs	(1) 4oz Jar		
Volatiles SW-846 8260B	~~(1) 4oz Jar or~~ (3) Encore Samplers	✓	
Volatiles SW-846 8015B	~~(1) 4oz Jar or~~ (3) Encore Samplers	✓	
MOISTURE FOR VOA ANALYSIS	(1) 4oz Jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

APPENDIX C.2.3
SWMU 16
SEDIMENT SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD0302
Sample Location: 16SW/SD03
Sampled By: SJC/JG
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/10/09	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1445	0-4"	TAN BRN	SAND SILT-TR F GRAVEL DRY
Method: DIS TROWEL			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number: 16SD0302	**Date:** 10/10/04	**Time:** 1445	**Sampler:** SJC/JG	
Photograph Number/Direction: ✓ Upstream (340° N)	Downstream	East	West	North / South
Predominant Surrounding Land Use: Wooded	Open Field	Other		
Canopy Cover: Open	Partly Open	Shaded		
Dicharge Pipe Present: Yes	No	CANT FIND		
Aquatic Vegetation Present: Yes	No	**Stream channelized:** Yes	No	
Water flowing: Yes	No	Not present		
Organisms Present: Fish (in) —	Other (insects, frogs, etc.): —			
Water Width (ft): NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA		
Channel Width (ft): NA	**Channel Depth (ft):** NA	NA		
Signs of flooding (circle all that apply) Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	No	If yes (approximate size)		
Sediment Substrate: Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply) Sand	Silt	Clay	Muck	
Debris (GLASS SHELLS)	Detritus	Concrete	Iron deposits	
Sediment Odors: Normal (EXO)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: Absent	Slight	Moderate	Profuse	
Water Odors: Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: None NA	Droplets	Sheen		
Turbidity: Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD0402
Sample Location: 16SW/SD 04
Sampled By: JG/SJC
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/10/04 Time: 1305 Method: DIS TROWEL Monitor Reading (ppm):	0-4"	BRN	SILTY SAND - TR F GR. MOIST

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number: 10SD0402 **Date:** 10/10/04 **Time:** 1305 **Sampler:** JG/SJC

Photograph Number/Direction: ✓ Upstream W 290° ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: (Wooded) Open Field Other

Canopy Cover: Open (Partly Open) Shaded

Dicharge Pipe Present: Yes (No)

Aquatic Vegetation Present: Yes (No) | **Stream channelized:** (Yes) No

Water flowing: Yes (No) (Not present)

Organisms Present: Fish (in) — Other (insects, frogs, etc.): —

Water Width (ft): NA | **Water Depth (ft):** NA | **Estimated Flow/Velocity:** NA

Channel Width (ft): 6' | **Channel Depth (ft):** 2'

Signs of flooding (circle all that apply) (Yes) No Water marks on trees (Water-borne debris piles) Other:

Deep Pools Present (>2 feet): Yes (No) If yes (approximate size)

Sediment Substrate: Bedrock (Boulder (>10 in)) (Cobble (2.5-10 in)) (Gravel (0.10-2.5 in))

(Circle all that apply) (Sand) (Silt) Clay Muck

STYROFOAM— (Debris) Detritus (Concrete) Iron deposits

Sediment Odors: (Normal) Sewage Petroleum Chemical Anaerobic

Sediment Oils: (Absent) Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: —

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD0502
Sample Location: 16SW/SD05
Sampled By: JG/SJC
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/10/04 Time: 1255 Method: DIS TROWEL Monitor Reading (ppm): —	0 – 4	BRN	SANDY SILT DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

S. Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number: 16SD0504	Date: 10/10/04	Time: 1255	Sampler: JG/SJC	
Photograph Number/Direction: ✓ Upstream 243° SW	Downstream	East	West	North / South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: (Open)	Partly Open	Shaded		
Dicharge Pipe Present: (Yes)	No	1' Φ CULVERT NEAR FENCE		
Aquatic Vegetation Present: Yes	(No)	Stream channelized: (Yes)	No	
Water flowing: Yes	(No)	(Not present)		
Organisms Present: Fish (in) —	Other (insects, frogs, etc.): —			
Water Width (ft): NA	Water Depth (ft): NA	Estimated Flow/Velocity: NA		
Channel Width (ft): 6'	Channel Depth (ft): 1'			
Signs of flooding (circle all that apply) Yes	(No)	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	(Gravel (0.10-2.5 in)	
(Circle all that apply) (Sand)	(Silt)	(Clay)	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: None NA	Droplets	Sheen		
Turbidity: Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD0602
Sample Location: 16SW/SD06
Sampled By: SJC/JG
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/10	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1425	0-4"	TAN	SANDY SILT DRY
Method: DIS TRAVEL			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

SJ Conta

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number: 16SD0602 **Date:** 10/10/04 **Time:** 1425 **Sampler:** JG/SJC

Photograph Number/Direction: ✓ Upstream 68° E ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: Wooded (Open Field) Other

Canopy Cover: (Open) Partly Open Shaded

Dicharge Pipe Present: (Yes) No ≈ 50' U.S. CMP ≈ 6" Φ PARTIALLY COVERED

Aquatic Vegetation Present: Yes (No) | **Stream channelized:** (Yes) No

Water flowing: Yes (No) (Not present)

Organisms Present: Fish (in) NA Other (insects, frogs, etc.): NA

Water Width (ft): NA | **Water Depth (ft):** NA | **Estimated Flow/Velocity:** NA

Channel Width (ft): 4'± | **Channel Depth (ft):** 3'

Signs of flooding (circle all that apply) Yes (No) Water marks on trees Water-borne debris piles Other:

Deep Pools Present (>2 feet): Yes (No) If yes (approximate size)

Sediment Substrate: Bedrock Boulder (>10 in) Cobble (2.5-10 in) (Gravel (0.10-2.5 in)

(Circle all that apply) (Sand) (Silt) Clay Muck

(Debris) PAPER Detritus Concrete Iron deposits

Sediment Odors: (Normal) Sewage Petroleum Chemical Anaerobic

Sediment Oils (Absent) Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD0802
Sample Location: 16SW/SD08
Sampled By: SJC/JG
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/10/04 Time: 1115 Method: DIS TROWEL Monitor Reading (ppm): —	0-4	GRAY BRN.	SANDY SILT DRY → DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

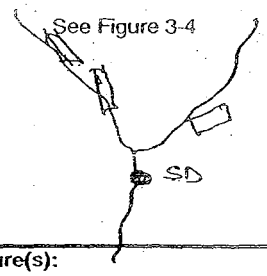
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 10SD0802 **Date:** 10/10/04 **Time:** 1115 **Sampler:** JG/SJC

Photograph Number/Direction: ✓ Upstream EAST ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: (Wooded) Open Field Other

Canopy Cover: Open (Partly Open) Shaded

Dicharge Pipe Present: (Yes) No BUT NOT CONNECTED / BROKEN UP ≈ 6" ID CONCRETE

Aquatic Vegetation Present: Yes (No) **Stream channelized:** (Yes) No

Water flowing: Yes (No) (Not present)

Organisms Present: Fish (in) — Other (insects, frogs, etc.): —

Water Width (ft): NA **Water Depth (ft):** NA **Estimated Flow/Velocity:** NA

Channel Width (ft): ≈ 8' **Channel Depth (ft):** ≈ 6'

Signs of flooding (circle all that apply) (Yes) No Water marks on trees (Water-borne debris piles) Other:

Deep Pools Present (>2 feet): Yes (No) If yes (approximate size)

Sediment Substrate: Bedrock (Boulder (>10 in)) (Cobble (2.5-10 in)) (Gravel (0.10-2.5 in))

(Circle all that apply) (Sand) (Silt) Clay Muck

Debris Detritus Concrete Iron deposits

Sediment Odors: (Normal) Sewage Petroleum Chemical Anaerobic

Sediment Oils: (Absent) Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: VERY STEEP U.S. OF SAMPLING POINT W/ BROKEN PCS OF DISCHARGE PIPE

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD0902
Sample Location: 16SW/SD 09
Sampled By: SJC/JG
C.O.C. No.: 0105

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10-7-04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1115	0-4"	TAN BRN	SANDY SILT - DRY → DAMP
Method: DISP TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

SJ Conte

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 16SD0902	**Date:** 10/7/04	**Time:** 1115	**Sampler:** JG/SJC	
Photograph Number/Direction: 1 70° E Upstream	Downstream	East	West	North / South
Predominant Surrounding Land Use: Wooded	Open Field	Other		
Canopy Cover: Open	Partly Open	Shaded		
Dicharge Pipe Present: Yes	No			
Aquatic Vegetation Present: Yes	No	**Stream channelized:** Yes	No	
Water flowing: Yes	No	Not present		
Organisms Present: Fish (in) —	Other (insects, frogs, etc.): BEES			
Water Width (ft): NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA		
Channel Width (ft): ≈ 4'	**Channel Depth (ft):** 2'±			
Signs of flooding (circle all that apply) Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	No	If yes (approximate size)		
Sediment Substrate: Bedrock	Boulders (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply) Sand	Silt	Clay	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: Normal	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: Absent	Slight	Moderate	Profuse	
Water Odors: Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: None NA	Droplets	Sheen		
Turbidity: Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: 2 EMPTY DRUMS 30'± NORTH OF CHANNEL

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD1002
Sample Location: 16SW/SD10
Sampled By: SJC/JG
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/10/04 Time: 1310 Method: DIS TROWEL Monitor Reading (ppm):	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-4	BRW	SILTY SAND-TR F GRAVEL DAMP → MOIST

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 16SD1002 **Date:** 10/10/04 **Time:** 1310 **Sampler:** JG/SJC

Photograph Number/Direction: ✓ Upstream (275° W) ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: (Wooded) Open Field Other

Canopy Cover: Open (Partly Open) Shaded

Dicharge Pipe Present: Yes (No)

Aquatic Vegetation Present: Yes (No) **Stream channelized:** (Yes) No

Water flowing: Yes (No) (Not present)

Organisms Present: Fish (in) — Other (insects, frogs, etc.): —

Water Width (ft): NA **Water Depth (ft):** NA **Estimated Flow/Velocity:** NA

Channel Width (ft): 7' **Channel Depth (ft):** 3'

Signs of flooding (circle all that apply) (Yes) No Water marks on trees (Water-borne debris piles) Other:

Deep Pools Present (>2 feet): Yes (No) If yes (approximate size)

Sediment Substrate: (Bedrock) (Boulder (>10 in)) (Cobble (2.5-10 in)) (Gravel (0.10-2.5 in))
(Circle all that apply) (Sand) (Silt) Clay Muck
(Debris) Detritus Concrete Iron deposits

Sediment Odors: (Normal) Sewage Petroleum Chemical Anaerobic

Sediment Oils: (Absent) Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD1102
Sample Location: 16SW/SD11
Sampled By: SJC/JG
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/10/04 Time: 1340 Method: DIS TROWEL Monitor Reading (ppm): ——	0-4	BRN	BRN SANDY SILT - TR F GRAVEL - DRY - DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: ——

Signature(s): SJConti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 16SD1102 **Date:** 10/10/04 **Time:** 1340 **Sampler:** SJC/JG

Photograph Number/Direction: ✓ Upstream (SW 220° ±) ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: (Wooded) Open Field Other

Canopy Cover: Open (Partly Open) Shaded

Dicharge Pipe Present: (Yes) No US ≈ 50' 1' Φ CULVERT

Aquatic Vegetation Present: Yes (No) **Stream channelized:** (Yes) No

Water flowing: Yes (No) (Not present)

Organisms Present: Fish (In) — Other (Insects, frogs, etc.): —

Water Width (ft): NA **Water Depth (ft):** NA **Estimated Flow/Velocity:** NA

Channel Width (ft): 6' **Channel Depth (ft):** 2'

Signs of flooding (circle all that apply) (Yes) No Water marks on trees (Water-borne debris piles) Other:

Deep Pools Present (>2 feet): Yes (No) If yes (approximate size)

Sediment Substrate: Bedrock (Boulder (>10 in)) (Cobble (2.5-10 in)) (Gravel (0.10-2.5 in))

(Circle all that apply) (Sand) (Silt) Clay Muck

(Debris) Detritus (Concrete) Iron deposits

Sediment Odors (Normal) Sewage Petroleum Chemical Anaerobic

Sediment Oils: (Absent) Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD1202
Sample Location: 16SW/SD12
Sampled By: SJC/JG
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/10/04 Time: 1130 Method: DIS TROWEL Monitor Reading (ppm): —	0-4	BRN	SANDY SILT – TR CLAY DAMP → MOIST

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number:	16SD1202	Date: 10/10/04	Time: 1130	Sampler: JG/SJC	
Photograph Number/Direction:	✓ Upstream 26° NE	Downstream	East	West	North / South
Predominant Surrounding Land Use:	Wooded	Open Field	Other		
Canopy Cover:	Open	Partly Open	Shaded		
Dicharge Pipe Present:	Yes	No			
Aquatic Vegetation Present:	Yes	No	Stream channelized:	Yes	No
Water flowing:	Yes	No	Not present		
Organisms Present:	Fish (in) —	Other (insects, frogs, etc.): —			
Water Width (ft):	NA	Water Depth (ft): NA	Estimated Flow/Velocity:	NA	
Channel Width (ft):	6'	Channel Depth (ft): 3'			
Signs of flooding (circle all that apply)	Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet):	Yes	No	If yes (approximate size)		
Sediment Substrate:	Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply)	Sand	Silt	Clay	Muck	
	Debris	Detritus	Concrete	Iron deposits	
Sediment Odors:	Normal	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	Absent	Slight	Moderate	Profuse	
Water Odors:	Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	None NA	Droplets	Sheen		
Turbidity:	Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD1302
Sample Location: 16SW/SD13
Sampled By: SJC/JG
C.O.C. No.: 0105

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/7/04 Time: 1050 Method: DIS TROWEL Monitor Reading (ppm): –	0-4"	BRN	F/C SAND – TR F GRAVEL MOIST → WET

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conte

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number:	16SD1302	Date: 10/7/04	Time: 1050	Sampler: SJC/JG	
Photograph Number/Direction:	✓ Upstream N 11° ±	Downstream	East	West	North / South
Predominant Surrounding Land Use:	Wooded	Open Field	Other		
Canopy Cover:	Open	Partly Open	Shaded		
Dicharge Pipe Present:	Yes	No			
Aquatic Vegetation Present:	Yes	No	Stream channelized:	Yes	No
Water flowing:	Yes	No	Not present		
Organisms Present:	Fish (in)	Other (insects, frogs, etc.): BEES			
Water Width (ft): NA	Water Depth (ft): NA	Estimated Flow/Velocity: NA			
Channel Width (ft): 8'	Channel Depth (ft): 2.5'				
Signs of flooding (circle all that apply)	Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet):	Yes	No	If yes (approximate size)		
Sediment Substrate:	Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply)	Sand	Silt	Clay	Muck	
	Debris	Detritus	Concrete	Iron deposits	
Sediment Odors:	Normal	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	Absent	Slight	Moderate	Profuse	
Water Odors:	Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	None NA	Droplets	Sheen		
Turbidity:	Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD 1602
Sample Location: 16SW/SD 16
Sampled By: T. ROJAHN
C.O.C. No.: 0122

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-14-04 Time: 1335 Method: Dis Trowel Monitor Reading (ppm): —	0-4"	BRN	SANDY SILT, TRACE Roots & Rock Frags (DAMP)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 165016 **Date:** 10-14-04 **Time:** 1335 **Sampler:** T. ROJAHN

Photograph Number/Direction: OLD LOCATION ____Upstream ____Downstream ____East ____West ____North ____South

Predominant Surrounding Land Use: Wooded Open Field Other

Canopy Cover: Open Partly Open Shaded

Dicharge Pipe Present: Yes No

Aquatic Vegetation Present: Yes No **Stream channelized:** Yes No

Water flowing: Yes No Not present

Organisms Present: Fish (in) NO Other (insects, frogs, etc.): NO

Water Width (ft): — **Water Depth (ft):** — **Estimated Flow/Velocity:** —

Channel Width (ft): 2 **Channel Depth (ft):** 1

Signs of flooding (circle all that apply) Yes No Water marks on trees Water-borne debris piles Other:

Deep Pools Present (>2 feet): Yes No If yes (approximate size)

Sediment Substrate: Bedrock Boulder (>10 in) Cobble (2.5-10 in) Gravel (0.10-2.5 in)

(Circle all that apply) Sand Silt Clay Muck

Debris Detritus Concrete Iron deposits

Sediment Odors: Normal Sewage Petroleum Chemical Anaerobic

Sediment Oils: Absent Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: HEAVY LEAF LITTER SUGAR MAPLE

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD1902
Sample Location: 16SW/SD19
Sampled By: SJC/JG
C.O.C. No.: 0113

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/7/04 Time: 1400 Method: DIS TROWEL Monitor Reading (ppm): —	0-4"	TAN BRN	SILTY F SAND - TR GRAVEL DRY → DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conte

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 16SD1902 **Date:** 10/7/04 **Time:** 1400 **Sampler:** SJC/JG

Photograph Number/Direction: ✓ Upstream 26° NE ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: Wooded Open Field Other

Canopy Cover: Open Partly Open Shaded

Dicharge Pipe Present: Yes No

Aquatic Vegetation Present: Yes No **Stream channelized:** Yes No

Water flowing: Yes No Not present

Organisms Present: Fish (in) — Other (insects, frogs, etc.): —

Water Width (ft): NA **Water Depth (ft):** NA **Estimated Flow/Velocity:** NA

Channel Width (ft): 28'± **Channel Depth (ft):** 5'

Signs of flooding (circle all that apply) Yes No Water marks on trees Water-borne debris piles Other:

Deep Pools Present (>2 feet): Yes No If yes (approximate size)

Sediment Substrate: Bedrock Boulder (>10 in) Cobble (2.5-10 in) Gravel (0.10-2.5 in)

(Circle all that apply) Sand Silt Clay Muck

Debris Detritus Concrete Iron deposits

Sediment Odors: Normal Sewage Petroleum Chemical Anaerobic

Sediment Oils: Absent Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: STAKE PRESENT ON EAST BANK

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD2302 (~~02~~)
Sample Location: 16SW/SD23 (02)
Sampled By: SJC/JG
C.O.C. No.: 0114

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/10/04 Time: 1330 Method: DIS TROWEL Monitor Reading (ppm): —	0-4	TAN BRN	SANDY SILT DRY → DAMP

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conte

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number:	16SD2302 (02)	Date: 10/10/04	Time: 1330	Sampler: JG/SJC	
Photograph Number/Direction:	210 SW ✓ Upstream	Downstream	East	West	North / South
Predominant Surrounding Land Use:	Wooded	Open Field	Other		
Canopy Cover:	Open	Partly Open	Shaded		
Dicharge Pipe Present:	Yes	No			
Aquatic Vegetation Present:	Yes	No	Stream channelized:	Yes	No
Water flowing:	Yes	No	Not present		
Organisms Present:	Fish (in) —	Other (insects, frogs, etc.): —			
Water Width (ft):	NA	Water Depth (ft): NA	Estimated Flow/Velocity: NA		
Channel Width (ft):	5'	Channel Depth (ft): 3'			
Signs of flooding (circle all that apply)	Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet):	Yes	No	If yes (approximate size)		
Sediment Substrate: (Circle all that apply)	Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
	Sand	Silt	Clay	Muck	
	Debris	Detritus	Concrete	Iron deposits	
Sediment Odors:	Normal	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	Absent	Slight	Moderate	Profuse	
Water Odors:	Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	None NA	Droplets	Sheen		
Turbidity:	Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: 2 DRAINAGE AREAS TO THE EAST NOT ON OUR MAP W/ DISCHARGE PIPE PRESENT.

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD2401
Sample Location: 16SW/SD24
Sampled By: SJC/JG
C.O.C. No.: 0113

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/8/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0910	0-4"	BRN	CLAYEY SILT - TR SAND WET → SATURATED
Method: DIS TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJConti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number:	16SD2401 E 16SW2401	Date: 10/8/04	Time: 0900	Sampler: JG/SJC
Photograph Number/Direction:	✓ Upstream N 345°	Downstream	East	West / North / South
Predominant Surrounding Land Use:	Wooded	Open Field	Other	
Canopy Cover:	Open	Partly Open	Shaded	
Dicharge Pipe Present:	Yes	No		
Aquatic Vegetation Present:	Yes	No	Stream channelized:	Yes / No
Water flowing:	Yes	No	Not present PONDED	
Organisms Present:	Fish (in) FISH 2"	Other (insects, frogs, etc.):	WATER BUGS	
Water Width (ft):	15'	Water Depth (ft): 0.8'	Estimated Flow/Velocity:	NONE
Channel Width (ft):	20'±	Channel Depth (ft): —	6' WEST 8' EAST	
Signs of flooding (circle all that apply)	Yes	No	Water marks on trees	Water-borne debris piles / Other:
Deep Pools Present (>2 feet):	Yes	No	If yes (approximate size)	
Sediment Substrate:	Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)
(Circle all that apply)	Sand	Silt	Clay	Muck
	Debris	Detritus	Concrete	Iron deposits
Sediment Odors:	Normal	Sewage	Petroleum	Chemical / Anaerobic
Sediment Oils:	Absent	Slight	Moderate	Profuse
Water Odors:	Normal	Sewage	Petroleum	Chemical / Anaerobic
Water Surface Oils:	None	Droplets	Sheen SLIGHT	
Turbidity:	Clear	Slightly Turbid	Turbid	Opaque

Other Comments/Observations: WATER IS PONDED - NOT FLOWING.

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD2501
Sample Location: 16SW/SD25
Sampled By: SJC/JG
C.O.C. No.: 0113

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/8/04 Time: 0845 Method: DIS TROWEL Monitor Reading (ppm):	0-4"	BRN	CLAYEY SILT - TR SAND WET → SATURATED

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number: 1650 2501 & 16 SW2801 Date: 10/8/04 Time: 0804 Sampler: SJC/JG

Photograph Number/Direction: ✓ Upstream 32° NE ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: (Wooded) Open Field Other

Canopy Cover: Open (Partly Open) Shaded

Dicharge Pipe Present: Yes (No)

Aquatic Vegetation Present: Yes (No) | Stream channelized: (Yes) No

Water flowing: Yes (No) Not present PONDED

Organisms Present: Fish (in) FISH 3" FROGS Other (insects, frogs, etc.): WATER BUGS

Water Width (ft): 10' | Water Depth (ft): 1' | Estimated Flow/Velocity: NO

Channel Width (ft): 21'± | Channel Depth (ft): 4.5'±

Signs of flooding (circle all that apply) (Yes) No Water marks on trees (Water-borne debris piles) Other:

Deep Pools Present (>2 feet): Yes (No) If yes (approximate size)

Sediment Substrate: Bedrock (Boulder (>10 in)) (Cobble (2.5-10 in)) (Gravel (0.10-2.5 in))

(Circle all that apply) (Sand) (Silt) (Clay) Muck

Debris Detritus Concrete Iron deposits

Sediment Odors: (Normal) Sewage Petroleum Chemical Anaerobic

Sediment Oils: (Absent) Slight Moderate Profuse

Water Odors: (Normal) Sewage Petroleum Chemical Anaerobic

Water Surface Oils: (None) Droplets Sheen

Turbidity: (Clear) Slightly Turbid Turbid Opaque

Other Comments/Observations: WATER IS POOLED - NOT FLOWING

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD 2601
Sample Location: 16SW/SD 26
Sampled By: SJC/JG
C.O.C. No.: 0113

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10-7-04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1440	0-4"	TAN BRN	TAN BRN SILTY F SAND - TR F ROCK FRAGS DRY → DAMP TR F GRAVEL
Method: DIS TROWEL			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): SJConti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number: 16SD2601 Date: 10/7/04 Time: 1440 Sampler: SJC/JG

Photograph Number/Direction: ✓ Upstream 314° NW ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: (Wooded) Open Field Other

Canopy Cover: Open (Partly Open) Shaded

Dicharge Pipe Present: Yes (No) 3' – 3.5' ϕ PLASTIC CULVERT LOC D.S. ≈ 50 FROM SAMPLE LOC.

Aquatic Vegetation Present: Yes (No) | Stream channelized: (Yes) No

Water flowing: Yes (No) (Not present)

Organisms Present: Fish (In) — Other (Insects, frogs, etc.): —

Water Width (ft): NA | Water Depth (ft): NA | Estimated Flow/Velocity: NA

Channel Width (ft): 8' | Channel Depth (ft): 2 > 3.5'

Signs of flooding (circle all that apply) (Yes) No Water marks on trees (Water-borne debris piles) Other:

Deep Pools Present (>2 feet): Yes (No) If yes (approximate size)

Sediment Substrate: Bedrock (Boulder) (>10 in) (Cobble) (2.5-10 in) (Gravel) (0.10-2.5 in)

(Circle all that apply) (Sand) (Silt) Clay Muck

Debris Detritus Concrete Iron deposits

Sediment Odors: (Normal) Sewage Petroleum Chemical Anaerobic

Sediment Oils: (Absent) Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD2701
Sample Location: 16SW/SD27
Sampled By: SJC/JG
C.O.C. No.: 0105

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/7/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1100	0-4"	BRN	SAND F/C - MOIST → WET
Method: DIS TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number:	16SD2701	Date: 10/7/04	Time: 1100	Sampler: SJC/JG	
Photograph Number/Direction:	✓ Upstream 40° NE	Downstream	East	West	North / South
Predominant Surrounding Land Use:	Wooded	Open Field	Other		
Canopy Cover:	Open	Partly Open	Shaded		
Dicharge Pipe Present:	Yes	No			
Aquatic Vegetation Present:	Yes	No	Stream channelized:	Yes	No
Water flowing:	Yes	No	Not present		
Organisms Present:	Fish (in) WORMS	Other (insects, frogs, etc.): BEES			
Water Width (ft):	NA	Water Depth (ft): NA	Estimated Flow/Velocity: NA		
Channel Width (ft):	7'	Channel Depth (ft):	E = 2'± W = 1.5±		
Signs of flooding (circle all that apply)	Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet):	Yes	No	If yes (approximate size)		
Sediment Substrate:	Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply)	Sand	Silt	Clay	Muck	
	Debris	Detritus	Concrete	Iron deposits	
Sediment Odors:	Normal	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	Absent	Slight	Moderate	Profuse	
Water Odors:	Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	None NA	Droplets	Sheen		
Turbidity:	Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD2801
Sample Location: 16SW/SD28
Sampled By: SJC/JG
C.O.C. No.: 0113

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/8/04 Time: 1315 Method: DIS TROWEL Monitor Reading (ppm):	0-4"	BRN	SILTY F/M SAND MOIST

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (2) Encore Samplers	Yes/No	
	2		

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number: 16SD2801 **Date:** 10/8/04 **Time:** 1315 **Sampler:** SJC/JG

Photograph Number/Direction: ✓ 45°NE Upstream ____ Downstream ____ East ____ West ____ North ____ South

Predominant Surrounding Land Use: (Wooded) Open Field Other

Canopy Cover: Open (Partly Open) Shaded

Dicharge Pipe Present: Yes (No)

Aquatic Vegetation Present: Yes (No) **Stream channelized:** (Yes) No

Water flowing: Yes (No) (Not present)

Organisms Present: Fish (in) NA Other (insects, frogs, etc.): NA

Water Width (ft): NA **Water Depth (ft):** NA **Estimated Flow/Velocity:** NA

Channel Width (ft): 3 TO 4' **Channel Depth (ft):** 2 TO 3'

Signs of flooding (circle all that apply) (Yes) No Water marks on trees (Water-borne debris piles) Other:

Deep Pools Present (>2 feet): Yes (No) If yes (approximate size)

Sediment Substrate: (Bedrock) (Boulder (>10 in)) (Cobble (2.5-10 in)) (Gravel (0.10-2.5 in))

(Circle all that apply) (Sand) (Silt) (Clay) Muck

Debris Detritus Concrete Iron deposits

Sediment Odors: (Normal) Sewage Petroleum Chemical Anaerobic

Sediment Oils: (Absent) Slight Moderate Profuse

Water Odors: Normal NA Sewage Petroleum Chemical Anaerobic

Water Surface Oils: None NA Droplets Sheen

Turbidity: Clear NA Slightly Turbid Turbid Opaque

Other Comments/Observations: MORE MOISTURE IN THIS CHANNEL AS COMPARED TO LOC 29

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SD2901
Sample Location: 16SW/SD29
Sampled By: SJC/JG
C.O.C. No.: 0113

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/8/04 Time: 1300 Method: DIS TROWEL Monitor Reading (ppm):	0-4"	GRAY BRN	SANDY SILT DRY → DAMP.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4oz Jar	Yes	
Volatiles SW-846 8260B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
	2		

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4

AS PER SWMU 16 MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number:	16SD2901	Date: 10/8/04	Time: 1300	Sampler: SJC/JG	
Photograph Number/Direction:	✓ Upstream 64°NE	Downstream	East	West	North / South
Predominant Surrounding Land Use:	Wooded	Open Field	Other		
Canopy Cover:	Open	Partly Open	Shaded		
Dicharge Pipe Present:	Yes	No			
Aquatic Vegetation Present:	Yes	No	Stream channelized:	Yes	No
Water flowing:	Yes	No	Not present		
Organisms Present:	Fish (in) NA	Other (insects, frogs, etc.): ND			
Water Width (ft):	NA	Water Depth (ft): NA	Estimated Flow/Velocity: NA		
Channel Width (ft):	3'±	Channel Depth (ft): 1'±			
Signs of flooding (circle all that apply)	Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet):	Yes	No	If yes (approximate size)		
Sediment Substrate:	Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply)	Sand	Silt	Clay	Muck	
	Debris	Detritus	Concrete	Iron deposits *	
Sediment Odors:	Normal	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	Absent	Slight	Moderate	Profuse	
Water Odors:	Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	None NA	Droplets	Sheen		
Turbidity:	Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: * Some Fe stained soils near 16SD/SW 08.

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 16SD 3001
Sample Location: 16SW/SD 30
Sampled By: SJC/JG
C.O.C. No.: 0113

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/8/04 Time: 1035 Method: DLS TROWEL Monitor Reading (ppm): —	0-4"	BRN	SANDY SILT - TR CLAY MOIST

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

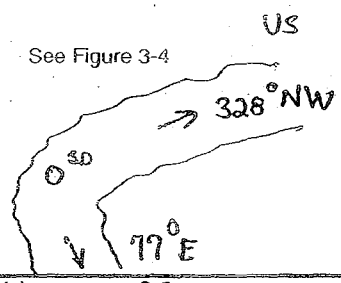
Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	3 (4) 4oz Jar	Yes	
Volatiles SW-846 8260B 3x4 = 12 ~~10~~	(1) 4oz Jar or (3) Encore Samplers	Yes/No	
Volatiles SW-846 8015B 2x4 = 8 ~~10~~	(1) 4oz Jar or (3) Encore Samplers	Yes/No	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-4



Circle if Applicable:

MS/MSD

Duplicate ID No.: 16FD100804 03

Signature(s): DS

SJ Conte

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number:	16SD3001	Date: 10/8/04	Time: 1035	Sampler: SJC/JG	
Photograph Number/Direction:	✓ Upstream 255° W	Downstream	East	West	North / South
Predominant Surrounding Land Use:	Wooded	Open Field	Other		
Canopy Cover:	Open	Partly Open	Shaded		
Dicharge Pipe Present:	Yes	No			
Aquatic Vegetation Present:	Yes	No	Stream channelized:	Yes	No
Water flowing:	Yes	No	Not present		
Organisms Present:	Fish (In) —	Other (Insects, frogs, etc.): —			
Water Width (ft):	NA	Water Depth (ft): NA	Estimated Flow/Velocity:	NA	
Channel Width (ft):	7'	Channel Depth (ft): →	N = 3'	S = .4'	
Signs of flooding (circle all that apply)	Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet):	Yes	No	If yes (approximate size)		
Sediment Substrate:	Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply)	Sand	Silt	Clay	Muck	
	Debris	Detritus	Concrete	Iron deposits	
Sediment Odors:	Normal	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	Absent	Slight	Moderate	Profuse	
Water Odors:	Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	None NA	Droplets	Sheen		
Turbidity:	Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: NO SW - DRY

APPENDIX C.3.1
SWMU 16
SURFACE WATER SAMPLE LOG SHEETS
ROUND 1

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW 01 01 EF
Sample Location: 16SW 01
Sampled By: T. Rojahn
C.O.C. No.: 0983

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

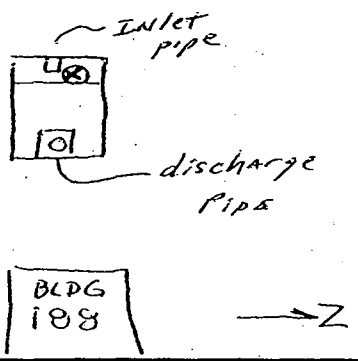
Date: 4/01/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1400	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	mV
Depth: Full H2O Column	Green							
Method: Bailer	to Black		WATER to discolored & oil sheen →					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	Yes
SVOCs (SIM)	4°C	(2) 1 L Amber	Yes
SVOCs (8151A)	4°C	(2) 1 L Amber	Yes
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Explosives Picrates	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

3' of H2O in sump
No sediment



MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —
Duplicate ID No.: —

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

~~[X] Stream~~ (TC)
[] Spring
[] Pond
[] Lake
[X] Other: E. Sump
[] QA Sample Type:

Sample ID No.: 16SW 02 Z01 E F
Sample Location: 16SW 02
Sampled By: T. Rojahn
C.O.C. No.: 0969

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
Date: 4/10/03								
Time: 0950								
Depth: MID								
Method: Peristaltic	CLEAR	8.13	0.281	9.14	2.1	10.51	NA	90.9

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
SVOCs (8270C)	4° C		(2) 1 L Amber	Yes
SVOCs (SIM)	4° C		(2) 1 L Amber	Yes
SVOCs (8151A)	4° C		(2) 1 L Amber	Yes
Explosives (8330)	4° C		(2) 1 L Amber	Yes
Explosives Picrates	4° C		(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	3 X	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	3 X	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	3 X	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

14 Extra 1 L Ambers Collected For SVOCs & Explosives

TD 8.05
H_2O @ 4.05
Inlet Pipe <1 gpm

NO SEDIMENT IN SUMP!

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 16SW 07 01 & F
Sample Location: 16SW 07
Sampled By: T. Rojahn
C.O.C. No.: 8969

~~[X] Stream~~
[] Spring
[] Pond
[] Lake
[X] Other: W. SUMP
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/10/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1330	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	mV
Depth: MID								
Method: Peristaltic	CLEAR	8.40	0.591	11.78	4.2	10.63	NA	89.1

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
SVOCs (8270C)	4° C	2 x	(2) 1 L Amber	Yes
SVOCs (SIM)	4° C	2 x	(2) 1 L Amber	Yes
SVOCs (8151A)	4° C	2 x	(2) 1 L Amber	Yes
Explosives (8330)	4° C	2 x	(2) 1 L Amber	Yes
Explosives Picrates	4° C	2 x	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	2 x	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	2 x	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	2 x	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

3.6' OF H_2O IN 8.2' SUMP
INLET PIPE ~1-3 gpm
TRACE SUDES

NO SEDIMENT IN SUMP!

MAP:

Refer to Figure 3-3 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD04100301 & F

Signature(s): T Rojahn

APPENDIX C.3.2
SWMU 16
SURFACE WATER SAMPLE LOG SHEETS
ROUND 2

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: SUMP - North
[] QA Sample Type:

Sample ID No.: 16SW0102
Sample Location: SWMU 16
Sampled By: TR/SG
C.O.C. No.: 4833

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 12/06/03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 0905								
Depth: 0-1'	Greenish	6.65	0.365	6.82	22	12.65	+193.9	—
Method: Bailer								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	~~Yes~~
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	

OBSERVATIONS/NOTES

Ft to H_2O = 3.68 FROM SE CORNER

MAP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: Sump - East
[] QA Sample Type:

Sample ID No.: 16SW0202
Sample Location: SWMU 16
Sampled By: TL / SG
C.O.C. No.: 4833

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 12-6-03 Time: 0935 Depth: 0-1 Method: Bailer (D.S.)	Sl Cloudy	7.61	0.264	9.49	120	10.69	+143.2	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	~~Yes~~
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

Depth to H_2O = 4.03 FROM SW CORNER

SIMAP

Circle if Applicable:

MS/MSD: —

Duplicate ID No.: 16FD12060301

Signature(s): Ty Kopal

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: SUMP - WEST
[] QA Sample Type:

Sample ID No.: 16SW0702
Sample Location: SWMU 16
Sampled By: TR/SG
C.O.C. No.: 4833

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 12-06-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1008								
Depth: 0-1'	CLEAR	7.68	0.575	12.20	5.3	10.78	+123.4	—
Method: DIS Bailer								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	~~Yes~~
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

Deth to H_2O = 4.88 From NE Corner

MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Tr[illegible]

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU ~~18~~ 16

Project No.: N9060 CTO 0279

Sample ID No.: 16SW1201

Sample Location: 16SW12

Sampled By: FW

C.O.C. No.: 4808

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-23-03	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 0935								
Depth: 4"	CLEAR	7.21	0.204	13.24	4.06	6.00	195.4	–
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	–
Volatiles 8260B	4°C/HCl	(3) 40ml VOC Vials	YES
Volatiles 8015B	4°C/HCl	(3) ↓	YES

OBSERVATIONS/NOTES

PONDED WATER

PHOTO # 0336

MAP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

Sample ID No.: 16SW1301
Sample Location: 16SW13
Sampled By: FW
C.O.C. No.: 4808

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 10-25-03								
Time: 1045								
Depth: 4"								
Method: DIRECT FILL		6.40	0.168	13.68	15.9	2.94	68.3	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes - F
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

PONDED WATER

PHOTO # 0338

MAP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: PONDED No Flow
[] QA Sample Type:

Sample ID No.: 16SW1401
Sample Location: 16SW14
Sampled By: MC/FW/TK
C.O.C. No.: 4806

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/24/03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1500								
Depth: MID	CLEAR	7.14	0.299	11.70	2.57	7.22	254.7	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

Depth 6"

PHOTO # (0332)

MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Tom Gail

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW1501
Sample Location: 16SW15
Sampled By: FW
C.O.C. No.: 4808

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-25-03 / Time: 0810 / Depth: 4" / Method: DIRECT FILL	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	6.51	0.378	12.45	15.9	2.87	194.1	–

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	–

OBSERVATIONS/NOTES

PONDED WATER
PHOTO # 0335

MAP

Circle if Applicable:

MS/MSD –

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

Sample ID No.: 16SW1701
Sample Location: 16SW17
Sampled By: MC / TR
C.O.C. No.: 4806

[X] Stream PONDED
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/24/03 Time: 1030	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Depth: M10 Method: Direct	CLEAR	6.93	0.154	9.61	3.39	6.99	204.0	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

OBSERVATIONS/NOTES

PONDED NO FLOW
PHOTO # 0329

MAP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
YES	16FD10240301

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

Sample ID No.: 165W11801
Sample Location: 165W18
Sampled By: MC
C.O.C. No.: 4806

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-24-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1400								
Depth: MID	CLEAR	6.39	0.108	12.88	1.0	5.74	251.6	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

6" DEEP
PHOTO #(0330)

2" DEEP
1' IN 3 SEC
2' WIDE
+
1' IN 5 SEC
1' WIDE
1" deep

MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

Sample ID No.: 16SW2001
Sample Location: 16SW20
Sampled By: RW
C.O.C. No.: 4808

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-25-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1100								
Depth: 2"	CLEAR	7.08	0.202	13.75	7.95	7.23	183.4	–
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	–

-F

OBSERVATIONS/NOTES

PONDED WATER
PHOTO # 0337

MAP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: PONDED NO FLOW
[] QA Sample Type:

Sample ID No.: 16SW2101
Sample Location: 16SW21
Sampled By: MC / TR
C.O.C. No.: 4806

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/24/03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1518								
Depth: SURFACE	CLEAR	6.78	0.184	15.12	10.59	1.91	239.6	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

Depth = 2"
PHOTO (# 0333)

MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Troy Rydell

APPENDIX C.3.3
SWMU 16
SURFACE WATER SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: DISCHARGE AREA
[] QA Sample Type:

Sample ID No.: 16SW—
Sample Location: 16SW/SD 03
Sampled By: JG / SJC
C.O.C. No.: —

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10/10/04								
Time: 1445								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] 13GWT_____-F

MAP

NO SAMPLE — DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJConte

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: DRAINAGE DITCH
[] QA Sample Type:

Sample ID No.: 16SW0301
Sample Location: 16SW/SD 03
Sampled By: SJC/TR
C.O.C. No.: 0133

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11/2/04								
Time: 1530								
Depth: 0-1"	CLEAR	7.93	.070	16.30	14.0	10.65	36.6	—
Method: DR. FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[] ~~MSW/T~~ F (TR)

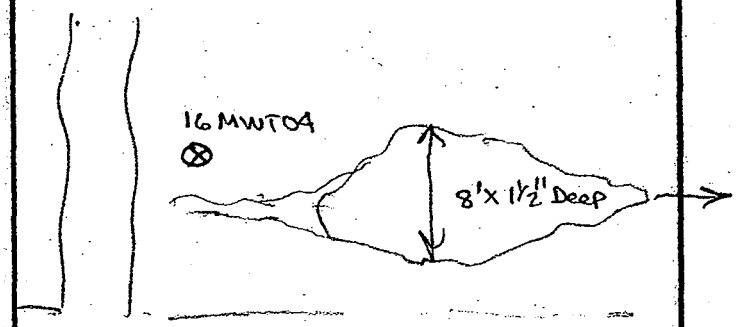
16SW0301-F

RAIN EVENT.

MAP:

SEE FIG 3-4

NO VISIBLE FLOW



Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conte

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW —
Sample Location: 16SW/SD04
Sampled By: JG/SJC
C.O.C. No.: NA

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/10/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1300								
Depth: —								
Method: —	—	—	—	—	—	—	—	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] 13GWT_____-F

MAP

NO SAMPLE DRY

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW 0401
Sample Location: 16SW/SD 04
Sampled By: T. ROJAHN
C.O.C. No.: 0135

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11-11-04								
Time: 1115								
Depth: SURFACE	V.SL. Cloudy	7.49	0.056	10.46	65	5.66	+1.07	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[X] No[] ~~18SW~~ 16SW 0401 -F

MEAS. FLOW 30-50 gpm
STORM EVENT

MAP

SEE FIG 3-4

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Tey Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW —
Sample Location: 16SW/SD 05
Sampled By: SSC/JG
C.O.C. No.: ~~0114~~ (TC) NA

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10/10/04								
Time: 1253								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes (No)
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes (No)
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes (No)
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes (No)

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ ~~F~~

MAP

NO SAMPLE — DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW 05 01
Sample Location: 16SW/SD 05
Sampled By: T. ROJAHN
C.O.C. No.: 0135

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 11-11-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1100								
Depth: SURFACE	CLEAR	7.25	0.098	10.96	24	6.62	113	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWF~~ 16SW 05 -F

MEAS.
Flow ~ 20-25 gpm
Storm EVENT

MAP

SEE FIG. 3-4

Circle if Applicable:

MS/MSD ✓ Duplicate ID No.: —

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW —
Sample Location: 16SW/SD06
Sampled By: JG/SJC
C.O.C. No.: NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/10/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1425								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[X] No[] ~~15GWT~~ ~~F~~

MAP

NO SAMPLE - DRY

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[X] Stream
[] Spring
[] Pond
[] Lake
[X] Other: DRAINAGE DITCH
[] QA Sample Type:

Sample ID No.: 16SW0601
Sample Location: 16SW/SD06
Sampled By: TR/STC
C.O.C. No.: 0133

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11/2/04 Time: 1520 Depth: 0-1" Method: DIR FILL	CLEAR	7.57	.169	16.45	2.0	10.33	48.0	—

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes No
		2 TOTAL	

OBSERVATIONS / NOTES:

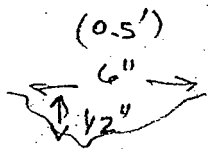
Filtered Sample Collected Yes[X] No[] ~~16GWT~~ F

16SW0601-F

RAIN EVENT

MAP:

SEE FIG. 3-4



2 SEC/FT
LEVEL CHANNEL - INSIDE THE FENCED AREA OF SWMU 16.

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW—
Sample Location: 16SW/SD08
Sampled By: SJC/JG
C.O.C. No.: NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10/10/04								
Time: 1110								
Depth: —								
Method: —	—	—	—	—	—	—	—	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ —E

NO SAMPLE DRY

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conte

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448.CTO 0343

Sample ID No.: 16SW 0801
Sample Location: 16SW/SD 08
Sampled By: T. Rojaun
C.O.C. No.: 0135

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 11-11-04 / Time: 1015 / Depth: SURFACE / Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	CLEAR 39	6.99	0.108	11.28	~~8~~ 39 (12)	7.62	122	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ 16SW 0801 -F

Storm EVENT

1" x 1' 2sec/ft

MAP

SEE FIG 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Ty Rojal

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW~~09 02~~ 73
Sample Location: 16SW/SD 09
Sampled By: SJC / JG
C.O.C. No.: NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-7-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1115								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] 13GWT_____-F

MAP

NO SAMPLE – DRY

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conte

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW0901
Sample Location: 16SW/SD09
Sampled By: SJC/TR
C.O.C. No.: 0131

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/2/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1500								
Depth: 0-2"	SL. CLOUDY	7.37	.162	16.42	16.5	10.38	45.9	—
Method: DIR FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES:

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ F

16SW0901-F

RAIN EVENT.

MAP:

SEE FIG. 3-4

5 TO 10 GPM

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW —
Sample Location: 16SW/SD 10
Sampled By: SJC/JG
C.O.C. No.: NA

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10/10/04								
Time: 1310								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] 13GWT ~~E~~

MAP

NO SAMPLE - DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJConti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW 10 01
Sample Location: 16SW/SD 10
Sampled By: T. ROJAHN
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 11-11-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1045								
Depth: SURFACE	CLEAR	7.26	0.066	10.74	46.7	6.02	120	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ 16SW 10 01 -F

MEAS. Bucket @ Falls
80-100 gpm

Storm EVENT

MAP

SEE - FIG 3-4

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Tey Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW —
Sample Location: 16SW/SD 11
Sampled By: JG / SJC
C.O.C. No.: NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10/10/04								
Time: 1340								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~19GWT~~ ~~E~~

MAP

NO SAMPLE – DRY.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW 1101
Sample Location: 16SW/SD 11
Sampled By: T. ROJAHN
C.O.C. No.: 0136

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 11-11-04 / Time: 1127 / Depth: SURFACE / Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	CLEAR	7.37	0.201	11.99	10	8.01	+96	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ 16SW/ 1101 -F

Flow: 1" x 8" 2 cc/ft
Storm EVENT

MAP

SEE FIG 3-4

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW —
Sample Location: 16SW/SD 12
Sampled By: SJC/JG
C.O.C. No.: NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10/10/04								
Time: 1128/04								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ —F

MAP

NO SAMPLE DRY

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJConti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW1202
Sample Location: 16SW/SD12
Sampled By: TRISJC
C.O.C. No.: 0131 E0133

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11/2/04								
Time: 1440								
Depth: 0-2"	CLEAR	7.16	-100	16.24	38.4	9.38	51.4	–
Method: DIR. FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330			
Nitroaromatics and Nitramines	4°C	(1) 1 L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	3 (1) L HDPE + 1 DUP	Yes/No

OBSERVATIONS / NOTES:

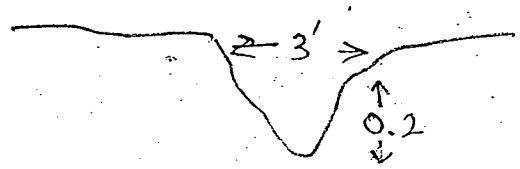
Filtered Sample Collected Yes[X] No[] ~~16SWT~~ ~~F~~

16SW1201-F

RAIN EVENT

MAP:

(73) SEE FIG 3-4



2 SEC/FT

Circle if Applicable:

MS/MSD ON

Duplicate ID No.: 16FD110204 01

Signature(s): S. Corch

NITRATE / NITRITE

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW
Sample Location: 16SW/SD 13
Sampled By: SJC/JG
C.O.C. No.: —

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10/7/04								
Time: 1045								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[]. 13GWT_____-F

MAP

NO SAMPLE – DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW1302
Sample Location: 16SW/SD13
Sampled By: SJC/TR
C.O.C. No.: 0131

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11/2/04 Time: 1405 Depth: 0-2" Method: DIR FILL	CLEAR	7.64	.084	16.03	22.8	9.18	49.4	—

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	1 (2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

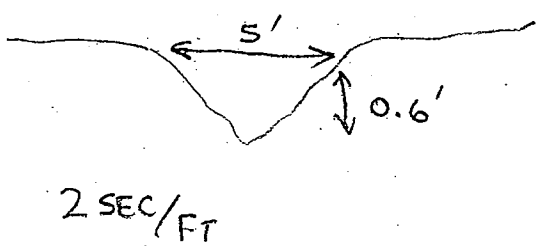
OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ _____-F
16SW1301-F

RAIN EVENT

MAP:

SEE FIG 3-4



Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW 1601
Sample Location: 16SW/SD 16
Sampled By: SJC/TR
C.O.C. No.: 0131

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11/2/04 Time: 1045 Depth: 0-2" Method: DIR FILL	CLEAR	7.55	.067	15.97	14.9	6.70	64.2	—

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No
		(2) TOTAL	

OBSERVATIONS / NOTES:

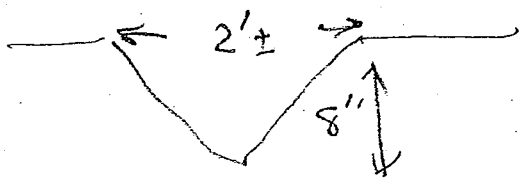
Filtered Sample Collected Yes[X] No[] ~~13GWT~~ ~~F~~
~~16FA~~
16SW1601-F

YOU CAN SEE THE RIBBON ON THE TREE – FROM STANDING ON THE CULVERT AT B-1997.

MAP:

SEE FIG. 3-4

6" AVE DEPTH



5 SEC/FT

ACCROSS FROM BUNKER 1997
≈105° ESE INTO THE BRIARS

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW —
Sample Location: 16SW/SD 19
Sampled By: SJC/JG
C.O.C. No.: NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/7/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1358								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ _____-F

MAP

NO SW SAMPLE - DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW1901
Sample Location: 16SW/SD 19
Sampled By: SJC/TR
C.O.C. No.: 0131

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 11/2/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1000								
Depth: 0-2"	CLEAR	7.53	.081	15.83	25	7.72	55.3	—
Method: DIR FILL								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ F19

16SWT1901-F

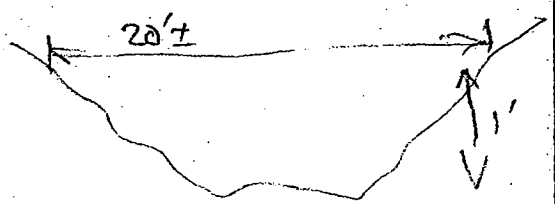
RAIN EVENT

< 1'/SEC EST.

>1000 GPM

MAP

SEE FIG 3-4



Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW ~~2302~~ (02) TC
Sample Location: 16SW/SD 23 (02)
Sampled By: JG/SJC
C.O.C. No.: NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/10/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1330								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] 13GWT_____-F

MAP

NO SAMPLE – DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): S. Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW2301
Sample Location: 16SW/SD23
Sampled By: T. ROJAHN
C.O.C. No.: 0136

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11-11-04 Time: 1140 Depth: SURFACE Method: "Direct"	CLEAR	7.75	0.064	10.90	7.2	7.41	+95	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] 13GWT23-F

FLOW 1" x 1' 5SEC/ft

MAP

SEE FIG 3-4

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW2401
Sample Location: 16SW/SD 24
Sampled By: SJC/JG
C.O.C. No.: 0113

[X] Stream (PONDED)
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/8/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0900								
Depth: 0-2	CLEAR	6.35	130	12.92	1	4.78	205	—
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION

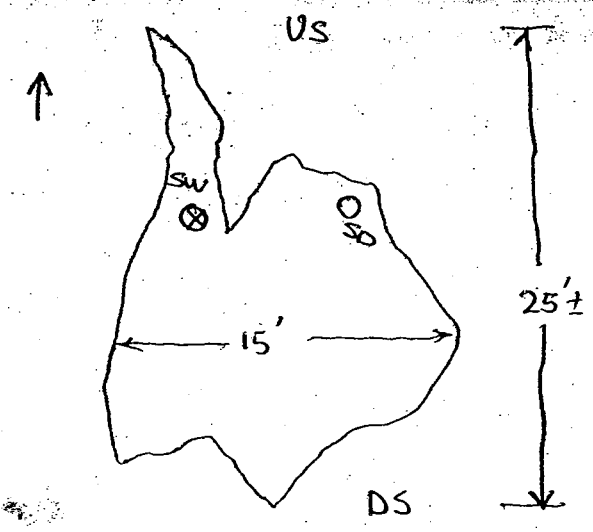
Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(13) (3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(12) (3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) 1 Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ ~~F~~

~~SEE SL~~ (F2)

MAP



Circle if Applicable:
MS/MSD ON VOAS ONLY

Duplicate ID No.: 16FD10080402 ON VOAS

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW2501
Sample Location: 16SW/SD25
Sampled By: SJC/JG
C.O.C. No.: 0113

[X] Stream (PONDED)
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10/8/04 Time: 0840 Depth: 0-2" Method: DIRECT FILL	CLEAR	6.57	126	11.21	2	3.86	269	–

SAMPLE COLLECTION INFORMATION

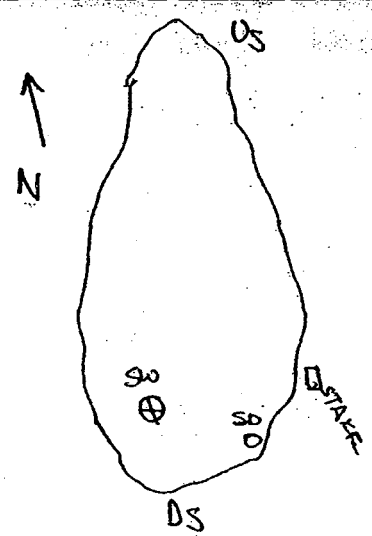
Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes No
Explosives SW-846 8330			
Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(4) (1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No

~~16WT~~_____-F
~~16SW2501-F~~

MAP



Circle if Applicable:
MS/MSD
Duplicate ID No.: 16FD10080401

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW —
Sample Location: 16SW/SD26
Sampled By: SJC/JG
C.O.C. No.: NA

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/7/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1430								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] 13GWT_____-F

MAP

NO SW SAMPLE – DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW2601
Sample Location: 16SW/SD 26
Sampled By: T. Rosahn
C.O.C. No.: 0124

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-26-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1105								
Depth: 3"	CLEAR	7.50	0.171	12.65	4.74	9.00	55.8	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~16GW~~ 16SW 2601 -F (TR)

Flow =

MEAS. @ culvert

three pipes - 1 gal 7 sec
1 gal 7 sec
1 gal 10 sec

3 gal in 8 sec or 22.5 gpm

MAP

SAMPLED POOL 16" deep
~3' x 8'

SEE FIG. ~~3-3~~ (TR) 3-4

Circle if Applicable:

MS/MSD	Duplicate ID No.:
YES	16FD0102604 01

Nitrate & Nitrite only

Signature(s): Ty Aspa

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW~~27-01-(72)~~
Sample Location: 16SW/SD 27
Sampled By: SJC / JG
C.O.C. No.: —

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/7/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1055								
Depth: —								
Method: —	—	—	—	—	—	—	—	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ _____-F

MAP

NO SAMPLE – DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW 2701
Sample Location: 16SW/SD 27
Sampled By: SJC/TR
C.O.C. No.: 0131

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11/2/04								
Time: 1420								
Depth: 0-2"								
Method: DIRFLW	CLEAR	7.23	.091	16.06	319	8.87	55.2	—

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	~~(2)~~ L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No
		8 TOTAL	

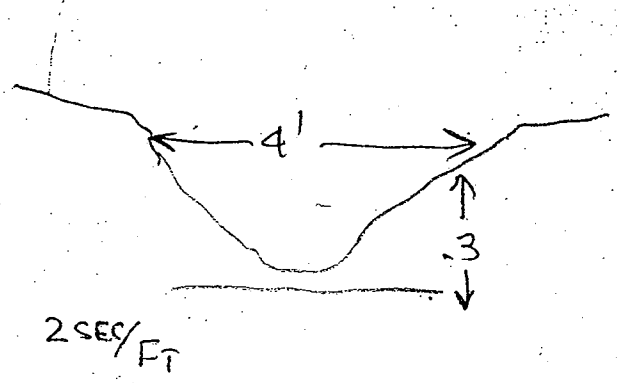
OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[] ~~13QWT~~ ~~F~~ (TR)
16SW2701-F

RAIN EVENT

MAP:

SEE FIG. 3-4



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW~~2801~~ (TC)
Sample Location: 16SW/SD 28
Sampled By: JG/SGC
C.O.C. No.: ~~0113~~ (TC) NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/8/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1315								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~15GWT~~ -F

MAP

NO SAMPLE - DRY

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW 2801
Sample Location: 16SW/SD28
Sampled By: T. ROJAHN
C.O.C. No.: 0135

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 11-11-04								
Time: 0950								
Depth: SURFACE	TANNISH	7.17	0.068	11.33	179	7.86	126	
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[X] No[] ~~10GWT~~ 16SW 2801 -F

Storm EVENT
4"x 1.5 @ 1/2 SEC/FT.

MAP

SEE FIG: 3-4

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW ~~2901~~ (TC)
Sample Location: 16SW/SD 29
Sampled By: SJC/JG
C.O.C. No.: ~~0113~~ (TC) NA

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/8/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1300								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ _____ F

NO SW SAMPLE - DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 16SW 2901
Sample Location: 16SW/SD 29
Sampled By: T. ROJAHN
C.O.C. No.: 0135

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 11-11-04 / Time: 0930 / Depth: SURFACE / Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	CLEAR	7.95	0.116	11.28	32.2	7.96	147	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ 16SW 2901 -F

Storm EVENT

1"x 1' 1.5 sec/ft

MAP

SEE FIG 3-4

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Tey Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW —
Sample Location: 16SW/SD 30
Sampled By: SJC/JG
C.O.C. No.: —

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/8/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1030								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[X] No[] ~~13GWT~~ ~~F~~

MAP

NO SAMPLE-DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

Sample ID No.: 16SW 3001
Sample Location: 16SW/SD 3a
Sampled By: T. ROJAHN
C.O.C. No.: 0124

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-26-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1200								
Depth: 2"	CLEAR	7.37	0.159	13.28	9.49	8.90	53.6	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes/No
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[X] No[] ~~16GW~~ 16SW 3001 -F

Flow = 5-10 gpm
sampled @ a pool 3'x 4'

MAP

SEE Fig. ~~3-3~~ 3-4

Circle if Applicable:

MS/MSD	Duplicate ID No.:
~~YES~~	16FD102604 02

EXP. ONLY

Signature(s): Terry Rojahn

APPENDIX C.4.1
SWMU 16
GROUND WATER SAMPLE LOG SHEETS
ROUND 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 01 01
Sample Location: WES-14-01-03
Sampled By: T. Rajagh
C.O.C. No.: 0988
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/23/03	Color	pH	S.C.	Temp.	Turbidity	DO	Sainity	ORP
Time: 1130	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: BLADDER	CLEAR	6.40	1.606	13.79	0.05	0.32	NA	-130

PURGE DATA:

Date: 4/23/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC								
Total Well Depth (TD): 53.7	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 31.65								
One Casing Volume(gal/L): 13.5								
Start Purge (hrs): 0750								
End Purge (hrs): 1122								
Total Purge Time (min): 212								
Total Vol. Purged (gal/L): 13.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	Yes
SVOCs (8270C)	4°C	(2) 1 L Amber	Yes
SVOCs (SIM)	4°C	(2) 1 L Amber	Yes
SVOCs (8151A)	4°C	(2) 1 L Amber	Yes
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Explosives Picrates	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

MID SCREEN CALC. 38.9
4.73
Pump Intake @ = 43.53'

WELL bri A 5.45' SUMP & 9.45' SCREEN

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Tony Rajagh

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: WES-14-01-83
DATE: 4/23/03

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0750	31.65	–	–	–	–	–	–	–	Start Purge
0800	33.91	200	12.33	6.28	1633	0.66	-117	320	2000 ml SL Cloudy
0810	34.40	150	11.59	6.32	1.620	0.54	-118	210	3500 ml " "
0820	34.75	55	10.94	6.32	1.582	0.87	-111	140	4050 ml " "
0830	35.10	55	11.03	6.32	1.563	0.79	-112	60	4600 ml CLEAR
0840	35.30	60	11.06	6.34	1.551	0.72	-113	30	5200 ml CLEAR
0850	35.50	55	11.17	6.35	1.548	0.67	-114	16	5750 ml CLEAR
0900	35.70	52	11.34	6.35	1.552	0.65	-115	9.5	6270 ml CLEAR
0910	35.85	50	11.62	6.36	1.563	0.63	-116	7.3	6770 ml CLEAR
0920	35.95	50	11.97	6.37	1.572	0.61	-117	6.4	7270 ml CLEAR
0930	36.05	50	12.15	6.38	1.576	0.59	-118	5.3	7770 ml CLEAR
0940	36.15	50	12.37	6.38	1.583	0.56	-119	4.4	8270 ml CLEAR
0950	36.25	50	12.65	6.38	1.589	0.53	-120	3.5	8770 ml CLEAR
1000	36.35	50	12.90	6.39	1.595	0.50	-121	2.7	9270 ml CLEAR
1010	36.68	70	13.43	6.40	1.615	0.42	-125	2.5	9970 ml CLEAR
1020	37.00	60	13.88	6.40	1.624	0.36	-128	2.2	10570 ml CLEAR
1030	36.85	40	14.51	6.40	1.653	0.37	-129	1.3	10970 ml CLEAR
1040	36.95	46	13.85	6.40	1.625	0.43	-128	0.5	11430 ml CLEAR
1050	36.95	50	14.07	6.40	1.625	0.39	-129	0.35	11930 ml CLEAR
1100	36.95	50	14.01	6.40	1.627	0.37	-130	0.05	12430 ml CLEAR
1110	36.95	50	13.83	6.40	1.616	0.33	-130	0.05	12930 ml CLEAR
1120	37.00	50	13.79	6.40	1.606	0.32	-130	0.05	13430 ml CLEAR
1122		50							13530 ml CLEAR
1130	→								Start Sampling

13.5 MIN. VOL.

SIGNATURE(S): Terry Rogalski

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 02 01
Sample Location: WES-14-02-83
Sampled By: B. BALKOVEC
C.O.C. No.: 0991
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Sainity	ORP
Date: 4/24/03								
Time: 1201	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	6.65	0.508	11.80	2.2	0.64	NA	+7.1

PURGE DATA:

Date: 4/24/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 28.74	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 14.86								
One Casing Volume (gal/L): 2.3								
Start Purge (hrs): 1041								
End Purge (hrs): 1200								
Total Purge Time (min): 79								
Total Vol. Purged (gal/L): 8.6L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	Yes
SVOCs (8270C)	4° C	(2) 1 L Amber	Yes
SVOCs (SIM)	4° C	(2) 1 L Amber	Yes
SVOCs (8151A)	4° C	(2) 1 L Amber	Yes
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Explosives Picrates	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

35' Sump

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: WFS-14-02-83
DATE: 4/24/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (ml/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1041	14.86	START							CLEAR
1045	15.04	240	12.49	6.89	0.682	1.10	+9.2	11	.9 L
1050	15.11	150	12.42	6.79	0.658	0.66	+1.3	10.5	1.6 L
1055	15.08	100	12.39	6.83	0.654	0.70	-15.4	10	—
1100	15.06	100	12.37	6.81	0.652	0.73	-10.7	8.2	V. CLEAR 2.6 L
1105	15.06	100	12.31	6.82	0.649	0.69	-10.9	7.8	—
1110	15.06	100	12.21	6.80	0.624	0.74	-2.1	6.7	3.6 L
1115	15.06	100	12.18	6.77	0.617	0.81	+1.4	5.1	—
1120	15.06	100	12.12	6.76	0.613	0.93	+3.5	4.8	4.6 L
1125	15.06	100	12.11	6.74	0.613	0.95	+7.1	4.4	—
1130	15.06	100	12.06	6.71	0.608	0.93	+11.0	3.4	5.6 L
1135	15.06	100	11.95	6.64	0.587	0.85	+12.1	3.1	—
1140	15.05	100	12.00	6.67	0.586	0.81	+13.4	3.0	6.6 L
1145	15.06	100	11.97	6.64	0.578	0.74	+10.5	2.8	—
1150	15.06	100	11.77	6.65	0.570	0.68	+8.8	2.6	7.6 L
1155	15.06	100	11.76	6.64	0.570	0.67	+7.4	2.5	—
1200	15.05	100	11.80	6.65	0.568	0.64	+7.1	2.2	8.6 L
	→ END PURGE SAMPLED @ 1201								

SIGNATURE(S): Robert Balkwill 8.5 L

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 02 02
Sample Location: WS-14-02-83
Sampled By: B Baucom
C.O.C. No.: 0297
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Sainity	ORP
Date: 5/11/03	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Time: 1732								
Method: Peristaltic	CLEAR	6.69	0.496	12.84	0.4	1.18	NA	-46.1

PURGE DATA:

Date: 5/11/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 28.24	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 13.91								
One Casing Volume (gal/L): 2.4								
Start Purge (hrs): 1550								
End Purge (hrs): 1730								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	~~Yes~~ N/A
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	~~Yes~~ N/A
SVOCs (8270C)	4° C	(2) 1 L Amber	Yes
SVOCs (SIM)	4° C	(2) 1 L Amber	~~Yes~~ N/A
SVOCs (8151A)	4° C	(2) 1 L Amber	~~Yes~~ N/A
Explosives (8330)	4° C	(2) 1 L Amber	~~Yes~~ N/A
Explosives Picrates	4° C	(2) 1 L Amber	~~Yes~~ N/A
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ N/A
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	~~Yes~~ N/A

OBSERVATIONS / NOTES:

RE-SAMPLED

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Baltrus

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: WES-14-02-83
DATE: 5/4/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1550	13.94	START							CLEAR -
1555	14.09	100	14.17	6.83	0.641	4.87	-71.8	7.8	-
1600	14.09	100	13.57	6.70	0.610	1.03	-36.6	6.0	1L
1610	14.09	95	13.43	6.73	0.594	0.59	-83.4	3.2	-
1620	14.10	95	13.11	6.77	0.567	0.53	-84.2	1.2	2.9L
1630	14.10	95	13.14	6.79	0.547	0.79	-75.8	1.0	-
1640	14.11	95	13.20	6.79	0.531	1.00	-67.0	0.9	4.8L
1650	14.11	95	13.12	6.78	0.517	1.39	-53.3	0.9	-
1700	14.11	95	12.88	6.74	0.508	1.32	-47.3	0.7	6.7L
1710	14.12	95	12.86	6.70	0.498	1.21	-44.1	0.5	-
1720	14.12	95	12.85	6.69	0.499	1.20	-45.0	0.5	8.6L
1730	14.12	95	12.84	6.69	0.496	1.18	-46.1	0.4	7 vol 9.5L
	→ END PURGE SAMPLED @ 1732								

SIGNATURE(S): Robert Balthrop

9.2L = 1 vol

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 03 01
Sample Location: WES-14-03-83
Sampled By: B. BALKOVEC
C.O.C. No.: 0991
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Sainity	ORP
Date: 4/24/03	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Time: 1632								
Method: PERISTALTIC	CLEAR	5.84	0.483	14.17	2.8	1.63	NA	-154.2

PURGE DATA:

Date: 4/24/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 38.31	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 19.53								
One Casing Volume (gal/L): 3								
Start Purge (hrs): 1433								
End Purge (hrs): 1630								
Total Purge Time (min): 117								
Total Vol. Purged (gal/L): 12.2L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	Yes
SVOCs (8270C)	4° C	(2) 1 L Amber	Yes
SVOCs (SIM)	4° C	(2) 1 L Amber	Yes
SVOCs (8151A)	4° C	(2) 1 L Amber	Yes
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Explosives Picrates	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

25' Sump

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	Robert Balkovec
—	—	

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: WES-14-03-83
DATE: 4/24/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1433	19.53	START							CLEAR
1435	—	170	14.74	6.33	0.501	3.65	+159.3	11	
1440	20.94	170	14.47	6.25	0.492	3.13	+156.0	13	1.2 L
1445	21.50	100	14.69	6.26	0.492	3.09	+155.6	10	—
1450	21.74	100	14.54	6.22	0.491	3.03	+157.9	11	*UNABLE TO PUMP BELOW 100 ml/min
1455	22.01	100	14.45	6.19	0.487	2.92	+156.2	11	PUMP SHUTS OFF. 2.7 L
1500	22.27	100	14.34	6.17	0.485	2.81	+154.3	7.4	3.2 L
1510	23.00	100	14.30	6.20	0.483	2.60	+156.2	7.0	4.2 L
1520	23.30	100	14.26	6.01	0.483	2.31	+158.4	6.1	5.2 L
1525	23.41	100	14.18	5.96	0.481	2.18	+159.2	5.3	—
1530	23.46	100	14.11	5.94	0.481	2.10	+159.1	5.3	6.2 L
1535	23.50	100	14.00	5.92	0.481	1.98	+157.9	5.2	—
1540	23.54	100	13.94	5.92	0.481	1.93	+158.6	5.2	7.2 L
1545	23.61	100	13.92	5.91	0.480	1.87	+158.0	4.4	—
1550	23.67	100	13.91	5.90	0.480	1.80	+157.7	3.7	8.2 L
1555	23.66	100	13.97	5.88	0.481	1.74	+159.8	3.9	—
1600	23.64	100	14.10	5.87	0.483	1.72	+159.2	3.8	9.2 L
1605	23.62	100	14.22	5.87	0.483	1.70	+158.1	3.6	—
1610	23.61	100	14.14	5.86	0.482	1.65	+155.9	3.5	10.2 L
1615	23.59	100	14.18	5.84	0.483	1.64	+154.4	3.1	—
1620	23.58	100	14.18	5.85	0.483	1.65	+154.0	3.0	11.2 L
1625	23.57	100	14.17	5.84	0.482	1.64	+154.1	3.0	—
1630	23.58	100	14.17	5.84	0.483	1.63	+154.2	2.8	Final. 12.2 L
	→ END PURGE								
	SAMPLED @ 1632								

SIGNATURE(S): Robert Balkwill

11.5L = 1 vol.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 04 01
Sample Location: 14-4-93
Sampled By: B. BALKOVEC
C.O.C. No.: 0988
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/23/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 0811	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	3.68	0.720	13.31	0.5	0.29	NA	1207.4

PURGE DATA:

Date: 4/23/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 49.16'	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 27.83								
One Casing Volume (gal/L): 3.5								
Start Purge (hrs): 0723								
End Purge (hrs): 0810								
Total Purge Time (min): 47								
Total Vol. Purged (gal/L): 3.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	Yes
SVOCs (8270C)	4° C	(2) 1 L Amber	Yes
SVOCs (SIM)	4° C	(2) 1 L Amber	Yes
SVOCs (8151A)	4° C	(2) 1 L Amber	Yes
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Explosives Picrates	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

5' Sump
Screened 31' BGS - 40' BGS
Tubing set @ 36'

Wet = 13.2L

Circle if Applicable:

MS/MSD —
Duplicate ID No.: —

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: WES-14-4-83
DATE: 4/23/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0723	27.83	START							CLEAR
0727	27.86	300	12.90	3.63	0.704	1.24	+218.6	1.2	
0730	27.86	300	13.05	3.67	0.714	0.78	+218.2	1.0	2.1L
0735	27.86	300	13.22	3.80	0.716	0.59	+217.3	1.1	—
0740	27.86	300	13.22	3.80	0.716	0.58	+217.8	1.0	5.1L
0745	27.86	300	13.22	3.80	0.716	0.59	+217.3	1.0	—
0750	27.86	300	13.22	3.67	0.718	0.40	+214.2	1.0	9.1L
0755	27.85	300	13.26	3.64	0.718	0.33	+213.3	0.9	—
0800	27.86	300	13.29	3.68	0.720	0.32	+211.9	1.0	11.1L
0805	27.86	300	13.30	3.67	0.720	0.30	+204.1	0.5	—
0810	27.86	300	13.31	3.68	0.720	0.29	+202.4	0.5	7 Vol 14.1L
	→ END PURGE								
	SAMPLED @	0811							

SIGNATURE(S): Robert Balkwill

13.2L = Vol

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 05 01
Sample Location: WES-14-05-93
Sampled By: T. ROJAHN
C.O.C. No.: 0988
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/22/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1045	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: BLADDER	CLEAR	4.38	0.625	12.95	0.00	0.90	—	152

PURGE DATA:

Date: 4/22/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC								
Total Well Depth (TD): 57.30	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 33.47								
One Casing Volume(gal/L): 12.8								
Start Purge (hrs): 0900								
End Purge (hrs): 1040								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 13.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	3 X (3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	3 X (2) 40 mL Vials	Yes
SVOCs (8270C)	4°C	(2) 1 L Amber	Yes
SVOCs (SIM)	4°C	(2) 1 L Amber	Yes
SVOCs (8151A)	4°C	(2) 1 L Amber	Yes
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Explosives Picrates	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	3 X (1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	3 X (1) 1 L HDPE	Yes
SVOCs & Explosives	Extra For MS/MSD =	(14) 1 L AMBERS	YES

OBSERVATIONS / NOTES:

MIP SCREEN @ 38.5
+ 4.63
Pump Intake = 43.13'

WELL HAS A 5' SUMP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
YES	—

Signature(s): Terry Rojahn

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: WES-14-05-83
DATE: 4/22/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	
0900	33.47	—	—	—	—	—	—	—	0	CLEAR
0910	33.75	200	13.55	4.25	0.633	2.10	69	25	2000	CLEAR
0920	33.75	130	13.75	4.46	0.636	1.51	56	2.7	3300	CLEAR
0930	33.75	130	13.74	4.48	0.636	1.20	92	1.5	4600	CLEAR
0940	33.75	130	13.17	4.46	0.627	1.02	116	0.8	5900	CLEAR
0950	33.75	130	13.04	4.44	0.625	1.29	127	0.35	7200	CLEAR
1000	33.75	130	13.02	4.42	0.625	1.02	135	0.15	8500	CLEAR
1010	33.75	130	13.01	4.42	0.625	1.01	141	0.00	9800	CLEAR
1020	33.75	130	12.90	4.38	0.623	0.95	146	0.00	11100	CLEAR
1030	33.75	130	12.88	4.38	0.622	0.91	149	0.00	12400	CLEAR
1040	33.75	130	12.95	4.38	0.625	0.90	152	0.00	13700	CLEAR
1045	—	—	—	—	—	—	—	—	SAMPLE TIME	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW T01 01
Sample Location: 16MW T01
Sampled By: B. Balkovec
C.O.C. No.: 0988
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/22/03 (START)	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 0800	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	GRAY	6.51	1.061	13.01	>999	4.51	NA	+63.1

PURGE DATA:

Date: 4/21/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 26.65	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 25.61								
One Casing Volume (gal/L): .17								
Start Purge (hrs): 1522								
End Purge (hrs): 1530								
Total Purge Time (min): 8								
Total Vol. Purged (gal/L) 1.1	--							

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
VOCs 8260B	HCl / 4°C	4/22/03	(3) 40 mL Vials	(Yes)
VOCs 8015B	HCl / 4°C	4/22/03	(2) 40 mL Vials	(Yes)
SVOCs (8270C)	4°C		(2) 1 L Amber	~~Yes~~ NO
SVOCs (SIM)	4°C		(2) 1 L Amber	~~Yes~~
SVOCs (8151A)	4°C		(2) 1 L Amber	~~Yes~~
Explosives (8330)	4°C		(2) 1 L Amber	~~Yes~~
Explosives Picrates	4°C		(2) 1 L Amber	~~Yes~~
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C		(1) 1 L HDPE	~~Yes~~
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C		(1) 1 L HDPE	~~Yes~~
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C		(1) 1 L HDPE	~~Yes~~

OBSERVATIONS / NOTES:

Vol = 640 ml.

WL: 26.42 @ 0736 on 4/22/03
0800 4 VOCs 4/22/03
WELL DIDN'T RECOVER

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 16MW101
DATE: 4/2/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1522	25.61	START							
1525	26.22	200	13.23	6.90	1.064	5.45	+74.0	>999	BRN.
1530	DRY	≈200	13.01	6.51	1.061	4.51	+63.1	>999	
		1.1L TOTAL VOL.							

SIGNATURE(S): Robert Balsover

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT02 01
Sample Location: 16GWT02
Sampled By: B. Balkovec
C.O.C. No.: 0988
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Date: 4/22/03	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Time: 0946								
Method: Peristaltic	CLEAR	6.33	0.400	11.51	3.4	0.82	NA	-7.1

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Date: 4/22/03								
Method: Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 21.08	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 9.11								
One Casing Volume (gal/L): 1.95								
Start Purge (hrs): 0828								
End Purge (hrs): 0945								
Total Purge Time (min): 77								
Total Vol. Purged (gal/L): 7.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	Yes
SVOCs (8270C)	4°C	(2) 1 L Amber	Yes
SVOCs (SIM)	4°C	(2) 1 L Amber	Yes
SVOCs (8151A)	4°C	(2) 1 L Amber	Yes
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Explosives Picrates	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

7.4L=1 vol

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Robert Balkovec

TBD: To Be Determined

Reds

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 16MW102
DATE: 4/22/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	Vol.
0828	9.11	START							LT. BROWN	
0830	9.32	200	11.07	6.96	0.395	2.66	-30.7	150	HAZY	
0835	9.48	170	11.10	6.46	0.396	0.77	-39.2	81		
0840	9.58	100	11.47	6.45	0.402	0.77	-39.6	27	CLEAR	1.5L
0845	9.56	100	11.44	6.44	0.402	0.73	-37.5	14		–
0850	9.64	100	11.61	6.43	0.402	0.69	-28.0	8.5	PUMP STOPPED @ 0846	2.5L
0855	9.66	100	11.51	6.43	0.400	0.70	-14.1	8.0	STARTED BEING AWAY	–
0900	9.70	125	11.49	6.43	0.402	0.71	-8.8	5.4	HAD TO READJUST FLOW	3.6L
0905	9.75	120	11.72	6.41	0.404	0.70	-5.6	5.1	& UNABLE TO KEEP PUMP RUNNING	
0910	9.80	100	11.94	6.43	0.408	0.77	-2.8	4.8	@ 100 ml/min	≈ 4.8L
0915	9.81	100	12.31	6.37	0.413	0.81	+1.0	4.6		–
0920	9.83	100	12.35	6.37	0.414	0.83	-3.6	4.0	SUNSHINING ↑ TOC	≈ 5.8L
0925	9.86	100	12.12	6.35	0.410	0.83	-4.1	3.7		–
0930	9.90	100	11.99	6.34	0.408	0.83	-5.3	3.4		6.8L
0935	9.94	100	11.57	6.33	0.401	0.83	-7.5	3.2		–
0940	9.96	100	11.49	6.33	0.400	0.83	-6.6	3.5	1 vol Removed	7.8L
0945	9.98	100	11.51	6.33	0.400	0.82	-7.1	3.4		8.3L
1000	→ END PURGE									
1010	SAMPLED @	0946								
1020										

7.4L = 1 vol

SIGNATURE(S): Robert Balthrop

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT03 01
Sample Location: 16MWT03
Sampled By: T. ROJAHN
C.O.C. No.: 0991
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/25/03	Color	pH	S.C.	Temp.	Turbidity	DO	Sainity	ORP
Time: 1135	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: BLADDER	CLEAR	5.23	0.607	12.26	10	0.64	—	+35

PURGE DATA:

Date: 4/25/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC								
Total Well Depth (TD): 38.07	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 27.56								
One Casing Volume(gal/L): 6.8								
Start Purge (hrs): 0940								
End Purge (hrs): 1130								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 7.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	Yes
SVOCs (8270C)	4°C	(2) 1 L Amber	Yes
SVOCs (SIM)	4°C	(2) 1 L Amber	Yes
SVOCs (8151A)	4°C	(2) 1 L Amber	Yes
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Explosives Picrates	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	~~Yes~~ No
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Pump Intake @ 33'

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 16MWT03
DATE: 4/25/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (SU)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0940	27.56	—	—	—	—	—	—	—	Start Purge
0950	28.45	150	12.70	5.12	0.636	1.11	+70	30	1500
1000	28.60	80	12.50	5.16	0.638	1.11	+64	30	2300
1010	28.46	50	12.13	5.18	0.632	1.16	+59	36	2800
1020	28.50	55	12.09	5.21	0.628	1.00	+51	70	3350
1030	28.53	55	12.15	5.21	0.624	0.90	+45	47	3900
1040	28.55	55	12.20	5.23	0.621	0.83	+41	25	4450
1050	28.56	55	12.20	5.23	0.617	0.79	+39	20	5000
1100	28.57	55	12.20	5.23	0.614	0.74	+37	16	5550
1110	28.57	55	12.20	5.23	0.610	0.69	+36	14	6100
1120	28.58	55	12.22	5.23	0.608	0.67	+35	12	6650
1130	28.58	55	12.26	5.23	0.607	0.64	+35	10	7,200
1135	—	—	—	—	—	—	—	—	Start Sampling

SIGNATURE(S): Terry Kyle

6.8L

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW704 01
Sample Location: 16MWTD4
Sampled By: B. BALKOVEC
C.O.C. No.: 0988
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/22/03	Color	pH	S.C.	Temp.	Turbidity	DO	Sainity	ORP
Time: 1437	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	6.28	0.225	12.41	9.2	5.41	NA	+79.7

PURGE DATA:

Date: 4/22/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 22.59	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 11.13								
One Casing Volume (gal/L): 2.7								
Start Purge (hrs): 1243								
End Purge (hrs): 1435								
Total Purge Time (min): 112								
Total Vol. Purged (gal/L): 3.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	Yes
SVOCs (8270C)	4° C	(2) 1 L Amber	Yes
SVOCs (SIM)	4° C	(2) 1 L Amber	Yes
SVOCs (8151A)	4° C	(2) 1 L Amber	Yes
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Explosives Picrates	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Vol = 10.2L

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	Robert Balkovec
—	—	

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 16MW704
DATE: 4/22/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1243	11.13	START							CLOUDY BROWN
1245	11.31	130	13.27	5.41	0.634	4.32	+101.7	450	—
1250	11.64	130	13.30	5.25	0.588	3.46	+118	230	HAZY .91 L
1255	11.66	120	13.08	5.50	0.503	4.89	+99.1	50	—
1300	11.64	110	12.72	5.87	0.361	6.15	+70.4	20	SLIGHT HAZE 2.1 L
1305	11.63	110	12.36	6.10	0.318	6.77	+76.5	10	STABLE WL @ 110 ml/min —
1310	11.63	110	12.33	6.17	0.286	6.89	+84.1	10	3.2 L
1315	11.64	110	12.32	6.16	0.281	6.70	+74.5	12	—
1320	11.64	110	12.32	6.16	0.267	6.61	+83.7	17	SLIGHT HAZE 4.3 L
1325	11.66	110	12.34	6.19	0.255	6.44	+91.7	28	—
1330	11.67	110	12.36	6.18	0.251	6.28	+92.6	36	5.4 L
1335	11.66	110	12.29	6.20	0.242	6.01	+94.7	45	—
1340	11.65	110	12.30	6.19	0.240	6.00	+97.8	50	CLEANED OUT CELL 6.5 L
1345	11.66	110	12.21	6.26	0.238	6.63	+97.6	50	—
1350	11.65	110	12.45	6.22	0.239	6.14	+95.8	45	7.6 L
1355	11.66	110	12.50	6.00	0.247	6.21	+76.6	43	—
1400	11.66	110	12.52	6.21	0.242	5.46	+81.2	40	8.7 L
1405	11.67	110	12.52	6.23	0.237	5.78	+87.8	31	—
1410	11.67	110	12.44	6.26	0.226	5.57	+91.2	17	9.8
1415	11.67	110	12.38	6.28	0.222	5.47	+85.2	13	—
1420	11.66	110	12.40	6.28	0.224	5.43	+84.7	12	≈1 vol. 10.4 L
1425	11.65	110	12.39	6.28	0.225	5.42	+82.9	9.4	—
1430	11.66	110	12.41	6.28	0.224	5.40	+80.2	9.7	12 L
1435	11.67	110	12.41	6.28	0.225	5.41	+79.7	9.2	≈ 12.6 L
→ END PURGE									
SAMPLED @ 1437									

10.2 L 1 vol

SIGNATURE(S): Robert Bultman

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT05 01
Sample Location: 16MWT05
Sampled By: T. ROJAHN
C.O.C. No.: 0981
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Sainity	ORP
Date: 4/24/03	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Time: 1300								
Method: SAMPLE	CLEAR	4.92	0.684	14.47	6.8	0.20	—	+185

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Date: 4/24/03								
Method: BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC								
Total Well Depth (TD): 41.82	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 30.68								
One Casing Volume(gal/L): 7								
Start Purge (hrs): 1045								
End Purge (hrs): 1255								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 14.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
VOCs 8260B	HCl / 4°C	2 X	(3) 40 mL Vials	Yes
VOCs 8015B	HCl / 4°C	2 X	(2) 40 mL Vials	Yes
SVOCs (8270C)	4° C	2 X	(2) 1 L Amber	Yes
SVOCs (SIM)	4° C	2 X	(2) 1 L Amber	Yes
SVOCs (8151A)	4° C	2 X	(2) 1 L Amber	Yes
Explosives (8330)	4° C	2 X	(2) 1 L Amber	Yes
Explosives Picrates	4° C	2 X	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	2 X	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	—	(1) 1 L HDPE	~~Yes~~ N/J
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	2 X	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

MID. SCREEN = 36.82

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
—	FD04240301	[signature]

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 16MW T05
DATE: 4/24/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1045	30.68	—	—	—	—	—	—	—	Start Purge
1055	30.90	110	14.82	4.18	0.698	1.48	+149	50	1100 V. SL. CLOUDY
1105	30.82	110	14.78	4.34	0.702	0.88	+154	55	2200 " " "
1115	30.82	110	14.64	4.40	0.689	0.66	+152	55	3300 " " "
1125	30.82	110	14.55	4.46	0.681	0.44	+150	55	4400 " " "
1135	30.82	110	14.54	4.48	0.664	0.38	+152	50	5500 " " "
1145	30.82	110	14.53	4.48	0.646	0.31	+154	50	6600 " " "
1155	30.82	110	14.11	4.49	0.609	0.47	+157	45	7700 CLEAR
1205	30.82	110	14.10	4.50	0.610	0.30	+160	34	8800 CLEAR
1215	30.82	110	14.10	4.49	0.678	0.24	+164	26	9900 CLEAR
1225	30.82	110	14.24	4.48	0.671	0.23	+169	21	11000 CLEAR
1235	30.82	110	14.38	4.45	0.674	0.22	+175	16	12100 CLEAR
1245	30.82	110	14.44	4.43	0.677	0.21	+181	12	13200 CLEAR
1255	30.82	110	14.47	4.42	0.684	0.20	+185	6.8	14300 CLEAR
1300	—	—	—	—	—	—	—	—	Start sampling

7.0 L = MIN. VOL.

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW706 01
Sample Location: 16MW06
Sampled By: T. ROJAHN
C.O.C. No.: 0994
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Date: 4/28/03	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Time: 0932								
Method: SAME	CLEAR	7.70	0.56	15.04	8.8	0.48	~~-106~~ 74	-106

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Date: 4/28/03								
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC								
Total Well Depth (TD): 28.28	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 25.25								
One Casing Volume(gal/L): 1.9								
Start Purge (hrs): 0835								
End Purge (hrs): 0930								
Total Purge Time (min): 55								
Total Vol. Purged (gal/L): 4.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	4/29	Yes
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	4/29	Yes
SVOCs (8270C)	4°C	2 ~~(2)~~ 1 L Amber	4/29	Yes
SVOCs (SIM)	4°C	1 ~~(2)~~ 1 L Amber	4/28	Yes
SVOCs (8151A)	4°C	1 ~~(2)~~ 1 L Amber	4/28	Yes
Explosives (8330)	4°C	1 ~~(2)~~ 1 L Amber	4/29	Yes
Explosives Picrates	4°C	1 ~~(2)~~ 1 L Amber	4/28	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	4/28	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	—	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	4/28	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Tony Rojahn

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 16 MWT06
DATE: 4/29/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0835	25.25	—							Start Purge
0845	25.67	130	14.80	6.96	0.452	0.11	-51	350	650 ml BRN
0850	25.77	90							1300 } Surveyors Arrive
0855	25.90	90							1750 } let them in gate
0900	26.05	90							2200
0905	26.18	90	14.61	7.49	0.484	0.27	-86	45	2650 CLEAR
0910	26.28	90	14.80	7.52	0.490	0.32	-92	35	3100 "
0915	26.40	90	14.78	7.49	0.498	0.37	-98	25	3550 "
0920	26.51	90	15.00	7.70	0.502	0.44	-102	16	4000 "
0925	26.61	90	14.81	7.70	0.511	0.46	-105	9.8	4450 "
0930	26.73	90	15.00	7.70	0.516	0.48	-106	8.8	4900 "
0932	—	—	—	—	—	—	—	—	Start Sampling
1015	—	—	—	—	—	—	—	—	(Dry)
* 4/29/03									
1000	26.95								
1002	~~Dry~~ Pk	—	—	—	—	—	—	—	Start Sampling
1037	Dry		~3L	Collected					

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW0602
Sample Location: 16MW06
Sampled By: R. Balkovec
C.O.C. No.: 0997
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
Date: 5/11/03								
Time: 1310								
Method: Peristaltic	[redacted]	6.43	0.460	14.21	43.01	6.44	NA	-117.1

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	ORP
Date: 5/11/03								
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 28.30	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 15.70								
One Casing Volume(gal/L): 2.1								
Start Purge (hrs): 0908								
End Purge (hrs): 1308								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	~~Yes~~ NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	~~Yes~~ NO
SVOCs (8270C)	4°C	(2) 1 L Amber	Yes
SVOCs (SIM)	4°C	(2) 1 L Amber	~~Yes~~ NO
SVOCs (8151A)	4°C	(2) 1 L Amber	~~Yes~~
Explosives (8330)	4°C	(2) 1 L Amber	~~Yes~~
Explosives Picrates	4°C	(2) 1 L Amber	~~Yes~~
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	~~Yes~~
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	~~Yes~~
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	~~Yes~~

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 16MW106
DATE: 5/11/03

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0909	15.70	START							
0915	16.60	150	13.56	6.04	0.885	9.03	+93.6	13.6	
0935	19.00	150	13.25	6.72	0.863	8.05	+88.7	5.0	
0945	19.56	150	12.66	6.70	0.835	9.30	+88.0	45.1	
0955	20.00	150	13.40	6.68	0.839	9.17	+82.3	14.2	
1005	20.23	85	13.52	6.64	0.837	8.45	+78.7	200.7	
1015	21.10	430							* INCREASE RATE TO PUMP WELL DRY
1025	22.01	430	12.43	6.67	0.837	9.63	+79.3	53.1	BASED ON HISTORICAL INFO.
1035	22.75	85	12.91	6.71	0.857	8.40	+84.4	58.6	
1045	23.98	85	13.41	6.77	0.921	8.00	+90.1	111.7	* WELL NOT DRAWING DOWN, WILL
1100	23.11	85	14.68	6.83	0.943	7.15	+93.9	146.1	DEAR RATE DOWN TO SEE IF WELL
1130	24.05	85	17.01	6.85	0.999	6.70	+96.4	72.1	STABILIZES.
1200	25.10	85	14.51	6.90	0.965	6.82	+100.7	64.1	
1230	26.00	85	14.25	6.98	0.960	6.89	+104.7	55.3	
1308	26.31	85	14.20	6.93	0.960	6.94	+117.1	43.1	4 HRS Sand
→ END PURGE									
	SAMPLED @	1310							

SIGNATURE(S): Robert Balkwill

APPENDIX C.4.2
SWMU 16
GROUND WATER SAMPLE LOG SHEETS
ROUND 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW0102
Sample Location: WES-14-01-83
Sampled By: M. COCHRAN
C.O.C. No.: 4808
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 10-26								
Time: 1255								
Method: BLADDER	CLEAR	6.17	1.452	12.72	.61	.70	-5.0	–

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 10-26-03								
Method: BLADDER								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material								
Type: 53.70			See Low Flow Purge Data Sheets					
Total Well Depth (TD): ~~54.0~~								
Static Water Level (WL): 34.12								
One Casing Volume(gal/L): 12								
Start Purge (hrs): 0910								
End Purge (hrs): 1250								
Total Purge Time (min): 34.40								
Total Vol. Purged (gal/L): 12								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	NO
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 16GW0102
DATE: 10-26-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0910	34.12	70	6.29	1.420	230	3.0	12.08	–	-5	0 CLOUDY
0920	34.70	70	6.29	1.438	210	2.48	12.08	–	-4	700
0930	35.60	70	6.30	1.426	120	1.34	12.11	–	-9.2	1400
0940	37.70	60	6.31	1.403	68	1.24	10.99	–	-10.8	2100
0950	35.90	60	6.31	1.415	49.7	1.14	11.84	–	-8.1	2700
1000	36.52	60	6.32	1.403	49.1	1.00	11.88	–	-13.5	3300
1010	36.91	60	6.31	1.402	32.1	.97	11.89	–	-12.3	3900
1020	37.30	60	6.30	1.393	24.8	.86	11.92		-10.8	4500 CLEAR
1030	37.70	50	6.31	1.374	22.6	.89	12.05	–	-11.2	5100
1040	37.95	50	6.30	1.381	46.3	.89	11.92	–	-13.4	5600
1050	38.24	50	6.28	1.374	24.7	.86	11.75	–	-11.2	6100
1100	38.50	50	6.26	1.382	15.1	.84	11.98	–	-10.7	6600
1110	38.72	50	6.25	1.395	8.69	.79	12.17	–	-10.6	7100
1120	38.90	50	6.24	1.401	7.64	.80	12.26	–	-11.2	7600
1130	* –	50	6.24	1.412	7.65	.74	12.16	–	-11.5	8100
1140	–	50	6.23	1.414	6.41	.62	12.18	–	-12.8	8600
1150	–	50	6.23	1.424	7.17	.49	12.12	–	-14.4	9100
1200	–	50	6.22	1.429	4.96	.59	12.22	–	-15.4	9600
1210	–	50	6.21	1.431	3.41	.52	12.05	–	-15.6	10100
1220	–	50	6.21	1.436	2.44	.47	12.33	–	-13.3	10600
1230	–	50	6.20	1.444	2.44	.51	12.64	–	-10.6	11100
1240	–	50	6.19	1.446	1.65	.51	12.72	–	-7.8	11600
1250	–	50	6.17	1.452	.61	.70	12.72	–	-5.0	12100

SIGNATURE(S): [signature]

* – METER PROBE HIT TOP OF PUMP MEASUREMENT CANT BE TAKEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW0203
Sample Location: WES-14-02-83
Sampled By: FCW
C.O.C. No.: 4812 & 4808
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-25-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1608								
Method: LOW FLOW	CLEAR	6.54	1.750	15.27	0.80	6.3	-0.8	—

PURGE DATA:

Date: 10-25-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: LOW FLOW								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 28.74								
Static Water Level (WL): 16.25								
One Casing Volume(~~gal~~/L): 2.0								
Start Purge (hrs): 1436								
End Purge (hrs): 1608								
Total Purge Time (min): 92								
Total Vol. Purged (~~gal~~/L): 2.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	✓
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	✓

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): FCW

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: WES-14-02-03
DATE: 10-23-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1436	16.25									START
1450	16.44	100	6.44	2.286	1.2	10.0	15.96	—	8.7	
1500	16.45	↓	6.47	2.203	0.83	8.2	15.79	—	6.2	
1510	16.46	↓	6.48	2.105	0.97	7.0	15.70	—	1.2	
1520	16.43	90	6.48	2.050	1.02	7.3	15.55	—	0.5	
1530	16.44	↓	6.49	1.972	1.45	7.3	15.41	—	1.8	
1540	16.44	↓	6.50	1.913	0.79	6.9	15.44	—	0.6	
1550	16.44	↓	6.51	1.859	0.70	6.7	15.45	—	-0.1	
1600	16.45	↓	6.52	1.753	1.10	6.5	15.31	—	-0.7	
1608	16.45	↓	6.54	1.750	0.80	6.3	15.27	—	-0.8	SAMPLE
1750										END

SIGNATURE(S): [illegible]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: F. WZOKWYCH 10/25/03
Field Analyst: T ROSHAN & F. RAMSEK 10/26/03
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: WES-14-02-03
Sample Location: 16GW0203
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 10/25/03 Time: 1608	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Method: Peristaltic	CLEAR	6.54	1.750	15.27	0.80	6.3	—	-0.8

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)
Electrode Make & Model: YSI
Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:
Equipment: Chemetrics Test Kit
Concentration: 0.2 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0.2
☐	1 to 12 ppm	K-7512	

Analysis Time: 1025

Notes:

Alkalinity:
Equipment: Chemetrics Test Kit
Concentration: 300 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-9810	
☒	50 to 500 ppm	K-9815	300
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1035
Filtered: ☐

Notes:

Carbon Dioxide:
Equipment: Chemetrics Test Kit
Concentration: 105 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☒	100 to 1000 ppm	K-1920	105
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1048

Notes:

Ferrous Iron (Fe^{2+}):
(TR) ~~Dilute Factor 5 x 0.95~~ > 3.30
Equipment: DR-850 DR-8 90 Range: 0 - 3.00 mg/L
Program/Module: ~~500nm~~ 33
Concentration: (TR) ~~4.75~~ ppm
Analysis Time: 1053
Filtered: ☐
Notes: High Limit No Dilution = >3.30 ppm (TR) ~~Did Factor 2 Dilution > 3.30~~

Hydrogen Sulfide (H_2S):
Range: 0 - 5 mg/L
Equipment: HS-C Other:
Exceeded 5.0 mg/L range on color chart: ☐
Concentration: 0.0 ppm
Analysis Time: 1059
Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: F. WUDKWYCH
Field Analyst: T. ROJAHN & F. RAMSEK

Sample ID No.: WES-14-02-83
Sample Location: 166W0203
Duplicate: ☐
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-8 90 Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.0 ppm
Analysis Time: 1104 Filtered: ☐
Notes:

Nitrite (NO_2^--N):
Equipment: DR-850 DR-8 90 Range: 0 - 0.350 mg/L
Program/Module: 62
Concentration: 0.003 ppm
Analysis Time: 1121 Filtered: ☐
Standard Solution: ☐ Results: _____
Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):
Equipment: DR-850 DR-8 90 Range: 0 - 20.0 mg/L
Program/Module: 525nm 41
Concentration: (TX) ~~1.5~~ ppm 1.5 ppm
Analysis Time: 1131 Filtered: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ~~☐~~ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

WELL NA WAS RUN NEXT day due to 1800 Hr deadline to Exist Army property.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW0302
Sample Location: WES-14-03-83
Sampled By: T. ROJAHN
C.O.C. No.: 4818 & 4819
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 11/8/03								
Time: 1215								
Method: SAME	CLEAR	4.82	0.355	13.62	1.06	0.74	+350	—

PURGE DATA:

Date: 11/8/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 38.31								
Static Water Level (WL): 20.75								
One Casing Volume(gal/L): 10.8								
Start Purge (hrs): 1015								
End Purge (hrs): 1215								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L) 12.1								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	YES ← Vials Broke in Transit to LAB
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

38.31 - 20.75 = 17.56 x 0.163 = 2.8 gal or 10.8 L

INTAKE @ MID SCREEN

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: WES-14-03-83
DATE: 11/8/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1015	20.75	—	—	—	—	—	—	—	—	Start PURGE
1025	22.27	100	5.16	0.400	33.3	2.49	12.02	—	283	1000 CLEAR
1035	23.05	110	5.20	0.364	21.0	1.06	10.97	—	282	2100 "
1045	23.35	100	5.36	0.356	11.1	1.00	11.26	—	281	3100 "
1055	23.61	100	5.26	0.365	10.51	0.92	12.49	—	293	4100 "
1105	23.83	100	4.99	0.370	10.23	0.74	12.50	—	307	5100 "
1115	23.91	100	5.01	0.364	7.25	0.71	12.44	—	336	6100 "
1125	23.91	100	4.94	0.368	5.81	0.69	12.91	—	326	7100 "
1135	23.91	100	4.99	0.368	3.06	0.68	12.92	—	324	8100 "
1145	23.91	100	4.96	0.370	1.82	0.76	13.40	—	332	9100 "
1155	23.91	100	4.82	0.365	1.50	0.75	13.59	—	349	10100 "
1205	23.91	100	4.87	0.360	1.25	0.75	13.73	—	355	11100 "
1215	23.91	100	4.82	0.355	1.06	0.74	13.62	—	350	12100 "
1215	—	—	—	—	—	—	—	—	—	SAMPLE TIME

SIGNATURE(S): [illegible]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: T. ROJAHN
Field Analyst: TR
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 16GW0302
Sample Location: WES-14-03-83
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 11-8-03								
Time: 1215	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	CLEAR	4.82	0.355	13.62	1.06	0.74	~~+35~~ 70	+350

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI
Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 1 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	1
☑	1 to 12 ppm	K-7512	1

Analysis Time: 1251

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1300

Filtered: ☐

Notes: No color change (pink)

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 130 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	130
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1302

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-890 Range: 0 - 3.00 mg/L
Program/Module: ~~500nm~~ 33

Concentration: 0.54 ppm

Analysis Time: 1318

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other:
Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm
Analysis Time: 1320

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	16GW0302
Project No.:	9060	Sample Location:	WES-14-03-83
Sampled By:	T. ROJAHN	Duplicate:	☐
Field Analyst:	T. ROJAHN	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-8 90 Range: 0 - 0.70 mg/L Concentration: 0.04 ppm

Program/Module: 610nm 93 Analysis Time: 1327 Filtered: ☐

Notes:

Nitrite (NO_2^--N): Concentration: 0.007 ppm

Equipment: DR-850 DR-8 90 Range: 0 - 0.350 mg/L Analysis Time: 1306 Filtered: ☐

Program/Module: 62

Standard Solution: ☐ Results: ____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}): Concentration: 2.1 ppm

Equipment: DR-850 DR-8 90 Range: 0 - 20.0 mg/L Analysis Time: 1336 Filtered: ☐

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW0402
Sample Location: WES- 14-4-83
Sampled By: FCW
C.O.C. No.: 4814 & 4908
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 10-26-03								
Time: 0955								
Method: Low Flow	CLEAR	3.65	0.735	13.21	0.13	0.54	328.7	--

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 10-26-03								
Method: Low Flow								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 49.16								
Static Water Level (WL): 30.81								
One Casing Volume(gal/L): 3.0								
Start Purge (hrs): 0855								
End Purge (hrs): 0955								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	—
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	—
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

Circle if Applicable:
MS/MSD
Duplicate ID No.: 16FD10260301

Signature(s): FCW

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: WES-14-4-83
DATE: 10-26-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. Celsius	Salinity (%)	ORP (mv)	Comments (Volume & Color)
0855	30.81									START
0905	30.85	220	3.64	0.732	0.88	1.06	13.15	–	379.7	
0915	30.85		3.62	0.736	0.79	0.76	13.12	–	358.6	
0925	30.85		3.59	0.739	0.27	0.65	13.20	–	347.8	
0935	30.85		3.64	0.739	0.0	0.54	13.20	–	340.9	
0942	30.85		3.62	0.741	0.10	0.57	13.24	–	337.6	
0948	30.85		3.62	0.740	0.50	0.56	13.15	–	332.6	
0955	30.85		3.65	0.735	0.13	0.54	13.21	–	328.7	SAMPLE
1225										END

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW0507
Sample Location: WES-14-05-83
Sampled By: M. COCHRAN
C.O.C. No.: 4812 & 4808
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 10-25-03								
Time: 1630								
Method: BLADDER	CLEAR	4.77	.587	13.39	1.96	.28	263	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 10-25-03								
Method: BLADDER								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 53.30								
Static Water Level (WL): 36.74								
One Casing Volume (gal/L): ~~2.5~~ 10.2								
Start Purge (hrs): 1528								
End Purge (hrs): 1630								
Total Purge Time (min): 62								
Total Vol. Purged (gal/L): 12 ~~[illegible]~~								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	YES
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

MID SCREEN @ ~~38.5~~ 43'

53.30
- 36.74
16.56' PER VOLUME

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: WES-14-05-83
DATE: 10-25-03

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)	
1528	36.74	200	—	—	—	—	—	—	—	0	CLEAR
1538	36.85	200	4.58	.579	18.5	1.91	13.63	—	298	2000	CLEAR
1548	36.87	200	4.76	.584	7.09	.73	13.56		275	4000	CLEAR
1558	36.89	200	4.79	.585	4.74	.49	13.49	—	267	6000	CLEAR
1608	36.88	200	4.77	.586	4.78	.42	13.43	—	265	8000	CLEAR
1618	36.89	200	4.78	.587	2.40	.30	13.40	—	264	10000	CLEAR
1623	36.89	200	4.77	.587	1.85	.30	13.40	—	262	11000	CLEAR
1628	36.88	200	4.77	.587	1.96	.28	13.39	—	263	12000	CLEAR

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: M. COCHRAN
Field Analyst: T. ROSMAN
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 16GW0502
Sample Location: WES-14-05-83
Duplicate: ☐
Blank: ☐

SAMPLING DATA

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Date: 10-25-03								
Time: 1630								
Method: BLADDER	CLEAR	4.77	0.587	13.39	1.96	0.28	NA	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)
Electrode Make & Model: YSI
Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:
Equipment: Chemetrics Test Kit
Concentration: 0.25 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0.25
☐	1 to 12 ppm	K-7512	

Analysis Time: 1642

Notes:

Alkalinity:
Equipment: Chemetrics Test Kit
Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	No Reaction
☑	50 to 500 ppm	K-9815	No Reaction
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1650
Filtered: ☐

Notes:

Carbon Dioxide:
Equipment: Chemetrics Test Kit
Concentration: 150 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	150
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1652

Notes:

Ferrous Iron (Fe^{2+}):
Equipment: DR-850 DR-890 Range: 0 - 3.00 mg/L
Program/Module: 500nm 33
Concentration: 2.91 ppm
Analysis Time: 1703
Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L
Equipment: HS-C Other:
Exceeded 5.0 mg/L range on color chart: ☐
Concentration: 0.0 ppm
Analysis Time: 1716

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: MC
Field Analyst: TR

Sample ID No.: 16GW0502
Sample Location: WES-14-05-83
Duplicate: ☐
Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-890 Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.1 ppm
Analysis Time: 1718 Filtered: ☐
Notes:

Nitrite (NO_2^--N):

Equipment: DR-850 DR-890 Range: 0 - 0.350 mg/L
Program/Module: 62
Concentration: 0.005 ppm
Analysis Time: 1745 Filtered: ☐
Standard Solution: ☐ Results: _____
Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):

Equipment: DR-850 DR-890 Range: 0 - 20.0 mg/L
Program/Module: 525nm 41
Concentration: 2.7 ppm
Analysis Time: 1727 Filtered: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0102
Sample Location: 16MW701
Sampled By: FW/TK
C.O.C. No.: 4818
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: ~~11-9-03~~ 11-9-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1035								
Method: PERISTALTIC	Cloudy	5.97	2.322	15.05	85.7	2.59	+177	—

PURGE DATA:

Date: 11-8-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 26.65								
Static Water Level (WL): 14.72								
One Casing Volume(gal/L): 1.9								
Start Purge (hrs): 1455								
End Purge (hrs): 1800								
Total Purge Time (min): 185								
Total Vol. Purged (gal/L): 4.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	11/09@1035 (3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	↓ ↓ (3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	—
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	~~Yes~~
Sulfate & Chloride	4°C	(1) L HDPE	~~Yes~~
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	—
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 16MW T01
DATE: 11-8-03

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1455	(PC) ~~26.65~~ 14.72									START
1508	15.75	75	6.39	2.353	15.6	3.76	14.86	–	89.6	
1516	16.65		6.23	2.320	5.76	2.00	14.61	–	108.6	
1525	17.04		6.19	2.309	4.08	1.62	14.49	–	128.9	
1535	17.40		6.14	2.292	4.59	1.44	14.24	–	140.0	
1545	17.78		6.12	2.286	3.61	1.45	14.16	–	149.1	
1555	18.20		6.09	2.278	2.82	1.73	14.10	–	156.7	
1605	18.67		6.04	2.277	7.49	2.30	14.16	–	167.4	
1615	19.10		5.98	2.267	12.6	2.95	14.11	–	178.6	
1625	19.48		5.95	2.248	20.4	3.91	14.08	–	189.3	
1635	20.00		5.84	2.244	18.4	4.86	14.03	–	202.2	7500
1645	20.53	80	5.78	2.250	13.9	4.96	14.05	–	210.9	
1655	21.02		5.74	2.248	9.92	4.54	13.80	–	217.1	
1708	21.53		5.76	2.251	7.66	3.85	13.68	–	216.6	2640
1720	22.24	85	5.79	2.258	6.15	3.04	13.66	–	209.3	
1730	22.70		5.86	2.261	6.04	2.50	13.64	–	200.1	1870
1740	23.20	100	5.92	2.279	7.66	2.17	14.00	–	189.6	1000
1750	23.95	140	5.99	2.291	9.47	1.63	14.21	–	180.0	2800 4.2 GALLONS
1800	25.20									END PURGE 11/8/03
		11/09/03								
1025	25.56	–	–	–	–	–	–	–	–	START PURGE 11/8/03
1030	25.92	100	6.08	2.296	79.3	2.74	14.62	–	176	500 ml SL Cloudy
1035	26.20	100	5.97	2.322	85.7	2.59	15.05	–	177	1000 ml SL Cloudy
1035										START SAMPLING

TR

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 166WT0202
Sample Location: 16MWT02
Sampled By: FCW
C.O.C. No.: 4814
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-26-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1550								
Method: LOW FLOW	CLEAR	5.76	0.391	14.81	6.7	1.08	273.2	—

PURGE DATA:

Date: 10-26-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: LOW FLOW								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 21.08								
Static Water Level (WL): 11.21								
One Casing Volume(gal/L): 1.6								
Start Purge (hrs): 1420								
End Purge (hrs): 1550								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 2.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	—
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	—
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 16MWT02
DATE: 10-26-03

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. Celsius	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1420	11.21									START
1430	11.96	100	6.04	0.653	85	1.23	15.17	—	55.8	
1440	12.39		5.95	0.554	27.2	0.98	15.01	—	100.3	
1450	12.84		5.93	0.506	21.9	0.91	14.98	—	158.0	
1500	13.14		5.92	0.481	21.1	1.07	14.66	—	209.0	
1510	13.59		5.91	0.482	20.0	0.93	14.58	—	227.5	
1518	13.90		5.91	0.475	16.0	0.94	14.90	—	240.5	
1526	14.19		5.86	0.433	11.3	1.24	14.77	—	262.6	
1534	14.48		5.78	0.388	10.6	1.47	14.92	—	289.9	
1540	14.70		5.74	0.370	8.4	1.36	14.87	—	293.5	
1545	14.90		5.74	0.372	7.4	1.21	14.91	—	287.9	
1550	15.12		5.76	0.391	6.7	1.08	14.81	—	273.2	SAMPLE
1715										END

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0302
Sample Location: 16MWT03
Sampled By: FW
C.O.C. No.: 4818
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-9-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1635								
Method: BLADDER	CLEAR	5.46	0.536	12.35	49	1.23	129.9	—

PURGE DATA:

Date: 11-9-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 38.07								
Static Water Level (WL): 30.40								
One Casing Volume(gal/L): 1.2								
Start Purge (hrs): 1425								
End Purge (hrs): 1635								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 2.1								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	1 ~~(2)~~ L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	1 ~~(2)~~ L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	✓ -F
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	—
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]
Intake 2x10 water volume

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): [illegible]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 16MWT03
DATE: 11-9-03

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. Celsius	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1425	30.40									START
1435	30.80	70	5.66	0.533	999	4.02	12.90	–	111.9	
1445	30.86	55	5.53	0.536	999	2.25	12.84	–	119.4	
1455	30.91	↓	5.50	0.539	999	1.95	13.08	–	121.8	
1505	30.94	60	5.50	0.555	556	2.07	13.90	–	127.4	
1515	30.97		5.48	0.542	745	1.63	12.91	–	126.6	
1525	30.98		5.51	0.540	374	1.91	12.89	–	128.8	
1535	31.02		5.50	0.538	197	1.34	12.62	–	127.0	
1545	31.04		5.46	0.536	102	1.48	12.52	–	131.7	
1555	31.06		5.44	0.539	58	1.55	12.70	–	134.6	
1605	31.07		5.44	0.538	54	1.44	12.51	–	133.7	
1615	31.09		5.45	0.537	50	1.38	12.44	–	132.0	
1625	31.10		5.46	0.535	49	1.23	12.26	–	130.4	
1635	31.09	↓	5.46	0.536	49	1.23	12.35	–	128.9	SAMPLE
1800										END

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW T0402
Sample Location: 16MWT04
Sampled By: T. ROJAHN
C.O.C. No.: 4818 & 4819
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-8-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1640								
Method: PERISTALTIC	CLEAR	5.84	0.582	15.73	2.20	0.89	+152	—

PURGE DATA:

Date: 11-8-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.59								
Static Water Level (WL): 14.18								
One Casing Volume(gal/L): 8.3								
Start Purge (hrs): ~~1425~~ 1530								
End Purge (hrs): 1640								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 14.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	YES
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	YES

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

27.59 - 14.18 = 13.41 x 0.163 = 2.2 gal or 8.3 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): T. Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 16MWT04
DATE: 11-8-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mv)	Comments (Volume & Color)
1430	14.18	–	–	–	–	–	–	–	–	Start PURGE
1440	14.83	150	4.07	1.285	2.47	1.24	16.53	–	306	1500 CLEAR
1450	14.73	120	5.03	0.712	3.18	1.27	16.31	–	235	2700 CLEAR
1500	14.73	110	5.47	0.619	7.34	1.04	16.30	–	188	3800 CLEAR
1510	14.75	110	5.63	0.517	31.0	0.96	16.27	–	170	4900 CLEAR
1520	14.75	110	5.73	0.480	43.1	0.94	15.97	–	158	6000 WHITE PERCIP.
1530	14.75	110	5.78	0.454	43.9	0.91	15.97	–	156	7100 "
1540	14.77	110	5.82	0.429	23.0	0.94	15.72	–	155	8200 CLEAR
1550	14.77	110	5.86	0.418	13.3	0.89	15.69	–	155	9300 "
1600	14.77	110	5.90	0.409	6.49	0.85	15.91	–	164	10400 "
1610	14.77	110	5.96	0.381	4.17	0.82	15.68	–	155	11500 "
1620	14.77	110	5.92	0.586	3.19	0.87	15.91	–	156	12600 "
1630	14.82	110	5.80	0.581	2.59	0.91	15.88	–	150	13700 "
1640	14.81	110	5.84	0.582	2.20	0.89	15.73	–	152	14800 "
1640										Sample Time

SIGNATURE(S): [illegible]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: T. ROJAHN
Field Analyst: T. ROJAHN / FW
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 16GWT0402
Sample Location: 16MWT04
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 11-8-03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: 1640	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	CLEAR	5.84	0.582	15.73	2.20	0.89	—	+152

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv) Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 2 ppm FW

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	2

Analysis Time: 1709

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: 75 ppm FW

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	75
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1716

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 19 ppm FW

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	19
☑	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1720

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-850 Range: 0 - 3.00 mg/L

Program/Module: ~~500nm~~ 33

Concentration: ~~5.19~~ 73.30 ppm TR

Analysis Time: 1722

Filtered: ☐

Notes: ~~Dilute 2:1~~ TR ~~1.73 X 3 = 5.19~~ High Limit

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm FW

Analysis Time: 1723

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	16GW70802
Project No.:	N9060	Sample Location:	16MW704
Sampled By:	T. ROJAHN	Duplicate:	☐
Field Analyst:	T. ROJAHN / FW	Blank:	☐

Sulfide (S^{2-}): TK

Equipment: DR-850 DR-8 50 Range: 0 - 0.70 mg/L Concentration: 0.00 ppm

Program/Module: 610nm 93 Analysis Time: 1739 Filtered: ☐

Notes:

Nitrite (NO_2^--N): Concentration: 0.004 ppm TK

Equipment: DR-850 DR-8 90 Range: 0 - 0.350 mg/L Analysis Time: 1723 Filtered: ☐

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}): Concentration: 1.0 ppm TK

Equipment: DR-850 DR-8 90 Range: 0 - 20.0 mg/L Analysis Time: 1740 Filtered: ☐

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ last page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0502
Sample Location: 16MWT05
Sampled By: T. ROSAHN
C.O.C. No.: 4824
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-22-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1617								
Method: SAME	CLEAR	438	0.663	15.85	7.72	1.30	+210	—

PURGE DATA:

Date: 11-22-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2"Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 41.82								
Static Water Level (WL): 32.42								
One Casing Volume(gal/L): 5.8								
Start Purge (hrs): 1445								
End Purge (hrs): 1615								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 10								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	NO
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

MUD SCREEN 36.82
41.82 - 32.42 = 9.4 x 0.163 = 1.5 gal or 5.8L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16MWT0502
DATE: 11-22-03
WEATHER: Partly Cloudy 60°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1445	32.42	—	—	—	—	—	—	—	—	Start Purge
1455	32.90	2.000	200	4.32	0.661	119	1.45	16.07	+ 47	Sl. Cloudy
1505	32.77	3.000	100	4.33	0.665	69.1	1.42	16.09	+ 49	V.Sl. Cloudy
1515	32.75	4.000	100	4.34	0.666	45.0	1.47	16.01	+ 112	CLEAR
1525	32.76	5.000	100	4.36	0.665	34.0	1.45	15.88	+ 154	CLEAR
1535	32.77	6.000	100	4.36	0.664	30.5	1.42	15.82	+ 174	CLEAR
1545	32.77	7.000	100	4.36	0.664	16.1	1.40	15.81	+ 188	CLEAR
1555	32.75	8.000	100	4.37	0.664	12.2	1.33	15.93	+ 205	CLEAR
1605	32.76	9.000	100	4.36	0.665	10.76	1.31	15.90	+ 208	CLEAR
1615	32.76	10.000	100	4.38	0.663	7.72	1.30	15.85	+ 210	CLEAR
1617	—	—	—	—	—	—	—	—	—	Start Sampling

Water Quality Meter (S/N) 998141 2 AA
Control Box Type (S/N) MP10-1550 Micro Purge QED
Turbidity Meter (S/N) 3317-2402

Pump Intake Depth MID SCREEN

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0603
Sample Location: 16MWT06
Sampled By: FCW
C.O.C. No.: 4818 & 4819
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-8-03	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1308								
Method: PERISTALTIC	CLEAR	6.49	1.216	14.55	1.99	1.67	188.6	—

PURGE DATA:

Date: 11-8-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 28.30								
Static Water Level (WL): 17.91								
One Casing Volume(gal/L): 1.6								
Start Purge (hrs): 0908								
End Purge (hrs): 1308								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 5.1								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	—
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	✓
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]
Intake @ MID SCREEN

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): [illegible]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 16MWT06
DATE: 11-8-03

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0908	17.91									START
0918	18.60	80	6.79	1.168	385	3.03	12.24	–	204.5	
0928	18.94		6.78	1.180	107	1.95	12.52	–	186.5	
0938	19.21		6.77	1.182	29.2	1.50	12.53	–	169.4	
0948	19.33		6.74	1.182	10.2	1.41	12.64	–	161.5	
0958	19.54		6.68	1.167	5.5	1.42	12.68	–	158.7	
1010	19.80		6.57	1.138	3.60	2.00	12.87	–	162.5	
1020	19.97		6.57	1.113	7.35	2.47	12.35	–	164.6	
1030	20.15		6.59	1.098	13.1	2.81	12.38	–	162.4	
1040	20.27		6.59	1.083	8.66	3.19	12.33	–	160.0	
1050	20.39		6.58	1.096	8.00	3.34	13.02	–	157.1	
1100	20.57		6.55	1.121	7.30	3.32	13.54	–	156.6	
1110	20.75		6.53	1.122	7.14	3.19	13.48	–	158.0	
1120	20.97		6.52	1.127	6.72	3.03	13.38	–	160.4	
1133	21.20		6.50	1.134	9.37	2.89	13.50	–	160.5	
1145	21.38		6.49	1.157	4.90	2.78	14.05	–	160.7	
1155	21.51		6.48	1.170	4.15	2.57	14.34	–	163.0	
1205	21.63		6.48	1.177	3.68	2.45	14.43	–	164.7	
1215	21.83		6.47	1.189	3.26	2.29	14.52	–	169.0	
1225	21.97		6.47	1.191	2.31	2.16	14.57	–	171.6	
1235	22.12		6.48	1.198	2.49	2.04	14.53	–	174.8	
1245	22.25		6.48	1.208	2.80	1.91	14.86	–	176.6	
1258	22.47		6.48	1.218	2.80	1.76	14.62	–	183.9	
1308	22.65	↓	6.49	1.216	1.99	1.67	14.55		188.6	SAMPLE
1445										END

SIGNATURE(S): [illegible]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: F. W
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 16GWT0603
Sample Location: 16MWT06
Duplicate: ☐
Blank: ☐

11/9/03 RAW NA
~~DONE~~ (TR)

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 11-8-03								
Time: 1308	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	CLEAR	6.49	1.216	14.55	1.99	1.67	–	+198.6

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 1.5 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	1.5

Analysis Time: 0915

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: 200 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-9810	
☑	50 to 500 ppm	K-9815	200
☑	100 to 1000 ppm	K-9820	180

Analysis Time: 0923

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 40 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	40
☑	100 to 1000 ppm	K-1920	still Pink
☐	250 to 2500 ppm	K-1925	

Analysis Time: 0935

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-850 Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.03 ppm

Analysis Time: 0945

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 6.0 ppm

Analysis Time: 0945

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	16GWT0603
Project No.:	N9060	Sample Location:	16MWT06
Sampled By:	F. W	Duplicate:	☐
Field Analyst:	T.R	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-890 Range: 0 - 0.70 mg/L Concentration: 0.07 ppm

Program/Module: 610nm 93 Analysis Time: 0956 Filtered: ☐

Notes:

Nitrite (NO_2^--N): Concentration: 0.016 ppm

Equipment: DR-850 DR-850 Range: 0 - 0.350 mg/L Analysis Time: 0925 Filtered: ☐

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}): Concentration: 3.8 ppm

Equipment: DR-850 DR-850 Range: 0 - 20.0 mg/L Analysis Time: 0958 Filtered: ☐

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0801
Sample Location: 16MWT0801
Sampled By: TR
C.O.C. No.: 4833
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-5-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1030								
Method: Dis. Bailer	GREY	7.16	0.257	16.90	>1000	2.13	64.3	—

PURGE DATA:

Date: 12-5-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bailer (Dis.)								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 97.6								
Static Water Level (WL): 91.55								
One Casing Volume(gal/L): 3.73								
Start Purge (hrs): 1320								
End Purge (hrs): 1330								
Total Purge Time (min): 10								
Total Vol. Purged (gal/L) 9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	12/6/03 (3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	12/6/03 (3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	12/6/03 (1) L Glass Amber *min Vol.	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	12/6/03 (1) L HDPE *min Vol	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	~~Yes~~
Sulfate & Chloride	4°C	(1) L HDPE	~~Yes~~
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	NO
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

12/6/03 Hand bailed until dry ~ 9 L.
Well dry on 12/7/03!

97.60
91.55
6.05 (.163) = .986 gal = 3.73 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Terry Spal

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GWT0801
DATE: 12-5-03
WEATHER:

Time (Hrs)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1320	91.55	–	–	–	–	–	–	–	–	Start Purge
1326	–	4.0	NA	6.84	0.260	>1000	3.87	10.09	71.2	GREY
1330	DRY	9.0	NA	7.16	0.257	>1000	2.13	11.90	64.3	END PURGE

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317-2402

Pump Intake Depth NA (Bailer Well)

SIGNATURE(S): [illegible]

PAGE 2 OF 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0901
Sample Location: 16MWT09
Sampled By: Goerdt
C.O.C. No.: 4824
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-22-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1614								
Method: Peristaltic	Clear	4.10	0.502	16.56	4.82	2.33	329.8	—

PURGE DATA:

Date: 11-22-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.65								
Static Water Level (WL): 13.32								
One Casing Volume(gal/L): 8.84								
Start Purge (hrs): 1422								
End Purge (hrs): 1612								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L) 10.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	No
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

27.65
13.32
14.33 (0.163) = 2.34 gal = 8.842

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
—	—	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GWT09
DATE: 11-22-03
WEATHER: 65° Partly Cloudy

Time (Hrs)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1422	13.32	–	–	–	–	–	–	–	–	Start purge
1432	13.81	1.0	1000	3.44	1.308	50.6	1.64	17.14	369.4	v. slight cloud
1442	13.86	1.9	900	3.42	1.267	36.8	1.47	17.31	386.0	"
1452	13.91	2.8	900	3.40	1.207	27.0	1.42	17.22	397.7	"
1502	13.94	3.7	900	3.42	1.129	30.3	1.81	17.20	408.3	"
1512	13.97	4.6	900	3.58	0.920	24.3	2.16	16.98	387.1	"
1522	13.99	5.6	1000	3.80	0.743	17.1	2.36	16.89	362.0	clear
1532	14.00	6.6	1000	3.93	0.648	9.99	2.43	16.71	349.2	"
1542	13.99	7.6	1000	3.97	0.594	7.49	2.41	16.84	346.0	"
1552	14.01	8.6	1000	4.04	0.550	5.65	2.35	16.90	336.0	"
~~1552~~ 1562	14.01	9.6	~~1000~~ 500	4.06	0.535	5.78	2.34	17.03	333.3	"
1602	14.01	9.6	500	4.08	0.512	4.66	2.34	16.75	330.1	"
1607	14.00	10.1	500	4.09	0.504	3.85	2.31	16.80	330.2	"
1612	14.00	10.6	500	4.10	0.502	4.82	2.33	16.56	329.8	Stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth ~ MID SCREEN

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1001
Sample Location: 16MWT10
Sampled By: Goyal
C.O.C. No.: 4822 & 4826
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 11-21-03								
Time: 1003								
Method: Peristalic	Clear	3.72	1.178	14.77	5.56	1.28	328.9	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 11-21-03								
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.15								
Static Water Level (WL): 22.30								
One Casing Volume(gal/L): 2.99								
Start Purge (hrs): 0842								
End Purge (hrs): 0957								
Total Purge Time (min): 75								
Total Vol. Purged (gal/L): 7.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

27.15
22.30
4.85(0.163) = .791 gal = 2.99 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GWT10
DATE: 11-21-03
WEATHER: Partly Cloudy 55° F

Time (Hrs)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0842	22.30		—	—	—	—	—	—	—	Start purge
0852	22.48	100	100	3.95	1.517	70.5	1.04	13.90	291.7	Cloudy
0902	22.51	2.0	100	3.92	1.409	46.3	0.94	14.17	300.2	Clear
0912	22.53	3.0	100	3.86	1.315	37.5	0.80	14.24	317.5	Clear
0922	22.54	4.0	100	3.83	1.263	26.2	0.91	14.33	323.0	"
0932	22.57	5.0	100	3.79	1.208	14.5	1.02	14.52	331.5	"
0942	22.59	6.0	100	3.75	1.196	8.44	1.18	14.73	332.1	"
0952	22.59	7.0	100	3.73	1.188	6.62	1.25	14.78	329.2	"
0957	22.59	7.5	100	3.72	1.178	5.56	1.28	14.77	328.9	" Stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth ~25'

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: JGoerdt
Field Analyst: T. Rojahn
Field Form Checked as per QA/QC Checklist (initials): TKR

Sample ID No.: 16GWT10 01
Sample Location: 16MWT10
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Date: 11-21-03								
Time: 1003								
Method: Peristaltic	CLEAR	3.72	1.178	14.77	5.56	1.28	~~328.9~~ 74	328.9

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI
Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.35 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0.35
☑	1 to 12 ppm	K-7512	

Analysis Time: 1034

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1042

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 280 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	280
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1050

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L
Program/Module: 500nm 33

Concentration: >3.30 ppm

Analysis Time: 1057

Notes: High Limit

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Concentration: 0.0 ppm

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: 1102

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	16GWT1001
Project No.:	9060	Sample Location:	16MWT10
Sampled By:	JG	Duplicate:	☐
Field Analyst:	TK	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-850 Range: 0 - 0.70 mg/L Concentration: 0.02 ppm

Program/Module: 610nm 93 Analysis Time: 1111 Filtered: ☐

Notes:

Nitrite (NO_2^--N): Concentration: 0.002 ppm

Equipment: DR-850 DR-850 Range: 0 - 0.350 mg/L Analysis Time: 1044 Filtered: ☐

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}): Concentration: ≥22 ppm

Equipment: DR-850 DR-820 Range: 0 - 20.0 mg/L Analysis Time: 1117 Filtered: ☐

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ~~☐~~ N/A

Title block on 1st each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16 ~~MW~~ GWT 1101
Sample Location: SWMU 16
Sampled By: SG
C.O.C. No.: 4833
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 12/6/03								
Time: 1330								
Method: Bailer (DIS.)	GREY	7.35	0.256	7.29	650	4.61	188.0	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12/5/03								
Method: Bladderpump/Bailer								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 98.65								
Static Water Level (WL): 96.57								
One Casing Volume(gal/L): 2.08								
Start Purge (hrs): 1515								
End Purge (hrs): 1600								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 1.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	12/6 (3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	12/6 (3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	12/6 * (1) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	12/7 * (1) L Glass Amber @ 1000 Hrs	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	12/6 (1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	12/7 (1) L HDPE @ 1000 Hrs	YES -F
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	~~Yes~~ NO
Sulfate & Chloride	4°C	(1) L HDPE	~~Yes~~ NO
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	NO
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes [redacted] (N) * Min. Vol.

Dried out on 12/5 @ 1600 Hrs
Started sampling on 12/6 @ 1330 Hrs.
Finished sampling on 12/7 @ 1000 Hrs.

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: 18 SWMU

WELL ID.: 13 MWT 11 (72) 6
DATE: 12/5/03
WEATHER: Rain, SNOW, 33°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L) (19)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1515	96.40	0	150	7.41	0.252	1000	6.74	7.15	157.0	GREY CLOUDY
1525	97.20		100	7.35	0.256	650	4.51	7.29	188.0	
1535	—	0.75								DRY.
										Pulled bladder
1600	Dry	.50								pump + dried out
										with bailer.
	Total	1.25g								2 bailers.

Water Quality Meter (S/N) 028041
Control Box Type (S/N) #400 (meio)
Turbidity Meter (S/N) 3106 - T402

BLADER
Pump Intake Depth ~98.0' / Bailed Dry

SIGNATURE(S): Scott Grier

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU ~~13~~ 16 QS
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW7201 QS
Sample Location: 16GW12
Sampled By: Gorzat
C.O.C. No.: 4822 & 4826
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-21-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1316								
Method: Peristaltic	Clear	4.27	0.795	16.04	4.11	0.64	306.8	–

PURGE DATA:

Date: 11-21-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERIstaltic								
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 28.57								
Static Water Level (WL): 21.66								
One Casing Volume(gal/L): 4.28								
Start Purge (hrs): 1148								
End Purge (hrs): 1313								
Total Purge Time (min): 85								
Total Vol. Purged (gal/L): 9.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No
Methane, Ethane, Ethene	4°C	(2) 40ml Vials	Yes
Sulfate + Chloride	4°C	(1) L HDPE	Yes
Volatiles SW846 8260B	4°C/HCl	(3) 40 ml Vials	Yes
Volatiles SW846 8015B	4°C/HCl	(3) 40ml Vials	Yes

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

28.57
21.66
6.91 gal (.163) = 1.13 = 4.28 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
NO	16FD11210301

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GW12
DATE: 11-21-03
WEATHER: Partly Cloudy 60°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1148	21.66	—	—	—	—	—	—	—	—	Start purge
1158	22.02	1.1	110	4.30	0.822	11.8	0.86	15.18	312.2	clear
1208	22.21	2.2	110	4.34	0.816	11.6	0.75	15.18	301.8	"
1218	22.32	3.2	100	4.27	0.831	11.4	0.69	15.43	317.7	"
1228	22.35	4.2	100	4.28	0.850	10.37	0.69	16.03	313.5	"
1238	22.22	5.2	100	4.34	0.889	10.01	0.80	17.30	295.5	"
1248	22.14	6.2	100	4.38	0.862	7.74	0.81	17.86	287.7	"
1258	22.30	7.4	120	4.33	0.801	6.38	0.64	15.71	302.9	"
1308	22.34	8.6	120	4.27	0.799	5.65	0.64	15.83	307.8	"
1313	22.34	9.5	90	4.27	0.795	4.11	0.64	16.04	306.8	Stop purge

Water Quality Meter (S/N) 98F0478AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth ≈25'

SIGNATURE(S): [illegible]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: JGoelot
Field Analyst: TROJAHN
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 16GWT1201
Sample Location: 16MWT12
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Date: 11-21-03								
Time: 1316								
Method: PERISTALTIC	CLEAR	4.27	0.745	16.04	4.11	0.64	—	+306.8

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.1 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0.1
☐	1 to 12 ppm	K-7512	

Analysis Time: 1410

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1418

Filtered: ☐

Notes: Pink @ start

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 260 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	260
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1424

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-890 Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: >3.30 ppm

Analysis Time: 1431

Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1433

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Sample ID No.: 16GWT1201
Project No.: 9060
Sample Location: 16MWT12
Sampled By: JG
Duplicate: ☐
Field Analyst: TK
Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-890 Range: 0 - 0.70 mg/L
Concentration: 0.01 ppm
Program/Module: 610nm 93
Analysis Time: 1453 Filtered: ☐
Notes:

Nitrite (NO_2^--N):

Concentration: 0.000 ppm
Equipment: DR-850 DR-854 Range: 0 - 0.350 mg/L
Analysis Time: 1434 Filtered: ☐
Program/Module: 62
Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):

Concentration: 9.4 ppm
Equipment: DR-850 DR-850 Range: 0 - 20.0 mg/L
Analysis Time: 1501 Filtered: ☐
Program/Module: 525nm 41
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1301
Sample Location: 16GWT13
Sampled By: Goerdt
C.O.C. No.: 4826 & 4824
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-22-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1200								
Method: Peristaltic	Clear	4.72	0.933	21.88	8.67	7.27	264.8	—

PURGE DATA:

Date: 11-22-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" ø PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 20.32								
Static Water Level (WL): 14.80								
One Casing Volume(gal/L): 3.41								
Start Purge (hrs): 0927								
End Purge (hrs): 1157								
Total Purge Time (min): 150								
Total Vol. Purged (gal/L): 17.65								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected (Yes) [] No ~~X~~ Yes QS

Pump shut down during sampling to accomodate drillers work on pad. Restart of pump, checked turbidity before metals indicated 52.6 NTUs. Filtered metal obtained.

20.32
14.80
5.52 (.163) = .899 = 3.41 L

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GWT130
DATE: 11-22-03
WEATHER: 50° Partly Cloudy

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0927	14.80	—	—	—	—	—	—	—	—	Start purge
0937	15.31	1.20	1200	4.68	0.393	36.4	7.29	15.59	234.5	cloudy
0947	15.51	2.40	1200	4.76	0.384	64.8	7.27	15.80	236.7	"
0957	15.79	3.40	1000	4.88	0.359	72.4	7.67	15.91	231.7	cloudy/brownish
1007	16.09	4.40	1000	4.94	0.320	71.1	7.97	15.81	234.6	"
1017	16.35	5.35	950	4.94	0.323	41.8	7.99	16.19	238.7	"
1027	16.59	6.30	950	4.90	0.331	29.0	7.95	16.33	241.7	"
1037	16.82	7.25	950	4.77	0.351	22.0	7.65	16.36	247.9	clearer
1047	17.07	8.20	950	4.59	0.374	20.1	6.85	16.62	261.6	clear
1057	17.32	9.15	950	4.57	0.381	20.5	6.74	16.54	267.0	"
1107	17.57	10.10	950	4.57	0.386	22.6	7.36	16.69	272.2	"
1117	17.65	11.05	950	4.61	0.406	30.7	7.75	18.77	274.9	"
1127	17.65	12.00	950	4.64	0.423	21.3	7.55	20.55	273.8	"
1137	17.65	12.95	950	4.67	0.431	16.0	7.38	21.52	271.4	"
1147	17.65	13.90	950	4.70	0.435	11.9	7.28	21.98	268.8	"
1157	17.65	14.85	950	4.72	0.433	8.67	7.27	21.88	264.8	" Stop purge
~~1207~~										

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth —

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: JGoerdt
Field Analyst: TK/JG
Field Form Checked as per QA/QC Checklist (initials): TK

Sample ID No.: 16GWT1301
Sample Location: 16MWT13
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Date: 11-22-03								
Time: 1200								
Method: Peristaltic	CLEAR	4.72	0.433	21.88	8.67	7.27	—	+264.8

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 6 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	6

Analysis Time: 1320

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1325

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 140 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	140
☐	250 to 2500 ppm	K-1925	

Analysis Time: 130

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-850 Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: >3.30 ppm

Analysis Time: 1340

Notes: (1335) Well Pad was purged stretch tubing to max; added an extension to powered intake - turbidity increased

Filtered: ☑

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: HS-C Other:

Concentration: 0.0 ppm (JG)

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: 1325

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	16GWT1301
Project No.:	9060	Sample Location:	16MWT13
Sampled By:	J.G	Duplicate:	☐
Field Analyst:	T.R	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-8 20 Range: 0 - 0.70 mg/L Concentration: 0.02 ppm

Program/Module: 610nm 93 Analysis Time: 1401 Filtered: ☑

Notes:

Nitrite (NO_2^--N): Concentration: 0.008 ppm

Equipment: DR-850 DR-8 50 Range: 0 - 0.350 mg/L Analysis Time: 1331 Filtered: ☐

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}): Concentration: 4.1 ppm

Equipment: DR-850 DR-8 50 Range: 0 - 20.0 mg/L Analysis Time: 1405 Filtered: ☑

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1501
Sample Location: 16GWT15
Sampled By: Goerdt
C.O.C. No.: 4835,4833
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-6-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1352								
Method: Bladder pump	Clear	7.99	0.392	12.78	22.5	2.57	174.1	—

PURGE DATA:

Date: 12-6-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder pump	21.6 L	7.99	0.392	12.78	22.5	2.57	—	—
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 94.7								
Static Water Level (WL): 52.2								
One Casing Volume(gal/L): 26.2								
Start Purge (hrs): 0950								
End Purge (hrs): 1350								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 21.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	Yes

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]

94.7
52.2
42.5(.163) = 6.93 gal = 26.22 L

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

D-MNA

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GWT501
DATE: 12-6-03
WEATHER: Sunny 32° F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0950	52.20	—	—	—	—	—	—	—	—	Start purge
1000	53.15	.9	90	7.65	0.362	59.7	7.71	11.53	160.8	clear
1010	53.93	1.8	90	7.89	0.377	32.3	6.76	11.88	158.5	"
1020	55.13	2.7	90	8.09	0.385	34.3	3.60	12.19	152.9	"
1030	55.85	3.6	90	8.10	0.388	32.8	3.26	12.47	153.5	"
1040	56.53	4.5	90	8.10	0.387	30.5	3.09	12.33	155.5	"
1050	56.92	5.4	90	8.10	0.386	30.1	2.92	12.29	157.3	"
1100	57.54	6.3	90	8.11	0.384	30.3	2.89	12.44	158.6	"
1110	58.05	7.2	90	8.10	0.387	29.8	2.88	12.54	158.7	"
1120	58.94	8.1	90	8.10	0.386	24.3	2.87	12.43	160.9	"
1130	59.61	9.0	90	8.09	0.387	23.3	2.86	12.42	162.2	"
1140	59.92	9.9	90	8.09	0.387	23.5	2.85	12.42	162.4	"
1150	60.47	10.8	90	8.09	0.387	23.2	2.86	12.42	162.7	"
1200	61.39	11.7	90	8.08	0.389	23.4	2.78	12.55	166.1	"
1210	61.87	12.6	90	8.08	0.390	24.1	2.72	12.59	170.8	"
1220	62.69	13.5	90	8.06	0.392	24.3	2.66	12.60	172.3	"
1230	63.01	14.4	90	8.06	0.394	24.3	2.40	12.63	174.0	"
1240	63.72	15.3	90	8.04	0.395	24.6	2.61	12.72	174.7	"
1250	64.33	16.2	90	8.04	0.395	24.7	2.60	12.77	175.9	"
1300	65.08	17.1	90	8.04	0.393	24.2	2.61	12.75	175.2	"
1310	65.75	18.0	90	8.04	0.394	22.7	2.59	12.73	174.1	"
1320	66.43	18.9	90	8.06	0.393	22.4	2.58	12.74	173.8	"

Water Quality Meter (S/N) 98F0478-AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317-2402

Pump Intake Depth 90'

SIGNATURE(S):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GWT150I
DATE: 12-6-03
WEATHER: Sun 38°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1330	66.92	19.8	90	8.02	0.392	22.6	2.58	12.76	173.7	Clear
1340	68.36	20.7	90	8.00	0.392	22.4	2.56	12.76	173.4	"
1350	68.81	21.6	90	7.99	0.392	22.5	2.57	12.78	174.1	Stop Purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317-2402

Pump Intake Depth 90'

SIGNATURE(S): [illegible]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060 CTO 279
Sampled By: Gouvdt
Field Analyst: Gouvdt
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 16GWT 1501
Sample Location: 16GWT 15 /M (TR)
Duplicate: ☑
Blank: ☐

SAMPLING DATA

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Date: 12-6-03								
Time: 1352								
Method: Bladder	Clear	7.99	0.392	12.78	22.5	2.57	—	+174.1

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)
Electrode Make & Model: YSI
Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:
Equipment: Chemetrics Test Kit
Concentration: 3.5/4.1 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☒	1 to 12 ppm	K-7512	3.5/4.0

Analysis Time: 1524/1527

Notes:

Alkalinity:
Equipment: Chemetrics Test Kit
Concentration: 250/240 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-9810	
☑	50 to 500 ppm	K-9815	250/
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1550/1553
Filtered: ☑

Notes:

Carbon Dioxide:
Equipment: Chemetrics Test Kit
Concentration: <10/<10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	<10/<10
☐	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1532/1537

Notes:

Ferrous Iron (Fe^{2+}):
Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L
Program/Module: 500nm 33
Concentration: 0.00/0.00 ppm
Analysis Time: 1606/1612
Filtered: ☑

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L
Equipment: HS-C Other: _____
Exceeded 5.0 mg/L range on color chart: ☐
Concentration: 0.00/0.00 ppm
Analysis Time: 1615/1620

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE

Project No.: 9060 CTO 279

Sampled By: Gerdt

Field Analyst: Gerdt

Sample ID No.: 16GWT1501

Sample Location: 16GWT15 / M12

Duplicate: ☑

Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-8 __ Range: 0 - 0.70 mg/L

Program/Module: 610nm 93

Concentration: 0.01/0.02 ppm

Analysis Time: 1628/1629 Filtered: ☑

Notes:

Nitrite (NO_2^--N):

Equipment: DR-850 DR-8 __ Range: 0 - 0.350 mg/L

Program/Module: 62

Concentration: 0.007/0.012 ppm

Analysis Time: 1441/1508 Filtered: ☑

Standard Solution: ☐ Results: _____

Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 20.0 mg/L

Program/Module: 525nm 41

Concentration: 0.3/0.2 ppm

Analysis Time: 1634/1635 Filtered: ☑

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☑ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1601
Sample Location: 16MWT16
Sampled By: T.KOJAHN
C.O.C. No.: 4824
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-22-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1745								
Method: SAME	BRN	5.03	1.860	17.61	>1000	5.24	+ 306	—

PURGE DATA:

Date: 11-22-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other ORP
Method: Dedicated Bailer	1	5.03	1.860	17.61	>1000	5.24	—	+306
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2"Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 35.2								
Static Water Level (WL): 33.42								
One Casing Volume(gal/L):								
Start Purge (hrs): 0925								
End Purge (hrs): 0926								
Total Purge Time (min): 1								
Total Vol. Purged (gal/L): 1 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	11/22 (3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	11/22 (3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	11/23 (2) L Glass Amber @ 0915	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~ NO
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	11/22 (1) L HDPE	YES ~~Yes~~ ~~NO~~ (1L)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	11/23 (1) L HDPE @ 0915	YES (=F)
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	~~Yes~~ NO
Sulfate & Chloride	4°C	(1) L HDPE	~~Yes~~
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]

35.2 - 33.42 = 1.48' x 0.163 = 0.24 gal or 1L

WELL DRY AFTER 1 Volume

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1701
Sample Location: 16GWT17
Sampled By: Gaudet
C.O.C. No.: 4828
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-5-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1027								
Method: Peristaltic	Clear	5.58	0.649	11.63	5.92	0.63	111.5	—

PURGE DATA:

Date: 12-5-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic	7.65	5.58	0.649	11.63	5.92	0.63	—	—
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" ϕ PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 26.02								
Static Water Level (WL): 15.27								
One Casing Volume(gal/L) 6.63								
Start Purge (hrs): 0900								
End Purge (hrs): 1025								
Total Purge Time (min): 85								
Total Vol. Purged (gal/L): 7.65								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	No
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

26.02
15.27
10.75(.163) = 1.75 gal = 6.632

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
—	—	[signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GWT1701
DATE: 12-5-03
WEATHER: Rain 37° F

Time (Hrs)	Water Level (Ft. below TOC)	Volume (gal (L))	Flowrate (mL/min)	pH (SU)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0900	15.27	–	–	–	–	–	–	–	–	Start Purge
0910	15.49	1.0	1000	5.96	1.122	379	1.41	11.16	61.2	Cloudy
0920	15.50	2.0	1000	5.97	1.012	285	0.98	10.73	65.1	"
0930	15.51	2.7	700	5.87	0.819	184	0.79	10.58	78.9	"
0940	15.56	3.6	900	5.71	0.729	124	0.73	11.31	95.0	"
0950	15.59	4.5	900	5.65	0.687	53.9	0.76	11.50	102.5	Clear
1000	15.62	5.4	900	5.62	0.661	22.3	0.74	11.59	107.0	"
1010	15.64	6.3	900	5.60	0.653	11.9	0.68	11.61	109.5	"
1020	15.65	7.2	900	5.58	0.648	6.04	0.64	11.50	112.4	"
1025	15.65	7.65	450	5.58	0.649	5.92	0.63	11.63	111.5	Stop purge

Water Quality Meter (S/N): 98F0478AB
Control Box Type (S/N): NA
Turbidity Meter (S/N): 3317-2402

Pump Intake Depth: ~21'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1801
Sample Location: 16MWT18
Sampled By: T. ROJAHN
C.O.C. No.: 4394 & 4395
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Date: 1-25-04								
Time: 0853								
Method: SAME	LtGrey	7.23	0.650	14.19	>1000	3.07	-69	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 1-24-04								
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 104.5								
Static Water Level (WL): 96.65								
One Casing Volume(gal/L): 4.8								
Start Purge (hrs): 1115								
End Purge (hrs): 1305								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 8.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	Yes
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 &	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	Yes
Methane, Ethane & Ethene	4°C	(2) 40ml Vails	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

104.5 - 96.65 = 7.85 x 0.163 = 1.28 gal or 4.8L

DRIED OUT WELL ON 1-24-04

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 16

WELL ID.: 16GW17 19
DATE: 1-24-04
WEATHER: Mostly Sunny 20's

MIN Vol. 4.82

Time (Hrs)	Water Level (Ft. Below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1115	96.65	–	–	–	–	–	–	–	–	Grey
1125	97.00	500	50	7.50	0.345	+1000	7.45	12.79	-112	"
1135	97.38	1400	90	7.48	0.414	>1000	4.42	13.49	-146	"
1145	98.18	2300	90	7.34	0.518	>1000	4.45	13.22	-126	"
1155	98.76	3200	90	7.26	0.611	>1000	4.49	13.08	-103	"
1205	99.34	3800	60	7.30	0.608	>1000	5.35	13.44	-75	Lt Grey → Milky
1215	99.81	4600	80	7.34	0.599	>1000	5.46	13.44	-65	" " "
1225	100.20	5100	70	7.37	0.585	>1000	5.71	13.10	-55	" " "
1235	100.55	5800	70	7.38	0.578	>1000	5.80	13.11	-50	" " "
	Turbidity	High	& Drawdown	evident	will	purge	dry	and		
1245			sample	tomorrow	– 1/25/04					
	101.30	7200	140	7.29	0.598	>1000	5.04	14.10	-43	Grey
1255	102.38	8600	140	7.23	0.650	>1000	3.07	14.18	-69	Grey
13:05	103.3 TOC	of Pump	WELL	DRY						→ DRY
										→ Start Sampling
1/25 0853	99.37	–	–	–	–	–	–	–	–	

Water Quality Meter (S/N) 01M0616 AA
Control Box Type (S/N) MP10 - 1449
Turbidity Meter (S/N) 0910 - 4298

Pump Intake Depth ~1' off bottom

SIGNATURE(S): Terry Rogal

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	~~01~~ 16 GW T1801
Project No.:	~~N0845~~ 9060	Sample Location:	16MWT18
Sampled By:	T. ROJAHN	Duplicate:	☐
Field Analyst:	TR	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	TRR		

SAMPLING DATA

Date: 1-25-04	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: 0853	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Bladder	Lt Grey	7.23	0.650	14.18	71000	3.07	—	-69

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv) Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 4 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	—
☑	1 to 12 ppm	K-7512	4

Analysis Time: 0954

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: 500 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-9810	
☑	50 to 500 ppm	K-9815	—
☑	100 to 1000 ppm	K-9820	500

Analysis Time: 1001

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 18 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	18
☑	100 to 1000 ppm	K-1920	—
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1007

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.12 ppm

Analysis Time: 1018

Filtered: ☑

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: — ppm

Analysis Time: —

Notes: Well dry - could not sample

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	01GWT1801
Project No.:	~~N0845~~ 9060	Sample Location:	01MWT18
Sampled By:	Terry Rosahal	Duplicate:	☐
Field Analyst:	TR	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-8 __ Range: 0 - 0.70 mg/L Concentration: 0.04 ppm

Program/Module: 610nm 93 Analysis Time: 1035 Filtered: ☑

Notes:

Nitrite (NO_2^--N):

Concentration: 0.005 ppm

Equipment: DR-850 DR-8 __ Range: 0 - 0.350 mg/L Analysis Time: 1009 Filtered: ☑

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.0 ppm

Equipment: DR-850 DR-8 __ Range: 0 - 20.0 mg/L Analysis Time: 1049 Filtered: ☑

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly a[illegible]er (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency [illegible] as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: NA

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

APPENDIX C.4.3
SWMU 16
GROUND WATER SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 0103
Sample Location: WES 140183
Sampled By: Goerdt
C.O.C. No.: 0087
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-26-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1729	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder	Clear	5.76	1.50	17.28	4.53	54.72	-69.9	—

PURGE DATA:

Date: 8-26-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 53.70								
Static Water Level (WL): 32.01								
One Casing Volume(gal/L): 13.1								
Start Purge (hrs): 1326								
End Purge (hrs): 1726								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 21.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 43'

53.70
32.01
21.69(.163) = 3.54 gal
= 13.1 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: WES 14-01-83
DATE: 8-26-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1326	32.01	–	–	–	–	–	–	–	–	Start purge
1336	32.59	.90	90	5.72	1.556	–	2.84	17.17	51.7	–
1346	33.94	1.8	90	5.78	1.554	192	1.94	17.13	29.6	Cloudy
1356	35.41	2.7	90	5.82	1.555	153	2.08	17.19	-2.1	"
1406	35.21	3.6	90	5.84	1.553	–	8.72	17.10	-22.1	–
1416	35.52	4.5	90	5.86	1.554	127	16.21	17.23	-26.7	Cloudy
1426	36.09	5.6	90	5.85	1.546	58	23.03	17.21	-23.2	Slightly cloudy
1436	36.54	6.5	90	5.86	1.540	39.1	26.69	17.35	-4.9	"
1446	36.84	7.4		5.84	1.519	32.6	33.20	17.16	-18.5	Clear
1456	37.19	8.3		5.83	1.507	27.8	34.90	17.21	-16.3	"
1506	37.41	9.2		5.81	1.518	–	37.0	17.43	-18.1	"
1516	37.87	10.1		5.81	1.520	–	39.31	17.52	-21.6	–
1526	38.14	11.0		5.82	1.519	–	41.20	17.40	-32.4	–
1536	38.52	11.9		5.80	1.517	9.55	41.76	17.31	-39.8	Clear
1546	38.61	12.8		5.80	1.521	–	44.08	17.51	-35.7	–
1556	38.69	13.7		5.80	1.520	–	44.79	17.51	-44.2	–
1606	38.85	14.6		5.80	1.518	6.49	46.30	17.44	-45.2	Clear
1616	38.88	15.5		5.77	1.501	–	47.76	17.12	-44.0	–
1626	38.93	16.4		5.76	1.510	–	48.14	17.14	-36.1	
1636	38.96	17.3		5.77	1.508	–	48.62	17.36	-29.6	
1646	39.02	18.2		5.77	1.509	5.34	49.13	17.44	-27.3	
1656	39.09	19.1		5.76	1.515	–	52.02	17.68	-46.0	
1706	39.17	20.0		5.76	1.517	–	50.84	17.71	-48.4	
1716	39.21	20.9		5.76	1.503	–	56.34	17.30	-67.8	
1726	39.25	21.8		5.76	1.500	4.53	54.72	17.28	-69.9	Stop purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) MP10 1586
Turbidity Meter (SN) 4650 4300

Pump Intake 43'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 0204
Sample Location: WES 14-02-83
Sampled By: Goerdt
C.O.C. No.: 0085
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-25-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1022								
Method: Ded. Bladder	Clear	5.75	.502	17.24	0.0	.12	124.0	--

PURGE DATA:

Date: 8-25-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Ded. Bladder								
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 28.74								
Static Water Level (WL): 16.95								
One Casing Volume(gal/L): 7.1								
Start Purge (hrs): 0855								
End Purge (hrs): 1020								
Total Purge Time (min): 85								
Total Vol. Purged (gal/L): 9.85								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 19-

28.74
16.95
11.79(.163) = 1.92 gal
= 7.1 L

Circle if Applicable:

MS/MSD –

Duplicate ID No.: –

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: WES 14 0283
DATE: 8-25-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min.~~ L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
~~0855~~	16.95	–	–	–	–	–	–	–	–	Start purge
0905	16.22	1.75	175	6.33	.677	–	.24	18.10	99.8	–
0915	16.20	2.85	110	6.26	.676	1.19	.23	17.75	94.3	clear
0925	16.29	3.95	110	6.05	.589	1.02	.22	17.27	107.3	"
0935	16.43	5.45	150	5.86	.548	.04	.18	17.05	119.4	"
0945	16.39	6.55	110	5.88	.571	∞	.15	17.90	124.3	"
0955	16.35	7.65	110	5.85	.528	0.0	.14	17.35	126.0	"
1000	16.36	8.20	55	5.84	.514	0.0	.14	17.15	123.7	"
1005	16.39	8.75	55	5.82	.512	0.0	.12	17.06	122.0	"
1015	16.39	9.3	55	5.78	.507	0.0	.12	17.19	122.0	"
1020	16.38	9.85	55	5.75	.502	0.0	.12	17.24	124.0	end purge

Water Quality Meter (SN) 99K00.55
Control Box type (SN) MP10 1586
Turbidity Meter (SN) 4650 4300

Pump Intake 19'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 0303
Sample Location: ~~MW~~ WES 140383
Sampled By: Goeyat
C.O.C. No.: 0085
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-24-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1745								
Method: Ded. Bladder	Clear	5.28	.430	18.66	15.5	.10	438.1	—

PURGE DATA:

Date: 8-24-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Ded. Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 38.31								
Static Water Level (WL): 20.75								
One Casing Volume(gal/L): 10.6								
Start Purge (hrs): 1342								
End Purge (hrs): 1742								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 22.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 28'

38.31
20.75
17.56 (.163) = 2.86 gal
= 10.59 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: WES 14-03-83
DATE: 8-24-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1342	20.75	—	—	—	—	—	—	—	—	Start purge
1352	21.89	1.0	100	5.01	.448	69.8	16.32	19.50	275.7	clear
1402	22.25	2.0	100	4.88	.451	42.1	14.73	21.76	315.7	"
1412	22.45	3.0	100	4.86	.466	29.1	12.84	22.78	367.7	"
1422	22.42	4.0	100	4.87	.478	27.6	11.05	23.81	379.8	"
1432	22.38	4.9	90	4.89	.496	24.2	10.72	25.73	408.9	"
1442	22.67	5.8	90	4.13	.463	24.8	7.55	20.42	463.7	"
1452	23.00	6.7	90	4.21	.464	26.9	6.55	21.20	480.1	"
1502	23.21	7.6	90	4.38	.468	26.9	5.21	23.70	481.6	
1512	22.30	8.5	90	4.87	.527	26.7	4.93	27.70	484.2	
1522	22.47	9.4	90	4.81	.491	25.9	3.71	20.46	481.4	
1532	22.63	10.3	90	4.78	.475	23.1	2.31	20.60	478.5	
1542	22.91	11.2	90	4.85	.453	22.8	1.75	18.76	479.6	
1552	23.32	12.1	90	4.83	.435	22.9	1.36	17.88	481.8	
1602	23.78	13.0	90	4.93	.426	24.3	1.10	17.67	480.6	
1612	23.81	13.9	90	4.97	.413	24.8	.71	16.75	478.3	
1622	23.92	15.5	160	5.02	.419	25.6	.41	16.46	477.0	
1632	23.65	16.4	90	5.13	.443	24.2	.28	18.74	469.7	
1642	22.80	17.3	90	5.20	.463	23.0	.29	20.65	460.8	
1652	22.73	18.2	90	5.24	.469	19.8	.30	20.34	452.1	
1702	22.65	19.1	90	5.27	.465	15.1	.24	19.97	445.6	
1712	22.73	20.0	90	5.27	.449	14.8	.21	19.21	442.3	
1722	22.81	20.9	90	5.25	.441	14.4	.14	18.86	441.7	
1732	22.85	21.8	90	5.25	.431	15.1	.11	18.62	441.3	
1742	22.91	22.7	90	5.28	.430	15.5	.10	18.66	438.1	Stop purge

Water Quality Meter (SN) 99K00055
Control Box type (SN) MPIO 1568
Turbidity Meter (SN) 4650-4300

Pump Intake 28'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 0403
Sample Location: KMW104
Sampled By: T. ROJAHN
C.O.C. No.: 0085
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 08/25/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1120								
Method: SAME	CLEAR	4.10	0.838	15.03	8.9	*	124	---

PURGE DATA:

Date: 8/25/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: DED. BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 49.16								
Static Water Level (WL): 29.44								
One Casing Volume(gal/L): 12.2								
Start Purge (hrs): 1013								
End Purge (hrs): 1118								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 13								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 38'

19.72' x 0.163 = 3.2 gal or 12.2 L

* DO MALFUNCTION - PROBE must have a bubble. READINGS to high.

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16 MW 04
DATE: 8/25/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1013	29.44	0	–	–	–	–	–	–	–	START PURGE
1023	29.47	2000	200	5.40	0.843	6.2	21.16*	14.90	117	CLEAR
1033	29.48	4000	200	4.73	0.828	7.4	*	14.83	128	CLEAR
1043	29.48	6000	200	4.39	0.832	7.9	*	14.79	126	CLEAR
1053	29.48	8000	200	4.16	0.834	8.5	*	14.83	124	CLEAR
1103	29.48	10000	200	4.14	0.836	9.1	*	14.87	123	CLEAR
1113	29.48	12000	200	4.11	0.837	9.5	*	14.91	123	CLEAR
1118	29.48	13000	200	4.10	0.838	8.9	*	15.03	124	CLEAR
1120	–	–	–	–	–	–	–	–	–	SAMPLE TIME

Water Quality Meter (SN) 01C0134
Control Box type (SN) MP10-1231
Turbidity Meter (SN) 1760-1800

Pump Intake 38'

* DO MALFUNCTION
o/s 7100

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW 0503
Sample Location: WES 14-5-83
Sampled By: Goerdt
C.O.C. No.: 0087
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-25-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1459	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	Clear	5.73	.694	15.26	9.7	19.79	57.5	—

PURGE DATA:

Date: 8-25-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 53.3								
Static Water Level (WL): 35.62								
One Casing Volume(gal/L): 10.7								
Start Purge (hrs): 1256								
End Purge (hrs): 1456								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 12.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 48'

53.30
35.62
17.68(.763) = 2.9 gal
= 10.7 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: WES 14-5-83
DATE: 8-25-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min~~ L)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1256	35.62	–	–	–	–	–	–	–	–	Start purge
1306	35.69	0.80	80	5.98	.935	125	.54	18.25	90.2	cloudy
1316	35.71	1.6	80	5.81	.828	113	.36	16.76	24.8	"
1326	35.71	2.4	80	5.72	.772	94.2	.41	16.69	52.4	"
1336	35.68	3.2	80	5.70	.754	63.7	.56	16.59	56.3	"
1346	35.62	4.0	80	5.71	.741	42.8	3.51	16.51	59.0	less cloudy
1356	35.66	5.2	120	5.70	.715	21.1	5.83	15.54	47.7	"
1406	35.69	6.4	120	5.72	.711	21.6	8.99	15.43	48.1	"
1416	35.73	7.6	|	5.73	.707	18.4	12.18	15.35	45.2	Clear
1426	35.73	8.8	|	5.73	.704	14.7	14.83	15.36	46.1	"
1436	35.72	10.0	|	5.73	.700	12.6	17.19	15.30	53.8	"
1446	35.72	11.2	|	5.73	.699	10.8	18.35	15.33	57.6	"
1451	35.72	11.8	60	5.73	.695	10.1	18.80	15.27	57.4	"
1456	35.72	12.4	60	5.73	.694	9.7	19.79	15.26	57.5	end purge

Water Quality Meter (SN) 99K00255
Control Box type (SN) MP10 1586
Turbidity Meter (SN) 4650 4300

Pump Intake 48'

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0103
Sample Location: 16MWT01
Sampled By: Goerdt
C.O.C. No.: 0086
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-28-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1830	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder	Clear	5.83	2.50	17.28	48.7	5.43	244.6	—

PURGE DATA:

Date: 8-28-08	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 26.65								
Static Water Level (WL): 13.50								
One Casing Volume(gal/L) 7.9								
Start Purge (hrs): 1426								
End Purge (hrs): 1826								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 13.95								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 23'

26.65
13.50
13.15 (.163) = 2.14 gal
= 7.9 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT01
DATE: 8-28-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min.~~ L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1426	13.50	—	—	—	—	—	—	—	—	
1436	15.09	.90	90	—	—	—	—	—	—	changing
1446	—	1.4	50	—	—	—	—	—	—	batteries in DYSI
1456	16.61	2.0	60	4.89	2.570	—	2.27	19.16	266.2	—
1506	—	2.6	60	4.89	2.553	—	2.26	18.90	266.8	—
1516	—	3.2	60	4.94	2.554	—	3.76	18.99	269.2	—
1526	17.58	3.8	60	4.97	2.550	—	3.60	18.85	270.5	—
1536	17.98	4.4	60	5.00	2.493	44.6	4.47	17.94	272.8	clear
1546	18.24	5.0	60	5.03	2.511	—	5.24	18.30	275.1	—
1556	18.72	5.8	80	5.05	2.519	47.2	6.15	18.36	276.8	clear
1606	18.89	6.8	80	5.07	2.491	—	6.36	18.04	276.6	—
1616	19.28	7.4	80	5.09	2.499	—	6.65	18.14	275.8	—
1626	19.78	8.2	80	5.14	2.518	71.7	6.65	18.33	274.1	clear
1636	19.91	8.65	45	5.19	2.534	—	7.42	18.55	272.0	—
1646	20.24	9.1	45	5.21	2.552	—	7.97	18.85	274.0	—
1656	~~20.63~~ 20.40	9.55	45	5.24	2.566	—	8.68	19.00	274.2	—
1706	20.63	10.0	45	5.31	2.604	28.7	10.61	19.60	271.9	clear
1716	20.81	10.45	45	5.36	2.606	—	10.75	19.36	266.2	—
1726	20.92	10.95	50	5.39	2.594	21.8	10.13	19.34	264.8	clear
1736	21.09	11.45	50	5.41	2.592	16.9	9.91	19.27	263.1	"
1746	21.20	11.95	50	5.41	2.598	—	9.88	19.36	264.6	—
1756	21.38	12.45	50	5.42	2.599	15.8	9.81	19.42	263.5	clear
1806	*	12.95	50	5.49	~~1.369~~	*	*	*	*	lowering pump
1816	21.40	13.45	50	5.80	2.551	73.9	8.49	17.89	250.3	clear
1826	21.53	13.95	50	5.83	2.496	48.7	5.43	17.28	244.6	end purge

Heavy rain & lightning

Water Quality Meter (SN) 99K00055
Control Box type (SN) MP10 ~~1564~~ 1586
Turbidity Meter (SN) 4650 4300

Pump Intake 23'

SIGNATURE(S): [illegible]

* air hose ~~[illegible]~~ disconnected & flow thru cell drained - no readings.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0203
Sample Location: 16MWT02
Sampled By: T. ROSAHN
C.O.C. No.: 0086
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 8/29/04								
Time: 1000								
Method: SAME	CLEAR	6.03	0.343	20.46	8.7	0.87	+60	—

PURGE DATA:

Date: 8/20/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2"Ø, PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 21.08								
Static Water Level (WL): 11.66								
One Casing Volume(gal/L):								
Start Purge (hrs): 1020								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 16'

9.42 x 0.163 = 1.5 gal or 5.8

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): Terry Rosahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MW102
DATE: 8/28/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1020	11.66	0	-	-	-	-	-	-	-	Start Purge
1030	12.24	800	80	6.46	0.360	25	3.95	19.95	+39	CLEAR
1040	12.45	1600	80	6.26	0.345	16	1.94	19.63	52	CLEAR
1050	12.78	2500	90	6.07	0.324	14	1.58	19.94	57	CLEAR
1100	13.10	3400	90	5.95	0.317	12	1.52	20.39	58	CLEAR
1110	13.22	3800	40	5.88	0.327	10	1.64	22.02	59	CLEAR
1120	13.33	4200	40	5.87	0.349	8.2	1.90	23.50	56	CLEAR
1130	13.58	4600	40	5.95	0.333	8.6	1.43	22.15	54	CLEAR
1140	13.80	5000	40	5.90	0.327	8.8	1.46	21.94	62	CLEAR
1150	13.93	5300	30	5.93	0.322	10.0	1.67	22.72	58	CLEAR
1200	13.93	5500	20	5.93	0.330	12.0	1.78	23.86	57	CLEAR
1210	13.94	5700	20	5.96	0.338	25.0	2.42	25.13	57	CLEAR
1220	13.97	6000	30	5.99	0.341	7.4	2.46	25.26	56	CLEAR
1230	14.36	6800	80	6.01	0.308	7.9	1.12	20.41	66	CLEAR
1240	14.60	7350	55	5.87	0.286	6.8	1.20	21.40	65	CLEAR
1250	14.53	7450	10	5.89	0.301	5.2	1.77	22.96	60	CLEAR
1300	14.62	7750	30	5.93	0.316	3.7	1.97	23.45	63	CLEAR
1310	14.96	8450	70	5.99	0.303	3.2	1.00	21.05	64	CLEAR
1320	15.26	9000	55	5.97	0.301	3.8	0.98	20.57	62	CLEAR
1330	↓	9500	50	↓	↓	↓	↓	↓	↓	HES AUDIT DEBRIEFING
1340		10000	50							
1350		10500	50							
1400	16.30	11000	50	5.90	0.347	9.0	0.98	21.16	62	CLEAR
1410	16.56	11500	50	5.99	0.338	8.5	0.92	20.50	62	CLEAR
1420	16.80	12000	50	6.03	0.343	8.7	0.87	20.46	60	CLEAR
1425	—	—	WELL	Let Recharge	& sample	to	morrow		→	Dry to Intake

Water Quality Meter (SN) 01C0134 48
Control Box type (SN) 419
Turbidity Meter (SN) 1760-1800

Pump Intake 16.8'

SIGNATURE(S): Terry Rogers

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW T0303
Sample Location: 16GWT 03
Sampled By: Goerdt
C.O.C. No.: 0086
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-28-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1213	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder	Clear	4.54	.620	18.06	7.25	—	18.06	—

PURGE DATA:

Date: 8-28-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 38.07								
Static Water Level (WL): 29.93								
One Casing Volume(gal/L): 4.9								
Start Purge (hrs): 0907								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 35'

38.07
29.93
8.14(.163) = 1.33 gal
= 4.9 L

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 16MWT03
DATE: 8-28-08

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0907	29.93	–	–	–	–	–	–	–	–	Start purge
0917	29.97	.45	45	5.26	.368	–	*	21.80	276.6	–
0927	31.19	.90	|	4.59	.618	440	|	18.33	251.7	Brown
0937	31.63	1.35	|	4.61	.624	–	|	19.31	238.6	–
0947	32.05	1.8	|	4.65	.637	145	|	19.78	230.4	Lt. Brown
0957	31.73	2.25	|	4.66	.635	–	|	19.58	227.1	–
1007	30.33	2.70	|	4.68	.634	90.6	7.74	19.44	223.6	Cloudy
1017	30.34	3.15	|	4.62	.598	+	7.83	16.69	222.0	–
1027	30.37	3.6	~~120~~ 45	4.61	.597	115	7.90	16.68	221.8	Cloudy
1037	30.45	4.8	120	4.59	.591	–	*	16.49	229.6	–
1047	30.72	6.0	120	4.59	.594	–	|	16.58	231.3	–
1057	30.83	7.2	120	4.57	.595	–	|	16.70	234.2	–
1107	30.89	8.3	110	4.60	.613	37.6	|	17.57	237.1	Clear
1117	30.90	8.4	110	4.49	.614	–	|	17.39	247.4	–
1127	30.92	9.4	100	4.51	.613	–	|	17.33	249.8	–
1137	30.92	10.4	100	4.55	.613	–	|	17.29	255.5	–
1147	30.92	11.4	100	4.55	.614	–	|	17.30	255.7	–
1157	30.93	12.4	100	4.55	.619	9.83	|	17.67	254.8	Clear
1207	30.94	13.4	100	4.54	.620	7.25	|	18.06	259.9	Stop purge

Water Quality Meter (SN) 99K00555 86
Control Box type (SN) MP10 1568 87
Turbidity Meter (SN) 4650 4300

Pump Intake 35'

SIGNATURE(S): [illegible]

* DO was not reading correctly (>20 mg/L).

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0403
Sample Location: 16MWT04
Sampled By: T. Rojahn
C.O.C. No.: 0072
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 8/15/04								
Time: 1105								
Method: SAME	CLEAR	5.60	0.232	19.95	5.13	1.81	54	--

PURGE DATA:

Date: 8/15/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Dedicated Bladder								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.59								
Static Water Level (WL): 14.16								
One Casing Volume(gal/L): 8.3								
Start Purge (hrs): 0933								
End Purge (hrs): 1103								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L) 9.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ _____ Dedicated BLADDER PUMP

13.43' X 0.163 = 2.2gal or 8.3L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT04
DATE: 8/15/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0933	14.16	0	–	–	–	–	–	–	–	Start Purge
0943	14.65	1100	110	5.72	0.283	14.7	7.70	18.87	78	CLEAR
0953	14.74	2000	100	5.53	0.240	8.96	8.64	18.70	75	CLEAR
1003	14.70	3000	100	5.48	0.223	5.79	6.80	18.84	66	CLEAR
1013	14.65	4100	100	5.56	0.223	4.15	5.37	19.07	58	CLEAR
1023	14.68	5000	90	5.51	0.226	5.91	3.80	19.04	57	CLEAR
1033	14.70	6000	100	5.59	0.227	2.79	2.82	19.01	54	CLEAR
1043	14.69	7000	100	5.61	0.216	5.76	2.13	19.24	53	CLEAR
1053	14.68	8000	100	5.56	0.230	5.16	1.84	19.31	55	CLEAR
1058	14.68	8500	100	5.58	0.231	4.61	1.80	19.41	55	CLEAR
1103	14.68	9000	100	5.60	0.232	5.13	1.81	19.45	54	CLEAR
1105	–	–	–	–	–	–	–	–	–	Start Sampling

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) MP10 - 1586
Turbidity Meter (SN) 4650 - 4300

Pump Intake 22.0' Dedicated Pump

SIGNATURE(S): Terry Nozik

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0503
Sample Location: 16MWT05
Sampled By: Goodx
C.O.C. No.: 0087
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-26-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1146								
Method: Bladder	Clear	4.92	.670	16.63	9.55	.06	231.6	—

PURGE DATA:

Date: 8-26-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 41.82								
Static Water Level (WL): 32.97								
One Casing Volume(gal/L): 5.34								
Start Purge (hrs): 0942								
End Purge (hrs): 1142								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 12.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 38'

41.82
32.97
8.85(.163) = 1.44 gal
= 5.34 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT05
DATE: 8-26-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min~~)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0942	32.97	–	–	–	–	–	–	–	–	Start purge
0952	33.19	1.0	100	4.70	.682	–	0.14	17.09	301.6	– Heavy
1002	33.21	2.0	100	4.67	.675	–	0.12	16.87	293.5	– rains
1012	33.24	3.0	100	4.66	.671	–	0.08	16.64	286.0	–
1022	33.25	4.0	100	4.67	.672	81.9	0.08	16.67	281.0	sl. cloudy
1032	–	5.0	100	4.71	.675	–	0.08	16.65	273.6	–
1042	33.28	6.0	100	4.72	.675	33.1	0.07	16.66	269.0	clear
1052	33.25	7.0	100	4.73	.673	–	.06	16.63	264.3	–
1102	33.28	8.0	100	4.76	.668	19.7	.04	16.53	256.5	clear
1112	–	9.0	100	4.81	.667	–	.03	16.52	247.8	–
1122	33.28	10.0	100	4.86	.670	14.7	.04	16.69	241.1	clear
1132	–	11.0	100	4.89	.670	11.4	.05	16.62	236.3	"
1142	33.24	12.0	100	4.92	.670	9.55	.06	16.63	231.6	Stop purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) MPI0 1586
Turbidity Meter (SN) 4650 4300

Pump Intake 38'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT0604
Sample Location: 16MWT06
Sampled By: T. ROJAHN
C.O.C. No.: 0085
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/24/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1650								
Method: SAMS	CLEAR	4.69	1.219	18.77	29	0.39	402	—

PURGE DATA:

Date: 8/24/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Deo. Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 28.30'								
Static Water Level (WL): 17.18								
One Casing Volume(gal/L): 6.9								
Start Purge (hrs): 1245								
End Purge (hrs): 1645								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 15.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 25'

11.12' x 0.163 = 1.8 gal or 6.9 L

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): Tony Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16 MWT 06
DATE: 8/24/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (SU's)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1245	17.18	0	–	–	–	–	–	–	–	START PURGE
1255	18.70	1500	150	4.59	1.130	21	1.21	17.77	+42	CLEAR
1305	18.95	2100	60	4.40	1.223	19	1.10	21.08	312	CLEAR
1315	19.03	2600	50	4.10	1.223	17	1.00	20.80	268	CLEAR
1325	19.10	3100	50	3.78	1.224	16	0.95	20.45	230	CLEAR
1335	19.21	3600	50	3.55	1.225	15	0.91	20.19	197	CLEAR
1345	19.38	4200	60	3.66	1.203	12	0.95	19.97	376	CLEAR
1355	19.58	4800	60	3.56	1.201	10.1	1.02	19.60	403	CLEAR
1405	19.75	5400	60	3.44	1.197	8.9	1.09	19.75	427	CLEAR
1415	19.93	6100	70	3.24	1.194	8.8	1.09	19.35	445	CLEAR
1425	20.08	6800	70	3.42	1.205	10.2	1.09	19.66	444	CLEAR
1435	20.22	7500	70	3.01	1.235	12	1.02	20.35	466	CLEAR
1445	20.38	8200	70	2.57	1.260	13	0.95	21.04	485	CLEAR
1455	20.52	8800	60	2.29	1.255	14	0.96	20.77	501	CLEAR
1505	20.73	9400	60	2.33	1.250	15	0.90	20.54	510	CLEAR
1515	20.91	10000	60	2.36	1.246	16	0.85	20.34	519	CLEAR
1525	21.12	10600	60	2.98	1.227	21	0.72	19.84	370	CLEAR
1535	21.28	11200	60	3.45	1.212	32	0.57	19.23	256	CLEAR
1545	21.51	11800	60	3.43	1.189	39	0.60	18.32	359	CLEAR
1555	21.76	12400	60	3.43	1.167	45	0.62	17.43	451	CLEAR
1605	22.95	13000	60	4.04	1.180	50	0.54	17.98	324	CLEAR
1615	22.13	13600	60	4.58	1.195	55	0.42	18.48	198	CLEAR
1625	22.22	14200	60	4.71	1.224	40	0.40	19.18	326	CLEAR
1635	22.35	14800	60	4.66	1.214	35	0.39	18.87	389	CLEAR
1645	22.46	15400	60	4.69	1.219	29	0.39	18.77	402	CLEAR
1650	—	—	—	—	—	—	—	—	–	SAMPLE TIME

Water Quality Meter (SN): 01C0979 AA
Control Box type (SN): MP10 - 1588
Turbidity Meter (SN): 1760 - 1800

Pump Intake: 25' DEDICATED PUMP

SIGNATURE(S): Terry Rogers

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW~~A~~T0802
Sample Location: 16MWT08
Sampled By: T. ROJAHN
C.O.C. No.: NA
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/16/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: ~~1154~~								
Method: ~~3/4" BLADDER~~								

PURGE DATA:

Date: 10/15/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: MICRO BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" ø PVC		See Low Flow Purge Data Sheets						
Total Well Depth (TD): 97.6								
Static Water Level (WL): 95.81		CALL WELL DRY						
One Casing Volume(gal/L): 1.1L								
10/15 Start Purge (hrs): 1130 START PUMP 1205 H2O								
10/16 End Purge (hrs): 1130								
Total Purge Time (min): 75								
Total Vol. Purged (gal/L): 1.4L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	~~Yes~~
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	~~Yes~~
Explosives SW-846 8330		10/16 ~300ml	
Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	~~Yes~~
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 96.6

1.79' x 0.163 = 0.29 gal or 1.1L

Start 3/4" PUMP @ 1130
WATER @ 1205
Note = COLLECT 300ml 10/16
• 10/17 LESS THAN 50ml IN TUBINS
• WELL RECOVERED <0.2' IN 24hrs
• WILL CALL WELL DRY

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT08
DATE: 10/15/04

Start pumping @ 1130

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1205	95.81	–	–	–	–	–	–	–	–	Start of H_2O
1220	*	100	6.7	7.19	–	–	5.02	11.57	62.9	
1235	*	130	2	7.28	0.330	–	5.68	10.93	26.7	
1250	*	200	5	7.39	0.618	–	4.53	10.37	32.1	
1305	*	300	6.7	7.47	0.615	–	4.06	10.19	32.6	
1320	*	350	3.3	7.50	0.611	30.5	4.45	10.02	36.2	Dry w/ H_2O in Tubing
1130	*			10/16/04						
		1350		Remove ~10 liter of H_2O from Tubing						
				10/17/04						
1140	96.43	–	–	–		–	–	–	–	Start Pump to cont sampling
1240		No H_2O came to surface – Pump <50ml on								
				of tubing Call well dry						
				40.2' recharge in 24 Hrs.						
				No sample collected						
				Round 1 had ~4' more H_2O in water column						

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) MP10 - 1588
Turbidity Meter (SN) 4650 - 4300

Pump Intake ~1' off Bottom

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW T0802
Sample Location: 16MWT
Sampled By: T. ROJAUN
C.O.C. No.: 0133
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-30-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1600	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bailer 1/2"	—	—	—	—	—	—	—	—

PURGE DATA:

Date: NA	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method:								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type:			See Low Flow Purge Data Sheets					
Total Well Depth (TD):								
Static Water Level (WL):								
One Casing Volume(gal/L):								
Start Purge (hrs):								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes (No)
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes (No)
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	~ 800ml (2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
10/30 Collected 500ml			
10/30 Collected 210ml			
11/01 Collected 100ml			

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW NA -F

Pump intake @ NA

@Start 9" of water in Bailer, then quickly to 3" @1700 Hrs only 1" of water in Bailer will stop and resume tomorrow after recharge

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	
—	—	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW-T0902
Sample Location: 16MWT09
Sampled By: Goerdt
C.O.C. No.: 0082
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 8/17/04								
Time: 1201								
Method: Dedicated Bladder	Clear	4.7	937	19.68	2.32	.37	199.7	---

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 8-17-04								
Method: Dedicated Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.70								
Static Water Level (WL): 15.19								
One Casing Volume(gal/L): 7.5								
Start Purge (hrs): 0916								
End Purge (hrs): 1156								
Total Purge Time (min): 210								
Total Vol. Purged (gal/L): 9.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 22'

Dedicated bladder pump

27.70
15.19
12.51 (.163) = 2.04 gal
= 7.5 L

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT09
DATE: 8-17-04

Time (Hrs)	Water Level (Ft. below TOC)	Volume (~~mL/Min~~ L)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0916	15.19	—	—	—	—	—	—	—	—	Start purge
0926	15.53	1.1	110	4.51	1.383	53.7	0.60	16.70	163.8	Clear
0936	15.70	2.2	110	4.43	1.070	26.0	0.34	15.94	156.2	"
0946	15.52	3.3	110	4.34	.852	11.8	.27	16.45	178.2	"
0956	15.45	3.8	50	4.57	1.177	8.19	.30	17.52	157.8	"
1006	~~15.52~~ 9.00	4.2	50	4.58	1.219	4.07	.29	17.29	145.3	"
1016	15.52	4.8	50	4.49	1.011	2.04	.28	16.83	149.1	"
1026	15.62	5.2	50	4.46	.944	1.78	.26	16.44	152.7	"
1036	15.45	5.65	45	4.48	.909	1.84	.28	17.61	173.6	"
1046	15.52	6.15	50	4.57	1.056	1.15	.29	17.22	161.5	"
1056	15.60	6.65	50	4.52	.906	0.86	.33	16.90	173.5	"
1106	15.52	7.35	70	4.55	.951	0.75	.36	16.85	182.6	"
1116	15.65	7.80	45	4.46	.781	0.20	.37	16.67	196.0	"
1126	15.48	8.25	45	4.47	.756	0.38	.40	18.16	208.0	"
1136	15.49	8.7	45	4.58	.928	0.32	.37	17.62	200.0	"
1146	15.42	9.15	45	4.60	.919	0.21	.37	18.81	202.0	"
1151	—	9.37	22	4.61	.918	—	.38	19.33	201.9	
1156	15.40	9.59	22	4.70	.937	2.32	.37	19.68	199.7	Stop purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) MP10 1231
Turbidity Meter (SN) 4650 4300

Pump Intake 22'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW T 1002
Sample Location: 16MWT10
Sampled By: Goerdt
C.O.C. No.: 0082
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-17-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1618	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Ded. Bladder	Clear	3.21	1.274	16.75	6.71	.14	50.2	—

PURGE DATA:

Date: 8-17-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Dedicated								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.16								
Static Water Level (WL): 23.21								
One Casing Volume(gal/L): 2.4								
Start Purge (hrs): 1315								
End Purge (hrs): 1610								
Total Purge Time (min): 175								
Total Vol. Purged (gal/L): 16.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 25'

Dedicated bladder pump

27.15
23.21
3.94 (.163) = .642 gal
= 2.38 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
✓	16FD08170402

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MW10
DATE: 8-17-04

Time (Hrs)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1315	23.21	–	–	–	–	–	–	–	–	Start purge
1325	23.24	.75	75	3.40	1.764	196	.38	20.04	363.3	sl cloudy
1335	23.28	1.50	75	3.37	1.709	133	.18	19.03	385.7	"
1345	23.30	2.25	75	3.46	1.613	132	.09	18.05	401.5	"
1355	23.30	3.00	75	3.57	1.547	82.3	.08	18.24	406.5	"
1405	23.51	4.00	100	3.52	1.352	80.4	.08	17.13	416.5	"
1415	23.35	5.00	100	3.54	1.287	77.7	.09	16.95	421.5	"
1425	23.39	6.00	100	3.59	1.252	62.1	.11	17.14	427.1	"
1435	23.38	7.00	100	3.62	1.171	40.6	.13	16.95	433.0	"
1445	23.39	8.00	100	3.62	1.129	26.0	.14	16.61	438.7	clear
1455	23.40	9.00	100	3.54	1.116	20.4	.13	16.61	446.7	"
1505	23.42	10.00	100	3.40	1.097	16.8	.12	16.32	456.9	"
1515	23.42	11.2	120	3.31	1.092	17.0	.12	16.50	469.0	"
1525	23.42	12.2	100	3.29	1.105	15.8	.11	17.37	474.4	"
1535	23.42	13.2	100	3.30	1.098	15.6	.11	17.18	479.2	"
1545	23.41	14.2	100	3.33	1.092	14.6	.13	17.16	485.6	"
1555	23.42	15.2	100	3.27	1.282	10.33	.12	16.85	494.2	"
1600	23.42	~~15.2~~	~~100~~ 50	3.23	1.277	8.48	.14	16.83	497.5	"
1605	23.41	16.2	~~100~~ 50	3.23	1.277	6.82	.14	16.98	499.0	"
1610 ~~1620~~	23.42	16.7	50	3.21	1.284	6.31	.14	16.75	501.2	end purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) MP10 1231
Turbidity Meter (SN) 4650 4300

Pump Intake 25'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1102
Sample Location: 16MWT11
Sampled By: T. ROJAHN
C.O.C. No.: 0085 & 0087
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/25/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0855								
Method: SAME	CLEAR	5.47	1.004	24.93	4.7	0.87	95	—

PURGE DATA:

Date: 8/24/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: DED. BLADDER								
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 98.65								
Static Water Level (WL): *								
One Casing Volume(gal/L): <2								
Start Purge (hrs): 1025								
End Purge (hrs): 1125								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 1.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
Volatiles SW-846 8260B	4°C/HCl	8/25	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	8/25	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	8/25	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	8/26	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3		(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 97'

* H_2O LEVEL PROBE ON TOP OF DED. BLADDER PUMP

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16 MWT 11
DATE: 8/24/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1025	*	0	–	–	–	–	–	–	–	START PURGE
1030	*	150	30	6.19	0.515	–	2.05	22.49	-75	CLEAR
1035	*	300	30	5.99	0.906	5.7	1.20	20.89	-209	CLEAR
1045	*	600	30	5.79	0.902	3.6	1.17	20.68	-160	CLEAR
1055	*	800	20	5.23	0.923	4.0	1.10	21.83	+77	CLEAR
1105	*	1000	20	5.30	0.967	5.8	1.04	23.50	121	CLEAR
1115	*	1100	10	5.47	1.004	4.7	0.87	24.93	95	CLEAR
1125	*	1200	10	–	–	–	–	–	–	DRY

Water Quality Meter (SN) 01C0979 AA
Control Box type (SN) MP10-1588
Turbidity Meter (SN) 1760-1800

Pump Intake 97'

* BELOW TOP OF PUMP

Control box = 2 cycles / 125' mark + 150'

SIGNATURE(S): Terry [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1202
Sample Location: 16MWT12
Sampled By: Gossett
C.O.C. No.: 0085
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-24-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1208								
Method: Ded. Bladder	Clear	4.64	2.785	17.81	7.63	3.66	220.7	—

PURGE DATA:

Date: 8-24-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Ded. Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 28.57								
Static Water Level (WL): 21.55								
One Casing Volume(gal/L): 4.3								
Start Purge (hrs): 1015								
End Purge (hrs): 1205								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 4.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 25'

28.57
21.55
7.02(.163) = 1.14 gal
= 4.23 L

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT12
DATE: 8-24-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1015	21.55	—	—	—	—	—	—	—	—	Start purge
1025	21.69	0.3	30	3.61	3223	61.5	.11	20.95	402.3	clear
1035	21.75	0.6	30	4.51	2.985	33.8	.11	18.91	332.6	"
1045	21.77	0.9	30	4.56	2.990	25.2	.15	18.94	299.6	"
1055	21.77	1.2	30	4.60	2.977	15.4	.24	18.92	264.0	"
1105	21.80	1.65	45	4.63	2.985	11.3	.43	19.01	249.9	"
1115	21.81	2.1	45	4.66	2.993	10.8	1.43	18.99	235.1	"
1125	21.81	2.55	45	4.68	3.024	10.4	2.14	19.81	230.7	"
1135	21.81	3.0	45	4.72	3.049	10.1	3.04	20.17	219.0	"
1145	21.83	3.45	45	4.67	2.822	9.22	3.35	17.07	215.6	"
1155	21.84	3.9	45	4.63	2.811	9.03	3.51	17.31	221.2	"
1205	21.87	4.35	45	4.64	2.785	7.63	3.66	17.81	220.7	end purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) MP10-1568
Turbidity Meter (SN) 4650-4300

Pump Intake 25'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT13O2
Sample Location: 16MWT13
Sampled By: T. ROJAHN / Tom Dickson
C.O.C. No.: 0083
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 08/18/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0730								
Method: Bladder Pump	Sl Cloudy	5.42	0.420	18.44	105	0.08	+ 541	—

PURGE DATA:

Date: 8/17/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: DED. Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 20.32								
Static Water Level (WL): 12.79								
One Casing Volume(gal/L) 4.6								
Start Purge (hrs): 1110								
End Purge (hrs): 1510								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L) 4.6L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 17'

7.53 X 0.163 = 1.2 gal OR 4.6 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Troy Rojahn, Tom Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT13
DATE: 8/17/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1110	12.79	0	–	–	–	–	–	–	–	Start Purge
1120	13.06	800	80	5.44	0.393	270	0.36	18.13	72	Cloudy Yellowish Tint
1130	13.33	1900	110.0	4.92	0.384	180	0.33	18.34	155	Cloudy " "
1140	13.58	3000	110.0	4.82	0.387	190	0.31	17.92	286	Cloudy " "
1150	13.81	4000	100.0	4.69	0.384	190	0.29	17.72	358	Cloudy " "
1200	14.06	5,100	110	5.09 (+.4)	0.424	150	0.23	19.02	210	Cloudy " "
1210	14.19	5,600	50	4.94	0.419	140	0.24	19.49	393	Cloudy " "
1220	14.42	6,300	70	4.73	0.416	120	0.19	18.41	510	Sl. Cloudy
1230	14.61	7,100	80	4.66	0.419	110	0.16	18.13	541	Sl. Cloudy
1240	14.87	7900	80	4.69	0.422	120	0.14	18.07	556	Sl. Cloudy
1250	15.18	8700	80	4.79	0.425	220	0.11	17.91	562	Cloudy
1300	15.41	9500	80	4.69	0.426	198	0.10	18.09	580	Cloudy
1310	*	10,300	80	4.87	0.429	177	0.09	18.45	320	Cloudy
1320	*	11,100	80	5.08	0.431	137	0.09	18.80	287	Sl. Cloudy
1330	*	11,500	40	4.94	0.426	116	0.10	18.36	490	Sl. Cloudy
1340	*	12,200	70	4.93	0.411	116	0.09	17.53	538	Sl. Cloudy
1350	*	12900	70	5.11	0.405	105	0.08	17.50	552	Sl. Cloudy
1400	*	13600	70	5.12	0.384	36.8	0.08	17.36	557	Clear
1410	*	14200	60	5.29	0.399	16.7	0.07	18.02	557	Clear
1420	*	14900	70	5.29	0.395	11.7	0.07	17.71	567	Clear
1430	*	15500	60	5.34	0.388	10.6	0.06	18.59	565	Clear
1440	*	16000	50	5.36	0.400	13.2	0.06	17.92	560	Clear
1450	*	16500	50	5.37	0.401	14.9	0.06	17.96	560	Clear
1500	*	17100	60	5.37	0.413	107	0.08	18.34	554	Clear - Cloudy
1510	*	17400	30	5.42	0.421	105	0.08	18.44	541	Clear - Cloudy
STOP → ~~1512~~	DRY *	—	—	—	—	—	—	—	—	Sample Tomorrow

Water Quality Meter (SN): 01C0979 AA
Control Box type (SN): MP10 - 1586
Turbidity Meter (SN): 3592 - 3502

Pump Intake: 17' Dedicated Bladder Pump
M-Scope
* on pump top.

SIGNATURE(S): Troy Light

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1502
Sample Location: 16GWT15
Sampled By: Tom Dickson
C.O.C. No.: 0082
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 08/17/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1535								
Method: Bladder Pump	Clear	6.15	411	15.85	2.0	1.77	143.1	—

PURGE DATA:

Date: 08/17/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2.0" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 94.70								
Static Water Level (WL): 54.01								
One Casing Volume(gal/L): 6.6gal/25.1L								
Start Purge (hrs): 1120								
End Purge (hrs): 1530								
Total Purge Time (min): 250								
Total Vol. Purged (gal/L): 21.810L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 88'

40.69' x 0.163 = 6.6gals / 25.1 L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Tom Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 16GWT75
DATE: 08/17/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (µS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1128	54.86		50	8.00	516	—	9.70	21.73	42.6	Clear Adjust Flowrate
1141	56.30	650	90	8.85	467	3.4	3.47	16.76	-32.2	
1151	56.96	1550	90	7.59	462	2.8	2.10	17.39	14.0	
1200	58.08	2360	90	6.93	448	2.4	1.78	17.21	39.4	
1210	59.16	3360	100	6.30	438	2.3	1.99	17.04	69.9	
1220	60.19	4260	90	5.97	438	2.2	2.04	17.39	88.7	
1235	61.41	5610	90	5.89	436	1.9	1.94	17.38	98.0	
1245	62.14	6510	90	5.80	434	1.9	1.84	17.29	104.1	
1255	62.85	7410	90	5.75	431	2.1	1.89	17.16	109.1	
1315	64.37	9210	90	5.59	432	2.3	1.76	17.33	124.1	
1325	65.17	10110	90	5.40	433	2.4	1.91	17.45	135.6	
1335	65.81	11010	90	5.29	431	2.1	1.89	17.30	143.0	
1355	67.09	12810	90	5.66	423	2.4	1.86	16.50	137.9	
1405	67.90	13710	90	5.84	421	2.2	1.92	16.40	136.0	
1415	68.47	14610	90	5.96	419	2.3	1.88	16.28	135.7	
1425	69.05	15510	90	6.02	417	2.5	1.87	16.13	138.0	
1445	70.34	17310	90	6.10	415	2.2	1.85	16.06	139.0	
1500	71.31	18810	100	6.12	413	2.6	1.84	15.85	140.7	
1510	71.95	19810	100	6.13	412	2.1	1.80	15.87	141.7	
1520	72.57	20810	100	6.12	411	2.4	1.80	15.78	143.4	
1530	73.28	21810	100	6.15	411	2.0	1.77	15.85	143.1	

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) MP10-1588
Turbidity Meter (SN) 1760-1800

Pump Intake 88'

SIGNATURE(S): Tom Dickson

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1602
Sample Location: 16MWT16
Sampled By: T. ROJAHN
C.O.C. No.: 0086
Type of Sample: 0087
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/27/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1000								
Method: BAILER	Yellow BRN	6.24	1.789	20.33	>1000	5.5	58	—

PURGE DATA:

Date: 8/26/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	~~Salinity~~ ORP	Other
Method: DED. BAILER	1	6.24	1.789	20.33	>1000	5.5	58	—
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 35.20								
Static Water Level (WL): 33.38								
One Casing Volume(gal/L) 1.1								
Start Purge (hrs): 1610								
End Purge (hrs): 1615								
Total Purge Time (min): 5								
Total Vol. Purged (gal/L) 1.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
Volatiles SW-846 8260B	4°C/HCl	8/27	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	8/27	(3) 40ml Vials	Yes
Explosives SW-846 8330				
Nitroaromatics and Nitramines	4°C	8/27	(2) L Glass Amber started	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3		(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3		(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 16.8'

1.82 x 0.163 = 0.3gal or 1.1 L

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW T1702
Sample Location: 16MW T17
Sampled By: Goerdt
C.O.C. No.: 0087
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-25-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1747	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Del. Bladder	Clear	4.59	.786	18.56	9.1	.18	274.3	—

PURGE DATA:

Date: 8-25-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Del. Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 26.02								
Static Water Level (WL): 15.95								
One Casing Volume(gal/L): 6.1								
Start Purge (hrs): 1543								
End Purge (hrs): 1743								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 13.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 21'

26.02
15.95
10.07 (.163) = 1.64 gal
= 6.1 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16GWT17
DATE: 8-25-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min.~~)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1543	15.95	—	—	—	—	—	—	—	—	Start purge
1553	16.03	1.2	120	4.97	1.298	—	6.12	20.40	152.8	—
1603	16.28	2.4	120	4.66	1.060	72.9	1.06	19.64	163.6	Slightly cloudy
1613	16.23	3.3	90	4.62	1.069	68.3	0.88	21.15	173.3	"
1623	16.23	4.2	90	4.70	1.155	54.2	0.77	21.39	157.8	clear
1633	16.18	5.1	90	4.64	1.178	42.7	0.79	22.13	160.2	clear
1643	16.22	6.1	100	4.69	1.251	25.7	0.80	22.43	160.4	"
1653	16.30	7.4	130	4.39	1.174	21.4	0.50	20.06	178.5	"
1703	16.29	8.7	130	4.33	1.087	13.7	0.35	19.56	196.7	"
1713	16.31	10.0	130	4.30	.862	13.9	0.21	18.87	269.9	"
1723	16.39	11.3	130	4.48	.833	11.6	0.20	18.88	277.0	"
1733	16.37	12.6	130	4.52	.792	9.8	0.17	18.56	276.1	"
1738	16.37	13.2	60	4.56	.788	—	0.18	18.59	274.9	"
1743	16.38	13.8	60	4.59	.786	9.1	0.18	18.56	274.3	End purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) MP10 1586
Turbidity Meter (SN) 4650-4300

Pump Intake 21'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1802
Sample Location: 16MWT18
Sampled By: Gorrdt
C.O.C. No.: 0087
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-27-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1347	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder	Cloudy	6.58	1.043	23.89	150	3.31	6.7	–

PURGE DATA:

Date: 8/27/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder								
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 104.5								
Static Water Level (WL): 95.66								
One Casing Volume(gal/L): 5.4								
Start Purge (hrs): 0944								
End Purge (hrs): 1344								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 12.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

Pump intake @ 104'

104.50
95.66
8.84(.163)=1.44 g
=5.4 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT18
DATE: 8-27-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0944	95.66	—	—	—	—	—	—	—	—	Start purge
0954	—	.45	45	—	—	—	—	—	—	No water yet
1004	95.67	.90	45	7.34	1.065	—	2.62	26.12	215.3	not thru flow
1014	95.88	1.35		7.29	1.055	—	2.57	25.58	216.8	cell yet.
1024	96.05	1.80		7.24	1.027	>1000	2.87	25.06	219.2	—
1034	96.33	2.25		7.14	1.001	>1000	2.37	23.48	216.4	—
1044	96.60	2.7		7.02	.987	>1000	2.33	22.74	178.0	—
1054	97.03	3.15		6.88	.978	>1000	2.53	22.17	83.0	—
1104	97.15	3.6		6.81	.978	890	2.57	22.16	56.0	cloudy
1114	97.53	4.15	55	6.71	.970	—	2.69	21.77	33.0	—
1124	97.84	4.7	55	6.69	.966	—	2.91	21.48	16.2	—
1134	98.02	5.15	45	6.71	.998	—	2.91	23.05	11.4	—
1144	98.19	5.6		6.69	.999	—	3.17	23.41	14.2	—
1154	98.33	6.05		6.70	1.004	—	3.41	23.87	18.9	—
1204	98.59	6.5		6.69	1.027	385	3.85	24.04	23.1	cloudy
1214	98.71	6.95		6.68	1.032	—	3.94	24.21	21.6	—
1224	98.97	7.4		6.69	1.041	209	4.04	24.39	18.0	cloudy
1234	99.10	7.85		6.69	1.042	—	4.19	24.48	7.3	—
1244	99.25	8.3		6.67	1.045	167	4.33	24.63	-2.1	cloudy
1254	99.47	8.75		6.68	1.083	—	4.08	24.72	-4.7	—
1304	99.63	9.2		6.67	1.097	—	4.10	24.87	74.3	—
1314	99.86	9.95	75	6.44	.989	179	3.75	21.95	55.8	cloudy
1324	100.25	10.7		6.34	.974	—	3.51	21.63	18.4	—
1334	100.63	11.45		6.57	1.054	—	3.17	25.37	7.7	—
1344	100.92	12.2		6.58	1.043	150	3.31	23.89	6.7	end purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) MP10 1586
Turbidity Meter (SN) 4650 4300

Pump Intake Well bottom ~104'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT1901
Sample Location: 16MWT19
Sampled By: Goerdt
C.O.C. No.: 0086
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-29-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1118	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Peristaltic	Clear	4.73	.412	19.60	2.91	3.32	341.9	—

PURGE DATA:

Date: 8-29-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.96								
Static Water Level (WL): 3.23								
One Casing Volume(gal/L) 8.9								
Start Purge (hrs): 0944								
End Purge (hrs): 1114								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L) 9.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 16GW_____-F

Pump intake @ 13'

17.96
3.23
14.73 (.163) = 2.4 gal
= 8.9 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
✓	16FD0829 0401	[signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT19
DATE: 8-29-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min.~~ L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0944	3.23	–	–	–	–	–	–	–	–	Start purge
0954	3.52	1.0	100	4.72	.398	–	4.19	18.35	298.7	
1004	3.58	2.0	100	4.87	.411	–	4.28	19.09	301.2	
1014	3.68	3.0	100	4.88	.417	8.21	4.28	19.40	303.6	clear
1024	3.93	3.3	130	4.78	.418	5.23	4.04	19.86	317.5	"
1034	3.88	5.3	100	4.74	.417	4.11	3.70	19.77	330.9	"
1044	3.83	6.3	100	4.74	.416	2.93	3.61	19.70	335.5	"
1054	3.83	7.3	100	4.75	.412	2.88	3.46	19.48	342.6	"
1104	3.83	8.3	100	4.75	.410	3.06	3.41	19.24	342.0	"
1114	3.83	9.3	100	4.73	.412	2.91	3.32	19.60	341.9	end purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) N/A
Turbidity Meter (SN) 4650 4300

Pump Intake 13'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GWT2001
Sample Location: 16MWT20
Sampled By: T. ROJAHN
C.O.C. No.: 0086
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/29/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1355								
Method: SAME	CLEAR	5.53	0.126	20.62	5.6	6.91	84	—

PURGE DATA:

Date: 8/29/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 18.08								
Static Water Level (WL): 4.23								
One Casing Volume(gal/L) 8.5								
Start Purge (hrs): 1113								
End Purge (hrs): 1353								
Total Purge Time (min): 160								
Total Vol. Purged (gal/L) 8.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected ~~Yes~~ No 16GW_____-F

Pump intake @ _____

13.85' x 0.163 = 2.3 gal in 8.5 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MWT20
DATE: 8/29/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1113	4.23	0	—	—	—	—	—	—	—	START PURGE
1123	5.49	1100	110	6.14	0.139	33	10.02	19.75	+79	CLEAR
1133	5.83	1750	65.0	5.83	0.135	18	8.58	20.12	96	CLEAR
1143	6.20	2450	70.0	5.65	0.129	23	8.50	20.16	105	CLEAR
1153	6.15	2950	50.0	5.52	0.130	18	8.18	21.33	109	CLEAR
1203	6.15	3300	35.0	5.50	0.130	12	7.96	21.56	109	CLEAR
1213	6.23	3800	50	5.46	0.130	12	7.73	21.50	108	CLEAR
1223	6.30	4300	50	5.42	0.128	12	7.56	21.44	107	CLEAR
1233	6.28	4800	50	5.41	0.128	10	7.45	21.67	107	CLEAR
1243	6.27	5300	50	5.38	0.129	7.9	7.24	21.99	108	CLEAR
1253	6.30	5800	50	5.39	0.127	7.3	7.27	21.33	108	CLEAR
1303	6.27	6300	50	5.46	0.127	6.2	7.10	21.62	104	CLEAR
1313	6.29	6800	50	5.52	0.126	6.1	7.18	20.89	98	CLEAR
1323	6.33	7300	50	5.56	0.123	6.3	7.13	20.35	92	CLEAR
1333	6.37	7800	50	5.57	0.122	4.6	7.11	20.06	89	CLEAR
1343	6.32	8300	50	5.56	0.123	4.8	6.94	20.51	87	CLEAR
1353	6.29	8800	50	5.53	0.126	5.6	6.91	20.62	84	CLEAR
1355	—	—	—	—	—	—	—	—	—	START SAMPLING

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): 419
Turbidity Meter (SN): 1760-1800

Pump Intake: 13'

SIGNATURE(S): Terry Nagel

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU16
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 16GW T2101
Sample Location: 16 MW T21
Sampled By: T. ROJAHN
C.O.C. No.: 0122
Type of Sample:
[X] Low Concentration
[] High Concentration

8.67 (10/16/04)

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 10-16-04								
Time: 1030								
Method: SAME	CLEAR	11.96	2.480	13.22	21.8 (10/15)	1.04	+52.8	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 10/14/04								
Method: Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 97.5								
Static Water Level (WL): 69.34								
One Casing Volume(gal/L): 17.4								
Start Purge (hrs): 1402								
End Purge (hrs): 1802								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 17.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vials	Yes
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vials	Yes
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 16GW_____-F

28.16 × 0.163 = 4.6 gal or 17.4L

Pump intake @ 92.5

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 16MW21
DATE: 10/15/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1402	69.34	—	—	—	—	—	—	—	—	Start PURGE
1412	69.88	700	70	11.86	2.265	112	1.64	13.08	54.2	Sl. Cloudy
1422	71.42	1600	90	11.90	2.380	78.9	1.33	13.91	57.1	V. Sl. Cloudy
1432	72.95	2600	100	11.90	2.393	62.6	1.17	13.74	59.4	V Sl. Cloudy
1442	74.77	3600	100	11.89	2.387	43.3	1.10	14.11	60.8	CLEAR
1452	75.32	4100	50	11.89	2.405	36.5	1.17	14.45	60.5	CLEAR
1502	75.88	4600	50	11.87	2.427	30.0	1.23	14.77	60.4	CLEAR
1512	76.55	5100	50	11.87	2.434	22.3	1.25	14.72	61.0	CLEAR
1522	77.60	5800	70	11.88	2.423	14.7	1.25	14.37	62.9	CLEAR
1532	78.65	6550	75	11.89	2.436	11.7	1.22	14.27	62.8	CLEAR
1542	79.80	7300	75	11.90	2.432	9.92	1.21	13.88	61.7	CLEAR
1552	80.05	8050	75	11.92	2.417	8.83	1.24	13.71	61.0	CLEAR
1602	82.11	8800	75	11.93	2.410	7.85	1.21	13.57	60.1	CLEAR
1612	82.94	9400	60	11.94	2.404	7.09	1.20	13.46	59.4	CLEAR
1622	83.58	10150	75	11.95	2.413	6.63	1.22	13.53	58.2	CLEAR
1632	84.27	10900	75	11.95	2.432	5.91	1.21	13.53	56.7	CLEAR
1642	84.56	11,650	75	11.96	2.443	5.95	1.22	13.51	56.2	CLEAR
1652	84.86	12,400	75	11.98	2.487	5.88	1.20	13.47	55.1	CLEAR
1702	85.10	13,150	75	11.98	2.508	5.66	1.17	13.36	54.7	CLEAR
1712	85.62	13,900	75	11.99	2.510	5.42	1.14	13.41	54.1	CLEAR
1722	86.25	14650	75	11.99	2.497	6.25	1.11	13.38	53.6	CLEAR
1732	86.65	15400	75	11.99	2.499	5.82	1.07	13.35	53.1	CLEAR
1742	87.24	16150	75	11.99	2.500	9.55	1.05	13.33	52.6	CLEAR
1752	87.68	16900	75	11.97	2.495	12.60	1.05	13.25	52.6	CLEAR
1802	88.28	17650	75	11.96	2.480	21.80	1.04	13.22	52.8	CLEAR
			With	Turbidity	on the		INCREASE;		AND	
			Due	to Late	hour	will allow	well	to RECHARGE		
				& SAMPLE	tomorrow					

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) MPC-1588
Turbidity Meter (SN) 4650-4300

Pump Intake 92.5

SIGNATURE(S): [illegible]

APPENDIX C.5.1
SWMU 16
CHAIN OF CUSTODY RECORDS
ROUND 1

A TECH NUS, INC. CTO: 0279 CHAIN OF CUSTODY NUMBER 0970 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	R. BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		T. ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. # 8316 7332 7258		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	VOCs 4oml Vials	SVOCs 8270C	SVOCs SIM	SVOC 8151A	METALS 6020 Hg 7470A	PCBS 8082	EXPLOSIVES 8330	PICRATES	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	G	P	G	G	G	
PRESERVATIVE USED									HCl 4°C	4°C	4°C	4°C	HNO3 4°C	4°C	4°C	4°C	
3/26	0700	TB 03260301	QC	—	—	QC	G	3	3								TRIP BLANK
3/26	1415	SB 03260301	QC	—	—	QC	G	12	3	2	2	2	1	2			TAP SOURCE BLANK
3/26	1500	RB 03260301	QC	—	—	QC	G	16	3	2	2	2	1	2	2	2	CUC SIEVE RINSATE
3/26	1525	SB 03260302	QC	—	—	QC	G	12	3	2	2	2	1	2			DI SOURCE BLANK

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	3/26/03	1830	1. RECEIVED BY	3/26/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CTO: 0279

CHAIN OF CUSTODY | NUMBER 0959 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX # 8316 7332 7236		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	VOCS 8260B ENCORE	VOCS 8015B ENCORE	SVOC 8270C/SIM/8151A	PCBS 8082	EXPLOSIVES 8330/PICRATES	METALS 6020 / Hg 7471A	TOC Lloyd Khan	CEC (9081)	PH (9045C)	COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	P	P	G	G	G	G	G	G		
								PRESERVATIVE USED	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C		
3/27	0715	TB0327030 1	QC	–	–	QC	G	3	2	1								VOA VIALS Trip Blank
3/27	0845	165501000 2	165B01	0	2	SO	G	7	3	2	1	X	X	1				
3/27	0900	165B010406	165B01	4	6	SO	G	5	3	–	1	X	X	1				
3/27	0905	165502 0002	165B02	0	2	SO	G	7	3	2	1	X	X	1	X	X	X	
3/27	0915	165B020406	165B02	4	6	SO	G	5	3	–	1	X	X	1	X	X	X	
3/27	0940	165B030002	165B03	0	2	SO	G	7	3	2	1	X	X	1				
3/27	1000	165504000 2	165B04	0	2	SO	G	7	3	2	1	X	X	1				
3/27	1010	165B41 0305	165B41	3	5	SO	G	7	3	2	1	–	X	1	X	X	X	
3/27	1015	165B41 0507	165B41	5	7	SO	G	7	3	2	1	–	X	1	X	X	X	
3/27	1055	165506 0002	165B06	0	2	SO	G	7	3	2	1	X	X	1				
3/27	1100	165507000 2	165B07	0	2	SO	G	7	3	2	1	X	X	1	X	X	X	
3/27	1330	165508000 2	165B08	0	2	SO	G	7	3	2	1	X	X	1				
3/27	1355	165509000 2	165B09	0	2	SO	G	7	3	2	1	X	X	1				

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	3/27/03	1900	1. RECEIVED BY FEDERAL EXPRESS	3/27/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS X = Additional PARAMETERS FOR ANALYSIS !!!

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TIN 001

TT 'A TECH NUS, INC. CTO: 0279 CHAIN OF CUSTODY NUMBER 0960 PAGE 1 OF 1

PROJECT NO: 9060	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE): Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED EX. # 8316 7332 7236		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOCS 8260B ENCORE SAMPLER	VOCS 8015B ENCORE SAMPLER	SVOC 8270C/SIM	PCBS 8082/8151A	EXPLOSIVES 8330 & PICRATES	METALS 6020 / HG 7471A	TOC	CEC 9081 Lloyd KHAN	PH 9045C	COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	P	P	G	G	G	G	G	G	G	
								PRESERVATIVE USED	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	
3/27	1400	165510 0002	165B10	0	2	SO	G	7	3	2	1	X	X	1				
3/27	1415	165516 0002	165B16	0	2	SO	G	7	3	2	1	X	X	1				
3/27	1440	165515 0002	165B15	0	2	SO	G	19	9	6	2	X	X	2				DO MS/MSD
3/27	1500	165514 0002	165B14	0	2	SO	G	7	3	2	1	X	X	1				
3/27	~~1520~~ 1515	165511 0002	165B11	0	2	SO	G	7	3	2	1	X	X	1				
3/27	1520	165B110204	165B11	2	4	SO	G	2	—	—	1	—	X	1				
3/27	1540	165517 0002	165B17	0	2	SO	G	7	3	2	1	X	X	1				
3/27	1545	165B170204	165B17	2	4	SO	G	2	—	—	1	—	X	1				DO NOT ANALYZE PCBS
3/27	0000	FD03270301	—	—	—	SO	G	7	3	2	1	X	X	1				FROM 165580 0002
3/27	0000	FD03270302	—	—	—	SO	G	7	3	2	1	X	X	1				FROM 165517 0002
3	~~0000~~	TR																
3/27	1035	165505 0002	165B05	0	2	SO	G	7	3	2	1	X	X	1				

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Terry Rojahn	3/27/03	1900	FEDERAL EXPRESS	3/27/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS (X) Additional Parameters for Analysis. (-) = Do Not Analyze

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CTO: 0279

CHAIN OF CUSTODY | NUMBER 0972 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUKKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX # 8316 7332 7225		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOCS ENCORE 8260B	VOCS ENCORE 8015B	SVOC 8270C/SIM/8151A	PCBS 8082	EXPLOSIVES 8330/PICRATES	METALS 6020 & Hg 7471A	TOC Lloyd KHAN	CEC 9081	PH 9045C	COMMENTS
									CONTAINER TYPE PLASTIC (P) or GLASS (G)			P	P	G	G	G	G	G
									PRESERVATIVE USED			4°C	4°C	4°C	4°C	4°C	4°C	4°C
3/28	0715	TB032803 01	QC	–	–	QC	G	3	2	1								TRIP BLANK VOA VIALS
3/28	0800	165S130002	165B13	0	2	SO	G	7	3	2	1	X	X	1				
3/28	0805	165B130204	165B13	2	4	SO	G	2	–	–	1	–	X	1				
3/28	0820	165S120002	165B12	0	2	SO	G	7	3	2	1	X	X	1	X	X	X	
3/28	0825	165B120204	165B12	2	4	SO	G	2	–	–	1	–	X	1	X	X	X	
3/28	0830	165S310002	165B31	0	2	SO	G	7	3	2	1	X	X	1	X	X	X	
3/28	0840	165S300002	165B30	0	2	SO	G	7	3	2	1	X	X	1				
3/28	0845	165B300203	165B30	2	3	SO	G	2	–	–	1	–	X	1				
3/28	0900	165S290002	165B29	0	2	SO	G	7	3	2	1	X	X	1				
3/28	0905	165B290203	165B29	2	3	SO	G	2	–	–	1	–	X	1				
3/28	0910	165S220002	165B22	0	2	SO	G	7	3	2	1	–	X	1				
3/28	0915	165B220203	165B22	2	3	SO	G	2	–	–	1	–	X	1				
3/28	0930	165S250002	165B25	0	2	SO	G	7	3	2	1	–	X	1				

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	3/28/03	1830	1. RECEIVED BY FEDERAL EXPRESS	3/28/03	1830
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS X = Additional Parameters for Analysis!

DISTRIBUTION WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TN 01

A TECH NUS, INC. CTO: 0279 — CHAIN OF CUSTODY NUMBER 0961 — PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE

SAMPLERS (SIGNATURE)	FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn	TERRY ROJAHN	(412) 921 8857	940 SOUTH HARNEY ST.
	CARRIER/WAYBILL NUMBER		CITY, STATE
	FED. EX # 8316 7332 7225		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P, P, G, G, G, G, G, G
PRESERVATIVE USED: 4°C, 4°C, 4°C, 4°C, 4°C, 4°C, 4°C, 4°C

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	VOCS 8260B ENCORE	VOCS 8015B ENCORE	SVOC 8270C/SIM/8151A	PCBS 8082	EXPLOSIVES 8330/PICRATES	METALS 6020/HG 7471A	TOC Lloyd Khan	CEC 9081	PH 9045C	COMMENTS
3/28	0935	16SB250203	16SB25	2	3	SO	G	2	–	–	1	–	X	1				
3/28	0940	16SS240002	16SB24	0	2	SO	G	7	3	2	1	–	X	1	X	X	X	
3/28	0945	16SB240203	16SB24	2	3	SO	G	2	–	–	1	–	X	1	X	X	X	
3/28	1000	16SS230002	16SB23	0	2	SO	G	7	3	2	1	–	X	1				
3/28	1005	16SB230203	16SB23	2	3	SO	G	2	–	–	1	–	X	1				
3/28	1030	16SS180002	16SB18	0	2	SO	G	7	3	2	1	X	X	1	X	X	X	
3/28	1035	16SB180203	16SB18	2	3	SO	G	2	–	–	1	–	X	1	X	X	X	
3/28	1040	16SS190002	16SB19	0	2	SO	G	7	3	2	1	X	X	1				
3/28	1045	16SB190203	16SB19	2	3	SO	G	2	–	–	1	–	X	1				
3/28	1100	16SS210002	16SB21	0	2	SO	G	19	9	6	2	–	X	2				DO MS/MSD
3/28	1120	16SS270002	16SB27	0	2	SO	G	7	3	2	1	X	X	1				
3/28	1125	16SB270203	16SB27	2	3	SO	G	2	–	–	1	–	X	1				
3/28	1130	16SS280002	16SB28	0	2	SO	G	7	3	2	1	X	X	1				

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	3/28/03	1830	1. RECEIVED BY FEDERAL EXPRESS	3/28/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: X = Additional Parameters for Analysis!

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO: TINUS-001

TETRA TECH NUS, INC.

CRO: 0279

CHAIN OF CUSTODY | NUMBER 0981 | PAGE 1 OF 1

PROJECT NO: 9060	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH PISTANCO	PHONE NUMBER: 412 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE): Tony Rozahn		FIELD OPERATIONS LEADER: T. ROZAHN	PHONE NUMBER: 412 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED EX 8316 7332 7225		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs 8260B	Explosives 8330	SVOCs 8270C	8330/SIM/8151A	PCBs 8082	Explosives 8330	Metals 6020	Hg 7471A	TOC Lloyd Kahn	Cec 9081	PH 9045	COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	P	P	P	G	G	G	G	G	G	G	G	
								PRESERVATIVE USED	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	
3/28	1135	16SB280203	16SB28	2	3	50	G	2	—	—	1	—	X	1						
3/28	1140	16SS200002	16SB28	0	2	50	G	7	3	2	1	—	X	1						
3/28	1440	16SS350002	16SB35	0	2	50	G	7	3	2	1	—	X	1						
3/28	1435	16SS370002	16SB37	0	2	50	G	7	3	2	1	X	X	1	X	X	X			
3/28	1410	16SS380002	16SB38	0	2	50	G	7	3	2	1	X	X	1						
3/28	1415	16SB380203	16SB38	2	3	50	G	5	3	—	1	X	X	1						
3/28	1400	16SB390002 (TR)	16SB39	0	2	50	G	7	3	2	1	X	X	1						
3/28	1405	16SB390203	16SB39	2	3	50	G	5	3	—	1	X	X	1						
3/28	1340	16SB400606	16SB40	5	6	50	G	7	3	2	1	—	X	1						
3/28	1345	16SB400608	16SB40	6	8	50	G	7	3	2	1	—	X	1						
3/28	0000	FD03280301	QC	—	—	50	G	7	3	2	1	—	X	1						FROM 16SS230002
3/28	0000	FD03280302	QC	—	—	50	G	2	—	—	1	—	X	1						FROM 16SB230203
3/28	0000	FD03280303	QC	—	—	50	G	7	3	2	1	—	X	1						FROM 16SB400608

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Tony Rozahn	3/28/03	1830	1. RECEIVED BY: FEDERAL EXPRESS	3/28/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: X = Additional Parameters For Analysis!

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

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FORM NO. TIN 01

T . TECH NUS, INC. CHAIN OF CUSTODY .IBER 0962 PAGE 1 OF 1

GTO: 0279

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	TRIANGLE / NORM HOFFA
SAMPLERS (SIGNATURE): Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 801 CAPITOLA DRIVE
		CARRIER/WAYBILL NUMBER: FED.EX. # 8316 7332 7203		CITY, STATE: DURHAM, NC 27713

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: DIOXIN/FURAN 8290 (CONTAINER TYPE: G; PRESERVATIVE USED: 4°C)	COMMENTS
3/27	1055	16SS060002	16SB06	0	2	SO	G	1	1	
3/27	1100	16SS070002	16SB07	0	2	SO	G	1	1	
3/27	1330	16SS080002	16SB08	0	2	SO	G	1	1	
3/27	1355	16SS090002	16SB09	0	2	SO	G	1	1	
3/27	1400	16SS100002	16SB10	0	2	SO	G	1	1	
3/27	1415	16SS160002	16SB16	0	2	SO	G	1	1	
3/27	1440	16SS150002	16SB15	0	2	SO	G	2	2	DO MS/MSD
3/27	1500	16SS140002	16SB14	0	2	SO	G	1	1	
3/27	1515	16SS110002	16SB11	0	2	SO	G	1	1	
3/27	1540	16SS170002	16SB17	0	2	SO	G	1	1	
3/27	0000	FD0327030 1	DUP	—	—	SO	G	1	1	FROM 16SS090002
3/27	0000	FD0327030 2	DUP	—	—	SO	G	1	1	FROM 16SS170002

1. RELINQUISHED BY: Terry Rojahn	DATE: 3/31/03	TIME: 1600	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 3/31/03	TIME: 1600
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC.

CTO: 0279

CHAIN OF CUSTODY NUMBER 0967

PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	R. BASINSKI	(412) 921-8308	TRIANGLE LAB / NORM HUFFA
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		T. ROJAHN	(412) 921-8857	801 CAPITOLA DRIVE
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. # 8316 7332 7203		DURHAM, NC 27713

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G

PRESERVATIVE USED: 4°C

TYPE OF ANALYSIS: DIOXIN / FURAN 8290

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS		COMMENTS
3/28	0800	165513 0002	165B13	0	2	SO	G	1	1	
3/28	0820	165512 0002	165B12	0	2	SO	G	1	1	
3/28	0830	165531 0002	165B31	0	2	SO	G	1	1	
3/28	0840	165530 0002	165B30	0	2	SO	G	1	1	
3/28	0900	165529 0002	165B29	0	2	SO	G	1	1	
3/28	0910	165522 0002	165B22	0	2	SO	G	1	1	
3/28	0930	165525 0002	165B25	0	2	SO	G	1	1	
3/28	0940	165524 0002	165B24	0	2	SO	G	1	1	
3/28	1000	165523 0002	165B23	0	2	SO	G	1	1	
3/28	1030	165518 0002	165B18	0	2	SO	G	1	1	
3/28	1040	165519 0002	165B19	0	2	SO	G	1	1	
3/28	1100	165521 0002	165B21	0	2	SO	G	2	2	DO MS/MSD
3/28	1120	165527 0002	165B27	0	2	SO	G	1	1	

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	3/31/03	1600	1. RECEIVED BY: FEDERAL EXPRESS	3/31/03	1600
2. RELINQUISHED BY:			2. RECEIVED BY:		
3. RELINQUISHED BY:			3. RECEIVED BY:		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TECH NUS, INC. CTO - 0279

CHAIN OF CUSTODY NUMBER 0971

PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	R. BASINSKI	(412) 921-8308	TRIANGLE LAB / NORM HOFFA
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		T. ROJAHN	(412) 921-8857	801 CAPITOLA DRIVE
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB # 8316 7332 7203		DURHAM, NC 27713

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G

PRESERVATIVE USED: 4°C

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Dioxin / Furan 8290	COMMENTS
3/28	1130	165528 0002	165B28	0	2	SO	G	1	1	
3/28	1140	165520 0002	165B20	0	2	SO	G	1	1	
3/28	0000	FD03280301	—	—	—	SO	G	1	1	FROM 165523 0002

1. RELINQUISHED BY: Terry Rojahn	DATE 3/31/03	TIME 1600	1. RECEIVED BY: FEDERAL EXPRESS	DATE 3/31/03	TIME 1600
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CTO 0279

CHAIN OF CUSTODY

NUMBER 0982

PROJECT NO: 9060	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412)921-8308
LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE	SAMPLERS (SIGNATURE): Terry Rojahn	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412)921-8857
ADDRESS: 940 South Harney St.	CARRIER/WAYBILL NUMBER: FED. EX. AB# 8316 7332 7199	CITY, STATE: SEATTLE, WA 98108	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT) INCHES	BOTTOM DEPTH (FT) INCHES	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	SVOCS 8270 SIM	8015LA EXPLOSIVES 8330	PICRATES	Metal & Hg 6020	TOC 9471A	CEC Lloyd Khan	PH 9081	AVS/SEM 9045C DRAFT EPA Method	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	G	G	G	G	G	
PRESERVATIVE USED									4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	
4/1/03	1035	16SD110004	16SD11	0	4	SD	G	2	1	X	X	1					
4/1	1045	16SD020004	16SD02	0	4	SD	G	2	1	X	X	1	X	X	X	X	
4/1	1105	16SD100004	16SD10	0	4	SD	G	2	1	X	X	1					
4/1	1110	16SD040004	16SD04	0	4	SD	G	2	1	X	X	1					
4/1	1120	16SD050004	16SD05	0	4	SD	G	2	1	X	X	1					
4/1	1235	16SD080004	16SD08	0	4	SD	G	2	1	X	X	1					
4/1	1250	16SD090004	16SD09	0	4	SD	G	2	1	X	X	1	X	X	X	X	
4/1	1305	16SD060004	16SD06	0	4	SD	G	4	*2	*X	*X	*2	~~*X~~	X	X	X	*Do MS/MSD
4/1	1315	16SD030004	16SD03	0	4	SD	G	2	1	X	X	1					
4/1	0000	FD04010301	QC	0	4	QC	G	2	1	X	X	1					FROM 16SD110004
4/1	0000	FD04010302	QC	0	4	QC	G	2	1	X	X	1	~~X~~				FROM 16SD060004

1. RELINQUISHED BY: Terry Rojahn	DATE: 4/01/03	TIME: 1830	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 4/01/03	TIME: 1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TECH NUS, INC. CTO: 0279 CHAIN OF CUSTODY NUMBER 0983 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB# 8316 7332 7199		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	SVOC 8270C, SIM, 8151A	EXPLOSIVES 8330	PICRATES	Total Metals 6020 & Hg 7470A	Diss. Metals 6020 & Hg 7470A	Ammonia 350.1 & Nitrate 353.2			COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	P	P	P			
PRESERVATIVE USED									4°C	4°C	4°C	4°C / HNO3	4°C / HNO3	4°C / H2SO4			
4/1	1400	16SW0101	16SW01	–	–	SW	G	12	6	2	2	1	–	1			
4/1	1400	16SW0101F	16SW01	–	–	SW	G	1	–	–	–	–	1	–			

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	4/01/03	1830	1. RECEIVED BY FEDERAL EXPRESS	4/01/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CTO: 0279 CHAIN OF CUSTODY NUMBER 0984 PAGE 1 OF 1

PROJECT NO: 9060	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE): Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED. EX AB # 8316 7332 7063		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP.(G) COMP.(C)	No. OF CONTAINERS	SVOC	SVOC	SVOC	PCBS	EXPLOSIVES	EXPLOSIVES	METALS 6020 & Hg	VOCS	VOCS	COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	G	G	G	G	G		
								PRESERVATIVE USED	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C / HNO3	4°C / HCl	
								TYPE OF ANALYSIS	8270C	SIM	8151A	8082	8330	PICRATES	Hg 7470A	8260B	8015B	
4/7	1615	RB04070301	QC	—	—	QC	G	13	2	2	2	2	2	2	1	—		S.S. MIXING BOWL
4/7	1630	RB04070302	QC	—	—	QC	G	13	2	2	2	2	2	2	1	—		DIG. TROWEL
4/9	0700	TB04090301	QC	—	—	QC	G	3	—	—	—	—	—	—	—	2	1	TRIP BLANK
4/9	1230	RB04090301	QC	—	—	QC	G	16	2	2	2	2	2	2	1	2	1	SLEEVE

1. RELINQUISHED BY: Terry Rojahn	DATE: 4/9/03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 4/9/03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

ENTS

TION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TECH NUS, INC. CTO: 0279 CHAIN OF CUSTODY NUMBER 0985 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	TRIANGLE / NORM HOFFA
SAMPLERS (SIGNATURE): Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 801 CAPITOLA DRIVE
		CARRIER/WAYBILL NUMBER: FED. EX AB# 8316 7332 7177		CITY, STATE: DURHAM, NC 27713

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: DIOXINS/FURANS 8290								COMMENTS
4/7	1615	RB04070301	QC	–	–	QC	G	2	2								S.S. MIXING BOWL
4/7	1630	RB04070302	QC	–	–	QC	G	2	2								DIS. TROWEL
4/9	1000	165S330002	165B33	0	2	SO	G	1	1								
4/9	1015	165S320002	165B32	0	2	SO	G	1	1								
4/9	1038	165S260002	165B26	0	2	SO	G	1	1								
4/9	1230	RB04090301	QC	–	–	QC	G	2	2								CORE SLEEVE
4/10	1210	135S140001	135B14	0	1	SO	G	1	1								

1. RELINQUISHED BY: Terry Rojahn	DATE 4/10/03	TIME 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE 4/10/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CTO-0279 CHAIN OF CUSTODY | NUMBER 0986 | PAGE 1 OF 1

PROJECT NO: 9060	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE): Terry Royal, Robert Balkovec		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED. EX AB# 8316 7332 7063		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOCS ENCORE 8260B	VOCS ENCORE 8015B	SVOC 8270C/SIM/8151A	PCB's 8082	EXPLOSIVES 8330 & PICRATES	METALS 6020 & Hg 7471A			COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	P	P	G	G	G	G			
								PRESERVATIVE USED	4°C	4°C	4°C	4°C	4°C	4°C			
4/9	0930	165S360002	165B36	0	2	SO	G	2	3	2	1	–	X	1			
4/9	0940	165B360203	165B36	2	3	SO	G	2	3	–	1	–	X	1			
4/9	0947	165S340002	165B34	0	2	SO	G	7	3	2	1	–	X	1			
4/9	0953	165B340203	165B34	2	3	SO	G	2	–	–	1	–	X	1			
4/9	1000	165S330002	165B33	0	2	SO	G	7	3	2	1	X	X	1			
4/9	1005	165B330204	165B33	2	4	SO	G	2	–	–	1	–	X	1			
4/9	1015	165S320002	165B32	0	2	SO	G	7	3	2	1	X	X	1			
4/9	1020	165B320204	165B32	2	4	SO	G	2	–	–	1	–	X	1			
4/9	1038	165S260002	165B26	0	2	SO	G	19	9	6	2	X	X	2			DO MS/MSD
4/9	1045	165B260204	165B26	2	4	SO	G	4	–	–	2	–	X	2			DO MS/MSD
4/9	0000	FD04090301	QC	–	–	QC	G	1	–	–	–	1	–	–			FROM 165S320002
4/9	0000	FD04090302	QC	–	–	QC	G	7	3	2	1	X	X	1			FROM 165S260002
4/9	0000	FD04090303	QC	–	–	QC	G	2	–	–	1	–	X	1			FROM 165B260204

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Royal	4/9/03	1900	1. RECEIVED BY: FEDERAL EXPRESS	4/9/03	1900
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

/02R
FORM NO. TINUS-001

TECH NUS, INC. CTO: 0279 — CHAIN OF CUSTODY — NUMBER 0969 — PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N19060	NSWC CRANE	R. BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		T. ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. # 8316 7332 7166		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	SVOC (8270C, SIM & 8151A) & PCB (8082)	EXPLOSIVES 8330	PICRATES	Total Metals Hg 6020 7470A	Diss. Metals & Hg 6020 7470A	Ammonia & Nitrate 350.1 353.2	SVOCs & Explosives (Extra Vol. for MS/MSD)		COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	P	P	P	G		
								PRESERVATIVE USED	4°C	4°C	4°C	4°C / HNO3	4°C / HNO3	4°C / H2SO4	4°C		
4/10	0850	16SW0201	16SW02	—	—	SW	G	30	6	2	2	3	—	3	14		DO MS/MSD
4/10	~~1350~~ 0850	16SW0201F	"	—	—	SW	G	3	—	—	—	—	3	—	—		DO MS/MSD
4/10	0000	FD04100301	DUP	—	—	SW	G	12	6	2	2	1	—	1			FROM 16SW0701
4/10	0000	FD04100301F	DUP	—	—	SW	G	1	—	—	—	—	1	—			FROM 16SW0701F
4/10	1330	16SW0701	16SW07	—	—	SW	G	12	6	2	2	1	—	1			
4/10	1330	16SW0701F	16SW07	—	—	SW	G	1	—	—	—	—	1	—			

1. RELINQUISHED BY Terry Rojahn	DATE 4/10/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 4/10/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 0988 | PAGE 1 OF 1

CTO: 0279

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB# 8316 7332 7155		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G G G G G P

PRESERVATIVE USED: 4°C/HCl 4°C/HCl 4°C 4°C 4°C 4°C 4°C 4°C/HNO3 4°C/H2SO4

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	VOCs 8260B	VOCs 8015B	SVOCs 8270C	SVOCs SIM	SVOCs 8151A	Explosives 8330	Explosives PICRATES	METALS 6020	Ammonia 350.1 & NS	7470A & SULFATES 3532	COMMENTS
4/22	0700	TB042203 01	QC	NA	NA	QC	G	3	2	1									TRIP BLANK
4/22	0800	16GWT0101	16MW T01	NA	NA	GW	G	4	2	2									
4/22	0946	16GWT0201	16MW T02	NA	NA	GW	G	17	3	2	2	2	2	2	2	1	1		
4/22	1045	16GW0501	WES-14 05-83	NA	NA	GW	G	*45	9	6	2	2	2	2	2	3	3		*DO MS/MSD
4/22	1437	16GWT0401	16MW T04	NA	NA	GW	G	17	3	2	2	2	2	2	2	1	1		
4/22	1630	RB042203 01	QC	NA	NA	QC	G	17	3	2	2	2	2	2	2	1	1		TEFLON TUBING ETC. RINSATE
4/23	0811	16GW0401	WES-14 04-83	NA	NA	GW	G	17	3	2	2	2	2	2	2	1	1		
4/23	1130	16GW0101	WES-14 01-83	NA	NA	GW	G	17	3	2	2	2	2	2	2	1	1		

1. RELINQUISHED BY Terry Rojahn	DATE 4/23/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 4/23/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS * 14 additional Glass Amber 1 L Bottles for Additional Volume for SVOCs & Explosives (MS/MSD)

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TIN[illegible]001

TECH NUS, INC. CTO: 0279 — CHAIN OF CUSTODY — BER 0991 — PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8316 7332 7144		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G G G G P P

PRESERVATIVE USED: HCl/4°C | HCl/4°C | 4°C | 4°C | 4°C | H_2SO_4/4°C | HNO_3/4°C | HNO_3/4°C

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs 8260B	VOCs 8015B	SVOCs 8270C SIM	Explosives 8151A	Explosives 8330	Ammonia + Nitrates 350.1 353.2	Metals + Hg 6020 7470A	Diss Metals + Hg 6020 7470A	COMMENTS
4/24	0800	TB04240301	QC	NA	NA	QC	G	3	2	1							TRIP BLANK
4/24	0830	RB04240301	QC	NA	NA	QC	G	17	3	2	6	2	2	1	1	-	BLADDER PUMP & TEFLON TUBING
4/24	0830	RB04240301-F	QC	NA	NA	QC	G	1	-	-	-	-	-	-	-	1	↓
4/24	1201	16GW0201	WES-14 02-83	NA	NA	GW	G	17	3	2	6	2	2	1	1	-	
4/24	1300	16GWT0501	16MW T05	NA	NA	GW	G	17	3	2	6	2	2	1	1	-	
4/24	1632	16GW0301	WES-14 03-83	NA	NA	GW	G	17	3	2	6	2	2	1	1	-	
4/24	0000	FD04240301	QC	NA	NA	GW	G	17	3	2	6	2	2	1	1	-	
4/25	0810	RB04250301	QC	NA	NA	QC ~~GW~~	G	4	-	-	-	2	-	1	1	-	PE & Silicon Tubing RINSATE
4/25	0810	RB04250301-F	QC	NA	NA	QC ~~GW~~	G	1	-	-	-	-	-	-	-	1	↓
4/25	1022	13GWT2601	13MW T26	NA	NA	GW	G	4	-	-	-	2	-	1	1	-	
4/25	1135	16GWT0301	16MW T03	NA	NA	GW	G	17	3	2	6	2	2	1	1	-	
4/25	1346	13GWT2101	13MW T21	NA	NA	GW	G	4	-	-	-	2	-	1	1	-	
4/25	0000	FD04250301	QC	NA	NA	GW	G	4	-	-	-	2	-	1	1	-	

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	4/25/03	1900	1. RECEIVED BY FEDERAL EXPRESS	4/25/03	1900
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0994 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Robert Balkovec / Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8316 7332 7122		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G)
PRESERVATIVE USED

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs 8260B (4°C/HCl)	VOCs 8015B (4°C/HCl)	SVOCs 8270C/SIM/8151A (4°C)	Explosives 8330 (4°C)	Ammonia 350.1 & Nitrates 353.2 (4°C)	Total Metals 6020 & Hg 7470A (4°C/H2SO4)	Diss. Metals 6020 & Hg 7470A (4°C/HNO3)	COMMENTS
4/28	800	TB04280302	QC	NA	NA	QC	G	3	2	1						
4/28	0932	16GWT0601	16MW T06	NA	NA	GW	G	13	3	2	4	1	1	1	1	–	MIN. VOL.
4/28	1220	13GWT2501	13MW T25	NA	NA	GW	G	1	–	–	–	–	–	–	1	–	MIN. VOL.
4/28	1606	13GWT2001	13MW T20	NA	NA	GW	G	17	3	2	6	2	2	1	1	–	
4/28	1606	13GWT2001-F	13MW T20	NA	NA	GW	G	1	–	–	–	–	–	–	–	1	
4/28	1748	13GWT0601	13MW T06	NA	NA	GW	G	1	–	–	–	–	–	–	1	–	MIN. VOL.
4/29	0926	13GWT1401	13MW T14	NA	NA	GW	G	4	–	–	–	2	–	1	1	–	

1. RELINQUISHED BY Terry Rojahn	DATE 4/29/03	TIME 1800	1. RECEIVED BY FEDERAL EXPRESS	DATE 4/29/03	TIME 1800
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TI TECH NUS, INC. CTO - 0279 CHAIN OF CUSTODY NUMBER 0997 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Robert Balkner		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. ABF		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G P
PRESERVATIVE USED: 4C 4C/HNO3

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: SVOC 8270C	TOTAL METALS & Hg 7470A 6020							COMMENTS
5/11	1310	16GWT0602	16MW TOG	NA	NA	GW	G	2	2								
5/11	1732	16GW0202	WES-14 02-83	NA	NA	GW	G	3	2	1							

1. RELINQUISHED BY Tony Lopez	DATE 5/12/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 5/12/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

APPENDIX C.5.2
SWMU 16
CHAIN OF CUSTODY RECORDS
ROUND 2

PARSONS TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4806 PAGE 1 OF _

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANH HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8412 2491 0824		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G)
PRESERVATIVE USED

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	Volatiles SW-846 8260B (4°C)	Volatiles SW-846 8015B (HCl)	Explosives SW-846 8330 (HCl)	Misc. Explosives SW-846 8330 (4°C)	Total Metals & Hg SW846 6020 & 7470A (4°C)	Diss Metals & Hg SW846 6020 & 7470A (4°C)	Nitrate + Nitrite EPA 353.2 (HNO3)	Selected Ion Monitoring (HNO3)	COMMENTS
10/24	0700	TB10240301	QC	–	–	QC	G	4	2	2							TRIP BLANK
10/24	0840	13SW3201	16 SW32	–	–	SW	G	6	–	–	2	2	1	–	–	6	DO MS/MSD
10/24	1030	16SW1701	16 SW17	–	–	SW	G	36	9	9	6	6	3	–	3	–	DO MS/MSD
10/24	1030	16SW1701-F	↓	–	–	SW	G	3	–	–	–	–	–	3	–	–	DO MS/MSD
10/24	1400	16SW1801	16 SW18	–	–	SW	G	12	3	3	2	2	1	–	1	–	
10/24	1400	16SW1801-F	↓	–	–	SW	G	1	–	–	–	–	–	1	–	–	
10/24	1500	16SW1401	16 SW14	–	–	SW	G	12	3	3	2	2	1	–	1	–	
10/24	1500	16SW1401-F	↓	–	–	SW	G	1	–	–	–	–	–	1	–	–	
10/24	1518	16SW2101	16 SW21	–	–	SW	G	12	3	3	2	2	1	–	1	–	
10/24	1518	16SW2101-F	↓	–	–	SW	G	1	–	–	–	–	–	1	–	–	
10/24	0000	16FD10240301	QC	–	–	SW	G	12	3	3	2	2	1	–	1	–	DUP OF 16SW1701
10/24	0000	16FD10240301-F	QC	–	–	SW	G	1	–	–	–	–	–	1	–	–	↓

1. RELINQUISHED BY	DATE 10/24/03	TIME 1830	1. RECEIVED BY FEDERAL EXPRESS	DATE 10/24/03	TIME 1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 4807

PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	CTO 0279 NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN [illegible]

SAMPLERS (SIGNATURE)	FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
[signature]	TERRY ROJAHN	(412) 921-8857	940 South HARNEY St
	CARRIER/WAYBILL NUMBER		CITY, STATE
	FED EX AB# 8412 2491 0824		SEATTLE, WA 98108

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G)

PRESERVATIVE USED

TYPE OF ANALYSIS

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT) INCHES	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	Volatiles (Encore) SW-846 8260B	Volatiles (Encore G) SW 846 8260B	Volatiles (4oz Jar) SW 846 8260B	Volatiles (4oz Jar) SW 846 8260B	Explosives & Misc. Exp. SW 846 8330	Metals & Mercury SW 846 6020 & 7471A	Selected Ecm Monitoring	COMMENTS
10/24	0850	13SD32 0004	13 SD32	0	4	SD	G	2	-	-	-	-	-	-	2	Do MS/MSD
10/24	1020	16SD19 0004	16 SD19	0	4	SD	G	8	3	3	-	-	1	1	-	
10/24	1100	16SD17 0004	16 SD17	0	4	SD	G	8	-	-	2	2	2	2	-	Do MS/MSD
10/24	1330	16SD16 0004	16 SD16	0	4	SD	G	8	3	3	-	-	1	1	-	
10/24	1410	16SD18 0004	16 SD18	0	4	SD	G	4	-	-	1	1	1	1	-	
10/24	1420	16SD15 0004	16 SD15	0	4	SD	G	4	-	-	1	1	1	1	-	
10/24	1510	16SD14 0004	16 SD14	0	4	SD	G	4	-	-	1	1	1	1	-	
10/24	1525	16SD21 0004	16 SD21	0	4	SD	G	4	-	-	1	1	1	1	-	
10/24	1611	16SD22 0004	16 SD22	0	4	SD	G	1	-	-	-	-	-	-	1	
10/24	0000	13FD10240301	QC	0	4	SD	G	1	-	-	-	-	-	-	1	DUP OF 13SD32 0004
10/24	0000	16FD10240302	QC	0	4	SD	G	4	-	-	1	1	1	1	-	DUP OF 16SD17 0004

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	10/24/03	1830	1. RECEIVED BY FEDERAL EXPRESS	10/24/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4808 PAGE 1 OF

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANH HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8308	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB # 8412 2491 1040		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	Volatiles SW 846 8260B	Volatiles SW 846 8260B	Explosives SW-846 8015B	MISC. Explosives SW 846 8330	Total Metals SW846 8330	Dis Metals SW846 6020	Hg 7470A	Hg 7470A	Nitrate EPA 353.2	Nitrite	Sulfate	Chloride	TOC	COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	G	P	P	P	P						
								PRESERVATIVE USED	4°C/HCl	4°C/HCl	4°C	4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C/H3PO4						
10/25	0800	TB10250301	QC	-	-	QC	G	4	2	2												TRIP BLANK
10/25	0810	16SW1501	16SW15	-	-	SW	G	12	3	3	2	2	1	-	1							
10/25	0810	16SW1501-F	↓	-	-	SW	G	1	-	-	-	-	-	1	-							
10/25	0935	16SW1201	16SW12	-	-	SW	G	12	3	3	2	2	1	-	1							
10/25	0935	16SW1201-F	↓	-	-	SW	G	1	-	-	-	-	-	1	-							
10/25	1045	16SW1301	16SW13	-	-	SW	G	12	3	3	2	2	1	-	1							
10/25	1045	16SW1301-F	↓	-	-	SW	G	1	-	-	-	-	-	1	-							
10/25	1100	16SW2001	16SW20	-	-	SW	G	12	3	3	2	2	1	-	1							
10/25	1100	16SW2001-F	↓	-	-	SW	G	1	-	-	-	-	-	1	-							
10/25	1608	16GW0203	16GW02	-	-	GW	G	15	3	3	2	2	1	-	1	1	2					
10/25	1630	16GW0502	16GW05	-	-	GW	G	13	3	3	2	2	1	-	1	1	-					
10/26	0955	16GW0402	16GW04	-	-	GW	G	39	9	9	6	6	3	-	3	3	-					Do MS/MSD
10/26	1255	16GW0102	16GW01	-	-	GW	G	13	3	3	2	2	1	-	1	1	-					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	10/27/03	1900	1. RECEIVED BY FEDERAL EXPRESS	10/27/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4811 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LADCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 841224911040		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G G

PRESERVATIVE USED: 4°C 4°C 4°C 4°C

TYPE OF ANALYSIS: Volatiles (4 oz jars) SW 846 8260B; Volatiles (4 oz jars) SW 846 8015B; Explosive & Misc. Exp. SW 846 8330; Metals Hg SW 846 6020 & 7471A

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT) INCHES	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	Volatiles (4 oz jars) SW 846 8260B	Volatiles (4 oz jars) SW 846 8015B	Explosive & Misc. Exp. SW 846 8330	Metals Hg SW 846 6020 & 7471A	COMMENTS
10/25	0945	16SD120004	16 SD12	0	4	SD	G	4	1	1	1	1	
10/25	1050	16SD130004	16 SD13	0	4	SD	G	4	1	1	1	1	
10/25	1110	16SD200004	16 SD20	0	4	SD	G	4	1	1	1	1	
10/25	0000	16FD10250301	QC	-	-	QC	G	4	1	1	1	1	Dup of 16SD130004

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	10/27/03	1900	1. RECEIVED BY FEDERAL EXPRESS	10/27/03	1900
2. RELINQUISHED BY			2. RECEIVED BY 16FD10250301 10/25 0000		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4812 PAGE 1 OF

PROJECT NO. CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER RALPH BASINSKI	PHONE NUMBER (412) 921-8308
LABORATORY NAME AND CONTACT: MICROSEEPS / DEBBIE HALLO	SAMPLERS (SIGNATURE):	FIELD OPERATIONS LEADER TERRY ROLAHN	PHONE NUMBER (412) 921-8857
ADDRESS 220 WILLIAM PITT WAY	CARRIER/WAYBILL NUMBER FED EX AB# 8412 2491 0846	CITY, STATE PITTSBURGH PA 15238	

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Methane, Ethane & Ethene	COMMENTS
10/25	1608	16GW0203	16 GW02	–	–	GW	G	2	2	
10/25	1630	16GW0502	16 GW05	–	–	GW	G	2	2	

1. RELINQUISHED BY	DATE 10/27/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 10/27/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 4814

PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB # 8412 2491 1040		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	Volatiles SW846 8260B	Volatiles SW846 8260B	Explosives SW846 8015B	Misc. Explosives SW846 8330	Total Metals & Hg SW846 6020 & 7470A	Nitrate + Nitrite EPA 353.2	Sulfate	Nitrate + Nitrite & Chloride	Selected Ion Analysis (350.1) & Ammonia (353.2)	COMMENTS
									CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	G	P	P	P	P	
									PRESERVATIVE USED	4°C/HCl	4°C/HCl	4°C	4°C	4°C/HNO3	4°C/NaOH	4°C	4°C/H2SO4	4°C
10/26	1550	16GWT0202	16 GWT02	-	-	GW	G	13	3	3	2	2	1	1	1			
10/26	0000	16FD10260301	QC	-	-	GW	G	13	3	3	2	2	1	1	1			DUP OF 16GW0402
10/27	0900	13SW1501	13/SW15	-	-	SW	G	6	-	-	2	2	1	-	-	1		
10/27	0940	13SW2801	13 SW28	-	-	SW	G	6	-	-	2	2	1	-	-	1		
10/27	1015	13SW0902	13 SW09	-	-	SW	G	6	-	-	2	2	1	-	-	1		
10/27	1110	13SW2501	13 SW25	-	-	SW	G	8 (TR)	-	-	2	2	1	-	-	1	2	
10/27	1305	13SW0702	13 SW07	-	-	SW	G	6	-	-	2	2	1	-	-	1		
10/27	1330	13SW2401	13 SW24	-	-	SW	G	6	-	-	2	2	1	-	-	1		
10/27	1410	13SW2601	13 SW26	-	-	SW	G	6	-	-	2	2	1	-	-	1		
10/27	0000	13FD10270301	QC	-	-	SW	G	8 (TR)	-	-	2	2	1	-	-	1	2	DUP OF 13SW2602 (TR)

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	10/27/03	1900	1. RECEIVED BY FEDERAL EXPRESS	10/27/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

LA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4815 PAGE 1 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8868	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX, AB # 8412 2491 1030		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	Explosives SW846 8330	Misc. Explosives SW846 8330	Total Metals SW846 6020 & Hg	Nitrate + Nitrite SW846 7470A	Ammonia (353.2) Sulfide (350.1)	Chloride	Total Organic Carbon SW846 9060	Volatiles SW846 8260B	Volatiles SW846 8015B	COMMENTS
									CONTAINER TYPE PLASTIC (P) or GLASS (G)						G	G	P	P	P	G
									PRESERVATIVE USED						4°C	4°C	4°C	4°C/HNO3	4°C/H2SO4	4°C	4°C/H3PO4	
10/28	1045	13GWT2402	13 GW24	–	–	GW	G	6	2	2	1	1										
10/28	1255	13GWT2302	13 GW23	–	–	GW	G	6	2	2	1	1										
10/28	1545	TB10280301	QC	–	–	QC	G	4	–	–	–	–	–	–	2	2						
10/28	1550	SB10280301	QC	–	–	QC	G	15	2	2	1	1	1	2	3	3						TAP H2O
10/28	1615	SB10280302	QC	–	–	QC	G	15	2	2	1	1	1	2	3	3						DI H2O
10/28	1555	13GWT1902	13 GW19	–	–	GW	G	6	2	2	1	1										

1. RELINQUISHED BY	DATE 10/28/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 10/28/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS 001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4818 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 CTO 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROUHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB# 8412 2491 0375		SEATTLE WA 98108

STANDARD TAT ☒ RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☒ 72 hr. ☐ 7 day ☐ 14 day — Explosives only see comments

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	EXPLOSIVES & MISC. EXPL. SW 846 8330	TOTAL METALS & Hg SW 846 6020 & 7470A	NITRATE & NITRITE EPA 353.2	SULFATE & CHLORIDE	Total Organic Carbon	Dis Metals & Hg SW846 6020 & 7470A	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)											G	G	G	R	R	R	G / P
PRESERVATIVE USED											4°C / HCl	4°C / HCl	4°C	4°C / HNO3	4°C / H2SO4	4°C	4°C / HNO3
11/8	0700	TB11080301	QC	–	–	QC	G	4	2	2							TRIP BLANK
11/7	0845	13GWT2502	13GW T25	–	–	GW	G	1	–	–	1					(TR)	FOR MISC. EXPLOSIVES MIN. VOL. SAMPLE
11/8	1215	16GW0302	16GW 03	–	–	GW	G	13	3	3	4	1	1	1	2		
11/8	1308	16GWT0603	16GW T06	–	–	GW	G	13	3	3	4	1	1	1	–		
11/8	1640	16GWT0402	16GW T04	–	–	GW	G	15	3	3	4	1	1	1	2		
11/9	1035	16GWT0102	16GW T01	–	–	GW	G	6	3	3	–	–	–	–	–		VERY LOW YIELD; MIN. VOL WELL
11/9	1635	16GWT0302	16GW T03	–	–	GW	G	11	3	3	2	1	1	1	–	(TR)	MIN VOL
11/9	1635	16GWT0302-F	16GW T03	–	–	GW	G	1	–	–	–	–	–	–	–	1	MIN VOL
11/10	0915	13GWT3801	13GW T38	–	–	GW	G	6	~~2~~ (TR)	~~2~~ (TR)	~~2~~ (TR)	4	1	* 1	~~1~~ (TR)	–	* ALSO ANALYZE FOR AMMONIA
11/10	0915	13GWT3801-F	13GW T38	–	–	GW	G	1	–	–	–	–	–	–	–	1	
11/10	1330	13GWT0702	13GW T07	–	–	GW	G	6	–	–	4	1	* 1				* ALSO ANALYZE FOR AMMONIA
11/10	0000	13FD11180301	QC	–	–	GW	G	6	–	–	4	1	* 1	(FROM 13GWT0702)			* ALSO ANALYZE FOR AMMONIA

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	11-10-03	1900	1. RECEIVED BY FEDERAL EXPRESS	11-10-03	1900
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS ** QUICK TURN FOR EXPLOSIVES ONLY @ 13GWT3801

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

FORM TtNUS-001 4/02R

A TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4819 PAGE 1 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC	RALPH BASINSKI	(412) 921-8308	MICROSEEPS / DEBBIE HALLO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	220 WILLIAM PITT WAY
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8412 2491 0386		PITTSBURGH, PA 15238

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Methane, Ethane & Ethene								COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	G								
								PRESERVATIVE USED	4°C								
11/8	1215	16GW0302	16 GW03	-	-	GW	G	2	2								
11/8	1308	16GWT0603	16 GWT06	-	-	GW	G	2	2								
11/8	1640	16GWT0402	16 GWT04	-	-	GW	G	2	2								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	11-10-03	1900	1. RECEIVED BY FEDERAL EXPRESS	11-10-03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO: TNUS 001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 4820

PAGE 1 OF 1

PROJECT NO.	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
3060 CTO 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN HO

SAMPLERS (SIGNATURE)	FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
[signature]	TERRY ROLAHN	(412) 921-8857	940 SOUTH HARNEY ST.

CARRIER/WAYBILL NUMBER	CITY, STATE
FED. EX. AB # 8412 2491 0397	SEATTLE WA, 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	Total Metals 6020 & Hg 7470A	Explosives SW 846 8330	Misc. Explosives SW 846 8330	Nitrate + Nitrite	Ammonia	Total Organic Carbon	Dis Metals 6020 & Hg 7470A	Volatiles 8260B	Volatiles 8015B	COMMENTS
									4°C / HNO3 P	4°C G	4°C G	4°C / H2SO4 P	4°C / H2SO4 G	4°C / HNO3 P	4°C	4°C	4°C	SEE COMMENTS
11/9	0910	13GWT2502	13GW T25	-	-	GW	G	1	1									
11/11	0925	13GWT0302	13GW T03	-	-	GW	G	8	1	2	2	1	2					
11/11	0925	13GWT0302-F	13GW T03	-	-	GW	G	1	-	-	-	-	-	1				
11/11	1315	TB11110301	QC	-	-	QC	G	4	-	-	-	-	-	-	2	2		TRIP BLANK G/HCl
11/11	1400	16SD220004	16SD 22	-	-	SD	G	6	-	-	-	-	-	-	3	3		PROVIDED(1) 4oz JAR FOR MOISTURE CONTENT W/ ENCORE SAMPLES

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	11/11/03	1900	1. RECEIVED BY FEDERAL EXPRESS	11/11/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

FORM TtNUS-001 4/02R

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4822 PAGE 1 OF _

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB # 8412 2491 0607		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	Explosives & Misc. Expl. SW 846 8330	Total Metals 6020 & Hg 7470A	Dis Metals 6020 & Hg 7470A	Nitrate + Nitrite (353.2)	Ammonia (350.1)	Total Organic Carbon	Volatiles SW 846 8260B	Volatiles SW 846 8015B	Sulfate & Chloride	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	P	P	P	G	G	G	P		
PRESERVATIVE USED									4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C/H3PO4	4°C/HCl	4°C/HCl	4°C		
11/20	1055	13GWT1102	13GW T11	-	-	GW	G	6	4	1	-	1						
11/20	1322	13GWT1002	13GW T10	-	-	GW	G	8	4	1	-	1	2					
11/20	1537	13GWT1602	13GW T16	-	-	GW	G	6	4	1	-	1						
11/19	0815	13GWT2502-F	13GW T25	-	-	GW	G	1	-	-	1	-						
11/20	1610	13GWT2502	13GW T25	-	-	GW	G	1	-	-	-	1						
11/21	0700	TB11210301	QC	-	-	QC	G	4	-	-	-	-	-	2	2			
11/21	1003	16GWT1001	16GW T10	-	-	GW	G	13	4	1	-	*1	-	3	3	1		
11/21	1316	16GWT1201	16GW T12	-	-	GW	G	13	4	1	-	*1	-	3	3	1		
11/21	0000	16FD11210301	QC	-	-	GW	G	13	4	1	-	*1	-	3	3	1	DUP OF 16GWT1201	

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Terry Rojahn	11-21-03	1900	FEDERAL EXPRESS	11-21-03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS *Nitrate + Nitrite only @ SWMU 16

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4824 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LANCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
TC for Jim Gaerdt		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB# 8412 2491 0581		SEATTLE, WA 98108

Terry Rojahn

STANDARD TAT ☒ EXCEPT * QUICK TURN
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☒ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW 846 8260B	VOLATILES SW 846 8260B	EXPLOSIVES SW 846 8015B	MISC. EXPLOSIVES SW 846 8330	TOTAL METALS 6020 & Hg 7470A	NITRATE + NITRITE 353.2	SULFATE & CHLORIDE	DIS. METALS 6020 & Hg 7470A	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	G	P	P	P	P	
PRESERVATIVE USED									4°C	4°C/HCl	4°C	4°C	4°C/HNO3	4°C/H2SO4	4°C	4°C/HNO3	
11/22	1200	16GWT1301	16GW T13	-	-	GW	G	13	3	3	2	2	1	1	1	-	
11/22	1200	16GWT1301-F	16GW T13	-	-	GW	G	1	-	-	-	-	-	-	-	1	
11/22	1614	16GWT0901	16GW T09	-	-	GW	G	13	3	3	2	2	1	1	1	-	
11/22	1617	16GWT0502	16GW T05	-	-	GW	G	13	3	3	2	2	1	1	1	-	
11/22	1745	16GWT1601	16GW T16	-	-	GW	G	7	*3	*3	-	-	1	-	-	-	* QUICK TURN
11/23	0945	16GWT1601	↓	-	-	GW	G	1	-	-	*1	-	-	-	-	-	* QUICK TURN
11/23	0915	16GWT1601-F	↓	-	-	GW	G	1	-	-	-	-	-	-	-	1	
11/22	0800	TB11220301	QC	-	-	QC	G	4	2	2	-	-	-	-	-	-	TRIP BLANK

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Terry Rojahn	11.24.03	1900	FED. EX.	11.24.03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: MONITORING WELL 16GWT1601 WAS A LOW YIELD WELL 2 MIN. VOLUME

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY) 4/02R

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4826 PAGE 1 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	MICROBEGENS / DEBBIE HALLO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
TK FOR Jim Gocadt		TRACY BOLAHN	(412) 921-8857	220 WILLIAM PITT WAY
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8412 2491 0592		PITTSBURGH, PA 15238

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Methane, Ethane, Ethene								COMMENTS
11/21	1003	16GWT1001	16GW T10	-	-	GW	G	2	2								
11/21	1316	16GWT1201	16GW T12	-	-	GW	G	2	2								
11/21	0000	16FD11210301	QC	-	-	GW	G	2	2								DUP OF 16GWT1201
11/22	1200	16GWT1301	16GW T13	-	-	GW	G	2	2								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	11-24-03	1900	1. RECEIVED BY FEDERAL EXPRESS	11-24-03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TIMUS 001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4828 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANH HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
TK FOR S. GRIER		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB # 8412 2491 0434		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	Volatiles SW 846 8260B	Volatiles SW 846 8260B	Explosives & Misc. Expl. SW 846 8330	Total Metals & Hg 6020 & 7470A	Dis. Metals & Hg 6020 & 7470A	Nitrate & Nitrite 353.2	Sulfate & Chloride	Total Organic Carbon	COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	P	P	P	P	G	
								PRESERVATIVE USED	4°C/HCl	4°C/HCl	4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C	4°C/H3PO4	
12/3	1500	TB12030301	QC	–	–	QC	G	4	2	2							TRIP BLANK
12/3	1520	16RB12030301	QC	–	–	QC	G	13	3	3	4	1	–	1	1		BLADDER PUMP
12/3	1535	13RB12030301	QC	–	–	QC	G	6	–	–	4	1	–	*1	–		PE TUBING, PERISTALTIC
12/3	1535	13RB12030301-F	QC	–	–	QC	G	1	–	–	–	–	1	–	–		" " "
12/3	1600	16RB12030302	QC	–	–	QC	G	15	3	3	4	1	–	1	1	2	TEFLON " "
12/4	1018	13GWT0902 (TK)	13GW T09	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	1050	13GWT4301	13GW T43	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	1150	13GWT3401	13GW T34	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	1510	13GWT2202	13GW T22	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	1700	13GWT4401	13GW T44	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	0000	13FD12040301	QC	–	–	GW	G	6	–	–	4	1	–	*1			DUP FROM 13GWT0902
12/5	0800	16RB12050301	QC	–	–	QC	G	6	3	3	–	–	–	–			BUCKET BIT RINSATE
12/5	1027	16GWT1701	16GW T17	–	–	GW	G	13	3	3	4	1	–	1	1		

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	12/05/03	1900	1. RECEIVED BY FEDERAL EXPRESS	12/05/03	1900
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS: * ALSO ANALYZE FOR AMMONIA

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

T A TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4829 PAGE 1 OF _

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8307	LAUCKS / ANH HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8412 2491 0434		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	VOLATILES (EXTENDED) SW 846 8260B	VOLATILES (EXTENDED) SW 846 8015B	Total Metals & Hg 6020 & 7470A	Total Metals & Hg 6020 & 7471A						COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									P	P	P	G						
PRESERVATIVE USED									4°C	4°C	4°C/HNO3	4°C						
12/5	0940	16SB470405	16SB 47	4	5	SO	G	6	3	3								
12/5	1015	16SB480203	16SB 48	2	3	SO	G	18	9	9								DO MS/MSD
12/5	1050	16SB490405	16SB 49	4	5	SO	G	6	3	3								
12/5	1115	16SB500103	16SB 50	1	3	SO	G	6	3	3								
12/5	0000	16FD12050301	QC	-	-	SO	G	6	3	3								DUP OF 16SB500103 ~~16FD12050301~~ TC
12/5	1130	16RB12050302	QC	-	-	QC	G	1	-	-	1							BUCKET BIT RINSATE
12/5	1155	16SS420002	16SB 42	0	2	SO	G	1	-	-	-	1						
12/5	1210	16SS430002	16SB 43	0	2	SO	G	2	-	-	-	2						
12/5	1225	16SS440002	16SB 44	0	2	SO	G	1	-	-	-	1						
12/5	1237	16SS450002	16SB 45	0	2	SO	G	1	-	-	-	1						
12/5	1255	16SS460002	16SB 46	0	2	SO	G	1	-	-	-	1						
12/5	0000	16FD12050302	QC	-	-	SO	G	1	-	-	-	1						DUP FROM 16SS450002

1. RELINQUISHED BY Terry Rojahn	DATE 12/05/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 12/05/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 4833

PAGE 1 OF 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / ANN HO	SAMPLERS (SIGNATURE)	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
ADDRESS: 940 SOUTH HARNEY ST	CARRIER/WAYBILL NUMBER: FED. EX AB # 8412 2491 0560	CITY, STATE: SEATTLE, WA 98108	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	Volatiles SW 846 8260B	Volatiles SW 846 8260B	Explosives SW-846 8015B	Total Metals & Misc. Expl. 6020/7470A Hg	Dis Metals & Hg 6020/7470A	Nitrate Nitrite 353.2	Sulfate & Chloride	Total Organic Carbon SW846 9060	COMMENTS
									CONTAINER TYPE PLASTIC (P) or GLASS (G)			G	G	G	P	P	P	P	G
									PRESERVATIVE USED			4°C	4°C/HCl	4°C	4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C	4°C/H3PO4
12/6	0700	TB12060301	QC	-	-	QC	G	4	2	2									
12/6	0905	16SW0102	16SW 01	-	-	SW	G	6	3	3									
12/6	0935	16SW0202	16SW 02	-	-	SW	G	6	3	3									
12/6	1008	16SW0702	16SW 07	-	-	SW	G	6	3	3									
12/6	0000	16FD12060301	QC	-	-	SW	G	6	3	3									DUP FROM 16SW0202
12/6	1030	16GWT0801	16GW T08	-	-	GW	G	8	3	3	*1	*1							* MIN. VOL WELL VERY SLOW RECHARGE
12/6	1330	16GWT1101	16GW T11	-	-	GW	G	8	3	3	*1	1							* MIN VOL. FOR EXPLOSIVES
12/6	1352	16GWT1501	16GW T15	-	-	GW	G	15	3	3	4	1	—	1	1	2			
12/6	1352	16GWT1501-F	↓	-	-	GW	G	1	—	—	—	—	1						
12/7	0850	13GWT0202	13GW T02	-	-	GW	G	6	—	—	4	1	—	**1					* ALSO ANALYZE AMMONIA
12/7	1000	16GWT1101	16GW T11	-	-	GW	G	1	—	—	*1	—	—						* MIN VOL FOR MISC. EXPLOSIVES
12/7	1000	16GWT1101-F	↓	-	-	GW	G	1	—	—	—	—	1						
12/7	1410	13GWT2801	13GW T28	-	-	GW	G	1	—	—	*4	1	—	**1					~~* MIN VOL FOR EXPLOSIVES~~ TK

1. RELINQUISHED BY: Terry Rojahn	DATE: 12-8-03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 12-8-03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: * ALSO ANALYZE FOR AMMONIA

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R

RA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4835 PAGE 1 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	MICROSEEPS / DEBBIE HALLO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	220 WILLIAM PITT WAY
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8412 2491 0539		PITTSBURGH, PA 15238

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: METHANE, ETHANE & ETHENE								COMMENTS
12/6	1352	16GWT1501	16GW T15	-	-	GW	G	2	2								

1. RELINQUISHED BY [signature]	DATE 12-8-03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 12-8-03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY) 4/02R

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 4394

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASNESKI	PHONE NUMBER: (412) 921-8308
		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
		CARRIER/WAYBILL NUMBER: FED. EX AB# 8412 2491 0993	

LABORATORY NAME AND CONTACT: MICROSEEPS / DEBBIE HALLO

ADDRESS: 220 WILLIAM PITT WAY

CITY, STATE: PITTSBURGH, PA 15238

SAMPLERS (SIGNATURE): [signature]

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G

PRESERVATIVE USED: A&C

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Methane & Ethane / Ethane	COMMENTS
1/25	0853	16GWT1801	16MW T18	-	-	GW	G	2	2	

1. RELINQUISHED BY [signature]	DATE 1-26-04	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS — DATE 1-26-04 TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY — DATE TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY — DATE TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE), YELLOW (FIELD COPY), PINK (FILE COPY)

4/02R
FORM TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4395 PAGE 1 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BUSINSKI	(412) 921-8308	LAUCKS LAB HQ
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 South HARNEY St.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8412 2491 0971		SEATTLE WA 98108

STANDARD TAT ☒ RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☒ 72 hr. ☐ 7 day ☐ 14 day

VOLATILES & EXPLOSIVES

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES (SW 8260B)	VOLATILES (SW 8260B)	EXPLOSIVES (SW 8330)	EXPLOSIVES & MISC.	TOTAL METALS (6020)	NITRATE & NITRITE (EPA 353.2)	SULFATE & CHLORIDE	DIS. METALS (6020)	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	P	P	P	P		
PRESERVATIVE USED									4°C/HCl	4°C/HCl	4°C	4°C/HNO3	4°C/H2SO4	4°C	4°C/HNO3		
TYPE OF ANALYSIS																	
1/25	0853	16GWT1801	16MW T16	-	-	GW	G	11	3	3	2	1	1	1	-		
1/25	0853	16GWT1801-F	16MW T16	-	-	GW	G	1	-	-	-	-	-	-	1		

1. RELINQUISHED BY Terry Rojahn	DATE 1-26-04	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 1-26-04	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

APPENDIX C.5.3
SWMU 16
CHAIN OF CUSTODY RECORDS
ROUND 3

TtRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0056 PAGE 1 OF

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB # 8447 8135 5410		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW-846 8260B	VOLATILES SW-846 8015B	PCBS	EXPLOSIVES SW-846 8330	TOTAL METALS + Hg SW 846 6020/7470A				COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	G	P				
PRESERVATIVE USED									4°C/HCl	4°C/HCl	4°C	4°C	4°C/HNO3				
8/10	1630	TB 08100401	QC	-	-	QC	G	4	2	2							
8/10	1645	SB 08100401	QC	-	-	QC	G	11	3	3	2	2	1				DI H2O
8/10	1700	SB 08100402	QC	-	-	QC	G	11	3	3	2	2	1				TAP H2O
8/10	1730	RB 08100401	QC	-	-	QC	G	2	-	-	2	-	-				SLEEVE
8/10	1745	RB 08100402	QC	-	-	QC	G	2	-	-	2	-	-				TROWEL

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	8/11/04	1900	1. RECEIVED BY FED. EX.	8/11/04	1900
2. RELINQUISHED BY	—		2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0060 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8447 8135 5410		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G, P, P, G
PRESERVATIVE USED: 4°C, 4°C, 4°C, 4°C

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PCBS SW-846 8082	VOLATILES SW-846 8260B	VOLATILES SW-846 8015B	% MOISTURE					COMMENTS
8/11	0928	135B450406	135B 45	4	6	SO	G	1	1								
8/11	0000	13FD081104 01	QC	–	–	SO	G	1	1								FROM 135B300204
8/11	1348	165S650102	165B 65	1	2	SO	G	6	–	3	2	1					
8/11	1356	165B650206	↓	2	6	SO	G	6	–	3	2	1					
8/11	1405	165B650608	↓	6	8	SO	G	6	–	3	2	1					
8/11	1423	165S640102 (FR)	165B 64	1	2	SO	G	6	–	3	2	1					
8/11	1435	165B640206	↓	2	6	SO	G	6	–	3	2	1					
8/11	1441	165B640608	↓	6	8	SO	G	6	–	3	2	1					
8/11	1456	165S630102	165B 63	1	2	SO	G	6	–	3	2	1					
8/11	1508	165B630206	↓	2	6	SO	G	6	–	3	2	1					
8/11	1517	165B630608	↓	6	8	SO	G	6	–	3	2	1					
8/11	1537	165S610102	165B 61	1	2	SO	G	6	–	3	2	1					
8/11	1545	165B610206	↓	2	6	SO	G	6	–	3	2	1					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	8/11/04	1900	1. RECEIVED BY FEDERAL EXPRESS	8/11/04	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001.

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0062 PAGE 1 OF

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB# 8447 8135 5410		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% MOISTURE							COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									P	P	G							
PRESERVATIVE USED									4°C	4°C	4°C							
8/11	1550	1658610607	1658 61	6	7	SO	G	6	3	2	1							
8/11	1605	1655600102	1658 60	1	2	SO	G	6	3	2	1							
8/11	1616	1658600206	↓	2	6	SO	G	6	3	2	1							
8/11	1622	1658600609	↓	6	9	SO	G	6	3	2	1							

1. RELINQUISHED BY Terry Rojahn	DATE 8/11/04	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 8/11/04	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0063 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LANCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8447 8135 5432		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): 4G | P | 4G | P | G
PRESERVATIVE USED: 4°C | 4°C | 4°C

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% MOISTURE						COMMENTS
8/12	0730	TB08120401	QC	–	–	QC	G	4	*2	*2							TRIP BLANK FIXED W/HCl
8/12	0815	165S660102	165B 66	1	2	SO	G	6	3	2	1						
8/12	0823	165B660206	↓	2	6	SO	G	6	3	2	1						
8/12	0828	165B660608	↓	6	8	SO	G	6	3	2	1						
8/12	0842	165S680102	165B 68	1	2	SO	G	6	3	2	1						
8/12	0854	165B680206	↓	2	6	SO	G	6	3	2	1						
8/12	0859	165B680609	↓	6	9	SO	G	6	3	2	1						
8/12	0912	165S670102	165B 67	1	2	SO	G	6	3	2	1						
8/12	0917	165B670206	↓	2	6	SO	G	16	9	6	1						DO MS/MSD
8/12	0936	165B670609	↓	6	9	SO	G	6	3	2	1						
8/12	0946	165S690102 (TR)	165B 69	1	2	SO	G	6	3	2	1						
8/12	0954	165B690206	↓	2	6	SO	G	6	3	2	1						
8/12	1002	165B690607	↓	6	7	SO	G	6	3	2	1						

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	8/12/04	1830	1. RECEIVED BY FEDERAL EXPRESS	8/12/04	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENT

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

A TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0064 PAGE 1 OF _

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Clark C. Fry III		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8447 8135 5432		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P P G
PRESERVATIVE USED: 4°C 4°C 4°C

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% Moisture						COMMENTS
8/12	1022	16SS720102	16SB72	1	2	SO	G	6	3	2	1						
8/12	1033	16SB720206	↓	2	6	SO	G	6	3	2	1						
8/12	1037	16SB720607	↓	6	7	SO	G	6	3	2	1						
8/12	1046	16SS730102	16SB73	1	2	SO	G	6	3	2	1						
8/12	1050	16SB730204	↓	2	4	SO	G	6	3	2	1						
8/12	1102	16SS750102 (TR)	16SB75	1	2	SO	G	6	3	2	1						
8/12	1106	16SB750203	↓	2	3	SO	G	6	3	2	1						
8/12	1240	16SS770102	16SB77	1	2	SO	G	6	3	2	1						
8/12	1249	16SB770206	↓	2	6	SO	G	6	3	2	1						
8/12	1304	16SB770610	↓	6	10	SO	G	6	3	2	1						
8/12	1317	16SS780102	16SB78	1	2	SO	G	6	3	2	1						
8/12	1323	16SB780206	↓	2	6	SO	G	16	9	6	1						DO MS/MSD
8/12	1338	16SB780609	↓	6	9	SO	G	6	3	2	1						

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	8/12/04	1830	1. RECEIVED BY FEDERAL EXPRESS	8/12/04	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 0065

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY St.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB # 8447 8135 5432		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% MOISTURE						COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									P	P	G						
PRESERVATIVE USED									4°C	4°C	4°C						
8/12	1348	165576 0102	165B 76	1	2	SO	G	6	3	2	1						
8/12	1357	165B76 0206	↓	2	6	SO	G	6	3	2	1						
8/12	1402	165B76 0607	↓	6	7	SO	G	6	3	2	1						
8/12	1413	165571 0102	165B 71	1	2	SO	G	6	3	2	1						
8/12	1418	165B71 0206	↓	2	6	SO	G	6	3	2	1						
8/12	1515	165552 0102	165B 52	1	2	SO	G	6	3	2	1						
8/12	1520	165B52 0205	↓	2	5	SO	G	6	3	2	1						
8/12	1528	165B53 0102	165B 53	1	2	SO	G	6	3	2	1						
8/12	1531	165B53 0205	↓	2	5	SO	G	6	3	2	1						
8/12	1545	165555 0102	165B 55	1	2	SO	G	6	3	2	1						
8/12	1548	165B55 0206	↓	2	6	SO	G	6	3	2	1						
8/12	1555	165B55 0607	↓	6	7	SO	G	6	3	2	1						
8/12	1600	165556 0102	165B 56	1	2	SO	G	6	3	2	1						

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	8/12/04	1830	1. RECEIVED BY FEDERAL EXPRESS	8/12/04	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0066 PAGE 1 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJANN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB# 8447 8135 5432		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW 8260B	VOLATILES SW 8260B	% MOISTURE						COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									6 P	6 P	G						
PRESERVATIVE USED									4°C	4°C	4°C						
8/12	1603	16SB560206	16SB 56	2	6	SO	G	6	3	2	1						
8/12	1615	16SB560608	↓	6	8	SO	G	6	3	2	1						
8/12	0000	16FD081204 01	QC	-	-	SO	G	6	3	2	1						DUP OF 16SB680206
8/12	0000	16FD081204 02	QC	-	-	SO	G	6	3	2	1						DUP OF 16SB770206
8/12	1230	TB081204 02	QC	-	-	QC	G	4	2	2	-						AFTERNOON TRIP BLANK / FIXED W HCL
8/12	1427	16SB700102	16SB 70	1	2	SO	G	6	3	2	1						ADDED to COC on 8/13
8/12	1435	16SB700206	↓	2	6	SO	G	6	3	2	1						↓
8/12	1440	16SB700607	↓	6	7	SO	G	6	3	2	1						

1. RELINQUISHED BY Terry Rojann	DATE 8/12/04	TIME 1830	1. RECEIVED BY FEDERAL EXPRESS	DATE 8/12/04	TIME 1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0067 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY St.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB # 8447 8135 5443		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% MOISTURE						COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	P	G	P	G				
PRESERVATIVE USED									4°C	4°C	4°C						
8/13	0755	TB08130401	QC	–	–	QC	G	4	*2	*2	–						FIXED w/HCl TRIP BLANK
8/13	0800	RB08130401 (FR)	QC	–	–	QC	G	6	*3	*3	–						CORER SLEEVE
8/13	0815	RB08130402	QC	–	–	QC	G	6	*3	*3	–						DRILLING SHOE
8/13	0846	16SS590102	16SB59	1	2	SO	G	6	3	2	1						
8/13	0851	16SB590206	16SB59	2	6	SO	G	6	3	2	1						
8/13	0900	16SB590608	16SB59	6	8	SO	G	6	3	2	1						
8/13	0912	16SS620102	16SB62	1	2	SO	G	6	3	2	1						
8/13	0917	16SB620206	16SB62	2	6	SO	G	6	3	2	1						
8/13	0923	16SB620607	16SB62	6	7	SO	G	6	3	2	1						
8/13	0938	16SS580102	16SB58	1	2	SO	G	6	3	2	1						
8/13	0941	16SB580206	16SB58	2	6	SO	G	6	3	2	1						
8/13	1001	16SB580607	16SB58	6	7	SO	G	6	3	2	1						
8/13	1010	16SS570102	16SB57	1	2	SO	G	6	3	2	1						

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	8/13/04	1900	1. RECEIVED BY FEDERAL EXPRESS	8/13/04	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

1 A TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0068 PAGE 1 OF

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8447 8135 5443		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% MOISTURE							COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									P	P	G							
PRESERVATIVE USED									4°C	4°C	4°C							
8/13	1013	16SB570206	16SB57	2	6	SO	G	6	3	2	1							
8/13	1030	16SS510102	16SB51	1	2	SO	G	6	3	2	1							
8/13	1033	16SB510204	16SB51	2	4	SO	G	6	3	2	1							
8/13	1050	16SB540102	16SB54	1	2	SO	G	6	3	2	1							
8/13	1059	16SB540205	16SB54	2	5	SO	G	16	9	6	1							DO MS/MSD
8/13	0000	16FD080130401	QC	-	-	SO	G	6	3	2	1							FROM 16SB580206

1. RELINQUISHED BY	DATE 8/13/04	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 8/13/04	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0072 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
~~6078~~ 7448/CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB # 8447 8135 5844		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: TOTAL METALS & Hg	SW 846 6020/7470A	EXPLOSIVES SW 846 8330	VOLATILES SW 846 8260B	VOLATILES SW 846 8015B					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									P	G	G	G						
PRESERVATIVE USED									4°C/HNO3	4°C	4°C/HCl	4°C/HCl						
8/14	0830	RB08140401	QC	-	-	QC	G	1	1									BUCKET BIT
8/14	1259	13GWT5001	13GW T50	-	-	GW	G	3	1	2								
8/14	1521	13GWT4901	13GW T49	-	-	GW	G	3	1	2								
8/14	1722	13GWT4801	13GW T48	-	-	GW	G	9	3	6								MS/MSD
8/14	0000	13FD08140401	QC	-	-	GW	G	3	1	2								
8/15	0715	16TB08150401	QC	-	-	QC	G	4	-	-	2	2						TRIP BLANK
8/15	1105	16GWT0403	16GW T04	-	-	GW	G	8	-	2	3	3						

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	8/16/04	1900	1. RECEIVED BY FEDERAL EXPRESS	8/16/04	1900
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

A TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0073 PAGE 1 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 270 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 5th HARNEY ST ~~940 SEATTLE, WA 98108~~
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8447 8135 5844		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C

TYPE OF ANALYSIS: Total Metals & Hg SW846 6020 / 7471A

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS		COMMENTS
8/14	1024	1655 850002	165B 85	0	2	SO	G	2	2	DO MS/MSD
8/14	1027	1658 850204	↓	2	4	SO	G	1	1	
8/14	1055	1655 860002	165B 86	0	2	SO	G	1	1	
8/14	1110	1658 86 0204	↓	2	4	SO	G	1	1	
8/14	1120	1655 870002	165B 87	0	2	SO	G	1	1	
8/14	1130	1658 870204	↓	2	4	SO	G	1	1	
8/14	1210	1655 880002	165B 88	0	2	SO	G	1	1	
8/14	1220	1658 880204	↓	2	4	SO	G	1	1	
8/14	1250	1658 890002	165B 89	0	2	SO	G	1	1	
8/14	1300	1658 89 0204	↓	2	4	SO	G	1	1	
8/14	0000	16FD08140401	QC	–	–	SO	G	1	1	FROM 1655 85 0002

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	8/16/04	1900	1. RECEIVED BY FEDERAL EXPRESS	8/16/04	1900
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0080 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC CRANE	RALPH BASILICI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: TERRY ROLAND	PHONE NUMBER (412) 921-8857	ADDRESS 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER FED. EX AB# 8447 9135 5844		CITY, STATE SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P P G
PRESERVATIVE USED: 4°C 4°C 4°C

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% MOISTURE							COMMENTS
8/16	1034	165598 0102	165B 98	1	2	SO	G	6	3	2	1							
8/16	1042	165898 0206	↓	2	6	SO	G	6	3	2	1							
8/16	1050	165898 0607	↓	6	7	SO	G	6	3	2	1							
8/16	1059	165599 0102	165B 99	1	2	SO	G	6	3	2	1							
8/16	1116	165899 0206	↓	2	6	SO	G	6	3	2	1							
8/16	1113	165899 0608	↓	6	8	SO	G	6	3	2	1							
8/16	1137	165892 0406	165B 92	4	6	SO	G	6	3	2	1							
8/16	1158	165892 0608	↓	6	8	SO	G	6	3	2	1							
8/16	1211	165890 0406	165B 90	4	6	SO	G	6	3	2	1							
8/16	1219	165890 0608	↓	6	8	SO	G	6	3	2	1							
8/16	1335	165891 0406	165B 91	4	6	SO	G	6	3	2	1							
8/16	1342	165891 0609	↓	6	9	SO	G	6	3	2	1							
8/16	1410	165894 0708	165B 91	7	8	SO	G	6	3	2	1							

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	8/16/04	1900	1. RECEIVED BY FEDERAL EXPRESS	8/16/04	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: TRIP BLANK ON 0072

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0081 PAGE 1 OF _

PROJECT NO: CTO 7449 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE	SAMPLERS (SIGNATURE)	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
ADDRESS: 940 South HARNEY St	CARRIER/WAYBILL NUMBER: FED. EX. AB # 8447 8135 5844	CITY, STATE: SEATTLE WA 98108	

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% MOISTURE						COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									P	P	G						
PRESERVATIVE USED									4°C	4°C	4°C						
8/16	1435	165B950406	165B 95	4	6	SO	G	16	9	6	1						MS/MSD
8/16	1445	165B950607	↓	6	7	SO	G	6	3	2	1						
8/16	1458	165B930406	165B 93	4	6	SO	G	6	3	2	1						
8/16	1505	165B930608	↓	6	8	SO	G	6	3	2	1						
8/16	1520	165B960406	165B 96	4	6	SO	G	6	3	2	1						
8/16	1525	165B960608	↓	6	8	SO	G	6	3	2	1						
8/16	1545	165B970406	165B 97	4	6	SO	G	16	9	6	1						MS/MSD
8/16	1555	165B970607	↓	6	7	SO	G	6	3	2	1						
8/16	0000	16FD08160401	QC	-	-	SO	G	6	3	2	1						FROM 165B910406
8/16	0000	16FD08160402	QC	-	-	SO	G	6	3	2	1						FROM 165B970607

1. RELINQUISHED BY: Terry Rojahn	DATE: 8/16/04	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 8/16/04	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: TRIP BLANK ON 0072

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 0082

PAGE 1 OF 1

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE	SAMPLERS (SIGNATURE): Terry Rojahn	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
ADDRESS: 940 South HARNEY ST	CARRIER/WAYBILL NUMBER: FED EX AB # 8447 8135 5822	CITY, STATE: SEATTLE WA 98108	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): *G | P | *G | P | G

PRESERVATIVE USED: 4°C | 4°C | 4°C

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	% MOISTURE	EXPLOSIVES SW 846 8330					COMMENTS
8/17	0800	TB08170401	QC	–	–	QC	G	4	*2	*2	–	–					*FIXED W/HCl TRIP BLANK
8/17	0816	165S740102	165B 74	1	2	SO	G	6	3	2	1	–					
8/17	0842	165B74 0206	↓	2	6	SO	G	16	9	6	1	–					
8/17	0000	16FD08170401 (TR)	QC	–	–	SO	G	6	3	2	1	–					DUP OF 165S740102
8/17	1201	16GWT0902	16MW T09	–	–	GW	G	8	*3	*3	–	2					
8/17	1535	16GWT1502	16MW T15	–	–	GW	G	8	*3	*3	–	2					
(TR) 8/17	1688	16GWT1002	16MW T10	–	–	GW	G	24	*9	*9	–	6					~~FROM~~ (TR)
8/17	0000	16FD08170402	QC	–	–	GW	G	8	*3	*3	–	2					FROM 16GWT1002

1. RELINQUISHED BY: Terry Rojahn	DATE: 8/16/04	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 8/16/04	TIME: 1900
2. RELINQUISHED BY	DATE (TR)	TIME	2. RECEIVED BY	DATE (TR)	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENT: ~~TRIP BLANK ON 0070~~ (TR) * FIXED W/HCl & GLASS CONTAINER

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FILE COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

T. A TECH NUS, INC. CHAIN OF CUSTODY NUMBER 00083 PAGE 1 OF

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 670 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 HARNEY ST.
Tom Dickson		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8947 8135 5811		SEATTLE WA 98108

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW846 8260B	VOLATILES SW846 8015B	EXPLOSIVES SW846 8330							COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G							
PRESERVATIVE USED									HCl 4°C	HCl 4°C	4°C							
8/18	0650	16TB08180401	QC	-	-	QC	G	4	2	2								TRIP BLANK
8/18	0730	16GWT1302	16GW T13	-	-	GW	G	8	3	3	2							

1. RELINQUISHED BY Terry Rojahn	DATE 8/18/04	TIME 1200	1. RECEIVED BY FEDEX AB# 8947 8135 5811	DATE 8/18/04	TIME 1200
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER 0085 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC GRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
TK for J. Goerdt		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY St.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8447 8135 5454		SEATTLE WA 98108

Terry Rojahn

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G P

PRESERVATIVE USED: 4°C/HCl, 4°C/HCl, 4°C, 4°C/HNO3

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	EXPLOSIVES SW 846 8330	Total Metal & Hg SW 846 6020/7470A					COMMENTS
8/24	0700	TB08240401	QC	-	-	QC	G	4	2	2							TRIP BLANK
8/24	1208	16GWT1202	16MW T12	-	-	GW	G	8	3	3	2						
8/24	1650	16GWT0604	16MW T06	-	-	GW	G	8	3	3	2						
8/24	1745	16GW0303	16MW 03	-	-	GW	G	8	3	3	2						
8/25	0855	16GWT1102	16MW T11	-	-	GW	G	7	3	3	*1						*MIN. volume well.
8/25	1022	16GW0204	16MW 02	-	-	GW	G	8	3	3	2						
8/25	1120	16GW0403	16MW 04	-	-	GW	G	8	3	3	2						
8/25	1530	RB08250401	QC	-	-	QC	G	9	3	3	2	1					Bladder Pump

1. RELINQUISHED BY: Terry Rojahn	DATE 8/25/04	TIME 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE 8/25/04	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

T TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0086 PAGE 1 OF ____

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LANCKS / HUGH PRENTICE	SAMPLERS (SIGNATURE): Terry Rojahn	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
ADDRESS: 940 SOUTH HARNEY ST.	CARRIER/WAYBILL NUMBER: FED EX AB# 8447 8135 5476	CITY, STATE: SEATTLE, WA 98108	

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	EXPLOSIVES SW 846 8330	Total Metals + Hg SW846 6020/7470A					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G						
PRESERVATIVE USED									4°C/HCl	4°C/HCl	4°C						
8/26	0700	TB08280401	QC	-	-	QC	G	4	2	2							TRIP BLANK
8/27	1000	16GWT1602	16GW T16	-	-	GW	G	2	-	-	1	1					LOW RECHARGING WELL
8/28	1213	16GWT0303	16GW T03	-	-	GW	G	8	3	3	2						
8/28	1830	16GWT0103	16GW T01	-	-	GW	G	8	3	3	2						
8/29	1000	16GWT0203	16GW T02	-	-	GW	G	8	3	3	2						
8/29	1118	16GWT1901	16GW T19	-	-	GW	G	27	9	9	6	3					
8/29	1355	16GWT2001	16GW T20	-	-	GW	G	9	3	3	2	1					
8/29	0000	16FD08290401	QC	-	-	GW	G	9	3	3	2	1					FROM 16GWT1901

1. RELINQUISHED BY: Terry Rojahn	DATE: 8/30/04	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 8/30/04	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 0087

PROJECT NO: CTO 343 7448	FACILITY: NSWC CRANE	PROJECT MANAGER: RALAH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE	SAMPLERS (SIGNATURE)	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
ADDRESS: 940 SOUTH HARNEY ST.	CARRIER/WAYBILL NUMBER: FED EX AB# 8447 8135 5465	CITY, STATE: SEATTLE WA 98108	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G P

PRESERVATIVE USED: 4°C | HCl | 4°C | HCl | 4°C | 4°C | HNO3

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	EXPLOSIVES SW 846 8330	Total METALS & Hg SW-846 6020 / 7470A					COMMENTS
8/25	1200	TB08250401	QC	-	-	QC	G	4	2	2							TRIP BLANK
(FR) 8/25	0855	16GWT1102	16GW T11	-	-	GW	G	1	-	-	-	1					LOW RECHARGE WELL
8/25	1459	16GW0503	16GW 05	-	-	GW	G	8	3	3	2						
8/25	1747	16GWT1702	16GW T17	-	-	GW	G	8	3	3	2						
8/26	1146	16GWT0503	16GW T05	-	-	GW	G	8	3	3	2						
8/26	1729	16GW0103	16GW 01	-	-	GW	G	8	3	3	2						
8/27	1000	16GWT1602	16GW T16	-	-	GW	G	6	3	3	-						LOW RECHARGE WELL
8/27	1347	16GWT1802	16GW T18	-	-	GW	G	8	3	3	2						

1. RELINQUISHED BY	DATE 8/27/04	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 8/27/04	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

A TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0105 PAGE 2 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N7448	NSWC CRANE	BASINSKI	412 921 8303	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
SJ Conti		CONTI	412 921 8422	940 SOUTH HARNEY
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 844781355546		SEATTLE, WA. 98108

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G G G P P P

PRESERVATIVE USED: 4°C, 4°C HCL, 4°C HCL, 4°C, 4°C, 4°C, 4°C H2SO4, 4°C HNO3, 4°C HNO3, 4°C

	DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	METALS+Hg (4°C) 846 6020, 7471A	VOLATILES 8260B	VOLATILES 8015B	EXPLOSIVES SW 846 8330	RDX SW 846 MOD	NITRATE/NITRITE As(N)	TOTAL METALS+Hg 6020/7470A	DISS METALS+Hg 6020/7470A	VOLATILES 8260B	VOLATILES 8015B (Encore)	COMMENTS
	10/7	0855	13SW0102	13SW/SD01	0	2"	SW	G	21						1					
	10/7	0855	13SW0102-F	"	0	2"	SW	G	1							1				Filtered
(13)	10/7	0900	13SD0102	"	0	4"	SD	G	1	1										
	10/7	0930	13SD2202	13SW SD22	0	4"	SD	G	1	1										
	10/7	1050	16SD1302	13SW SD13	0	4"	SD	G	1	1										
(16)	10/7	1100	16SD2701	13SW SD27	0	4"	SD	G	7	1							3	3		
	10/7	1115	16SD0902	13SW SD13	0	4"	SD	G	1	1										
	10/7	0800	TB10070401	QC	—	—	QC	G	4	—	2	2								AQ TRIP BLANK GLASS.

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY SJ Conti	10/7/04	1600	1. RECEIVED BY FED EX		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER 0113 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N7448	NSWC CRANE	BASINSKI	412 921 8303	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
SJ Conti		CONTI	412 921 8422	940 SOUTH HARNEY
		CARRIER/WAYBILL NUMBER PU # 61.		CITY, STATE
		FED EX AB # 8447 8135 5557		SEATTLE, WA. 98108

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G, G, G, P, P

PRESERVATIVE USED: 4°C, 4°C HCL, 4°C, 4°C HNO3, 4°C H2SO4, 4°C

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: METALS + Hg	6020 / 7471A	VOLATILES 8260B	VOLATILES 8015B	EXPL - NITROAROMATICS	NITRAMINES	TOTAL METALS (8330)	6020 / 7470A Hg	NITRATE / NITRITE	RS (N)	VOLATILES 8260B	VOLATILES 8015B	ENCORE	COMMENTS
10/7	1400	16SD1902	16SW SD19	0	4"	SD	G	1	1													
10/7	1440	16SD2601	16SW SD26	0	4"	SD	G	1	1													
10/8	0800	TB10080401	QC	—	—	QC	G	4	—	2	2											AQ TRIP BLANK
10/8	0840	16SW2501	16SW SD25	0	2"	SW	G	3	—					3								DO MS/MSD
"	0000	16FD10080401	—	—	—	SW	G	1	—					1								DUP OF 16SW2501
10/8	0845	16SD2501	16SW SD25	0	4"	SD	G	1	1													
10/8	0900	16SW2401	16SW SD24	0	2"	SW	G	22	—	3	2	2	1	1								MS DO/MSD ON VOAS
10/8	0000	16FD10080402	—	—	—	SW	G	6	—	3	3											VOAS ONLY DUP OF 16SW2401
10/8	0910	16SD2401	16SW SD24	0	4"	SD	G	1	1													
10/8	1035	16SD3001	16SW SD30	0	4"	SD	G	17	2										9	6		DO MS/MSD
10/8	0000	16FD10080403	—	—	—	SD	G	6	1										3	2		DUP OF 16SD3001
10/8	1300	16SD2901	16SW SD29	0	4"	SD	G	6	1										3	2		
10/8	1315	16SD2801	16SW SD28	0	4"	SD	G	6	1										3	2		

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY SJ Conti	10/8/04	1700	1. RECEIVED BY FED EX		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

TtNUS, INC. CHAIN OF CUSTODY NUMBER 0114 PAGE 1 OF

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N7448 270 343	NSWC CRANE	BASINSKI	412 921 8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		CONTI	412 921 8432	940 SOUTH HARNEY
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8447 8135 5568		SEATTLE, WA. 98108

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C
TYPE OF ANALYSIS: METALS + Hg 6020 / 7471A

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS									COMMENTS
10/10	1115	16SD0802	16SW SD08	0	4"	SD	G	1	1								
10/10	1130	16SD1202	16SW SD12	0	4"	SD	G	1	1								
10/10	1255	16SD0502	16SW SD05	0	4"	SD	G	1	1								
10/10	1305	16SD0402	16SW SD04	0	4"	SD	G	1	1								
10/10	1310	16SD1002	16SW SD10	0	4"	SD	G	1	1								
10/10	1330	16SD2302	16SW SD23	0	4"	SD	G	1	1								
10/10	1340	16SD1102	16SW SD11	0	4"	SD	G	1	1								
10/10	1425	16SD0602	16SW SD06	0	4"	SD	G	1	1								
10/10	1445	16SD0302	16SW SD/03	0	4"	SD	G	1	1								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	10/11/04	1800	1. RECEIVED BY FED EX	10/11/04	1800
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 0122

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
		LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE	
SAMPLERS (SIGNATURE): Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
		ADDRESS: 940 SOUTH HARNEY ST	
		CARRIER/WAYBILL NUMBER: FED. EX. AB# 8447 8135 5590	CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G G P

PRESERVATIVE USED: 4°C 4°C/HCl 4°C/HCl 4°C 4°C/HNO3

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Total Metals & Hg 6020 / 7471A	Volatiles SW-846 8260B	Volatiles SW-846 8015B	Explosives SW-846 8330	Total Metals & Hg 6020 / 7470A				COMMENTS
10/14	1335	16SD1602	16SW SD16	0	4"	SD	G	1	1								
10/16	0825	16TB10160401	QC	-	-	QC	G	4	-	2	2						TRIP BLANK
10/16	1000	16SS860002	16SB 86	0.5	2'	SO	G	1	1								
10/16	1030	16GWTZ101	16MW TZ1	-	-	GW	G	9	-	3	3	2	1				

1. RELINQUISHED BY: Terry Rojahn	DATE: 10/18/04	TIME: 1800	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 10/18/04	TIME: 1800
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TtA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0124 PAGE 1 OF

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 844781356623		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW 846 8260B	VOLATILES SW 846 8260B	EXPLOSIVES SW 846 8015B	Nitrate + Nitrite EPA 353.2	Total METALS & Hg 6020 / 7470A	Dis METALS & Hg 6020 / 7470A	EXP SW 846 8330	RDX SW 846 8330 MODIFIED	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	P	P	P	G		
PRESERVATIVE USED									4°C/HCl	4°C/HCl	4°C	4°C/H2SO4	4°C/HNO3	4°C/HNO3	4°C		
TYPE OF ANALYSIS																	
10/26	0700	16TB10260401	QC	–	–	QC	G	4	2	2							TRIP BLANK
10/26	1105	16SW2601	16SW SD02	–	–	SW	G	10	3	3	–	*3	1	–			*MS/MSD
10/26	1105	16SW2601-F	↓	–	–	SW	G	1	–	–	–	–	–	1			
10/26	0000	16FD10260401	QC	–	–	SW	G	1	–	–	–	1	–	–			FROM 16SW2601
10/26	1200	16SW3001	16SW SD30	–	–	SW	G	13	3	3	*6	–	1	–			* DO MS/MSD
10/26	1200	16SW3001-F	↓	–	–	SW	G	1	–	–	–	–	–	1			
10/26	0000	16FD10260402	QC	–	–	SW	G	2	–	–	2	–	–	–			FROM 16SW3001
10/26	1510	13SW3301	13SW SD33	–	–	SW	G	5	–	–	–	1	–	–	4		
10/26	1535	13SW3002	13SW SD30	–	–	SW	G	6	–	–	–	1	1	–	4		
10/26	1535	13SW3002-F	↓	–	–	SW	G	1	–	–	–	–	–	1			
10/26	1600	13SW2802	13SW SD28	–	–	SW	G	3	–	–	–	–	3	–			* DO MS/MSD
10/26	1600	13SW2802-F	↓	–	–	SW	G	3	–	–	–	–	–	3			* DO MS/MSD
10/26	0000	13FD10260401	QC	–	–	SW	G	1	–	–	–	–	1	–			

1. RELINQUISHED BY Terry Rojahn	DATE 10-27-04	TIME 1830	1. RECEIVED BY FEDERAL EXPRESS	DATE 10-27-04	TIME 1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0131 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 343 CTO 9	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8447 8135 6601		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P P G

PRESERVATIVE USED: 4°C/HCl 4°C/HCl 4°C/HNO3 4°C/HNO3 4°C

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW-846 8260B	VOLATILES SW-846 8015B	TOTAL METALS & Hg 6020/7470A	DIS. METALS & Hg	EXPLOSIVES SW-846 8330	Nitrate + Nitrite EPA 353.2			COMMENTS
11/2	0700	16TB11020401	QC	–	–	QC	G	4	2	2							
11/02	1000	16SW1901	16SW SD19	–	–	SW	G	1	–	–	1						
11/02	1000	16SW1901-F	↓	–	–	SW	G	1	–			1					
11/02	1045	16SW1601	16SW SD16	–	–	SW	G	1	–	–	1						
11/02	1045	16SW1601-F	↓	–	–	SW	G	1	–	–	–	1					
11/02	1405	16SW1302	16SW SD13	–	–	SW	G	9	3	3	1	–	1	1			
11/02	1405	16SW1302-F	↓	–	–	SW	G	1	–	–	–	1					
11/02	1420	16SW2701	16SW SD27	–	–	SW	G	7	3	3	1						
11/02	1420	16SW2701-F	↓	–	–	SW	G	1	–	–	–	1					
11/02	1440	16SW1202	16SW SD12	–	–	SW	G	11	3	3	1	–	1	*3			*DO MS/MSD (ON N-IN)
11/02	1440	16SW1202-F	↓	–	–	SW	G	1	–	–	–	1					
11/02	1500	16SW0901	16SW SD09	–	–	SW	G	1	–	–	1						
11/02	1500	16SW0901-F	↓	–	–	SW	G	1	–	–	–	1					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	11-02-04	1830	1. RECEIVED BY FEDERAL EXPRESS	11-02-04	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0133 PAGE 1 OF

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT
N7448 CTO 343	NSWC CRANE	R. BASINSKI	4129218308	LAUCKS - HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: T ROJAHN	PHONE NUMBER: 4129218857	ADDRESS: 940 SOUTH HARNEY ST
S. Corti / Tony Rojahn		CARRIER/WAYBILL NUMBER: FED EX AB# 8447 8135 6601		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	EXPLOSIVES SW846 8330	Total Metals & Hg 6020 / 7470A	Dis Metals & Hg 6020 / 7470A	Nitrate + Nitrite EPA 353.2				COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	P	P					
PRESERVATIVE USED									4°C	4°C / HNO3	4°C / HNO3					
11/30	1600	16GWT0802	16GW T08	-	-	GW	G	1	1	-	-	-				VERY LOW PRODUCING WELL
11/02	1580	16SW0301	16SW SD03	-	-	SW	G	1	-	1	-	-				LESS THAN MIN VOL WAS AV
11/02	1580	16SW0301-F	↓	-	-	SW	G	1	-	-	1	-				THAT COULD BE OBTAINED
11/02	0000	16FD11020401	QC	-	-	SW	G	1	-	-	-	1				FROM 16SW1202
~~11/02~~	~~TC~~					~~SW~~	~~TC~~									
11/02	1520	16SW0601	16SW SD06	-	-	SW	G	1	-	1	-	-				
11/02	1520	16SW0601	↓	-	-	SW	G	1	-	-	1	-				

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Tony Rojahn	11/02/04	1830	1. RECEIVED BY FED EX	11/02/04	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0135 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 343 7448	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB# 8447 8135 6586		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P P

PRESERVATIVE USED: 4°C | HCl | 4°C | HCl | 4°C | HNO3 | 4°C | HNO3

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOLATILES SW-846 8260 B	VOLATILES SW-846 8015B	TOTAL METALS & Hg 6020 / 7470A	DIS METALS & Hg 6020 / 7470A					COMMENTS
11/11	0800	16TB11110401	QC	–	–	QC	G	4	2	2							
11/11	0930	16SW2901	16SW SD29	–	–	SW	G	7	3	3	1						
11/11	0930	16SW2901-F	↓	–	–	SW	G	1	–	–	–	1					
11/11	0950	16SW2801	16SW SD28	–	–	SW	G	7	3	3	1						
11/11	0950	16SW2801-F	↓	–	–	SW	G	1	–	–	–	1					
11/11	1015	16SW0801	16SW SD08	–	–	SW	G	1	–	–	1						
11/11	1015	16SW0801-F	↓	–	–	SW	G	1	–	–	–	1					
11/11	1045	16SW1001	16SW SD10	–	–	SW	G	1	–	–	1						
11/11	1045	16SW1001-F	↓	–	–	SW	G	1	–	–	–	1					
11/11	1100	16SW0501	16SW SD05	–	–	SW	G	1	–	–	1						
11/11	1100	16SW0501-F	↓	–	–	SW	G	1	–	–	–	1					
11/11	1115	16SW0401	16SW SD04	–	–	SW	G	1	–	–	1						
11/11	1115	16SW0401-F	↓	–	–	SW	G	1	–	–	–	1					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	11-11-04	1800	1. RECEIVED BY FEDERAL EXPRESS	11-11-04	1800
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

A TECH NUS, INC. CHAIN OF CUSTODY NUMBER 0136 PAGE 1 OF ____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 343 7448	NSWC CRANE	R. BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		T. ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX. AB # 8447 8135 6586		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P P
PRESERVATIVE USED: 4°C | HNO3 4°C | HNO3

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: TOTAL METALS & Hg 6020 / 7470A	TYPE OF ANALYSIS: DIS METALS & Hg 6020 / 7470A							COMMENTS
11/11	1127	16SW1101	16SW SD11	–	–	SW	G	1	1	–							
11/11	1127	16SW1101-F	↓	–	–	SW	G	1	–	1							
11/11	1140	16SW2301	16SW SD23	–	–	SW	G	1	1	–							
11/11	1140	16SW2301-F	↓	–	–	SW	G	1	–	1							

1. RELINQUISHED BY Terry Rojahn	DATE 11-11-04	TIME 1800	1. RECEIVED BY FEDERAL EXPRESS	DATE 11-11-04	TIME 1800
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

APPENDIX C.6.1
SWMU 16
MONITORING WELL INSPECTION SHEETS
ROUND 1

MONITORING WELL INSPECTION SHEET

Well ID: WES-14-01-83

Time: 1348 Date: 4/15/03 Inspector's Name:

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	NA	NA	No WELL TAG; WRITE ID W/ PAINT MARKER
Well security	Condition protective case, cap, lock	NA	NA	only PVC stick up
Well pad	Concrete or gravel & condition	✓		6" CASING; W/ soil around base
Well seal	Condition of...	✓		
Area immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	NA	NA	
PVC Riser	Condition of riser & survey reference point	✓		MARKED REFERENCE POINT

Comments: (3) RR tracks as bollards; OK

Signature(s) [signature]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 1
January: 1999

MONITORING WELL INSPECTION SHEET

Well ID: WES-14-02-83

Time: 1710 Date: 4/15/03 Inspector's Name:

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	NA	NA	NO TAG; PAINTED ID ON Protective casing
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		Gravel & grass
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		Dry Grass; no standing H_2O
Dedicated sampling equipment	Condition of...	NA	NA	
PVC Riser	Condition of riser & survey reference point	✓		

Comments: (3) RR tracks for bollards

Signature(s) [signature]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 1
Jan 1999

MONITORING WELL INSPECTION SHEET

Well ID: WES-14-3-83

Time: 1506 Date: 4/11/03 Inspector's Name: T. Rosano

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	–	–	No well tag.
Well security	Condition protective case, cap, lock		✓	Repaired cap
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	NA	NA	
PVC Riser	Condition of riser & survey reference point	✓		

Comments: (3) R.R. tracks, No Protective casing

→ Repaired Lock 5/5/03
cap.

Signature(s) [signature]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 1
January: 1999

MONITORING WELL INSPECTION SHEET

Well ID: WES-14-4-83

Time: 1300 Date: 4/11/03 Inspector's Name: T. ROHAHN

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	–	–	NO WELL TAG;
Well security	Condition protective case, cap, lock	✓		REPLACE Broken J-PLUG
Well pad	Concrete or gravel & condition		✓	BROKEN, WILL REPAIR
Well seal	Condition of...		✓	
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		No standing H_2O; Ground SOFT
Dedicated sampling equipment	Condition of...	–	–	NA
PVC Riser	Condition of riser & survey reference point	✓		

Comments: (3) R.R. TRACKS No protective casing

Built NEW WELL PAD 5/5/03

Signature(s) [signature]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 1
Jan 1999

MONITORING WELL INSPECTION SHEET

Well ID: WES-14-5-83

Time: 1607 Date: 4/11/03 Inspector's Name: T. Lojahn

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	NA	NA	Paint ID
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		Gravel
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	NA	NA	
PVC Riser	Condition of riser & survey reference point	✓		

Comments:
(3) bollards; No protective casing
RR tracks

Signature(s) [signature]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 1
January: 1999

APPENDIX C.7.1
SWMU 16
MONITORING WELL DEVELOPMENT RECORDS
ROUND 1

Tetra Tech NUS, Inc.

EXISTING

MONITORING WELL DEVELOPMENT RECORD

Well: WES-14-01-83
Site: SWMU 16
Date Installed: 1983
Date Developed: 4/15/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): MEAS. 54.05
Static Water Level Before (ft.): 31.35
Static Water Level After (ft.): DRY
Screen Length (ft.): 4.67
One Well Volume (gal/L): 3.8 include sump
Casing ID (in.): 2 inch PVC
pump 2' off bottom of sump

Responsible Personnel: T. ROJAHN
Drilling Company: SEE RECORDS
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1246	0	~1 gpm	31.35	—	—	—	+1000	Start Pump (Grey)
1253	8 gal	—	—	15.29	6.15	1.707	310	CLOUDY
1255	10 gal	—	DRY	—	—	—	—	DRY
1300	↓	—	*	—	—	—	—	RECHARGE
1305	↓	—	*	—	—	—	—	↓
1310	10 gal	—	*	—	—	—	—	↓
1325	↓	—	47.40	—	(Pump not working)	→	→	~~Restart Purge~~ TL Pulled pump to check water level
1330	↓	—	47.20	→	→	→	→	RECHARGE to slow
1335	↓	—	47.07	→	→	→	→	to ~~purge~~ TL Fill tubing
1340	10 gal	—	46.95	→	→	→	→	AND pull water out well.

* M-scope probe wouldn't pass pumps in series; no water levels taken during recharge

Tetra Tech NUS, Inc.

EXISTING

MONITORING WELL DEVELOPMENT RECORD

Well: WES-14-02-83
Site: SWMU 16
Date Installed: 1983
Date Developed: 4/15/03
Dev. Method: Surged & Pumped
Pump Type: WATTERIX

Depth to Bottom (ft.): 28.74
Static Water Level Before (ft.): 14.76
Static Water Level After (ft.): DRY
Screen Length (ft.): 9.04'
One Well Volume (gal/L): 2.2
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROUAHN
Drilling Company: CHECK RECORDS
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1623	0	–	14.76	–	–	–	–	Start Purge
1628	8	–	DRY	14.59	6.22	2.087	+1000	Lt BRN (DRY)
1633	↓	–	14.97	–	–	–	–	RECHARGE
1638	↓	–	18.90	–	–	–	–	↓
1643	8	–	15.90	–	–	–	–	↓
1648	14	–	DRY	13.43	6.64	0.922	+1000	(DRY) Lt. BRN
1658	↓	–	18.13	–	–	–	–	RECHARGE
1708	14	–	16.02	–	–	–	–	↓
1718	20	–	DRY	12.14	8.00	0.382	+1000	(DRY) Lt Grey

Tetra Tech NUS, Inc.

EXISTING

MONITORING WELL DEVELOPMENT RECORD

Historic - 38.4

Well: WES-14-3-83
Site: SWMU 16
Date Installed: 1983
Date Developed: 4/11/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): MEAS. 38.25
Static Water Level Before (ft.): 18.58 (TOC PVC)
Static Water Level After (ft.): DRY
Screen Length (ft.): 9.11'
One Well Volume (gal/L): 3.3 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. COJAHN
Drilling Company: UNKOWN
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1416	0	—	18.58	—	—	—	—	GRAY BROWN
1422	↓	—	—	14.71	5.61	0.766	—	" "
1425	6.5	~	DRY	—	—	—	180	DRY 51 cloudy
1440	6.5	—	25.98	—	—	—	—	—
1442	↓	—	—	14.79	5.71	0.977	27	CLEAR
1443	8.0	—	DRY	—	—	—	—	DRY
1453	↓	—	28.45'	→				RECHARGE
1458	8.0	—	26.85'	→				RECHARGE
1459	↓	—	—	15.18	5.76	1.063	32	CLEAR
1501	10.0		DRY	→				DRY

Tetra Tech NUS, Inc.

EXISTING

MONITORING WELL DEVELOPMENT RECORD

Historic = 49.0'

Well: WES-1404-83
Site: SWMU 6
Date Installed: 1983
Date Developed: 4/11/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): MEAS = 41.47 (TOC) BEFORE; 49'0 AFTER PURGE
Static Water Level Before (ft.): 27.47
Static Water Level After (ft.): 27.23 @ 1301
Screen Length (ft.): 9.09
One Well Volume (gal/L): 3.5 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: UNKNOWN
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole – ppm
PID Readings: Breathing Zone – ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units uS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1224	0	—	27.47	—	—	—	—	MILKY
1229	15 L	300 ml	—	14.83	4.94	0.768	ERROR 2 (+1000)	CLOUDY / milky white sand
1235	—	—	27.80	—	—	—	145	SL Cloudy
1237	8 gal	360 ml	27.90	14.47	4.10	742	50	CLEAR
1247	16 gal	—	27.92	14.42	3.79	784	11	CLEAR
1252	—	—	—	14.40	3.76	785	8	CLEAR
1255	24 gal	→						Stop Purge

Tetra Tech NUS, Inc.

EXISTING

MONITORING WELL DEVELOPMENT RECORD

Well: KES-14.5-83
Site: SWMU 16
Date Installed: 1983
Date Developed: 04/16/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): Historic 53.3 MEASE 52.43
Static Water Level Before (ft.): 33.00
Static Water Level After (ft.): *
Screen Length (ft.): 9.25
One Well Volume (gal/L): ~ 8.4
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROSAHN
Drilling Company: UNKNOWN
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole____ppm
PID Readings: Breathing Zone____ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	* Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1523	0	—	—	—	—	—	—	GRAY
1528	↓	—	—	14.66	6.21	0.815	+1000	TAN BRN
1531	8	—	—	—	—	—	—	—
1533	↓	—	—	14.06	6.11	0.797	+1000	TAN BRN
1536	14	—	—	—	—	—	—	—
1540	19	—	—	14.16	6.08	0.805	500	TAN
1544	24	—	—	14.09	5.95	0.788	280	SL. TAN
1548	29	—	—	14.18	5.90	0.786	700	STOP PUMP LET WELL RECHARGE
1558	29	—	—	—	—	—	—	RESTART PUMP
1602	34	—	—	14.50	5.42	0.706	12	CLEAR

* Cannot get probe passed SERIES OF WHALE pumps.

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT01
Site: SWMU 16
Date Installed: 4/8/03
Date Developed: 4/15/03
Dev. Method: Surged & Pumped
Pump Type: WATERRIA

Depth to Bottom (ft.): 26.65
Static Water Level Before (ft.): 22.72
Static Water Level After (ft.): 25.99
Screen Length (ft.): 10'
One Well Volume (gal/L): 0.7
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1525	0	–	22.72	–	–	–	–	Start Purge
1527	1 gal	–	25.66	19.10	6.30	0.352	+1000	Dry (Grey Dark)
1532	↓	–	25.40	–	–	–	–	RECHARGE
1537	↓	–	25.33	–	–	–	–	↓
1542	1 gal	–	25.31	–	–	–	–	↓
1543	1.25	–	25.98	17.61	6.17	0.639	+1000	Dry (Grey)
1553	↓	–	25.87	–	–	–	–	RECHARGE
1603	1.25	–	25.87	–	–	–	–	↓
1605	1.50	–	25.99	19.20	6.49	0.603	+1000	(Grey) (Dry)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT02
Site: SWMU 16
Date Installed: 4/11/03
Date Developed: 4/15/03
Dev. Method: Surged & Pumped
Pump Type: Waterria

Depth to Bottom (ft.): 21.08
Static Water Level Before (ft.): 11.28
Static Water Level After (ft.): 20.25
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.6 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. Rivahni
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0929	0	–	11.28	–	–	–	–	Start Purge
0931	2.5 gal	–	19.05	11.94	6.03	0.397	+1000	(DRY) (BRN)
0936	↓	–	17.21	–	–	–	–	Recharge
0941	↓	–	16.71	–	–	–	–	↓
0946	2.5 gal	–	16.16	–	–	–	–	↓
0948	3.5	–	19.80	12.34	6.33	0.356	+1000	(DRY) (BRN)
0958	↓	–	18.36	–	–	–	–	Recharge
1008	3.5 gal	–	17.41	–	–	–	–	↓
1010	4.5 gal	–	20.25	12.64	6.15	0.342	+1000	(DRY) (BRN)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT03
Site: SWMU 16
Date Installed: 4/10/03
Date Developed: 4/15/03
Dev. Method: Surged & Pumped
Pump Type: WATTERRIA

Depth to Bottom (ft.): 38.07
Static Water Level Before (ft.): 27.92
Static Water Level After (ft.): 36.74
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.6 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1025	0	—	27.92	—	—	—	—	START PURGE
1030	3.5	—	37.10	16.03	6.17	0.402	+1000	(DRY) (Grey)
1035	↓	—	35.65	—	—	—	—	RECHARGE
1040	↓	—	35.05	—	—	—	—	↓
1045	3.5	—	34.52	—	—	—	—	↓
1047	5.0	—	37.30	15.74	6.13	0.454	+1000	(DRY) (Grey)
1057	↓	—	35.95	—	—	—	—	RECHARGE
1107	5.0	—	34.67	—	—	—	—	↓
1109	6.0	—	36.74	14.43	5.81	0.627	+1000	(DRY) (Grey)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT04
Site: SWMU 16
Date Installed: 4/9/03
Date Developed: 4/15/03
Dev. Method: Surged & Pumped
Pump Type: Waterra

Depth to Bottom (ft.): 27.40
Static Water Level Before (ft.): 12.32
Static Water Level After (ft.): 26.63
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.4 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. Rojahn
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1425	0	–	12.32	–	–	–	–	start purge
1427	3 gal	–	DRY	16.08	5.55	0.346	+1000	(DRY) BRN
1432	↓	–	19.92	–	–	–	–	RECHARGE
1437	↓	–	17.41	–	–	–	–	↓
1442	3	–	15.42	–	–	–	–	↓
1445	6	–	26.59	13.98	5.65	0.511	+1000	(DRY) BRN
1455	↓	–	22.00	–	–	–	–	RECHARGE
1505	6	–	17.32	–	–	–	–	↓
1508	9	–	26.63	13.61	5.89	0.308	+1000	(DRY) BRN

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 16 MWT05
Site: SWMU 16
Date Installed: 4/9/03
Date Developed: 4/15/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 41.82
Static Water Level Before (ft.): 30.56
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): ~1.6 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: B. BALKOVEC
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units µS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1245	START	≈1 gal/min	—	—	—	—	—	SURGED 1240-1245 GRAY
1250	—	—	39.70	15.94	5.03	650	>2000	
1252	37.5 gal	—	DRY	—	—	—	—	
1302	—	—	37.17	—	—	—	—	
1312	—	—	33.83	—	—	—	—	
1313	START	2L/min	—	17.01	4.75	679	>2000	CLOUDY GRAY
1320	—	—	39.60	—	—	—	—	
1330	≈15 gal	≈1 gal/min	41.65	17.21	4.60	691	>2000	SURGED WELL W/ PUMP
1331	16 gal	—	DRY	—	—	—	—	DARK GRAY
1341	—	—	37.48	—	—	—	—	
1351	—	—	34.15	—	—	—	—	
1352	START	—	—	17.45	4.26	701	>2000	
1357	—	≈1 gal/min	38.21	—	—	—	—	
1402	≈1 gal	—	DRY	—	—	—	—	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT06
Site: SWMU 16
Date Installed: 4/24/03
Date Developed: 4/26/03
Dev. Method: Surged & Pumped
Pump Type: Watterra

Depth to Bottom (ft.): 28.28
Static Water Level Before (ft.): 12.90
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.6 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1700	0	—	12.90	—	—	—	—	START DEV
1708	10 gal	—	Dry	14.52	7.42	0.260	+1000	DRY GREY
1713	↓	—	26.23	—	—	—	—	RECHARGE
1718	↓	—	25.73	—	—	—	—	↓
1723	10 gal	—	25.50	—	—	—	—	↓
1725	12 gal	—	DRY	14.87	7.88	0.354	+1000	DRY GREY
1735	↓	—	26.76	—	—	—	—	RECHARGE
1745	12 gal	—	26.60	—	—	—	—	↓
1746	13.5 gal	—	DRY	15.18	7.89	0.360	+1000	DRY GREY

APPENDIX C.7.2
SWMU 16
MONITORING WELL DEVELOPMENT RECORDS
ROUND 2

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT07
Site: SWMU 16
Date Installed: 11/11/03
Date Developed: –
Dev. Method: –
Pump Type: –

Depth to Bottom (ft.): 27.83
Static Water Level Before (ft.): DRY
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume: 0
Casing ID (in.): 2"

Responsible Personnel: TERRY ROLAHN
Drilling Co.: BOWSER MORNER
Project Name: NSWC CRANE
Project Number: 49060
PID Readings: Borehole – ppm
PID Readings: Breathing Zone – ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
			DRY WELL!					

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT08
Site: SWMU 16
Date Installed: 11-9-03
Date Developed: 11-21-03
Dev. Method: WATTERRIA
Pump Type: "

Depth to Bottom (ft.): 97.68
Static Water Level Before (ft.): 20.35
Static Water Level After (ft.): DRY
Screen Length (ft.): 10
One Well Volume: 12.5 gal
Casing ID (in.): 2" Ø

Responsible Personnel: T. ROSAHN / M. COCHRAN
Drilling Co.: BOWSER MORNER
Project Name: NSWC CRANE
Project Number: 9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1316	—	—	20.35	—	—	—	—	—
1326	10 gal	—	DRY	15.62	7.80	0.192	>1000	GREY
1338	15 gal	—	DRY	←			→	END DEV. ~3 gal in tubing

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT09
Site: SWMU 16
Date Installed: 11/8/03
Date Developed: 11/9/03
Dev. Method: SURGE & PURGE
Pump Type: WHALE

Depth to Bottom (ft.): 27.60
Static Water Level Before (ft.): 15.73
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume: ~2 gal
Casing ID (in.): 2"

Responsible Personnel: T. ROJAHN
Drilling Co.: BOXISER MARINER
Project Name: NSWC CRANE
Project Number: N9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

1535 - 1540 SURGE

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1540	0	—	15.73	—	—	—	—	GRAY
1552	9	0.75 gal	(DRY)	—	—	—	—	GRAYISH BRN
1602	9	—	24.00	—	—	—	—	RECHARGE
1612	9	—	22.65	—	—	—	—	" RESTART PUMP
1615	12	—	—	14.91	4.92	0.321	>1000	BRN
1617	14	—	(DRY)	—	—	—	—	DRY
1627	14	—	24.20	—	—	—	—	RECHARGE
1637	14	—	23.90	—	—	—	—	" (RESTART PUMP
1645	14	—	22.40	—	—	—	—	"
1648	17	—	DRY	14.98	4.91	0.272	>1000	DRY

16 MWT10

MONITORING WELL DEVELOPMENT RECORD

Well: ~~16MWT09~~ (FW)
Site: SWMU 16
Date Installed: 11-9-03
Date Developed: 11-11-03
Dev. Method: PUMP + SURGE
Pump Type: PERISTALTIC

Depth to Bottom (ft.): 26.82
Static Water Level Before (ft.): 23.68
Static Water Level After (ft.):
Screen Length (ft.): 10
One Well Volume: 0.5 gal
Casing ID (in.): 2

Responsible Personnel: E WUDKWYCH
Drilling Co.: BOWSER MORNER
Project Name: NSWC CRANE
Project Number: N9060
PID Readings: Borehole ___ ppm
PID Readings: Breathing Zone ___ ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ms/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1420	0	23.68 →		—	—	—	—	SURGE FOR 5 MIN.
1425	↓			—	—	—	—	PUMPING, DARK GREY
1605	8	25.15 →		—	—	—	—	CLOUDY
1615	9	—	—	14.86	3.84	1.203	1010	
1630	10	—	—	14.79	3.78	1.138	908	
1650	12 gal							END

MONITORING WELL DEVELOPMENT RECORD

Well: IGMWT 11
Site: SWMU 16
Date Installed: 11-11-03
Date Developed: 11-21-03
Dev. Method: Surge & Pump
Pump Type: Bailer

Depth to Bottom (ft.): 98.65
Static Water Level Before (ft.): 83.05
Static Water Level After (ft.): 97.5
Screen Length (ft.): 10'
One Well Volume: 10L
Casing ID (in.): 2"

Responsible Personnel: T. Rouhani
Drilling Co.: Bowser Morner
Project Name: NSWC Crane
Project Number: 9060
PID Readings: Borehole – ppm
PID Readings: Breathing Zone – ppm

Time	Cumulative Water Volume ~~(Gal.)~~ L	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0845	–	–	83.05	–	–	–	–	Start DEV.
0857	10 L	–	–	13.48	7.72	0.156	>1000	Grey
0909	20 L	–	–	13.22	8.30	0.193	>1000	"
0927	28 L	–	DRY	–	–	–	–	DRY
0947	–	–	97.5	–	–	–	–	END DEVELOPMENT
								RECHARGE SLOW

MONITORING WELL DEVELOPMENT RECORD

Well: 16 MWT12
Site: SWMU 16
Date Installed: 11/7/03
Date Developed: 11/9/03
Dev. Method: SURGE & PURGE
Pump Type: ~~WHALE~~ Peristaltic

Depth to Bottom (ft.): ~28.5
Static Water Level Before (ft.): 22.93
Static Water Level After (ft.): 28.45
Screen Length (ft.): 10'
One Well Volume: ~194 l
Casing ID (in.): 2"

Responsible Personnel: T. ROJAHN
Drilling Co.: BOWSER MORNER
Project Name: NSWC CRANE
Project Number: N 9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

SURGE 1345-1350 HRS

Time	Cumulative Water Volume ~~(Gal.)~~ L	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1355	—	650ml	22.93	—	—	—	>1000	DARK BRN → BLACK
1400	3,250	"	24.15	—	—	—	>1000	DARK BRN - Grey
1405	6,500	"	24.75	13.32	5.66	704	>1000	DARK BRN - Grey
1415	13,000	"	26.00	13.72	5.01	648	>1000	DARK BRN - Grey
1430	16,250	"	27.20	13.43	4.53	603	315	Greyish
1435	19,500	"	27.40	13.30	4.35	589	91.2	Lt Greyish
1440	22,750	"	27.65	13.55	4.22	585	333	Greyish
1455	32,500	"	28.40	13.63	4.16	565	>1000	Grey
1500	35,750	"	28.45	13.86	4.02	569	29.1	Clear END DEV.
1505	—	—	27.55	—	—	—	—	RECHARGE (V. Good)

6 volumes = 22.7L

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT13
Site: SWMU 16
Date Installed: 11-11-03
Date Developed: 11-21-03
Dev. Method: SURGE & PURGE
Pump Type: SURGEBLOCK / PUMP PERISTALTIC

Depth to Bottom (ft.): 20.1
Static Water Level Before (ft.): 10.22
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume: 6L
Casing ID (in.): 2" Ø

Responsible Personnel: M. COCHRAN
Drilling Co.: BOWSER MORNER
Project Name: NSWC CRANE
Project Number: 9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume ~~(Gal.)~~ L	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1520	—	—	10.22	—	—	—	—	Start Purge
1530	8 L	800	12.20	16.53	6.05	0.418	>1000	BRN
1550	24	800	16.57	15.76	5.68	0.399	>1000	BRN
1600	32	800	18.35	15.78	5.51	0.466	>1000	BRN
1610	40	800	DRY	—	—	—	—	PURGED DRY PUMP OFF
1630	40	800	16.55	15.66	5.61	.476	—	PUMP ON
1635								PURGED DRY
1655	41	800	19.65	15.47	5.63	.449	—	PUMP ON
1700								PURGED DRY

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT14
Site: SWMU 16
Date Installed: 11-7-03
Date Developed: NA
Dev. Method: ~~PUMP + SURGE~~ FLO
Pump Type: NA

Depth to Bottom (ft.): 24.30
Static Water Level Before (ft.): DRY
Static Water Level After (ft.): NA
Screen Length (ft.): 10
One Well Volume: NA
Casing ID (in.): 2

Responsible Personnel: F. WUDKWYCH
Drilling Co.: BOWSER MORNER
Project Name: N9060 CRANE
Project Number: N9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0900	—	—	DRY on 11-7-03	—	—	—	—	DRY WELL
11/21/03 → this well was ABANDONED								

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT15
Site: SWMU 16
Date Installed: 11-9-03
Date Developed: 11-21-03
Dev. Method: Surge & Purge
Pump Type: CHECK VALVE WATTERIA

Depth to Bottom (ft.): 97.0
Static Water Level Before (ft.): 53.70
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume: 7gal
Casing ID (in.): 2" Ø

Responsible Personnel: M. COCHRAN / SG / TR
Drilling Co.: BOWSER & MONNER
Project Name: NSWC CRANE
Project Number: 9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1610	—	—	—	—	—	—	—	
1630	6.0gal	—	—	—	—	—	—	PURGED DRY. (Grey)
		—						DRYED
1700	6.30g	—	91.62	—	—	—	—	ALLOWING RECHARGE
1710	6.30g	—	90.50	—	—	—	—	" "
1720	8.0g	—	DRY	13.83	7.60	.299	—	Water in Tubing

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT16
Site: SWMU 16
Date Installed: 11/9/03
Date Developed: 11/11/03
Dev. Method: Surge & Purge
Pump Type: WHALE

Depth to Bottom (ft.): 35.5
Static Water Level Before (ft.): 33.1
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume: ~2 L
Casing ID (in.): 2" Φ

Responsible Personnel: T. ROJAHN
Drilling Co.: BOWSER MORNER
Project Name: NSWC CRANE
Project Number: 9060
PID Readings: Borehole – ppm
PID Readings: Breathing Zone – ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1435	0	–	35.5	–	–	–	>1000	DRY < 1 min (BRN) (DRY)
1445	~3 L	~3 L	34.7	–	–	–	–	RECHARGE
1455	~3 L	–	34.35	–	–	–	–	"
1456	~4 L	attempt	to pump ...	NEGR	S.S.	Bailer	>1000	Removed ~1L (DRY)
1510	~4 L	–	34.60	–	–	–	–	RECHARGE
1515	~4.5 L	–	DRY	–	–	–	>1000	"
1545	–	–	DRY	–	–	–	–	DRY

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT17
Site: SWMU 16
Date Installed: 11-8-03
Date Developed: 11-22-03
Dev. Method: Surge & Pump
Pump Type: Peristaltic

Depth to Bottom (ft.): 26.0'
Static Water Level Before (ft.): 15.41
Static Water Level After (ft.): 17.85
Screen Length (ft.): 10'
One Well Volume: 7 L
Casing ID (in.): 2"Ø

Responsible Personnel: T. Rojahn
Drilling Co.: Bowser Morner
Project Name: NSWC Crane
Project Number: 9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1100	0	600	15.41	—	—	—	—	Start Dev BRN
1110	6L	600	16.30	17.06	5.69	0.725	921	BRN
1120	12L	600	16.93	16.98	5.83	0.650	390	BRN Nisch
1130	18L	600	17.18	17.06	5.75	0.668	155	Sl. Cloudy
1140	24L	600	17.45	17.08	5.55	0.646	>1000	BRN
1150	30L	600	17.53	17.15	5.47	0.644	>1000	BRN
1200	36L	600	17.70	17.23	5.43	0.627	>1000	BRN
1210	42L	600	17.75	17.19	5.29	0.624	>1000	BRN
1220	48L	600	17.83	17.23	5.15	0.609	737	Cloudy → BRN
1230	54L	600	17.85	17.14	5.10	0.602	175	Sl. Cloudy

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT18
Site: SUMU 16 CRANE NSWC
Date Installed: 1-18-04
Date Developed: 1-19-04
Dev. Method: WATERA + BAILER
Pump Type: NU

Depth to Bottom (ft.): 104.5
Static Water Level Before (ft.): 9.5
Static Water Level After (ft.): 104.1
Screen Length (ft.): 10'
One Well Volume: 15.5
Casing ID (in.): 2"

Responsible Personnel: FRED W. RAMSER
Drilling Co.: BOWSER MORNER
Project Name: CRANE NSWC
Project Number: 9060
PID Readings: Borehole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
	22 GAL	–	–	–	–	–	–	WATERA (EXTRACTING 18GALS)
								THEN USED BAILER
								TO SURGE AND WITH-
								DRAW WATER TILL WELL
								WAS DRY. WATER
								REMAINED HIGHLY
								TURBID GREY, BLK
								SPECS OF COAL?
								DISSIPATED WHEN
								~~WATA~~ WATER LEVEL
								REACHED 97' BGS.
								NO PARAMETERS
								MEASURED DUE TO
								HIGH TURBIDITY.

APPENDIX C.7.3
SWMU 16
MONITORING WELL DEVELOPMENT RECORDS
ROUND 3

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT19
Site: SWMU 16
Date Installed: 7/28/04
Date Developed: 8/27/04
Dev. Method: SURGE & PURGE
Pump Type: WHALER

Depth to Bottom (ft.): 18.00
Static Water Level Before (ft.): 4.33
Static Water Level After (ft.): *
Screen Length (ft.): 10'
One Well Volume (gal.): 2.2
Casing ID (in.): 2" Ø

Responsible Personnel: T. ROJAHN
Drilling Company: BOWSER - MORNER
Project Name: NSWC-CRANE
Project Number: 7448
PID Readings: Bore Hole – ppm
PID Readings: Breathing Zone – ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (~~mL/min.~~) (GAL)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1338	–	0	4.33	–	–	–	–	START DEV. (BRN)
1343	5	1	10.22	20.85	6.45	0.559	>1000+	BRN
1348	↓		12.00	20.11	6.24	0.515	>1000	BRN
1353	↓		12.82	19.65	6.25	0.515	>1000	BRN
1358	12		13.58	19.80	6.55	0.526	>1000	BRN
1403	↓		15.05	19.05	6.51	0.508	>1000	BRN
1408	↓		15.64	18.98	6.49	0.510	>1000	BRN
1413	17		16.65	19.15	6.53	0.512	>1000	BRN
1418	↓		*	20.24	6.56	0.506	>1000	BRN
1423	↓		*	20.37	6.48	0.495	700	LT.BRN
1428	21		*	20.59	6.45	0.495	130	SL. Cloudy
1433	↓		*	20.88	6.28	0.495	90	V. SL Cloudy
1438	↓		*	20.93	6.23	0.493	85	" " "
1443	22		*	21.01	6.22	0.495	50	CLEAR

* W.L. below top of pump

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 16MWT20
Site: SWMU 16
Date Installed: 7/28/04
Date Developed: 8/27/04
Dev. Method: SURGE & PURGE
Pump Type: WHALER

Depth to Bottom (ft.): 18.08'
Static Water Level Before (ft.): 5.00'
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.1
Casing ID (in.): 2" Ø

Responsible Personnel: T. ROJAHN
Drilling Company: BOWSER MORNER
Project Name: NSWC-CRANE
Project Number: 7448
PID Readings: Bore Hole – ppm
PID Readings: Breathing Zone – ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (~~mL/min.~~) (Gal)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1221	0	–	5.00 –	–	–	–	–	START PURGE (Grey)
1223	2	1gpm	–	20.57	7.21	0.341	>1000	GREY
1224	3	1gpm	9.80	–	–	–	–	Lt Grey
1228	7	1gpm	15.3	18.99	6.93	0.319	>1000	Grey
1230	9	1gpm	(DRY)	–	–	–	–	RECHARGE (DRY)
1235	↓	–	16.48	–	–	–	–	RECHARGE
1240	↓	–	16.00	–	–	–	–	↓
1245	↓	–	15.71	–	–	–	–	↓
1250	9	–	15.35	–	–	–	–	↓
1251	9	–	–	18.63	7.14	0.244	>1000	RESTART (BRN)
1253	11	1gpm	(DRY)	–	–	–	–	Grey
1258	↓	–	16.75	–	–	–	–	RECHARGE
1303	↓	–	16.48	–	–	–	–	
1308	11	–	16.21	–	–	–	–	RESTART
1308	11	–	–	19.68	6.92	0.217	>1000	Grey
1309	12	1gpm	DRY	–	–	–	–	DRY

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

97.5 Final ~4' of sediment

Well: 16 MW1T21
Site: SWMU 16
Date Installed: 9/9/04
Date Developed: 9/29/04
Dev. Method: Surge & Purge
Pump Type: Waterra

Depth to Bottom (ft.): 93.45 Start
Static Water Level Before (ft.): 67.05
Static Water Level After (ft.): DRY
Screen Length (ft.): 15'
One Well Volume (gal/L): 4.3
Casing ID (in.): 2"

Responsible Personnel: Conti / Ronahn
Drilling Company: B-M
Project Name: NSWC-CRANE
Project Number: 7448
PID Readings: Bore Hole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0730	—	—	—	—	—	—	—	—
0738	3	NA	84.1	13.26	11.87	4.013	>1000	Dark Grey
0746	5	NA	90.5	12.91	11.71	4.423	>1000	" " Added extra tubing pumped out ~4' of sediment
0750	7.5	NA	(DRY)	—	—	—	—	Recharge
0755	↓	NA	94.7	—	—	—	—	↓
0800	↓	NA	94.55	—	—	—	—	↓
0805	↓	NA	94.35	—	—	—	—	↓
0810	7.5	NA	94.28	—	—	—	—	↓
0813	8.5	NA	DRY	13.36	11.88	2.859	>1000	Dark Grey
0818	↓	NA	96.56	—	—	—	—	Recharge
0823	↓	NA	96.49	—	—	—	—	↓
0828	8.5	NA	96.42	—	—	—	—	↓
0830	9	NA	DRY	13.87	11.91	2.620	>1000	Dark Grey
	2 =	in Tubing						
	11 =	Total						

APPENDIX C.8.1
SWMU 16
WATER LEVEL MEASUREMENT SHEETS
ROUND 1

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	CRANE	**Project No.:**	N9060
Location:	CRANE, IN	**Personnel:**	B. Balkovec / T. Rojahn
Weather Conditions:	75 degrees and Sunny	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ____ No _x_	**Remarks:**	SWMU 16

Well or Piezometer Number	Date	Time	Elevation of Top of Inner Pipe (feet)	Total Well Depth From TOC (feet)	Water Level Measurement (feet)	Groundwater Elevation (feet)	Comments
WES-14-01-83	5/5/2003	1757	766.67		31.00	735.67	
WES-14-02-83	5/5/2003	1551	766.54		14.23	752.31	
WES-14-03-83	5/5/2003	1443	763.93		18.80	745.13	
WES-14-04-83	5/5/2003	1437	762.99		26.80	736.19	
WES-14-05-83	5/5/2003	1800	769.40		32.59	736.81	
16MWT01	5/5/2003	1422	764.50		25.19	739.31	
16MWT02	5/5/2003	1433	760.36		6.55	753.81	
16MWT03	5/5/2003	1430	764.41		27.20	737.21	
16MWT04	5/5/2003	1426	766.14		8.05	758.09	
16MWT05	5/5/2003	1428	766.88		29.77	737.11	
16MWT06	5/5/2003	1420	764.44		22.33	742.11	
WES-14-01-83	5/30/2003	1714	766.67		31.00	735.67	
WES-14-02-83	5/30/2003	1654	766.54		14.56	751.98	
WES-14-03-83	5/30/2003	1710	763.93		19.83	744.10	
WES-14-04-83	5/30/2003	1718	762.99		27.27	735.72	
WES-14-05-83	5/30/2003	1716	769.40		33.05	736.35	
16MWT01	5/30/2003	1656	764.50		22.70	741.80	
16MWT02	5/30/2003	1706	760.36		12.18	748.18	
16MWT03	5/30/2003	1704	764.41		28.07	736.34	
16MWT04	5/30/2003	1659	766.14		13.14	753.00	
16MWT05	5/30/2003	1701	766.88		30.39	736.49	
16MWT06	5/30/2003	1658	764.44		15.92	748.52	

*All measurements to the nearest 0.01 foot

APPENDIX C.8.2
SWMU 16
WATER LEVEL MEASUREMENT SHEETS
ROUND 2

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N9060
Location:	SWMU 16	**Personnel:**	T. Rojahn
Weather Conditions:	Partly Cloudy w/ Temp. in the 20s	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ____ No _X_	**Remarks:**	---

Well Number	Date	Time	Reference Point Elevation (feet)	Well Depth (feet)	Water Level Below Reference Point (feet)	Thickness of Product (feet)	Groundwater Elevation (feet)	Comments
WES-14-01-83	1/24/2004	1032	766.67		31.94	NA	734.73	
WES-14-02-83	1/24/2004	0935	766.54		15.36	NA	751.18	
WES-14-03-83	1/24/2004	1047	763.93		20.00	NA	743.93	
WES-14-04-83	1/24/2004	1041	762.99		28.39	NA	734.6	
WES-14-05-83	1/24/2004	1038	769.40		34.18	NA	735.22	
16MWT01	1/24/2004	0945	764.50		19.12	NA	745.38	
16MWT02	1/24/2004	1024	760.36		10.94	NA	749.42	
16MWT03	1/24/2004	1021	764.41		28.34	NA	736.07	
16MWT04	1/24/2004	1015	766.14		13.11	NA	753.03	
16MWT05	1/24/2004	1018	766.88		31.44	NA	735.44	
16MWT06	1/24/2004	0947	764.44		17.41	NA	747.03	
16MWT07	1/24/2004	1003	762.87		Dry	NA	Dry	
16MWT08	1/24/2004	1005	761.56		97.03	NA	664.53	
16MWT09	1/24/2004	1008	764.28		13.88	NA	750.4	
16MWT10	1/24/2004	1010	764.43		22.05	NA	742.38	
16MWT11	1/24/2004	1012	765.24		96.3	NA	668.94	
16MWT12	1/24/2004	1044	755.45		20.13	NA	735.32	
16MWT13	1/24/2004	1025	759.57		10.25	NA	749.32	
16MWT14	1/24/2004	---	Abandoned		Abandoned	NA	Abandoned	
16MWT15	1/24/2004	1026	759.69		53.23	NA	706.46	
16MWT16	1/24/2004	0956	764.74		32.93	NA	731.81	
16MWT17	1/24/2004	1000	766.53		15.35	NA	751.18	
16MWT18	1/24/2004	0951	764.44		96.65	NA	667.79	

* All measurements to the nearest 0.01 foot

APPENDIX C.9.1
SWMU 16
FIELD TASK MODIFICATION REQUEST FORMS
ROUND 1

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE
Project/Installation Name

0279/9060
CTO & Project Number

9060-01
Task Mod. Number

QAPP/SEC. 3.5.4
Modification To (e.g. Work Plan)

SWMUs 13 & 16
Site/Sample Location

MARCH 4, 2003
Date

Activity Description: WELL DRILLING at SWMUs 13 & 16 WAS PROPOSED USING DPT OR hollow STEM AUGER with split spoon SAMPLING ABOVE BEDROCK AND ROTARY DRILLING BELOW BEDROCK.

Reason for Change: THIS ACTIVITY CAN best be ACCOMPLISHED USING SONIC (ALSO REFERRED to AS ROTASONIC) TECHNOLOGY.

THE ADDVANTAGES OF USING SONIC TECHNOLOGY ARE LISTED ON THE ATTACHED SHEET.

Recommended Disposition: INSTALL MONITORING WELLS @ SWMUs 13 & 16 USING SONIC TECHNOLOGY

Terry Rojahn
Field Operations Leader (Signature)

03-04-03
Date

Approved Disposition:

Ralph Pasenski
Project/Task Order Manager (Signature)

3/24/03
Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

ADDVANTAGES TO SONIC TECHNOLOGY

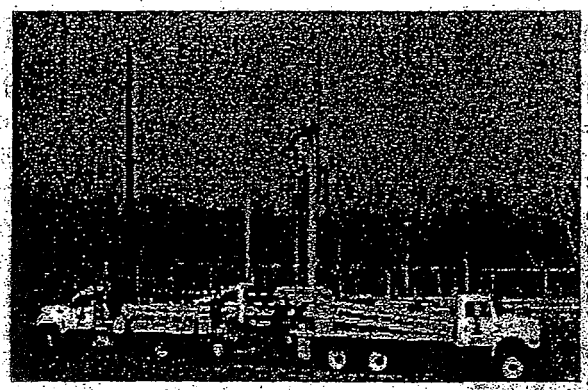
- Improves productivity.
- While drilling is performed a casing is advanced, therefore, eliminating the need for a permanent casing to be installed in the unconsolidated material.
- Drilling provides a continuous core with nearly a 100% recovery rate thus facilitating borehole logging activities.
- Larger sample volume (4-inch diameter by 5-foot long).
- This technology produces a cleaner hole thus enhancing well development.
- Produces less IDW.
- It can be set up for DPT.

Sonic Technology Description

Bowser-Morner's four sonic rigs are among the newest on the market. While actual depth capability in various formations is unkown, these 'new and improved' rigs are capable of advancing in excess if 400' using 4", 6", 8", 10" or 12" sonic tooling. A brief discussion of Sonic technology follows.

A sonic drill uses high frequency mechanical oscillations, developed in the special drill head, to transmit resonant vibrations and rotary power through the drill tooling to the drill bit, allowing it to achieve exceptional drilling penetration rates without the need for drilling fluids or air to effectively take overburden core samples. This is accomplished by the oscillator's conversion of centrifugal force generated by counter rotating, chambered rollers to sinusoidal or longitudinal force. Frequencies in excess of 180 Hz (as previously mentioned) are generated. These frequencies match the natural frequency of the drill tooling, causing no dampening of the vibratory wavelength to the bit. Therefore, this sonic vibratory action fluidizes the soil particles, destroying the shear strength and pushing the particles away from the tip of the drill bit and along the sides of the drill string. This liquefaction process allows for clean, rapid and smooth penetration of overburden formations.

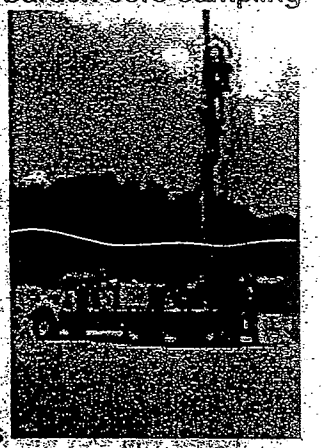
This unique methodology allows the machine to perform overburden and even bedrock core sample drilling with speed, precision, and an absolute minimal amount of disturbance and compaction that cannot be accomplished by any other equipment.



One of the main advantages of the sonic drill is its superior ability to produce continuous core samples of both unconsolidated and consolidated formations with significant detail and accuracy. The core samples can be analyzed to provide a precise and detailed stratigraphic profile of any overburden condition including dry or wet saturated sands and gravels, cobbles and boulders, clays, silts and hard tills. Recovery of a sample is as consistently close to 100% as any other boring

methodology.

The sonic rig also utilizes a dual line of drill pipe. The inner string of drill rods has the core barrel(s) attached. All overburden core sampling is done ahead of the outer string of drill casing with no fluid or air added to insure accurate, representative, undiluted samples. After the core barrel has been advanced, the outer drill casing is advanced to the same depth. This can best be accomplished with water; however, dry casing advancement methods can also be employed and are often performed by Bowser-Morner. With the outer casing left in place to hold the hole open, the core barrel is then removed from the borehole. The core sample can then be extracted into plastic sleeves, stainless steel sample trays, wooden core boxes or virtually any container. The outer drill casing ensures there is no sample contamination from uphole material by sealing it off prior to each sample run.



Also, when water use is permitted for casing advancement, it is by far the quickest and most effective means of combating heaving sands without the use of drilling mud or bentonite.

The outer casing also serves to hold the borehole open for installation of monitoring wells, piezometers, vents, observation wells, instrumentation or other downhole equipment. The outer drill casing has nominal diameters of 6" and 8", allowing ample space to install 2" and 4" wells with a 1" or 1 1/4" tremie pipe to place sand packs, seals, slurries and grouts into the annular space between the well screen/riser and the outer casing and borehole annulus. The drill bits used on the outer drill casing are open and are 5 7/8" through 8 1/2" diameter depending on borehole size requirements.

Another unique feature of the Sonic drilling method is the ability to ensure the filter pack and bentonite chip or pellet seal can actually be compacted into the borehole annulus by the resonant vibration applied to the outer casing as it is extracted from the borehole with the well screen and riser, pack, seal and grout or slurry installed in the annular space. The vibratory effect makes "bridging" unheard of and virtually eliminates the potential problem of locking the well and pulling it back as the outer casing string is extracted. This positive placement of well backfill materials allows for very controlled and quick well installations. Coupled with the lack

of cuttings slurry, such as in auger drilling, this positive placement greatly reduces well development time and increases well yields.

As required, the Sonic can retrieve thin wall (Shelby) or lined split spoon samples for lab analysis. Another feature is the ability to vibrate a two-inch drive point screen on the end of drill rods with an inflatable packer to seal off the casing. Then, a submersible pump can be lowered in the drill rods to evacuate x volumes of water before collecting a water sample.

Other features of the rig are:

1. It can be set up for conventional air coring;
2. It can drill hard bedrock by conventional air rotary or downhole hammer methods;
3. It can also be operated as a straight fluid rotary machine;
4. It can core through rocks and boulders and most bedrock formations;
5. Due to the liquefaction principal, it produces a fraction of the drill cuttings and fluids that other methods produce.

The speed, efficiency, superior sampling procedure, depth capacity, safety, reduction of drill cuttings and fluids, and the versatility of the Sonic machine make it a very cost effective and productive way of drilling, sampling, and installing.

Applications include environmental borings, installation of monitoring wells, aggregate exploration (ideal with the large diameter sample to significant depths), rock exploration, methane probes, conductor casing installation, extraction wells, instrumentation and virtually any other application < 12" in diameter and 500' in depth. We have also set up the Sonic for angle borings up to 45. Our Sonic Rig can advance a borehole up to 18" in diameter with some modifications, such as fabrication of an appropriate-sized trash barrel, customized rod make up/break-out, etc.

With the addition of Sonic capability, Bowser-Morner has acquired the latest technology to the subsurface industry and shown its 'commitment to excellence' once again in meeting customers' needs.

Boring, Sampling and Testing Rigs and Equipment

Environmental || Geotechnical and Mineral || Other Applications || Sonic Technology Applications
Well Rehabilitation Services

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/9060	9060-02
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/SEC. 3.5.4	SWMUS 13 & 16	MARCH 4, 2003
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: Work plan states that bentonite pellets be allowed to hydrate for at least 3 hours before grout is added to the hole.

Reason for Change: To shorten the time allowed for hydration of bentonite pellets. Waiting 3 hours is not necessary if a high-solids bentonite is used in lieu of a cement/bentonite mix.

Recommended Disposition: After 3 feet of bentonite pellets are placed above the sand pack, allow pellets to hydrate for 1 hour before grout mix is added. Then instead of cement/bentonite mix, use a 30% high solids bentonite mix to approximately 4 feet below ground surface. This one hour wait is sufficient based on conversations w/ bentonite supplier and paper by Jim Papp.

Terry Rogers — 03-04-03
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph Ramirez — 3/21/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

VOCs as indicated by the PID reading). The duplicate samples should be placed in the same type of containers and handled in the same manner as the regular soil samples. The duplicate samples will be given unique QC sample identifications (see SOP CTO166-02). One rinsate blank will be collected for every 10 soil samples. For soil samples, the rinsate blank will consist of running distilled water over a decontaminated sampling spoon into a decontaminated mixing bowl. This water will be used to fill sample bottles for the rinsate blank. This process will continue until all the necessary bottles are filled for the rinsate sample (see Tables 3-3 and 3-16).

Soil borings will be backfilled with either the soil cuttings (if uncontaminated) or bentonite pellets (if contaminated) in accordance with Section 3.11.

When a boring has been sampled and backfilled, it will be identified by a tall wooden lath driven into the soil near the boring; a 2-by-2-inch inch wooden stake will be driven into the center of the backfilled boring. The stake and the lath will both have brightly colored flagging attached to them to increase visibility, and both will be labeled using a waterproof marker with a unique soil boring number, corresponding to the boring log containing the survey data for the boring.

3.5.3 Inspection and Repair of Existing Monitoring Wells

Existing monitoring wells at SWMU 16 (WES-14-01-83 through WES-14-05-83) will be sampled as part of this investigation. These wells may have broken casings, bent casings, missing caps, no locks, broken locks, obstructions, and other problems. In addition, it is likely that some of the wells may contain enough sediment at the bottom that the well screen may be partially or totally clogged. Therefore, at the beginning of field activities, the existing wells will be located, inspected, and repaired if possible. For example, broken or bent polyvinyl chloride (PVC) riser pipes above the ground surface will be sawed off and new riser pipes will be added. Caps and locks will be replaced if necessary. The height of casing above ground surface and the depth to the bottom of the well will be measured and recorded. This information will be compared to the boring logs and well construction logs to confirm that the wells are open through the screen interval. These activities are addressed in SOP CTO166-09. Each of the existing wells will need to be redeveloped (see SOP CTO166-10) before any sampling can occur. After sampling all existing wells will be resurveyed.

3.5.4 Well Drilling and Installation

A total of 57 shallow wells will be installed at SWMUs 12, 13, and 16, and 30 wells may be installed at SWMU 19 as part of this investigation. Shallow well borings that do not encounter bedrock will be drilled

using DPT or hollow-stem auger drilling with split-spoon soil sampling. In some locations at SWMUs 12, 13, and 16, bedrock may be reached before shallow ground water is encountered. At these locations, monitoring wells will be completed as bedrock installations using rotary drilling.

At SWMUs 12, 13, and 16, where bedrock well installations are anticipated, up to two (SWMU 16) or four (SWMUs 12 and 13) well borings will be continuously sampled using hollow-stem auger drilling with split-spoon soil sampling or DPT through the soil until bedrock is reached; this will be continued with rotary coring to the final depth (minimum 2-inch-diameter samples). The soil samples and bedrock cores should provide an accurate characterization of stratigraphy, fracture distribution, and other features of the soil and rock units spanning the study area. Procedures for drilling and logging a boring in rock are included in SOP CTO166-11. After these holes have been cored, they will be enlarged to a minimum diameter of 5 inches using an air rotary drill rig. Remaining borings that extend into bedrock will be drilled using air rotary methods. Geologic logging of these borings will be based on the rock chips brought up with the circulating air (SOP CTO166-11). In addition, the rates of water produced during drilling will be carefully observed in order to identify rock zones that might be fractured and have above-average permeability characteristics. Drilling standby may be required to monitor for the presence of ground water.

Either a temporary steel casing or hollow-stem auger flights will be placed through the overburden and into the bedrock to minimize collapse and to minimize downward vertical contaminant migration during drilling of the bedrock borings. The temporary casings or auger flights will be removed just after the installation of the permanent PVC riser pipe, sand pack, and bentonite pellet seal; and immediately before installation of the ~~cement-bentonite grout.~~ high solids bentonite mixture

At least three each of the shallow well borings at SWMUs 12, 13, and 16 (to be identified by the field geologist) will be sampled continuously through the overburden, using either DPT or split-spoon sampling, until the total depth is reached or bedrock drilling is conducted. The remaining shallow well borings may be sampled at 5-foot intervals or as determined by the field geologist. Bedrock drilling, if required in the shallow well borings, can be conducted using a conventional rotary drilling with a roller bit and water wash.

A permanent monitoring well will be installed in each of the well borings. The wells will be constructed of 2-inch-diameter, Schedule 40, flush joint, PVC riser pipe and slotted screen (see SOP CTO166-12). In each well, the screen will be 10 feet long and have a slot size of 0.02 inch (factory slotted). All riser pipe and screen sections will be new and certified clean. Each well will consist of slotted screen and enough solid riser pipe above so that the riser will extend approximately 2.5 feet above the ground surface.

(20 to 40 Sieve Size)

A sand filter pack will be placed around the annulus of the well screen, from the bottom of the hole upward to 3 feet above the top of the well screen. Three feet of bentonite chips will be placed above the sandpack, and they will be allowed to wet and expand for at least ~~2 hours~~ 1 hr before bentonite grout is added to the hole. After at least ~~2 hours~~ 1 hr has elapsed, the remainder of the well annulus will be filled up to the ground surface with a ~~cement bentonite grout~~ mixture. A tremie pipe will be used to place ~~grout~~ the high solids mixture in the well annulus to help ensure a good seal ~~around the well annulus~~. 30% high solids bentonite to approximately 4 feet bgs. The remainder of the annulus will be a pure bentonite grout. An outer, black steel protective casing will be installed around the PVC casing. The outer casing will extend at least 2 feet below the ground surface and no more than 4 inches above the inner PVC well cap. The steel casing will have a hinged cap, or removable cap, and a padlock. A 6-inch-thick, 4-by -4-foot concrete surface pad will be placed around the well at the ground surface. In addition, ~~three~~ five barrier posts will be installed around the concrete pad. Details regarding well construction sand pack and grout materials, the outer protective casing, the well pad, and the protective barrier posts are included in SOP CTO166-12.

3.5.5 Packer Testing of Uncased Borings

At SWMUs 12, 13, or 16, where bedrock well installations are anticipated, the cored well borings may also be packer tested. The decision to perform packer testing will be based on information collected during drilling (fractures, water yield, and/or total footage cored) that would warrant a more detailed evaluation of specific water-yielding zones in the bedrock. A double inflatable packer assembly attached to the drill string of the drilling rig will be used to hydraulically test specific sections of each new uncased boring. The procedures for conducting a packer test are presented in SOP CTO166-13. The packer assembly will be thoroughly decontaminated before being placed in a boring. The inflatable packers will be set 5 to 10 feet apart (i.e., the vertical section of rock tested in a single test is 5 to 10 feet). The packer assembly will be lowered down the boring so that the packers isolate a section of the hole that was identified during drilling as being fractured or yielding above-average rates of ground water. Two to three different zones will be tested for each hole, as determined by the field geologist. The number and depths of the zones to be tested will be determined by the FOL, and lead field geologist based on their best judgment.

The packer tests will be the pump-out type, where ground water is pumped out of the hole from the isolated section of boring. A pump positioned between the two packers will pump water out of the packed-off interval. Thus, no external water will be introduced to the holes during the packer tests. The flow rate of water discharging from the pump and the hydraulic pressure within the pack-off interval will be measured frequently during the test. The pumping rate will be held nearly constant. Initially, the pumping rate will be at a low level (e.g., 1 gallon per minute or less). If this pumping rate can be sustained for 15 minutes and the water level stabilizes, then the rate will be increased to about 5 gallons per minute.

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279 / 9060	9060-03
Project/Installation Name	**CTO & Project Number**	**Task Mod. Number**
QAPP / TABLE 3-1 SEC. 3.5.7	SWMUS 13 & 16 GROUNDWATER & SURFACE WATER	MARCH 4, 2003
Modification To (e.g. Work Plan)	**Site/Sample Location**	**Date**

Activity Description: FIELD MEASUREMENTS FOR NITRATE IN groundwater (found in SECTION 3.5.7) were to be ACCOMPLISHED USING A HACH FIELD TEST KIT AS PRESENTED IN TABLE 3-1 OF the QAPP.

Reason for Change: Nitrate ANALYSIS will be performed by A FIXED BASE LAB for All groundwater and surface WATER SAMPLING locations at SWMUS 13 & 16. For consistency nitrate will be analyzed in SURFACE WATER to ESTABLISH A possible link with groundwater.

Recommended Disposition: FIELD ANALYSIS OF nitrate will not be necessary SINCE nitrate will be ANALYZED by A FIXED BASE LAB.

Terry Rosko — 03-04-03

Field Operations Leader (Signature) — **Date**

Approved Disposition:

Ralph Pharmakis — 3/24/03

Project/Task Order Manager (Signature) — **Date**

Distribution:

Program/Project File --
Project/Task Order Manager --
Field Operations Leader --

Other: _____

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE Project/Installation Name	0279/9060 CTO & Project Number SWMUS 13 & 16	9060-04 Task Mod. Number
QAPP (SEC. 3.5.10 Modification To (e.g. Work Plan)	SURFACE WATER Site/Sample Location	MARCH 4, 2003 Date

Activity Description: QAPP states that A filtered surface water sample collected for dissolved metals analysis is to be drawn into a plastic syringe and forced through a 0.45-µm filter cartridge directly into a sample container.

Reason for Change: SOP CTO166-19 states that new, clean, disposable tubing and a 0.45µm filter will be used in combination with A peristaltic pump @ EACH SURFACE WATER SAMPLING LOCATIONS. Also, given the fact that the dedicated filter should be pre-rinsed w/ sample water and the volume of sample REQUIRED the peristaltic pump is the better method.

Recommended Disposition: Follow NSWC CRANE SOP CTO166-19

Terry Rosik — 03-04-03
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph Ramsler — 3/4/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/9060	9060-05
Project/Installation Name	**CTO & Project Number**	**Task Mod. Number**
QAPP / SEC. 3.4.2 TABLE 3-5	Groundwater @ SWMUs 13 & 16	March 4, 2003
Modification To (e.g. Work Plan)	**Site/Sample Location**	**Date**

Activity Description: SEC. 3.4.2 states that one rinsate sample will be collected and analyzed each day... Table 3-5 reflects a rate of 1 per 10 samples with a min. of one per day of sampling.

Reason for Change: Historically @ CRANE the frequency of rinsate blanks through bladder pumps has been 1 per 5 samples. Additionally, if a peristaltic pump is used to purge & sample some of the monitoring wells then one batch blank on the dedicated disposable equipment used was considered sufficent. Note: U.S. EPA Region 5 RCRA QAPP guidance says field blank (ie rinsate) frequency = 1/10 TEB 3-5-03

Recommended Disposition:
Bladder pump rinsate frequency = 1 per 5 samples.
Peristaltic pump = Batch blank on disposable equipment (i.e., all tubing & filter lots).

Terry Rogers — March 4, 2003
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph Ramsey — 3/24/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC Crane	0279/9060	9060-06
Project/Installation Name	**CTO & Project Number**	**Task Mod. Number**
QAPP/Table 3-2 pg 33	SWMUs 13 & 16	March 18, 2003
Modification To (e.g. Work Plan)	**Site/Sample Location**	**Date**

Activity Description: Ammonia is listed under Miscellaneous Parameters to be analyzed for in soils for SWMU 13.

Reason for Change: Ammonia should not be analyzed in soils for SWMU 13.

Recommended Disposition: Remove Ammonia from analyses for soils for SWMU 13

Edward Sedlmyer — 3/18/03

~~Field Operations Leader~~ (Signature) — Date

Project Chemist

Approved Disposition:

Ralph Pharaoshi — 3/21/03

Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File
Project/Task Order Manager --
Field Operations Leader --

Other: _____

TABLE 3-2

SUMMARY OF SOIL SAMPLES AND LABORATORY ANALYSES
CTO 168
NSWC CRANE, CRANE, INDIANA
PAGE 2 OF 7

	Parameters [1]	Volatiles [2]		Semivolatiles			Explosives		Dioxin	Dyes	PCBs	Metals		Miscellaneous Parameters					
Description	Sample ID	SW-846 8260B	SW-846 8015B	SW-846 8270C	Selected Ion Monitoring	SW-846 8151A	SW-846 8330	Picrates	SW-846 8290	NSWC Crane	SW-846 8082	Metals SW-846 6020	Mercury SW-846 7471A	Cyanide	Perchlorate	TOC	CEC	pH	Ammonia
13SB03	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB04	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB05	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB06	0-2 ft bgs	1	1	1	1	1			1		1								
	0-4 ft bgs	1	1	1	1	1			1		1								
13SB07	0-2 ft bgs															1	1	1	1
	above water table															1	1	1	1
13SB08	0-2 ft bgs															1	1	1	1
	above water table															1	1	1	1
13SB09	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB10	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB11	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB12	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB13	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB14	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB15	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
13SB16	0-2 ft bgs			1	1	1			1		1								
	0-4 ft bgs			1	1	1			1		1								
Total Samples SWMU 13		2	2	28	28	28	0	0	28	0	28	0	0	0	0	4	4	4	4 0
SWMU 16																			
16SB01	0-2 ft bgs	1	1	1	1	1	1	1			1	1	1						
	TBD	1		1	1	1	1	1			1	1	1						
16SB02	0-2 ft bgs	1	1	1	1	1	1	1			1	1	1			1	1	1	
	TBD	1		1	1	1	1	1			1	1	1			1	1	1	
16SB03	0-2 ft bgs	1	1	1	1	1	1	1			1	1	1						
	TBD	1		1	1	1	1	1			1	1	1						
16SB04	0-2 ft bgs	1	1	1	1	1	1	1			1	1	1						

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC Crane	0279/9060	9060-07
Project/Installation Name	**CTO & Project Number**	**Task Mod. Number**
QAPP/Table 3-16 pg 60	SWMUs 13 & 16	March 18, 2003
Modification To (e.g. Work Plan)	**Site/Sample Location**	**Date**

Activity Description: Nitrate/Nitrite and Ammonia analyses are missing from Table 3-16.

Reason for Change: To complete Table 3-16

Recommended Disposition: Add Nitrate/Nitrite and Ammonia analyses to Table 3-16.

Ed Sedlmyer — 3/18/03

Field Operations Leader (Signature) — **Date**

Project Chemist

Approved Disposition:

Ralph Rasmussen — 3/21/03

Project/Task Order Manager (Signature) — **Date**

Distribution:

Program/Project File –
Project/Task Order Manager
Field Operations Leader –

Other:

TABLE 3-16

SUMMARY OF SAMPLE ANALYSES, CONTAINER TYPES AND VOLUMES, PRESERVATION REQUIREMENTS, AND HOLDING TIMES FOR AQUEOUS SAMPLES
CTO 166, NSWC CRANE
PAGE 1 OF 2

Parameter	Analyte/Methodology	Sample Container	Container Volume	Preservation[1]	Maximum Holding Time[2]
Explosives	Explosives SW-846 8330	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
	Picric and Picramic Acid Laucks HPLC Method	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
Metals	Total SW-846 6020, 7470A	Polyethylene, plastic cap w/ plastic liner	1000 mL	HNO_3 to pH <2	Within 180 days; mercury within 28 days
	Dissolved SW-846 6020, 7470A	Polyethylene, plastic cap w/ plastic liner	1000 mL	HNO_3 to pH <2	Within 180 days; mercury within 28 days
Volatiles	SW-846 8260B	Glass, black phenolic plastic screw cap, Teflon-lined septum	(6) 40 mL	Cool to 4 °C, dark, zero headspace, HCl to pH <2	14 days to analysis
	SW-846 8015B	Glass, black phenolic plastic screw cap, Teflon-lined septum	(6) 40 mL	Cool to 4 °C, dark, zero headspace, HCl to pH <2	14 days to analysis
Semivolatile	SW-846 8270C	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
	Selective Ion Monitoring SW-846 8270C	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
	PCP and Hexachlorophene SW-846 8151A	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
PCBs	PCBs SW-846 8082	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
Dyes	NSWC Crane	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
Dioxin	SW-846 8290	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C	Extraction 30 days; analysis within 45 days of extraction
Perchlorate	EPA Method 314.0	Polyethylene, plastic cap w/ plastic liner	500 mL	Cool to 4 °C, dark	28 days to analysis
Nitrate/nitrite	EPA Method 353.2	"	"	"	"
Ammonia	EPA Method 350.1	"	"	"	"

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/9060	9060-08
Project/Installation Name	**CTO & Project Number**	**Task Mod. Number**
QAPP / FIGURES 3-2 & 3-3	SWMU 5 13 & 16	6-09-03
Modification To (e.g. Work Plan)	**Site/Sample Location**	**Date**

Activity Description: UPON receipt of the actual survey data the surveyed sample locations were compared to the proposed sample locations.

Reason for Change: Significantly shifted sampling locations are addressed individually in the attached table. At SWMU 16 all other minor shifts (≤35') were representative of the area to be sampled. These locations were measured in (not surveyed) and shifted due mainly to line of sight obstructions (e.g. railroad cars, trees, magazine, etc.)

Recommended Disposition: NA

Terry Royal — 6-09-03
Field Operations Leader (Signature) — **Date**

Approved Disposition:

Ralph Pasquale — 6/10/03
Project/Task Order Manager (Signature) — **Date**

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other –

SAMPLING LOCATIONS SHIFTED SIGNIFICANTLY (50 FEET OR MORE) FROM THE PROPOSED LOCATION AS A RESULT OF A FIELD DECISION

SAMPLING LOCATION	DIRECTION MOVED	DISTANCE MOVED	REASON(S) MOVED
13MWT01	NE	~50'	(1)
13MWT02	SE	~50'	(2) & (3)
13MWT04	SW	~120'	(1)
13MWT06	SW	~60'	(2)
13MWT08	NNE	~70'	(4)
13MWT09	W	~190'	(5)
13MWT11	NE	~60'	(2)
13MWT14	SE	~90'	(3)
13MWT15	SE	~50'	(6)
13MWT19	SSE	~120	(3)
13MWT20	N	~100'	(5)
13MWT21	SW	~60'	(2) & (3)
13MWT25	NW	~60'	(2) & (3)
13SW/SD03	S	~140'	(7)
13SW/SD04	SE	~50'	(8)
13SW/SD05	NW	~100'	(5)
13SW/SD06	NW	~80'	(5)
13SW/SD07	NW	~60'	(5)
13SW/SD08	SE	~70'	(8)
13SW/SD09	SW	~70'	(7)
13SW11	E	~60'	(5) & (7)
13SW/SD09	NW	~50'	(7)
13SD21	SE	~60'	(9)
13SB07	E	~50'	(10)
16SD11	WSW	~160	(5)

(1) Moved to avoid steep terrain
(2) Moved to avoid possible underground utilities
(3) Moved to avoid a congested area (surface obstructions, above ground utilities, traffic hazards, parking lot, etc.)
(4) Moved to avoid wet terrain and possibly immobilize the drilling rig
(5) Moved sampling location closer to the possible contamination source
(6) Moved to avoid disturbing a riparian woodlot
(7) Moved location were a sufficient amount of aqueous sample could be collected
(8) Moved location to include stream's confluence with nearby stream receiving run off from study area
(9) Moved location were a sufficient amount of depositional material could be collected, also paced in location
(10) Moved sampling location down gradient of debris pile

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/9060	9060-09
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/SEC.3.4.2.3	SWMU 16	6-09-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: "Cast High Explosives Fill Ground Water Sampling" Five monitoring wells were proposed for installation - However, six monitoring wells were drilled & installed

Reason for Change: Monitoring Well 16MW101 - upon completion of development (4-15-03) and purged (4-21-03) the well was sampled on 4-22-03 but only produced enough water for VOAs and was still dry on 4-23-03.

Recommended Disposition: Because of the extremely slow recharge rate of monitoring well 16MW101 an additional well (16MW106) was installed next to 16MW101. Monitoring well 16MW106 was installed on 4-24-03 to replace monitoring well 16MW101. This had to be accomplished quickly, to take advantage of the on site HSA track drilling rig brought onsite to install 13MW113.

Terry Moak — 6-09-03
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph Rasmussen — 6/10/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279 / N9060	9060-10
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP / TABLE 3-2	SWMUs 13 & 16	6-09-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: TABLE 3-2 showed the Summary of Soil Samples to be collected at SWMUs 13 & 16.

Reason for Change: A shallow REFUSAL occurred at the following soil borings: 13SB14, 16SB03-10, 16SB14-16, 16SB20, 16SB21, 16SB31, 16SB35 and 16SB37. Thus resulting in the collecting of only the SURFACE soils @ the above soil boring locations.

Recommended Disposition: NA

FOR FURTHER INFORMATION SEE the Boring Logs in Appendix A.

Terry Rogers — Field Operations Leader (Signature) — Date: 06-09-03

Approved Disposition:

Ralph Pierantoni — Project/Task Order Manager (Signature) — Date: 6/10/03

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

TETRA TECH NUS

FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/N9060	9060-11
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/TABLE 3-11	SWMU 16	6-10-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: TABLE 3-11 SHOWED the SUMMARY of SURFACE WATER SAMPLES to be collected @ SWMU 16.

Reason for Change: The only SURFACE WATER locations with a sufficient amount of SURFACE WATER available for collection occurred @ 16SW01 (North Sump), 16SW02 (East Sump) & 16SW07 (West Sump).

Recommended Disposition: SURFACE WATER @ locations 16SW03-06 WERE NOT collected. Sampling locations 16SW03-06 ranged FROM completely dry to one location with less than ½" OF Stagnet WATER FOUND in ruts.

Field Operations Leader (Signature) — Date: 6-10-03

Approved Disposition:

Project/Task Order Manager (Signature) — Date: 6/10/03

Distribution:

Program/Project File
Project/Task Order Manager
Field Operations Leader

Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE — Project/Installation Name
0279/N9060 — CTO & Project Number
9060-12 — Task Mod. Number

QAPP / TABLE 3-13 — Modification To (e.g. Work Plan)
SWMUs 13 & 16 — Site/Sample Location
06-10-03 — Date

Activity Description: TABLE 3-13 SHOWED the SUMMARY OF SEDIMENT SAMPLES to be collected @ SWMUS 13 & 16. One Extra sediment sample was collected @ SWMU 13 & three sediment sump samples WERE not collected @ SWMU 16.

Reason for Change: Location 13SD23 was added to check the drainage ditch @ the northern portion of SWMU 13. No sediment was found in any of the three sumps (16SD01, 02 & 03) @ SWMU 16 and therefor not collected. However, A sediment sample (16SD02) was collected in the drainage ditch which formerly received discharge water from the EAST sump.

Recommended Disposition:
Same as discussed above.
Replaced sump sample 16SD02 with sediment sample collected from an adjacent drainage ditch.

Field Operations Leader (Signature) — Date: 06-10-03

Approved Disposition:

Project/Task Order Manager (Signature) — Date: 6/10/03

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –
Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279 / N9060	9060-13
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP / SEC. 3.5.12	SWMUS 13 & 16	6-10-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: STAFF GAUGE INSTALLATION and Estimation of Stream Flow: TEN staff gauges were installed @ SWMU 13. No staff gauges were installed @ SWMU 16 since NO SURFACE WATER flow WAS observed in any of the drainage ditches during the ENTIRE FIELD ACTIVITY.

Reason for Change: At SWMU 13 stream flow couldn't be physically MEASURED USING QAPP SOP CTO 166-21 due to nature of the streams & drainage ditches encountered @ SWMU 13. The physical ASPECTS of the streams & drainage ditches included - heavy grass encroachment, Extremely shallow water, rocks, narrow width, etc.

Recommended Disposition: All staff gauges were associated with culverts and the flow rate was estimated @ EACH of the 10 culverts selected as staff gauges. Only one round of staff gauges were taken since the field activities @ SWMU 13 didn't extend into the dry season.

Field Operations Leader (Signature) — Date: 6-10-03

Approved Disposition:

Project/Task Order Manager (Signature) — Date: 6/10/03

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	279 9060	9060-14
Project/Installation Name	CTO & Project Number	Task Mod. Number
GAPP/SECT. 3.5.5	Summit 13-16	6-13-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: PACKER TESTING WAS NOT PERFORMED AT SUMMIT 13 OR SUMMIT 16

Reason for Change: IT WAS FOUND THAT PACKER TESTING WAS NOT NECESSARY SINCE OUR OBJECTIVE WAS TO INSTALL OUR MONITORING WELLS BASED ON FIRST WATER ENCOUNTERED, NOT A HIGH YIELDING ZONE.

Recommended Disposition: ACCEPT MODIFICATION AS NOTED.

Field Operations Leader (Signature) — Date: 6-13-03

Approved Disposition:

Project/Task Order Manager (Signature) — Date: 6/13/03

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

APPENDIX C.9.2
SWMU 16
FIELD TASK MODIFICATION REQUEST FORMS
ROUND 2

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE
Project/Installation Name

0279 / 9060
CTO & Project Number

#1 (Round 2)
Task Mod. Number

QAPP
Modification To (e.g. Work Plan)

SWMU 13 & 16
Site/Sample Location

Date
13GWT3501 - 12/10/03
13GWT4101 - 11/23/03
16GWT0801 - 12/6/03
16GWT1101 - 12/6/03

Activity Description: SEE SECTION 3.5.7 REGARDING "LOW-FLOW SAMPLING OF MONITORING WELLS"

Reason for Change: DUE TO EXTREMELY SLOW RECHARGE RATES THE USE OF BLADDER PUMPS IN SOME DEEP WELLS WAS ABANDONED. SEVERE DRAWDOWN OCCURRED DURING THE PURGE, THUS TAKING HOURS FOR LIFT OF RECHARGE. ADDITIONALLY, WELLS DRIED OUT MANY TIMES DURING SAMPLE COLLECTION - RENDERING BLADDER PUMPS USELESS.

Recommended Disposition: USED DISPOSABLE TEFLON BAILERS TO SAMPLE SELECTED DEEP WELLS (THOSE WITH EXTREMELY SLOW RECHARGE RATES). ADDITIONALLY, MINIMUM SAMPLE VOLUME WAS COLLECTED PER ANALYSIS AND THE PARAMETERS COLLECTED WERE PRIORITIZED.

Terry Rosick
Field Operations Leader (Signature)

MARCH 2, 2004
Date

Approved Disposition:

Ralph Rhoads
Project/Task Order Manager (Signature)

3/2/04
Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

APPENDIX C.10.1
SWMU 16
EQUIPMENT CALIBRATION LOGS
ROUND 1

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: PHOTOVAC

SITE NAME: SWMU 13 & SMWU 16

MANUFACTURER: U.S. ENVIRONMENTAL

PROJECT No.: N9060 CTO 0279

SERIAL NUMBER: ED HK 321

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
3/25/03	ED HK 321	B BAUKOVEC	0.0	0.0	100.0	100.0	00210-03	
3/26/03	"	"	"	0.0	"	100.0	"	
3/27/03	"	"	"	0.0	"	100.0	"	
3/28/03	"	"	"	0.0	"	100.0	"	
3/29/03	"	"	0.0	0.0	100.0	100.0	"	
3/30/03	"	"	"	0.0	100.0	99.9	"	
3/31/03	"	"	"	0.0	100.0	100.0	"	
4/1/03	"	"	"	0.0	100.0	100.0	"	
4/2/03	"	"	"	0.0	100.0	100.0	"	
4/3/03	"	"	"	0.0	100.0	100.0	"	
4/4/03	"	"	0.0	0.0	100.0	100.0	"	
4/5/03	"	"	0.0	0.0	100.0	99.9	"	
4/6/03	"	"	0.0	0.0	100.0	100.0	"	
4/7/03	"	T. MOJAN	0.0	0.0	100	100	"	
4/8/03	"	B BAUKOVEC	0.0	0.0	100	100	"	
4/9/03	"	"	0.0	0.0	100	100	"	
4/14/03	"	"	0.0	0.0	100	100	"	
4/15/03	"	"	0.0	0.0	100	100	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: PHOTOVAC

SITE NAME: SWMU 13 & SMWU 16

MANUFACTURER: U.S. ENVIRONMENTAL

PROJECT No.: N9060 CTO 0279

SERIAL NUMBER: EO JK 303

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Calibration	Calibration	Calibration	Calibration		
3/25/03	EO JK303	B. PALKOWITZ	0.0	0.0	100.0	100.0	0024003	350 100 ppm
3/26/03	"	"	0.0	0.0	100.0	99.9	"	
3/27/03	"	"	0.0	0.0	100.0	100.0	"	
3/28/03	"	"	0.0	0.0	100.0	100.0	"	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: YSI 6920

SITE NAME: SWMU 13 & 16

MANUFACTURER: YSI

PROJECT No.: N9060 CTO 0279

SERIAL NUMBER: 01L0707AC

Date of Calibration	Person Performing Calibration	INITIAL CALIBRATION PH	COND	ORP	DO	NA	NA	CALIBRATION CHECK PH	COND	ORP	DO	NA	NA	Calibration Standard (Lot No.)	Remarks and Comments
3/29/03	TR	7.0 4.0	1000 uS/cm	100 mV	CHECK	....	....					....	....	7.0 2800 8/23/03 4.0 2760 8/07/03	1000 LOT 2393 EXP 12/11/03 ORP 3119 5/6/03
3/30/03	TR					....	....	OK	OK	OK		....	....		
4/10/03	TR	Re Calibrate				....	....					....	....	SAME	Stands & lot #s etc
4/11/03	TR	→				....	....					....	....	→ OK	check Cali.
4/12/03	TR	→				....	....					....	....	→ "	" "
4/13/03	TR	→				....	....					....	....	→ "	" "
4/15/03	TR		CHECK		CALI	....	TUES. morning will Cali. NEXT shift								(OK)
4/21/03	TR	7.0 4.0	1000 mS/cm	100 mV	8.78 OK	→						→		7.0 3100 4/22/03 4.0 3127 5/15/03	1mS/cm: 3383 12/11/03 ORP: SAME AS ABOVE
4/22/03	TR		CHECK		CALI.	....	EVERYthing OK →					....	→	Good	Same solutions AS Above
4/23/03	BB		CHECK		CAL.	....	1630		EVERYTHING O.K.			....	....	"	
4/24/03	TR		"		"	....	1830			"	"	....	....	"	"
4/25/03	TR	→				....	....					....	....	→ "	"
4/26/03	TR	→				....	....					....	....	→ "	"
4/27/03	TR	→				....	....					....	....	→ "	"
4/28/03	TR	→				....	....					....	....	→ "	"
4/29/03	TR	→				....	....					....	....	→ "	"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: YSI 6920

SITE NAME: SWMU 13 & 16

MANUFACTURER: YSI

PROJECT No.: N9060 CTO 0279

SERIAL NUMBER: 01L070704

Date of Calibration	Person Performing Calibration	INITIAL CALIBRATION PH	COND	ORP	DO	NA	NA	CALIBRATION CHECK PH	COND	ORP	DO	NA	NA	Calibration Standard (Lot No.)	Remarks and Comments
5/6/03	T.R.	7.0 4.0	1000 uS/cm	100 mV		....	....				Change of membrane	....	....	7.0 3106 4/22/03 4.0 3129 5/15/04	1mS/cm 3393 12/1/02 ORP: 3113 5/6/03
5/7/03	T.R					....	....					....	....	Cal. Check (OK)	
5/8/03	BB					....	....					....	....	CAL CHECK (OK)	
5/9/03	BB					....	....					....	....	CAL CHECK (OK)	
5/11/03	BB					....	....					....	....	CAL CHECK (OK)	
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		
						....	....					....	....		

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: YSI 6920

SITE NAME: SWMU 13 & 16

MANUFACTURER: YSI

PROJECT No.: N9060 CTO 0279

SERIAL NUMBER: 98H0359 AO

Date of Calibration	Person Performing Calibration	INITIAL CALIBRATION PH	COND	ORP	DO	NA	NA	CALIBRATION CHECK PH	COND	ORP	DO	NA	NA	Calibration Standard (Lot No.)	Remarks and Comments
4/21/03	BB	7.0 4.0	1.00 mS/cm	100 mV	8.28 O.K.	----	----					----	----	7.0 3106 4.0 3124	4/22/04 1mS/cm = 3393 5/15/04 ORP = SAME
4/22/03	"	CHECK		CALIBRATION			@	100	CHECK		O.K	----	----		
4/23/03	"	"			"	----	@	1.25	"		"	----	----		
4/25/03	"	CAL		CHECK @		1648			CHECK		O.K	----	----		
4/26/03	"	"		"	@	0750				"	"	----	----		
5/6/03	"	7.0 4.0	1.00 mS/cm	100 mV	9.61 O.K.	----	----					----	----	7.0 3106 4.0 3124	4/22/04 1mS/cm = 3393 5/15/04 ORP SAME
5/7/03	"	CAL		CHECK @		0700	----		O.K.			----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		

12/4/03 AS ABOVE

12/4/03

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: LaMotte 20/20

SITE NAME: SWMU 13 & SMWU 16

MANUFACTURER: LaMotte

PROJECT No.: N9060 CTO 0279

SERIAL NUMBER: 3323-2402

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
3/29	SAME	TR	0.0	0.0	0.0	0.0	NA	Standard supplied by
3/30	"	"	0.0	0.0	0.0	0.0	"	U.S. Eng.
4/1	"	"	0.0	0.0	0.0	0.0	"	
4/10	"	"	0.0	0.0	0.0	0.0	"	
4/11	"	"	0.0	0.0	0.0	0.0	"	
4/12	"	"	0.0	0.0	0.0	0.0	"	
4/13	"	"	0.0	0.0	0.0	0.0	"	
4/22	"	"	0.0	0.0	0.0	0.0	"	
4/23	"	"	0.0	0.0	0.0	0.0	"	
4/24	"	"	0.0	0.0	0.0	0.0	"	
4/25	"	"	0.0	0.0	0.0	0.0	"	
4/26	"	"	0.0	0.0	0.0	0.0	"	
4/27	"	"	0.0	0.0	0.0	0.0	"	
4/28	"	"	0.0	0.0	0.0	0.0	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: LaMotte 2020

SITE NAME: SWMU 13 & SMWU 16

MANUFACTURER: LaMotte (U.S. Environ)

PROJECT No.: N9060 CTO 0279

SERIAL NUMBER: 3332-2402

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
4/10/03	3332-2402	B.G. Alcoyne	0.0	0.0	10.0	10.0	NA	
4/11/03	"	"	0.0	0.0	10.0	10.0	"	
4/12/03	"	"	0.0	0.0	10.0	10.0	"	
4/13/03	"	"	0.0	0.0	10.0	10.0	"	
4/22/03	"	"	0.0	0.0	10.0	10.0	"	
4/23/03	"	"	0.0	0.0	10.0	10.0	"	
4/24/03	"	"	0.0	0.0	10.0	10.0	"	
4/25/03	"	"	0.0	0.0	10.0	10.0	"	
4/26/03	"	"	0.0	0.0	10.0	10.0	"	
4/27/03	"	"	0.0	0.0	10.0	10.0	"	
4/28/03	"	"	0.0	0.0	10.0	10.0	"	
4/29/03	"	"	0.0	0.0	10.0	10.0	"	
5/6/03	"	"	0.0	0.0	10.0	10.0	"	
5/7/03	"	"	0.0	0.0	10.0	10.0	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: 2020 TURBIDITY

SITE NAME: SWMU 13 & SMWU 16

MANUFACTURER: La Motte

PROJECT No.: N9060 CTO 0279

SERIAL NUMBER: 1749-1600

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			[illegible]	[illegible]	[illegible]	[illegible]		
5/6/03	1749-1600	TR	0.0	0.0	0.0	0.0	NA	Standard supplied by U.S. ENV.
5/7/03	"	TR	"	"	"	"	"	" " "
5/8/03	"	TR	"	"	"	"	"	" " "
5/9/03	"	TR	"	"	"	"	"	" " "
5/10/03	"	TR	"	"	"	"	"	" " "

APPENDIX C.10.2
SWMU 16
EQUIPMENT CALIBRATION LOGS
ROUND 2

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: PID 2020

SITE NAME: SWMUs 13 &16

MANUFACTURER: Perkin Elmer

PROJECT No.: N9060, CTO 0279

SERIAL NUMBER: EO FM 311

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Before Calibration	After Calibration	Before Calibration	After Calibration		
11-6-03	SAME	TC	—	—	99.4	100	00228-03	OK
11-7-03	"	RW	—	—	91.8	100	"	OK
11-8-03	"	RW	—	—	104	100	"	OK
11-9-03	"	RW	—	—	105	100	"	OK
~~11-10-03~~	~~"~~	~~RW~~	~~—~~	~~—~~	~~90.5~~	~~100~~	~~"~~	~~OK~~
11-10-03	"	MGL	—	—	94.5	100	"	OK
11-11-03	"	RWL			76.2	100		
11/17/03	"	SAG	—	—	98.5	100	"	OK
11/18/03	"	SG	—	—	104	100	"	OK
11/26/03	"	SG	—	—	98.5	100	"	OK
11/25/03	"	SG	—	—	88.9	100	"	OK
12/4/03	"	SG			96.4	100	"	OK
12/5/03	"	SG			98.9	100	"	OK
12/6/03	"	SG	—	—	98.5	100	"	OK
12/7/03	"	SG	—	—	96.0	100	"	OK

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: PHOTOVAC

SITE NAME: SWMUs 13 &16

MANUFACTURER: PERKIN ELMER

PROJECT No.: N9060, CTO 0279

SERIAL NUMBER: ED MF 352

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Before Calibration	After Calibration	Before Calibration	After Calibration		
10/25/03	SAME	TR	—	—	94.8	100	80228-03	OK
10/27/03	ED MF352	PWR	—	—	98.2	100	"	OK
11/3/03	"	MLC	—	—	98.4	100	"	OK
11/4/03	"							
11/5/03	"	TR	—	—	97.6	100	"	OK
11/10/03	"	PWR			90.5	100	"	OK
11/11/03	"	PWR			90.5	100		
11/12/03	"	MLC	—	—	98.5	100	"	OK
11/13/03	"	MLC						

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: PHOTOVAC PID

SITE NAME: SWMUs 13 & 16

MANUFACTURER: PERKIN ELMER

PROJECT No.: N9060, CTO 0279

SERIAL NUMBER: ED ~~MF~~ ~~352~~ HE 339

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Calibration	Calibration	Calibration	Calibration		
10-21-03	EDMF352	FUKAMSER	—	—	86.1	99.8	00228-03	
10-23-03	EDMF352	FUR	—	—	107	100	"	
10-24-03	ED HE339	FUR			105	100	"	
10-25-03	ED HE339	FUR			95.3	100	"	
10-26-03	ED HE339	FUR			102	100	"	
11-4-03	ED HE339	FUR			105	100	"	
11-5-03	"	TR	—	—	101	100	"	
11-6-03	"	TR	—	—	99.8	100	"	
11-7-03	"	MM	—	—	99.8	100	"	
11-8-03	"	FUR			99.1	100		
11-17-03	"	MM	—	—	5.6	100	"	
11-19-03	"	MM	—	—	99.0	100	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 13 &16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: LaMotte

MANUFACTURER: LaMotte

SERIAL NUMBER: 0920 4298

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Calibration	Calibration	Calibration	Calibration		
10/21/03	SAME	FW	0.0	0.0	0.0	0.0	NA - PROVIDED BY US ENV.	CHECKED TO STAND.
10/22/03	SAME	"	0.0	0.0	0.0	0.0	"	CHECKED TO Stand.
10/24/03	SAME	"	0.0	0.0	0.0	0.0	"	"
10/25/03	SAME	"	0.0	0.0	0.0	0.0	"	"
10/26/03	SAME	"	0.0	0.0	0.0	0.0	"	"
10/27/03	SAME	MGC	~~[illegible]~~	0.0	.09	0.0	"	"
11/5/03	"	TR	—	—	0.0	0.0	"	"
11/6/03	"	TR	—	—	0.0	0.0	"	"
11/7/03	"	TR	—	—	0.0	0.0	"	"
11/10/03	"	FW	—	—	0.0	0.0	"	"
11/9/03	"	FW	—	—	0.0	0.0	"	"
11/10/03	"	TR	—	—	0.0	0.0	"	"
11/11/03	"	FW	—	—	0.0	0.0	"	"
11/18/03	"	GPS	—	—	0.0	0.0	"	"
11/19/03	"	GPS	—	—	0.0	0.0	"	"
11/20/03	"	GPS	—	—	0.0	0.0	"	"
11/21/03	"	GPS	—	—	0.0	0.0	"	"
11/21/03	"	GPS	—	—	0.0	0.0	"	"
11/22/03	"	GPS	—	—	0.0	0.0	"	"
11/23/03	"	GPS	—	—	0.0	0.0	"	"
11/24/03	"	TR	—	—	0.0	0.0	"	"
11/25/03	"	TR	—	—	0.0	0.0	"	"
12/4/03	"	GPS	0	0	0	0	"	"
12/6/03	"	TR	0.0	0.0	0.0	0.0	"	"
12/7/03	"	TR	0.0	0.0	0.0	0.0	"	"

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 13 &16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: La Motte 2020

MANUFACTURER: La Motte

SERIAL NUMBER: 3317-2402

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Calibration	Calibration	Calibration	Calibration		
10/25/03	SAME	TK	0.00	0.00	0.00	0.00	N/A - Provided by U.S. Env.	(OK) → 10 NTU check
10/26/03	SAME	MGC	0.00	0.00	0.00	0.00	"	" "
10/27/03	SAME	MGC	0.00	0.00	0.00	0.00	"	" "
10/28/03	SAME	MGC	0.00	0.00	0.00	0.00	"	" "
10/4/03	"	TK	—	—	0.00	0.00	"	" "
11/5/03	"	TK	—	—	0.00	0.00	"	" "
11/6/03	"	TK	—	—	0.00	0.00	"	" "
11/7/03	"	TK	—	—	0.00	0.00	"	" "
11/8/03	"	FW	—	—	0.0	0.0	"	" "
11/9/03	"	FW	—	—	0.0	0.0	"	" "
11/10/03	"	TK	—	—	0.0	0.0	"	" "
11/11/03	"	FW	—	—	0.0	0.0	"	" "
11/18/03	"	TK	—	—	0.0	0.0	"	" "
11/19/03	"	TK	—	—	0.0	0.0	"	" "
11/20/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/21/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/21/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/22/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/23/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/24/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/25/03	"	[illegible]	—	—	0.0	0.0	"	" "
12/4/03	"	[illegible]	—	—	0	0	"	" "
12/5/03	"	[illegible]	—	—	0	0	"	" "
12/6/03	"	[illegible]	—	—	0	0	"	" "
12/7/03	"	[illegible]	—	—	0	0	"	" "
12/8/03	"	[illegible]	—	—	0	0	"	" "
12/9/03	"	[illegible]	—	—	0	0	"	" "

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: LA MOTTE / TURBIDMETER

SITE NAME: SWMUs 13 &16

MANUFACTURER: LA MOTTE

PROJECT No.: N9060, CTO 0279

SERIAL NUMBER: 3106-1402

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Before Calibration	After Calibration	Before Calibration	After Calibration		
11/17/03	3106-1402	S. GRIER	0	—	0, 9.5	0, 10	N/A	
11/18/03	"	"			0, 9.7	0, 10	"	
11/19/03	"	"			0, 10.5	0, 10	"	
11/20/03	"	"			0, 9.6	0, 10	"	
11/21/03	"	"			0, 8.9	0, 10	"	
11/22/03	"	"			0, 9.6	0, 10	"	
11/23/03	"	"			0, 8.9	0, 10	"	
11/24/03	"	"			0, 9.6	0, 10	"	
11/25/03	"	"			0, 9.1	0, 10	"	
12/4/03	"	SG	0	0	0	0.0, 10	"	
12/5/03	"	S.G.			0.0, 9.9	0.0, 10	"	
12/6/03	"	S.G.			0.0, 9.9	0.0, 10	"	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 02B0141

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH	COND	TURB	DO % mg/L	TEMP	FINAL READINGS PH	COND	TURB	DO	TEMP	Calibration Standard (Lot No.)	Remarks and Comments	
11/20/03	S.GRIER	7.15 3.88	937	N/A	~~N/A~~	N/A	7.00 4.00	1000.0	N/A	~~N/A~~	N/A	pH 7 - 3106 pH 4 - 3129	ORP 237 @ 18.0	(ok)
11/20/03	S.GRIER				88.7% 8.30 mg/L					97.9% 9.15 mg/L		SC - 3393 ORP - 0301385		
11/21/03	S.GRIER	7.03 4.00	911.0		100.6% 8.59			1000.0						
11/22/03	S.GRIER	7.00 4.11	940.0		99.9% 8.63	N/A	7.13 4.04	1000						
11/24/03	QS	7.00 3.97	1035					1001					234.7 @ 18.00	(ok)
11/25/03	S.GRIER	6.80 4.02	1018		98.6% 8.60		7.01 4.02	1000						
12/3/03	QS	7.07 3.98	1080		98.6% 8.62		7.00 4.00	1002		102.2 9.17			234.7 @ 18.0 234.7 @ 18.0	(ok)
12/4/03	S.G	7.06 3.99	1004											
12/5/03	SG	7.28 4.01	1006		100% 8.70		7.09 4.01	1006					ORP 236.5 @ 16.40	(ok)
12/6/03	SG	7.09 4.06	0.980		—		7.09 4.06	0.980		—			ORP 238.0 @ 17.76	(OK)
12/2/03	QS	7.02 4.01	1001		—		—	—		—			ORP 237.7 @ 19.7	(ok)
12/9/03	SG	7.24 4.16	998.0				7.24 4.16	998.4					234 @ 18.0	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99B1412

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH	COND	TURB	DO	TEMP	FINAL READINGS PH	COND	TURB	DO	TEMP	Calibration Standard (Lot No.)	Remarks and Comments
11/22/03	[illegible]	6.96 4.07	958	NA	—	—	—	—	NA	—	—	PH7 3106 PH4 3129	ORP 233 @ 18.0 (OK)
11/23/03	[illegible]	7.00 4.06	1026	NA	—	—	—	1000	NA	—	—	SC 3393 ORP 0351385	ORP 278.2 @ 18° 237.5 @ 18° (OK)
11/24/03	[illegible]	7.09 4.15	937	NA	—	—	4.00	1000	NA	—	—	"	175.3 @ 17 279.0 @ 17
11/25/03	[illegible]	6.87 4.47	1111	NA	—	—	7.00 4.00	1000	NA	—	—	"	310 @ 17° 235.4 @ 17° (ok)
12/3/03	[illegible]	6.99 4.04	962	NA	160 @ 76.04	—	6.99 4.00	1001	NA	98.5 9.2	—	"	273.4 @ 17° 237.5 @ 17° (OK)
12/5/03	[illegible]	6.97 3.88	1.02	NA	—	—	7.00 4.00		NA	—	—	"	236.5 @ 17.12° (ok)
12/6/03	[illegible]	7.03 3.97	1.052				—	1.052	NA	—	—	"	ORP 240.6 @ 16.10 (OK)
12/7/03	—	—	—				—	—		—		→	Not USED on 12/6/03
12/8/03	[illegible]												

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 98504 78AB

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH	COND	TURB	DO	TEMP		FINAL READINGS PH	COND	TURB	DO	TEMP	Calibration Standard (Lot No.)	Remarks and Comments
11/10/03	TL	7.41 3.63	1045	NA	—	—		7.00 4.00	1000	NA	—	—	PH7 8106 PH4 3129	JRI 243 @ 16.15°C (ok)
11/11/03	TL	7.01 4.04	944	NA	—	—		—	1000	NA	—	—	SC 3393 ORP 03+1385	242 @ 17.8 (ok)
11/12/03	QD	7.08 3.47	1001	NA	114.8 10.91	—		7.00 4.00	1000	NA	97.9 9.25	—		237 @ 18.5 (ok)
11/19/03	QD	7.08 4.04	987	NA	—	—		—	—	NA	—	—		236 @ 17.8 (ok)
11/20/03	QD	7.06 4.08	972	NA	—	—		—	—	NA	—	—		237 @ 16.3 (ok)
11/21/03	QD	7.02 4.02	943	NA	—	—		—	—	NA	—	—		~~237 @ 18.0 (ok)~~ 236 @ 17.9 (ok) QD
11/22/03	QD	7.07 4.00	~~938~~ 909	NA	—	—		—	1000	NA	—	—		236 @ 17.5 (ok)
11/23/03	QD	7.03 4.03	1025	NA	—	—		—	1000	NA	—	—		~~278.2 @ 18.5 (ok)~~ 237.9 @ 18.5 (ok)
11/24/03	QD	7.01 4.04	.939	NA	—	—			1.015	NA	—	—		237.9 @ 17.8 (ok)
11/25/03	QD	7.01 3.98	.977	NA	—	—			1.001	NA	—	—		GW 235.4 @ 17 ok
12/3/03	QD	6.99 4.07	.994	NA	85.3 7.24	—		7.00 4.00	1.001	NA	98.6 9.33	—		233.9 @ 17 237.5 @ 17 ok
12/6/03	SG	6.99 4.03	1040		—			6.99 4.03	1040	NA	—			264.8 @ 15.60°C ok
12/7/03	QD	7.02 4.01	1.012		—			—	—	NA	—	—		237.0 @ 18.0 (ok)
12/8/03	QD	7.03 4.02	.962		—			—	1050		—			239.3 237.5 @ 17.8 (ok)
12/9/03	QD	7.07 4.00	.874					—	1002		—			235.7 @ 18.0 (ok)

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99B1412

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH	COND	TURB	DO	TEMP	FINAL READINGS PH	COND	TURB	DO	TEMP	Calibration Standard (Lot No.)	Remarks and Comments
10/25/03	TR	7.13	0.984	NA	98.2	–	7.00 4.00	1000	NA	100%	–	PH 7 = 3106 PH 4 = 3129	ORP CHECK = 231.7 @ 18.18°C (OK)
10/26/03	TR	7.13 3.99	0975	NA	98.4	–	7.00 4.00	1000	NA	100%	–	SC = 3393 ORP = 03J1385	242 @ 16.96 (OK)
10/27/03	TR	7.01 4.01	1002	NA	–	–	NA	1000	NA	–	–		247 @ 17.83 (OK)
10/28/03	TR	6.98 4.01	1063	NA	–	–	NA	1000	NA	–	–		236 @ 18.03 (OK)
11/03/03	TR	7.03 3.96	1075	NA	99.1% 8.71 mg/L	–	7.00 4.00	1000	NA	98.0% 8.61 mg/L	–		234 @ 19.81 (OK)
11/5/03	TR	6.99 4.02	1026	NA	–	–	–	1000	NA	–	–		238 @ 19.00 (OK)
11/6/03	TR	6.99 4.02	937	NA	–	–	–	1000	NA	–	–		240 @ 19.26 (OK)
11/7/03	TR	7.00 4.04	1006	NA	–	–	–	–	NA	–	–		244 @ 16.09 (OK)
11/8/03	TR	4.04	985	NA	–	–	–	–	NA	–	–		243 @ 14.60 (OK)
11/9/03	FW	7.05 4.06	1008	NA	–	–	–	–	NA	–	–		ORP ~~[illegible]~~ 10.02 (OK) ORP Calib. = 237 @ 19.5°C
11/10/03	TR	7.03 4.09	1015	NA	–	–	–	1000	NA ~~1000~~ TR	–	–		237 @ 16.16°C (OK)
11/11/03	TR	7.06 4.08	996	NA	–	–	–	–	NA	–	–		235 @ 18.0 (OK)
11/17/03	TR	7.08 4.07	974	NA	75.0% 6.8 mg/L	–	7.00 4.00	1060	NA	97.8% 9.00 mg/L	–		237 @ 19.00 (OK)
11/19/03	TR	7.03 4.06	1015	NA	–	–	–	–	NA	–	–		237 @ 19.30 (OK)
11/20/03	QD	7.02 4.06	968	NA	–	–	–	–	NA	–	–		237 @ 18.00 (OK)
11/21/03	QD	6.98 4.04	964	NA	–	–	–	–	NA	–	–		234 @ 18.01 (OK)

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI 650 MDS w/600XL SONDE

MANUFACTURER: YSI 02G1124 AH

SERIAL NUMBER: 98F0478AB

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH	COND	TURB	DO	TEMP	FINAL READINGS PH	COND	TURB	DO	TEMP	Calibration Standard (Lot No.)	Remarks and Comments
10-21-03	FWR	4.05					4.00					pH 7 = 3106 pH 4 = 3129	INST. Not USED This Date
↓	↓	7.16	982	–	95.6%	–	7.00	1000	–	96%	–	SC = 3393 ORP = 03L1385	↓
10-22-03	TK				9.93 mg/L					9.93 mg/L			ORP CHECK 245 mV
10-23-03	FCW	7.00/ ~~1000~~ FCW	–				~~1000~~ FCW	1000	–				RECAL. COND. ORP 232.3 @ 18.55°C
↓		4.00	988										
10/24/03		7.02	959					1000					ORP 230 @ 17.45°C
↓		4.03	1010										ORP 231.5 @ 17.38
10/25/03		7.06 4.10											
10/26/03		7.07 4.06	990							9.50 mg/L			ORP 333.6 @ 16.16°C 334 @ 18.3
10/27/03		7.06 4.06	966					1000					↓ ORP 334 @ 18.3°C
10/27/03	(NOT	TX	458	CAL		OK)							
10/28/03		↓											
11/3/03	FCW	~~7.19~~	1.189	–	90.6% 8.03 mg/L	–	~~7.00~~ FCW	1.000	–	97.9% 8.56 mg/L	–	ORP	Ph probe broke will recal. on 11/4/03
11/4/03	FCW	6.19/ 4.37					7.00/ 4.00					ORP 237.5 @ 20.32°C	NEW ph Probe
11/6/03	FCW	7.11 3.71	0.938	–	–	–							ORP 242.8 @ 18.57
11/7/03	FCW	7.10 3.75	09.23				4.00	1.000					ORP 246.5 @ 14.43
11/8/03	FCW	7.35 3.63	1.050				7.00 4.00					ORP 243.6 @ 15.79°C	
11/9/03		7.37 3.62	1.017				7.00 4.00					ORP 246.7 @ 15.0°C	

APPENDIX C.10.3
SWMU 16
EQUIPMENT CALIBRATION LOGS
ROUND 3

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: PID/ PHOTOVAC

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: PHOTOVAC

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: ED MF 336

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
7-9-04	ED MF 336	SJC	AS PER MANUFACTURER				ISOBUTYLENE 00237	EXP 11-25-04
7-10-04	"	NA					NA	100 PPM
7-24-04	"	SJC	"	"	95	100	ISOBUTYLENE	
7-25-04	"	SJC	"	"	92	100	"	
7-26-04	"	SJC	"	"	98	100	"	
7/27/04	"	SJC	"	"	91	100	"	
7-28/04	"	SJC	"	"	90	100	"	
7-29/04	"	SJC	"	"	95	100	"	
7/30/04	"	SJC	"	"	96	100	"	
7/31/04	"	SJC	"	"	90	100	"	
8-10-04	"	SJC	"	"	98	100	"	
8-11-04	"	SJC	"	"	101	100	"	
8-12-04	"	SJC	"	"	102	100	"	
8-13-04	"	SJC	"	"	95	100	"	
8-14-04	"	SJC	"	"	—	100	"	
8-15-04	"	SJC	"	"	96	100	"	
8-16-04	"	SJC	"	"	95	100	"	
8/17/04	"	SJC	"	"	—	100	"	
8/26/04	"	SJC	"	"	94	100	LOT 00250-03	EXP 2/17/05
8/27/04	"	SJC	"	"	—	100	"	
8/28/04	"	SJC	"	"	—	100	"	
8/29/04	"	SJC	"	"	95	100	"	
8/30/04	"	SJC	"	"	"	100	"	
8/31/04	"	SJC	"	"	"	100	"	
9/1/04	"	SJC	"	"	"	100	"	
9/2/04	"	SJC	"	"	"	100	"	
9/8/04	"	SJC	"	"	"	100	"	
9/9/04	"	SJC	"	"	"	100	"	
9/10/04	"	SJC	"	"	91	100	"	
9/11/04	"	SJC	"	"	95	100	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: MINI RAE 2000

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: RAE SYSTEMS

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: 110-002635

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Zero Air	Span	Isobutylene			
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
8/11/04	110-002635	CCL	0.4	0.0	—	100	002237	
8/12/04	"	CCL	0.9	0.0	—	100	"	
8/13/04	"	CCL	1.9	0.0	—	100	"	
8/14/04	"	CCL	0.8	0.0	—	100	"	
8/15/04	"	CCL	0.8	0.0	—	100	"	
8/16/04	"	CCL	0.5	0.0	—	100	"	
8/17/04	"	Tom Dickson	0.0/100.0	0.0/100	0.9/110	0.9/103	"	Bkgd 0.9
8/22/04	"	CCL	1.6	0.0	—	104	LOT 00250-03	EXP. 2/17/05
8/23/04	"	CCL	0.8	0.0	—	100	"	"
8/29/04	"	CCL	0.5	0.0	—	100	"	"
8/30/04	"	CCL	0.5	0.0	—	100	"	"
8/31/04	"	CCL	0.6	0.0	—	100	"	"
9/1/04	"	CCL	0.4	0.0	—	100	"	"
9/2/04	"	CCL	0.5	0.0	—	100	"	"

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: PID / PHOTOVAC

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: PHOTOVAC

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: ED MF 336

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
9-12-04	ED MF 336	SJC	—	—	95	100	00350-03	EXP 2-17-05
10-17-04	"	TA	—	—	95.8	100	"	"
10-26-04	"	SJC	—	—	96	100	"	"
10-27-04	"	SJC	—	—	94.5	100	"	"
10-28-04	"	SJC	—	—	95	100	"	"
10-29-04	"	SJC	—	—	93.5	100	"	"
10-30-04	"	SJC	—	—	98	100	"	"
10-31-04	"	SJC	—	—	100	100	"	"
11-1-04	"	SJC	—	—	96.5	100	"	"
11-2-04	"	SJC	—	—	95	100	"	"
11-9-04	"	SJC	—	—	98	100	"	"
11-10-04	"	SJC	—	—	95	100	"	"
11-12-04	"	SJC	—	—	98	100	"	"
11-14-04	ED MF 352	TA	—	—	96	100	"	"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01C0134 AB

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
11/11/04	TR	7.01	3.99	1039	11.67 / 124.8%	17.5° / 236	—	—	1000	9.18 / 98.2%	17.5 / 240	PH-7 4110 PH 4 3350	OK
11/12/04	TR	7.04	3.99	980	8.49 / 87.9%	16.7 / 240	—	—	1001	9.37 / 98.1%	—	SC 4387 ORP 03K0667	"
11/13/04	TR	7.01	3.98	988	8.89 / 94.6	15.1 / 240.1	—	—	1000	9.22 / 99.2%	—		"
11/14/04	TR	7.00	3.98	1010	6.89 / 72.2	15.05 / 262	—	—	1001	9.51 / 99.7%	16.05 / 242.2		"
11/15/04	TR	7.02	4.02	992	12.83 / 136%	15.25 / 233	—	—	1001	9.37 / 99.5%	15.4 / 243		"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: YSI

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: YSI

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: 01C ~~BK~~ 0134

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
9/28/04	SJC	7.07	3.95	982	8.44	18.34 / 240.6	7.01	3.99	1001	8.85	18.05 / 237.3	PH 7 4910 PH 4 3390	OR
9/29/04	SJC	7.06	3.94	1031	8.79	18.35 / 238	7.02	4.00	999	9.21	18.39 / 237.6	SC 4387 ORP 03K0667	"
10/9/04	SJC	7.24	3.65	1006	10.03	20.31 / 248	7.00	4.00	1001	8.77	20.20 / 237.6		"
10/12/04	QD	7.32	4.05	1025	12.01	18.95 / 233.6	7.01	4.00	1000	8.98	18.82 / 237.6		"
10/13/04	QD	7.25	3.68	992	9.61	19.73 / 230.9	7.00	4.00	1000	8.81	19.79 / 237.5		"
10/15/04	TR	7.00	3.86	899	7.70 / 85.4	19.01 / 235	—	4.00	1000	8.65 / 96.0	—		"
10/26/04	TR	7.06	3.99	992	9.35 / 98.5	17.5°C / 237.7	7.00	4.00	1000	9.30 / 98.0	—		"
10/27/04	TR	7.03	3.98	1053	7.54 / 80.3%	18.4°C / 237	—	—	1000.0	9.13 / 97.8%	—		"
10/28/04	TR	7.01	3.95	1003	8.79 / 93.6	18.83 / 238	—	—	—	9.15 / 97.9%	—		"
10/29/04	TR	7.02	3.99	1060	10.69 / 111.6	20.89 / 233.0	—	—	1000	8.70 / 97.3%	—		"
10/30/04	TR	7.02	3.99	1008	9.54 / 105.3%	20.20 / 232.7	—	—	—	8.77 / 96.9	—		"
10/31/04	TR	6.99	3.98	937	10.72 / 111.3	17.83 / 236.6	—	4.00	1000	9.39 / 97.5%	17.13 / 237.4		"
11/1/04	TR	7.11	4.04	1004	9.03 / 96.7	17.81 / 239	7.00	4.00	—	9.15 / 97.2%	17.53 / 237.7		"
11/2/04	TR	6.98	3.97	1008	8.66 / 95.0	19.73 / 233.9	—	—	1000	8.87 / 97.3%	—		"
11/9/04	TR	6.96	3.91	986	14.09 / 159.7	20.02 / 236.2	7.00	4.00	1000	8.74 / 97.2%	20.00 / 237.3		"
11/10/04	TR	7.01	4.00	1009	71.6 / 67.4	15.54 / 241	—	—	—	9.18 / 98.8%	—		"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: YSI

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: YSI

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: 01K 0134

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
8/29/04	QD	7.21	3.67	979	7.21	23.56 238.9	7.00	4.00	982 ~~995~~	8.27 ~~45~~	23.64 237.7	ORP ~~03K0067~~ pH 4 3390	03K0067
8/30/04	QD	6.77	4.28	793	8.71	21.68 239.4	7.00	4.00	955	8.47	21.74 237.4	pH 7 3223 Sp. C. ~~44000~~	QD ~~4256~~ 4387
8/31/04	QD	6.99	3.37	631	9.61	21.55 238.5	7.00	4.00	967	8.51	21.83 237.6		
9/8/04	TK	8.04	3.50	951	–	–	7.00	4.00	1000	–	–		WELL DEV. ONLY
9/9/04	TK	7.27	3.85	967	9.20	20.20 240.0	7.00	4.00	1000	8.71	20.20°C 237.5		OK
9/10/04	TK	6.73	3.81	997	8.86	20.01 256	7.00	4.00	–	8.83	20.02 237.7		OK
9/11/04	TK	7.34	3.98	1024	8.64	20.31 244.9	7.00	4.00	1000	8.82	20.32 237.7		OK
9/12/04	TK	6.75	4.04	1001	8.92	19.66 215.4	7.00	4.00	–	8.70	19.74 237.4		OK
9/13/04	TK	7.08	3.68	1032	8.46	21.47 255.1	7.00	4.00	1000	8.49	21.44 238.1		OK
9/14/04	TK	6.97	4.08	995	13.00	20.84 228.7	–	–	–	8.48	20.70 238.4		
9/22/04	SC	6.80	4.54	984	6.02	18.5 225	7.00	4.00	998	8.93	19.94 236.8		OK
9/23/04	SSC	7.27	3.33	988	11.24	20.08 235.6	7.00	4.00	1000	8.99	20.41 237.4		OK
9/24/04	SSC	7.03	4.24	997	7.08	21.43 234.2	7.00	3.99	1000	8.67	21.24 237.4		OK
9/25/04	SG	7.02	4.07	1.016	11.70	20.94 263.6	7.00	4.00	1000	8.70	20.96 237.5		
9/26/04	QD	6.64	3.99	803	7.08	19.30 231.1	7.00	4.00	1000	8.86	19.34 237.6		
9/27/04	SSC	7.22	4.16	1274	7.20	18.74 216.7	7.00	4.00	1004	8.92	18.92 237.5		

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01C0979

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
7/29/04	QJS	~~3.99~~ 7.03	3.98	948	6.78	21.99 225	7.00	4.00	1000	8.65	21.34 234.7	pH 4 3390	
7/30/04	QJS	7.01	3.97	1000	—	21.5 238.2	—	4.00	1001	—	—	pH7 3223	
7/31/04	QJS	7.02	4.06	1018	—	23.0 324.1	7.00	4.00	1000	—	22.8 232.6	SpCon 4100	
8/1/04	QJS	7.10	3.99	980	—	22.62 234.1	7.00	—	1001	—	22.64 237.1		
8/17/04	QJS	7.00	3.94	950	8.70	20.4 238.7	7.00	4.00	1001	8.78	20.4 237.5	ORP = 03K0667 EXP 2/05	
8/24/04	QJS	7.08	3.96	1042	5.55	23.7 497	7.00	4.00	1010	8.40	23.08 237.6		
9/22/04	QJS	7.75	1.80	1837	6.07	20.17 189.4	6.98	3.99	922	8.91	20.12 232.4		
9/23/04	QJS	6.40	~~4.05~~ 4.05	839	4.09	20.97 294.0	7.00	4.00	1000	8.76	20.96 237.2		
9/28/04	SJC	6.50	4.16	968	12.91	19.09 175.7	7.01	4.00	1001	8.87	19.13 237.3		
9/29/04	SJC												

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99K0055

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
8/30/04	QD	7.20	3.66	847	8.49	21.98 252.6	7.01	4.00	952	8.50	21.96 237.2	PH4 5390 PH7 3223	
8/31/04	QD	6.93	4.16	540	6.48	21.37 252.8	7.01	3.99	937	8.47	21.37 237.4	SpC 4387 ORP 03K0667	
9/22/04	QD	6.70	4.07	1113	11.66	19.01 175.5	7.02	3.99	1000	7.12	20.07 236.8		
9/23/04	QD	7.09	3.81	889	6.74	20.96 373.1	7.02	4.00	999	8.90	20.79 236.1		
9/24/04	QD	7.02	3.73	1141	2.30	21.05 290	7.00	4.00	996	8.81	20.15 237.5		
9/25/04	QD	6.91	4.08	975	8.50	20.74 257.4	7.01	3.99	1000	8.78	20.66 237.4		
9/26/04	QD	7.03	4.00	1021	7.87	19.17 252.1	7.01	4.00	1000	8.75	19.12 232.4		
9/27/04	QD	7.17	3.82	989	6.92	19.83 213.6	7.00	4.00	1000	8.89	19.87 237.4		
9/28/04	QD	6.79	4.00	983	7.42	19.30 216.7	7.02	4.0	1000	8.78	19.29 237.4		
10/6/04	QD	7.21	3.94	941	7.80	16.77 224.4	7.01	3.99	1000	8.73	16.77 237.3		
10/7/04	QD	6.93	4.08	1044	7.77	17.49 120.8	7.00	3.99	1000	9.32	17.53 237.4		Changed DO membrane
10/8/04	QD	6.89	3.84	1040	8.36	19.86 271.5	7.01	3.99	1000	8.85	19.92 237.4		
10/9/04	QD	7.14	3.97	992	9.39	20.45 158.7	7.01	3.99	1000	8.86	20.41 237.1		
10/11/04	QD	7.05	3.74	992	8.81	17.85 261.8	7.00	4.01	1000	8.85	17.61 237.3		
10/12/04	QD	6.68	3.77	1016	10.27	18.31 197.1	7.00	4.00	1000	8.84	18.24 237.4		
10/13/04	QD	6.77	3.98	1025	9.61	19.78 250.7	7.01	4.00	1000	8.70	19.89 ~~237.4~~ QD 236.9		

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

INSTRUMENT NAME/MODEL: Turbidimeter/2020

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: Lamotte

PROJECT No.: N6878 & N7448; CTO 0357 & 0343

SERIAL NUMBER: 1760 - 1800

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
7/23/04		GB	0	0	8.8	10		
7/24/04		GB	—	—	9.2	10		
7/25/04		GB	0	0	9.6	10		
7/26/04		GB	0	—	10	—		
7/27/04		GB	0	—	10	—		
7/28/04		CCL	0	0	10	10		
7/29/04		CCL	0	0	10	10		
7/30/04		CCL	0	0	11	10		
7/31/04		CCL	0	0	11	10		
8/1/04		CCL	0	0	11	10		
8/17/04		GB	0	0	10	10		
8/24/04		GB	0	0	10	10		
8/25/04		GB	0	0	10	10		
8/26/04		GB	0	0	10	10		
8/27/04		GB	0	0	10	10		
8/28/04		GB	0	0	10	10		
8/29/04		GB	0	0	10	10		
8/30/04		GB	0	0	10	10		
8/31/04		GB	0	0	10	10		
9/22/04		GB	0	0	10	10		
9/23/04		GB	0	0	10	10		
9/24/04		GB	0	0	11	10		
9-25-04		GB	0	0	9.3	10		

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: Turbidimeter

MANUFACTURER: LaMotte

SERIAL NUMBER: 3592 3502

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
7-29-04		CCL	0	0	10	10	—	
7-30-04		CCL	0	0	12	10	—	
7-31-04		CCL	0	0	10	10	—	
8-1-04		CCL	0	0	10	10	—	
8-17-04		QJ	0	0	9.8	10	—	
9-22-04		QJ	0	0	11	10	—	
9-23-04		TA	0.3	0	10	10	—	
9-25-04		TA	0.0	0.0	10	10	—	
9-27-04		QJ	0	0	10	10	—	
9-28-04		QJ	0	0	10.15	10	—	
10-9-04		[illegible]	0	0	10	10	—	
10-12-04		QJ	0	0	9.84	10	—	
10-13-04		QJ	0	0	9.25	10	—	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

INSTRUMENT NAME/MODEL: Turbidimeter / 2020

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: La Motte

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: 4650 - 4300

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
9-25-04		[illegible]	0	0	10	10		
9-26-04		[illegible]	0	0	9.9	10		
9-27-04		[illegible]	0	0	10	10		
9-28-04		[illegible]	0	0	10	10		
9/29/04		[illegible]	0	0	10	10		ok
10-6-04		[illegible]	0	0	10	10		
10-7-04		[illegible]	0	0	9.95	10		
10-8-04		[illegible]	0	0	10	10		
10-9-04		[illegible]	0	0	10.10	10		
10-10-04		[illegible]	0	0	9.97	10		
10-11-04		[illegible]	0	0	10.05	10		
10-12-04		[illegible]	0	0	10	10		
10-13-04		[illegible]	0	0	9.87	10		
10-15-04		TR	0	0	10.34	10		OK
10-16-04		TR	0	0	10	10		"
10-26-04		TR	0	0	10.14	10		"
10-27-04		TR	0	0	10.07	10		"
10-28-04		TR	0	0	10.08	10		"
10-29-04		TR	0	0	10.08	10		"
10-30-04		TR	0	0	10	10		"
10-31-04		TR	0	0	10.05	10		"
11-1-04		TR	0	0	10.02	10		"
11-2-04		TR	0	0	10.11	10		"
11-9-04		TR	0	0	9.90	10		"
11-10-04		TR	0	0	9.98	10		"
11-11-04		TR	0	0	9.98	10		"
11-12-04		TR	0	0	9.92	10		"
11-13-04		TR	0	0	9.90	10		"
11-14-04		TR	0	0	9.98	10		"
11-15-04		TR	0	0	9.96	10		"

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: Turbidimeter/2020

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: LaMotte

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: 4650 - 4300

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre Calibration	Post Calibration	Pre Calibration	Post Calibration		
7-23-04		GS	0	0	10.14	10.0	—	
7-24-04		GS	—	—	9.5	10.0	—	
7-25-04		GS	0	0	9.6	10.0	—	
7-26-04		GS	0	—	9.8	10.0	—	
7-27-04		GS	0	—	10.0	—	—	
7-28-04		GS	0	—	10	—	—	
7-29-04		GS	0	—	10	—	—	
7-30-04		GS	0	—	10	—	—	
7-31-04		GS	0	—	10	—	—	
8-1-04		CCL	0	0	10	10	—	
8-14-04		GS	0	0	10	10	—	
8-15-04		TK	0	0	10.1	10	—	
8-17-04		GS	0	0	10.3	10	—	
8-24-04		GS	0	0	9.71	10	—	
8-25-04		GS	0	0	9.96	10	—	
8-26-04		GS	0	0	10.14	10	—	
8-27-04		GS	0	0	10.08	10	—	
8-28-04		GS	0	0	9.99	10	—	
8-29-04		GS	0	0	9.96	10	—	
8-30-04		GS	0	0	9.8	10	—	
8-31-04		GS	0	0	9.95	10	—	
9-8-04		TK	0	0	10.04	10	—	
9-9-04		TK	0	0	9.97	10	—	
9-10-04		TK	0	0	9.94	10	—	
9-11-04		TK	0	0	9.94	10	—	
9-12-04		TK	0	0	9.93	10	—	
9-13-04		TK	0	0	10.0	10	—	
9-14-04		TK	0	0	10.0	10	—	
9-22-04		GS	0	0	10	10	—	
9-23-04		TK	0	0	9.9	10	—	
9/24/04		GS	0	0	9.9	10	—	
9/25/04		TK	0	0	9.7	10	—	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01C0134

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
7/23/04	QS	7.41	4.89	.883	7.47	23.90 242.5	7.00	3.99	1.000	8.24	23.90 237.8	7/23 ORP-0311385	
7/24/04	QS	6.15	4.12	972	—	—	7.00	4.00	1000	—	19.6 237.2	PH4-3390	
7/25/04	QS	6.09	3.57	978	—	20.2 236.7	7.00	4.00	1001	—	—	PH7-3223	
7/26/04	QS	7.54	3.51	955	—	21.2 243.3	7.00	4.01	1000	—	21.0 237.4	Sp.C.-4100	
7/27/04	QS	6.61	4.07	983	—	20.1 236.7	7.00	4.01	1000	—	20.3 237.5		
7/28/04	QS	6.84	4.23	994	—	20.4 200.7	6.99	4.00	1000	—	20.4 237.8		
7/29/04	CCL	7.42	3.50	1026	—	21.65 248.5	7.00	4.00	1000	—	21.39 237.5		
7/30/04	CCL	7.48	4.13	1007	—	22.64 227.4	7.00	4.00	1000	—	22.65 237.6		
7/31/04	CCL	6.91	4.43	979	—	23.46 245.4	7.00	4.00	1000	—	23.45 237.4		
8/1/04	CCL	7.06	3.43	1012	—	22.79 240.5	7.00	4.00	1000	—	22.79 237.4		
8/15/04	TR	8.09	3.98	900	9.14	18.01 238.3	6.99	3.99	1000	9.02	18.75 237.6	8/15 PH7- SAME	Mixed NEW Zobell Sol good until FEB 15, 2005
8/17/04	QS	6.95	3.71	999	8.62	20.84 231.4	7.00	4.00	1000	8.64	20.86 237.4	PH4- "	
8/25/04	QS	6.84	3.70	1058	0.4	23.87 257.7	7.00	4.00	1000	8.25	23.83 238.6	SpC- "	
8/26/04	QS	7.76	2.70	996	6.95	23.63 210.4	7.00	4.00	1000	8.44	23.65 237.7	ORP-03K0667	
8/27/04	QS	7.17	3.76	993	8.47	25.12 273.0	7.01	4.00	1007	8.17	25.09 237.7		
8/28/04	QS	6.99	3.85	1025	8.27	24.93 199.3	7.00	4.00	1012	8.32	24.91 237.4		

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99K0055

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
7/4/04	GD	~~6.86~~ ~~5.86~~	5.56	890	7.12	156.1 24.5°C	7.00	4.01	1000	7.12	237.2 24.5°C	pH 4 3390 pH 7 3223 SP 2 5160	
7/26/04	GD	7.01	3.95	965	—	21.0 247.5	7.01	4.04	1000	—	237.4 21.10°		
7/27/04	GD	6.99	4.07	943	—	20.7 237.1	—	—	1000	—	—		
7/28/04	GD	7.02	4.06	1009	—	20.1 346.1	—	—	—	—	20.1 236.6		
7/29/04	GD	7.00	4.18	1055	~~6.78~~	21.33 234.3	7.00	4.00	1000	~~8.85~~	21.31 236.3		
7/30/04	GD	7.02	4.02	1005	—	21.1 235.1	—	—	—	—	—		
7/31/04	CCL	7.05	4.00	1002	—	23.47 262.1	7.00	4.00	1000	—	23.19 237.2		
8/1/04	GD	7.00	4.03	986	—	22.62 237.2	—	—	999	—	—		
8/14/04	GD	7.08	3.75	977	7.35	19.30 232.8	7.00	4.00	999	7.12	19.32 236.8		
8/17/04	GD	7.21	4.19	1037	5.45	20.35 236.1	7.01	4.00	1000	8.76	20.43 237.4	ORP 03K0667 ORP 2/05	
8/24/04	GD	7.02	3.86	10~~78~~ 25	4.46	23.47 215.6	7.00	4.00	~~1000~~ 1000	8.37	~~[illegible]~~ ~~[illegible]~~	23.47 237.4	
8/25/04	GD	7.07	4.06	1008	3.25	23.77 235.0	7.00	4.00	1000	8.25	23.78 237.4		
8/26/04	GD	6.72	4.28	1013	5.75	23.22 202.6	7.00	4.00	1000	8.41	23.15 237.4		
8/27/04	GD	7.01	4.23	1010	5.87	24.67 232.8	7.01	3.99	1000	7.66	24.71 237.4		
8/28/04	GD	6.95	3.96	1012	7.42	25.17 231.6	7.00	4.00	1000	8.39	25.08 237.4		
8/29/04	GD	7.12	3.83	1025	15.91	23.32 252.6	7.01	3.99	982	8.29	23.30 ~~[illegible]~~	237.4	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: Carbon Monoxide (CO) Monitor

MANUFACTURER: Industrial Scientific

SERIAL NUMBER: 9807008-381

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
08/16/04	See above	Tom Dickson	0.0/35/50	0.0/35/50	0.0/35/48	0.0/35/48	00190-02/03/16/02	Spec Air

APPENDIX D
MISCELLANEOUS FIELD DOCUMENTATION

APPENDIX D.1.1
SWMU 16
SITE LOGBOOK
ROUND 1

NSWC CRANE

N9060

CTO 279

SWMU 13 & 16

LOG BOOK

1363

START : 2-11-03

END :

TETRA TECH NUS, INC.

Terry R. Rojahn
Biologist

661 Andersen Drive, Pittsburgh, PA 15220-2745
(412) 921-8857 ▪ FAX (412) 921-4040
rojahnt@ttnus.com ▪ www.tetratech.com

IF LOST
RETURN
TO :

NSWC CRANE

PROJ. NO = 9060
SWMUS = 13 & 16
PROJECT TOM = RALPH BASINSKI
ASSIT. TOM = TOM JOHNSTON
FOL = TERRY ROJAHN
GEOLOGIST = BOB BALKOVEC

TITLE CRANE (NSWC)

PROJECT NO. 9060

BOOK NO. 1363

TUES. 2-11-03

Work continued from Page

- TRAVEL DAY -

1350 Hrs - ARRIVE @ BLDG 3245 AFTER RECEIVING BADGE @ MAIN GATE

- PREP. to lay out Monitoring Well & DPT Locations
- T. BRENT out of OFFICE
- CALL OFFICE talk to TOM JOHNSTON

1505 Hrs - LOCATE SWMU 16 - NEED ACCESS CLEARENCE FROM MIKE ROACH Ext. 3546

1530 Hrs - RETURN to BLDG 3245 - MEET w/ T. BRENT TOM will contact & get clearence @ SITES/SWMUS 13 & 16 FOR tomorrow

1550 Hrs - MEET with PUBLIC WORKS

- MARK locations in WHITE
- contact PW when finished locating borings & MW's
- Check BACK VIA phone FEB 24 → 27 - talk to DONNA (812) 854 6903

1610 Hrs - LEFT CENTER

1730 Hrs - SHOP FOR SUPPLIES - STAKES & PK NAILS

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

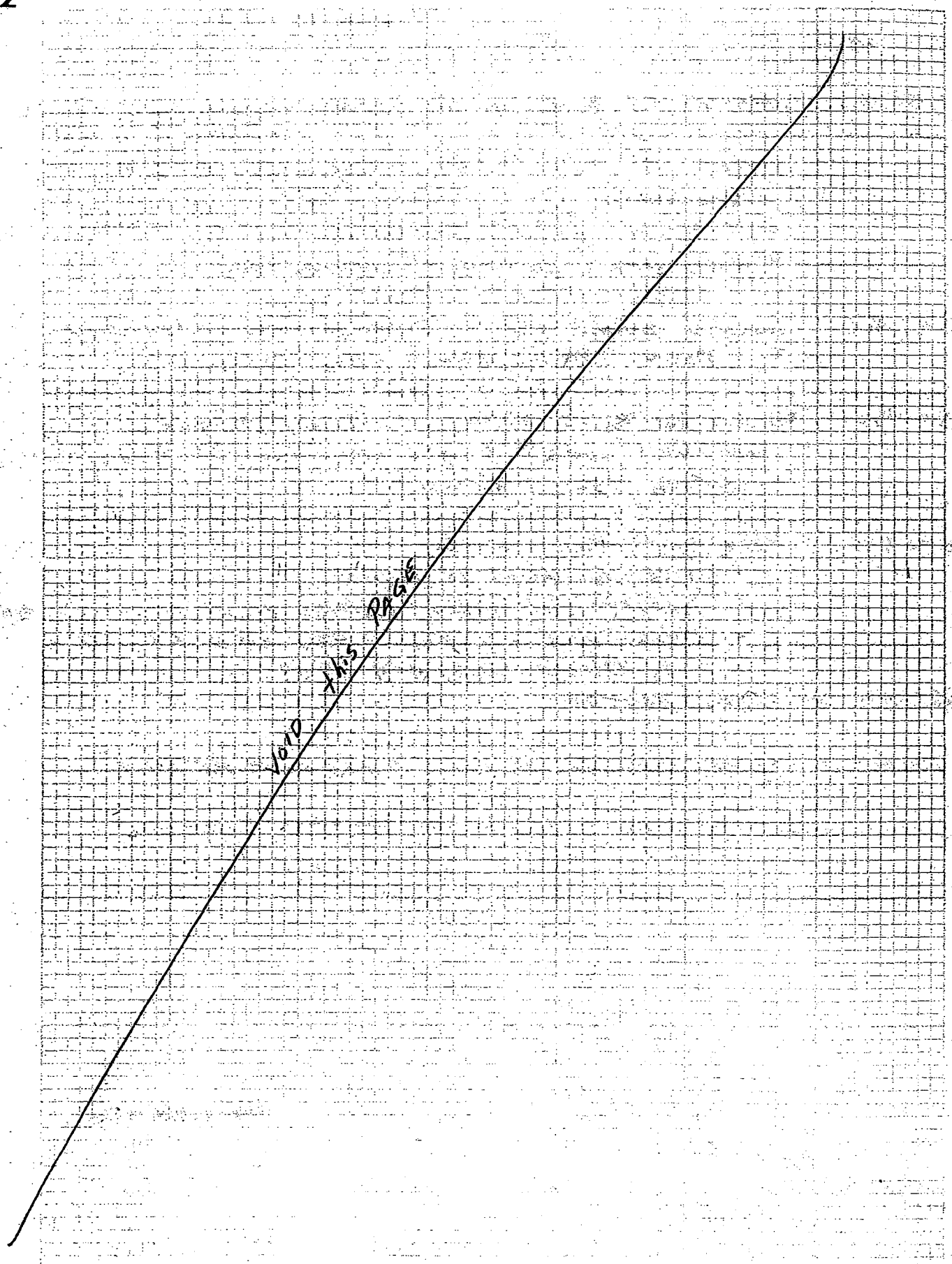
SIGNATURE Terry Rogers

DATE 2-11-03

DISCLOSED TO AND UNDERSTOOD BY **DATE** **WITNESS** **DATE**

B 100 P ©

2



WED. 2-12-03

Work continued from Page

0700Hrs - Arrive @ BLDG #3245
Wait for word from Army Environmental
on security issues @ both SWMUs
Army contact is Doug Johnson X 1481
0835Hrs - Got go ahead from Mr. Johnson to access
SWMUs 13 & 16 this date
- @ SWMU 13 to inform Mr Marvin Kluesner
X 1790 before entering area around BLDG 165
- Need to inform Mike Dages X-1472 to access
BLDG 146
Jeff Franklin - Supervisor
(TC) ~~Dor~~ Mike Roach - Production Super X-3546
SEE Doug Johnson's FAX - Pages 4 → 6 (X-1481)
0845 Hrs - Arrive @ SWMU 16
- Cannot be around BLDG 147 during defuser
operations - included are locations
16SB04, 05, 16MWT04 & 16SW/SD03
- Check in w/ guard & Jeff Franklin
- Located sampling locations until 1300Hrs
1315Hrs - Check in w/ T. Brent - Regarding Boiler
Removals @ BLDG #s 171 & 166
- 1400Hrs - T. Brent & T. Rojahn reconed
Boiler removal areas
- T. Rojahn - made sketches for R. Basinski
to use to place boring locations -
SEE SKETCHES ON PAGES - 7 & 8 & PHOTOS ON P. 11
1605Hrs - Finish sketches @ BLDS 171 & 166
1615Hrs - Arrive @ BLDG. #146 - talk to Jeff Franklin
- Defuser down - Finish location of Boring
sites near defuser
- Jeff said Defuser will be down 2/13/03
so T.R. could have free access
1700Hrs - Left BLDG 146 Area
1710Hrs Left Crane

Work continued to Page 4 → 9

SCIENTIFIC BLANKBOOK PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE Troy [illegible] DATE 2/12/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Brent Thomas J CNIN
From: Johnson, Douglas G [JohnsonD@crane.army.mil]
Sent: Wednesday, February 12, 2003 10:09 AM
To: Brent Thomas J CNIN
Subject: FW: TTNUS ACCESS

Importance: High

Here are the rules of engagement. Main issue is to ensure coordination with the area supervisors before beginning operations. I should have covered that requirement a little more clearly. Also, another rule that is not listed but is very important - POVs are not allowed inside red flagged areas (denoting explosives operations). It's easier to phone the supervisors ahead of time, as the supervisors are normally within the red-flagged area and are not easily accessible if you're driving a POV.

I can help in coordination with the production folks if needed. Current supervisor @ 146 is Mike Dages (X-1472), and supervisor at B-165/MFB is [redacted]. The head Production Supervisor is Mike Roach (X-3546).

In March, we'll have a short sit-down with the crew to go over the Safety and Security requirements. Shouldn't take too long, but should help in eliminating any problems during their work.

---Original Message---

From: Clinton, Leah K
Sent: Wednesday, February 12, 2003 9:55 AM
To: Voorhies, John D; Johnson, Douglas G; Baker, Sheryl G; Roach, Michael D; Flynn, Thomas R
Cc: SS Personnel
Subject: RE: TTNUS ACCESS
Importance: High

I believe we've coordinated this as much as possible given the short notification.

Here's the plan for this week:

1. MEA will notify people assigned access control duties. Although the contractor must check in, access will be authorized without an escort.
2. Doug Johnson will:
   a. Coordinate access for Friday, 14 Feb
   b. Make sure the contractor is made aware of the contractor's responsibilities (3 below).
3. The contractor will:
   a. Stop and identify himself to the person performing access control.
   b. Check in with the area supervisor immediately upon entry if the area is in operation and comply with all instructions/prohibitions given to him by the supervisor concerning safety and security.

Here's the plan for the longer term operation planned for mid-March:

1. Doug Johnson will:
   a. Make arrangements to provide the Key/Lock Officer with a copy of the contract or scope of work.
   b. Sign for all controlled contractor core keys
   c. Issue controlled keys to the contactor on DA Form 5513-R
   d. Make sure the contractors are made aware of their responsibilities.
   e. Oversee work and make sure the contractor turns the keys back in immediately upon completion of the work and prior to authorization for release of payment.

2. The Key/Lock Officer will:
   a. Install controlled contractor core locks on 145/146 area and MFB
   b. Provide assistance to Doug Johnson on proper issuance of keys to the contractor
   c. Remove the controlled locks once all keys have been returned by Doug Johnson.

3. The contractor will:
   a. Strictly control keys and immediately turn the keys back in once the contract work has been completed.
   b. Stop and identify himself to the person performing access control.

If gates are locked and nobody is at the guard house, the contractor is responsible for securing the gate behind him (coming and going). NOTE:

Locks must be relocked in their specific original order.

   c. Check in with the area supervisor immediately upon entry if the area is in operation and comply with all instructions/prohibitions given to him by the supervisor concerning safety and security.

4. MEA will notify people who are assigned access control duties. Although the contractor must check in, access will be authorized without an escort.

—Original Message—

From: Johnson, Douglas G
Sent: Tuesday, February 11, 2003 3:33 PM
To: Clinton, Leah K
Subject: FW: TTNUS ACCESS

Leah,

TetraTech is an environmental contractor that does corrective action work for Crane Navy. They are wanting to work on flagging, soil sampling, and drilling for studies at B-146 and Mine Fill B to determine levels of contamination. These actions are part of the overall Crane site cleanup effort.

Since we're at Bravo +, what is the best way to get TetraTech access to work in those areas and what level of supervision will they need? The scope of the operations is listed in Tom Brent's e-mail below. Terry Rojahn is at Crane currently, and would like to begin the flagging operations. The soil boring and drilling operations should not begin until March.

Let me know your thoughts on this issue.

Thanks,

Doug Johnson
Environmental Protection Specialist
SJMCN-SF
Crane Army Ammunition Activity
(812)854-1481
DSN 482-1481

—Original Message—

From: Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]
Sent: Tuesday, February 11, 2003 3:14 PM

SIGNATURE

DATE 2/12/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

To: Johnson, Douglas G
Subject: TTNUS ACCESS

Doug,

Terry Rojahn from Tetra Tech NUS needs access to B146 area & MFB to put in pin flags to obtain a PW digging permit. This will take about 3 days. Furthermore, he has a rented vehicle & would very much like to get this into the 2 sites (after all, MFB is a BIG place). Let me know what you can work out.

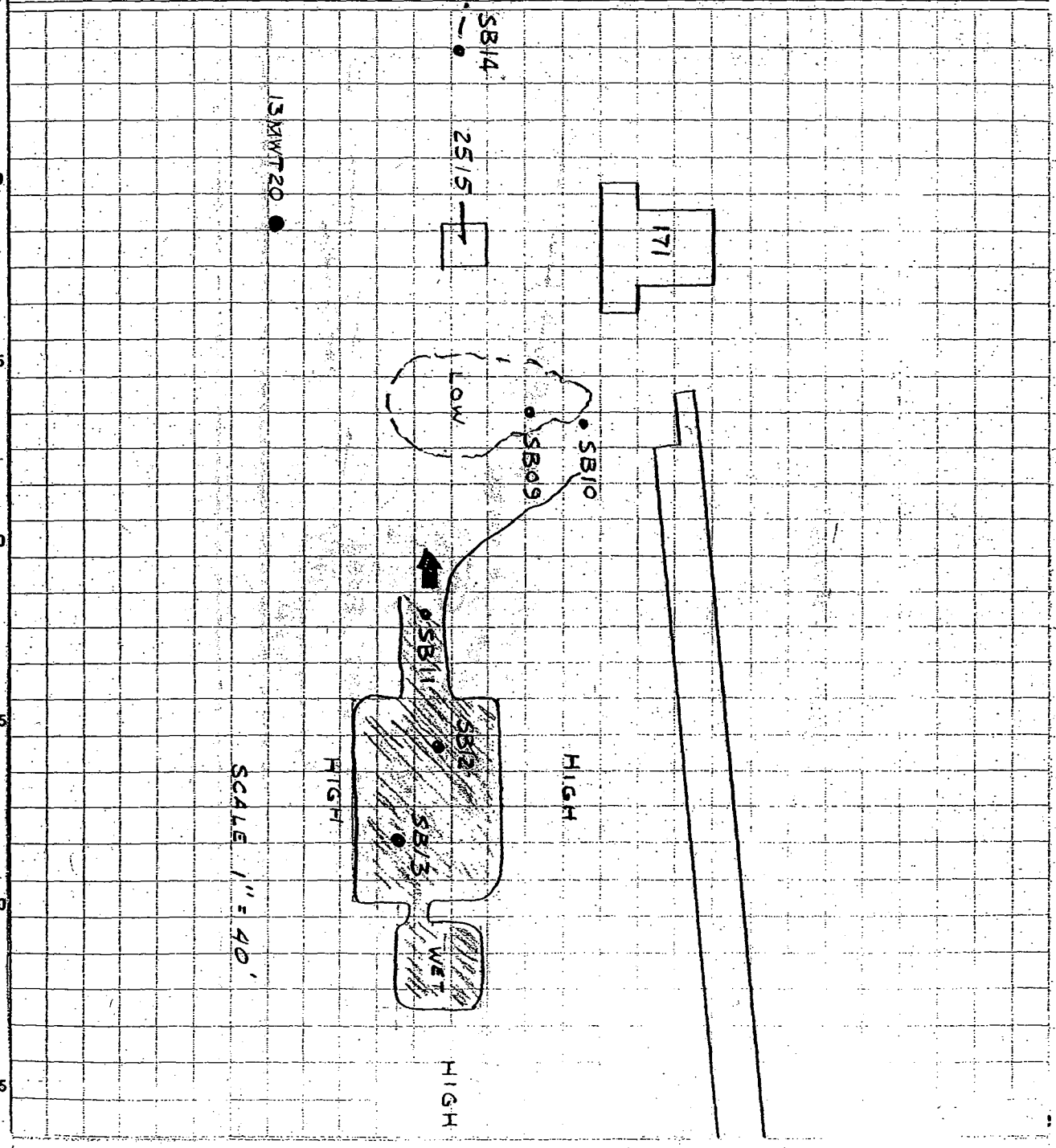
Just so you know, Tetra Tech will be mobilizing a full field crew about mid-March w/drill rigs to collect soil boring samples and install wells. I'll let you know more as soon as I find out details. Please let me know what we need to do to make this happen at these 2 sites.

Thanks,
Tom

TITLE PROJECT NO. 9060

BOOK NO. 1363

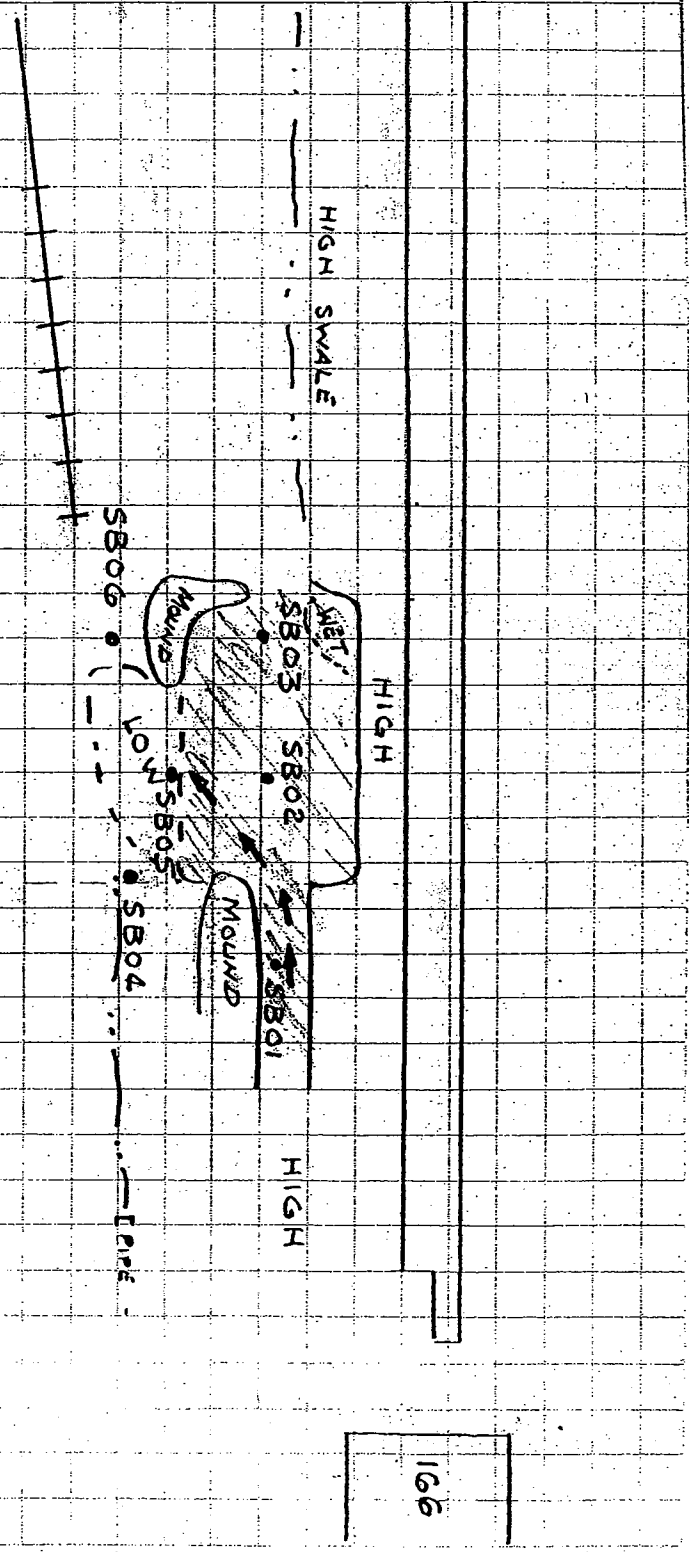
CLIENT CRANE	JOB NUMBER 9060
SUBJECT SOIL REMOVAL NEAR BLDG 171	
BASED ON FIELD MEASUREMENTS	DRAWING NUMBER
BY T.R / CHECKED BY	APPROVED BY / DATE 2-12-03



SIGNATURE Ty Nagel DATE 2/12/03

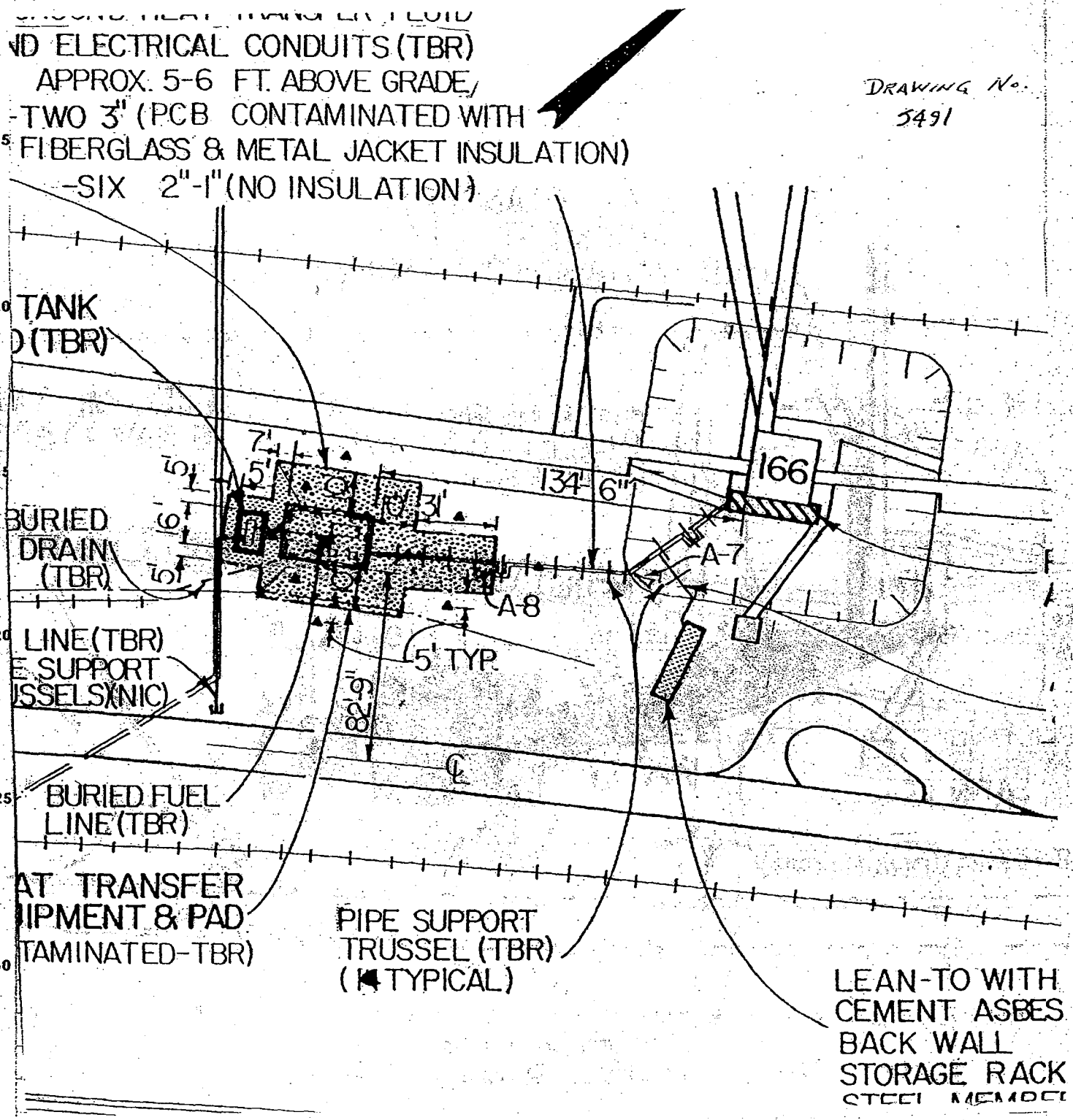
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

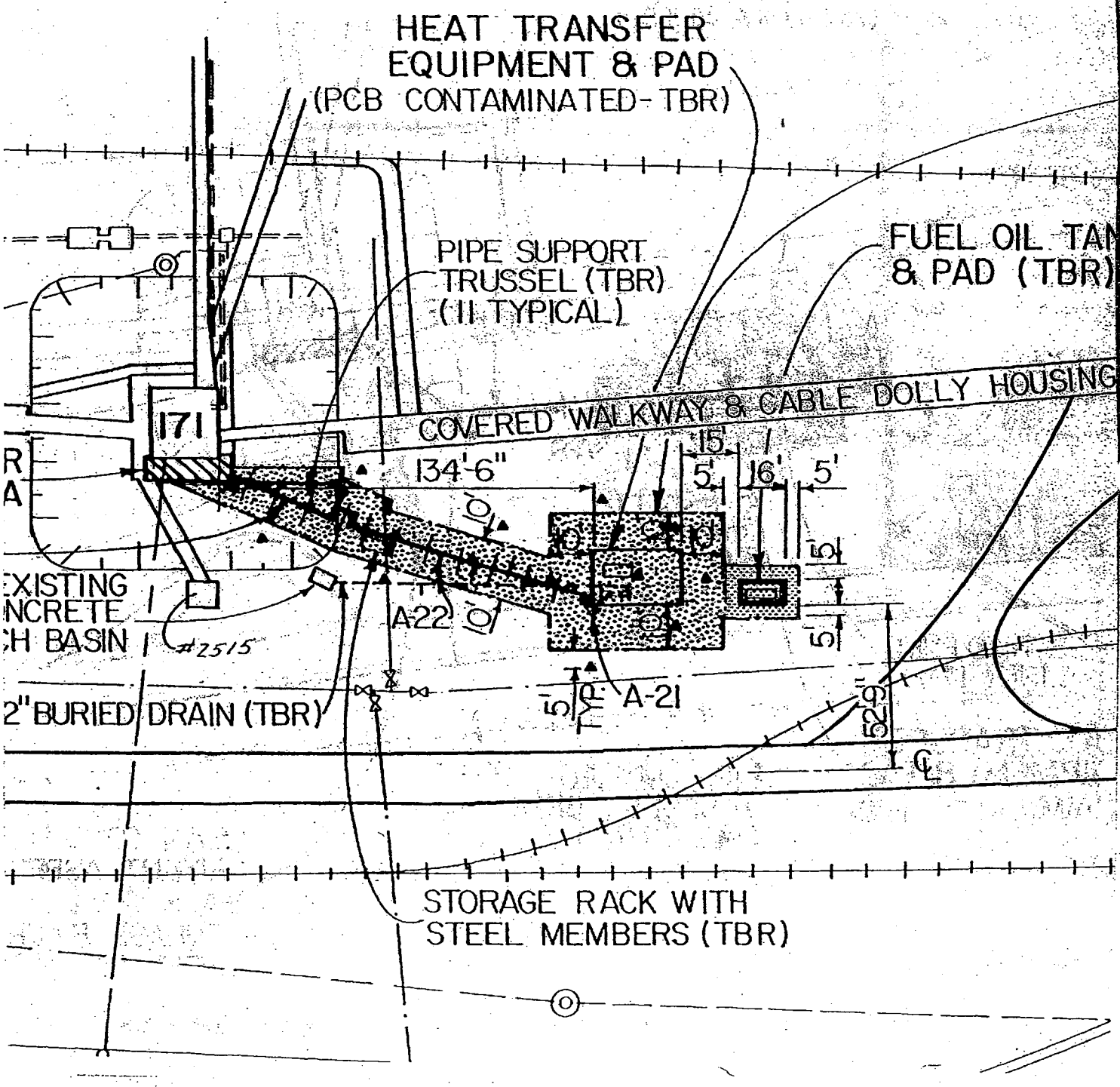
CLIENT	JOB NUMBER
CRANE	9060
SUBJECT: SOIL REMOVAL NEAR BLDG 166	
BASED ON: FIELD MEASUREMENTS	DRAWING NUMBER
BY: T.R. / CHECKED BY:	APPROVED BY: / DATE: 2-12-09



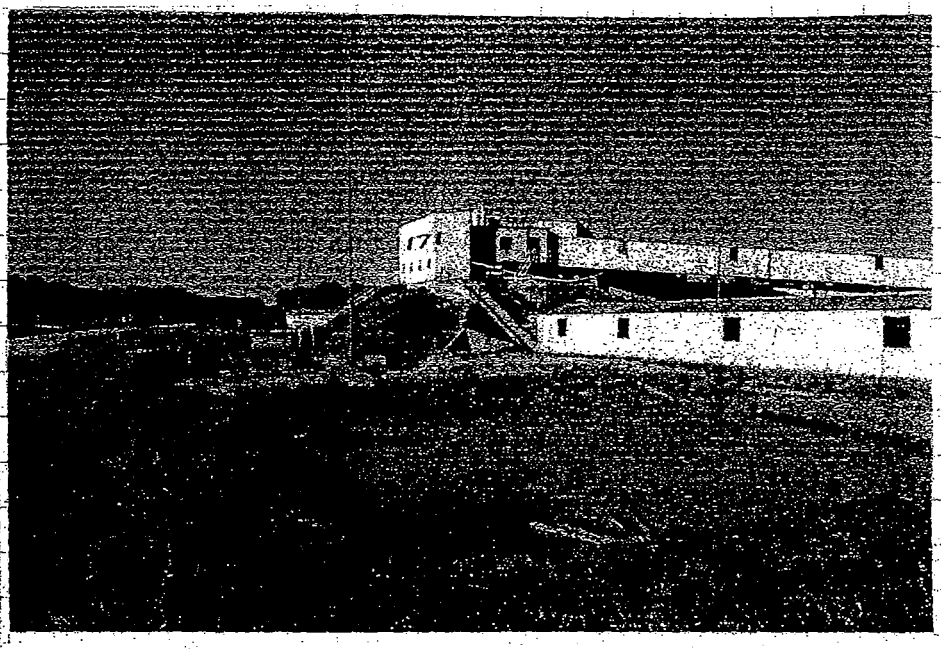
SCALE 1" = 40'

DRAWING No. 5491

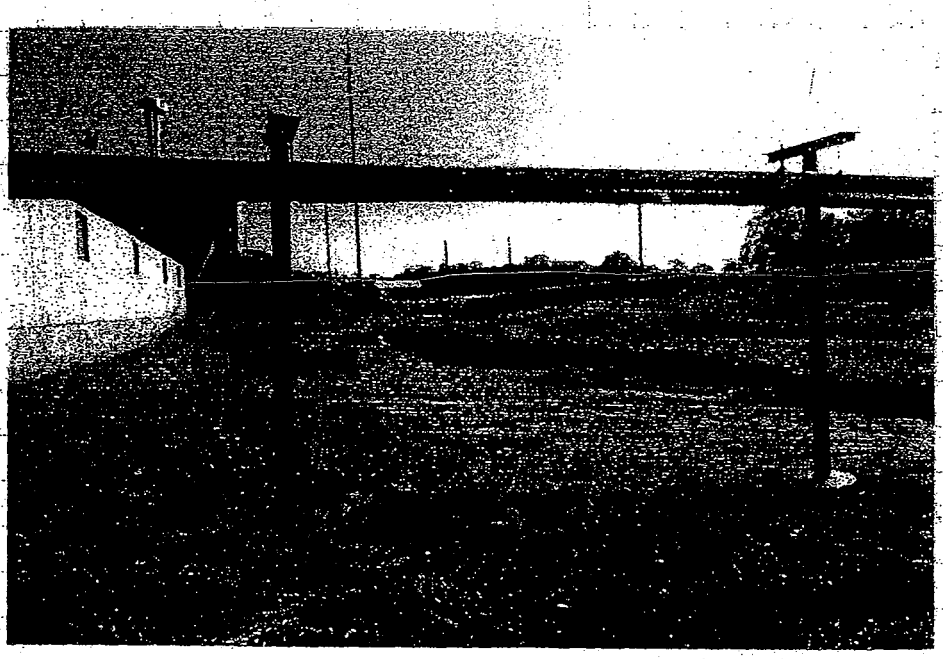



HEAT TRANSFER
EQUIPMENT & PAD
(PCB CONTAMINATED-TBR)
PIPE SUPPORT
TRUSSEL (TBR)
(11 TYPICAL)
FUEL OIL TAN
& PAD (TBR)
COVERED WALKWAY & CABLE DOLLY HOUSING
171
134'-6"
15'
5'
16'
5'
10'
10'
10'
10'
5'
5'
5'
5'
52'-9"
A-22
A-21
#2515
EXISTING
NCRETE
CH BASIN
2" BURIED DRAIN (TBR)
STORAGE RACK WITH
STEEL MEMBERS (TBR)

Work continued from Page



24



25

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE

DATE 2/12/03

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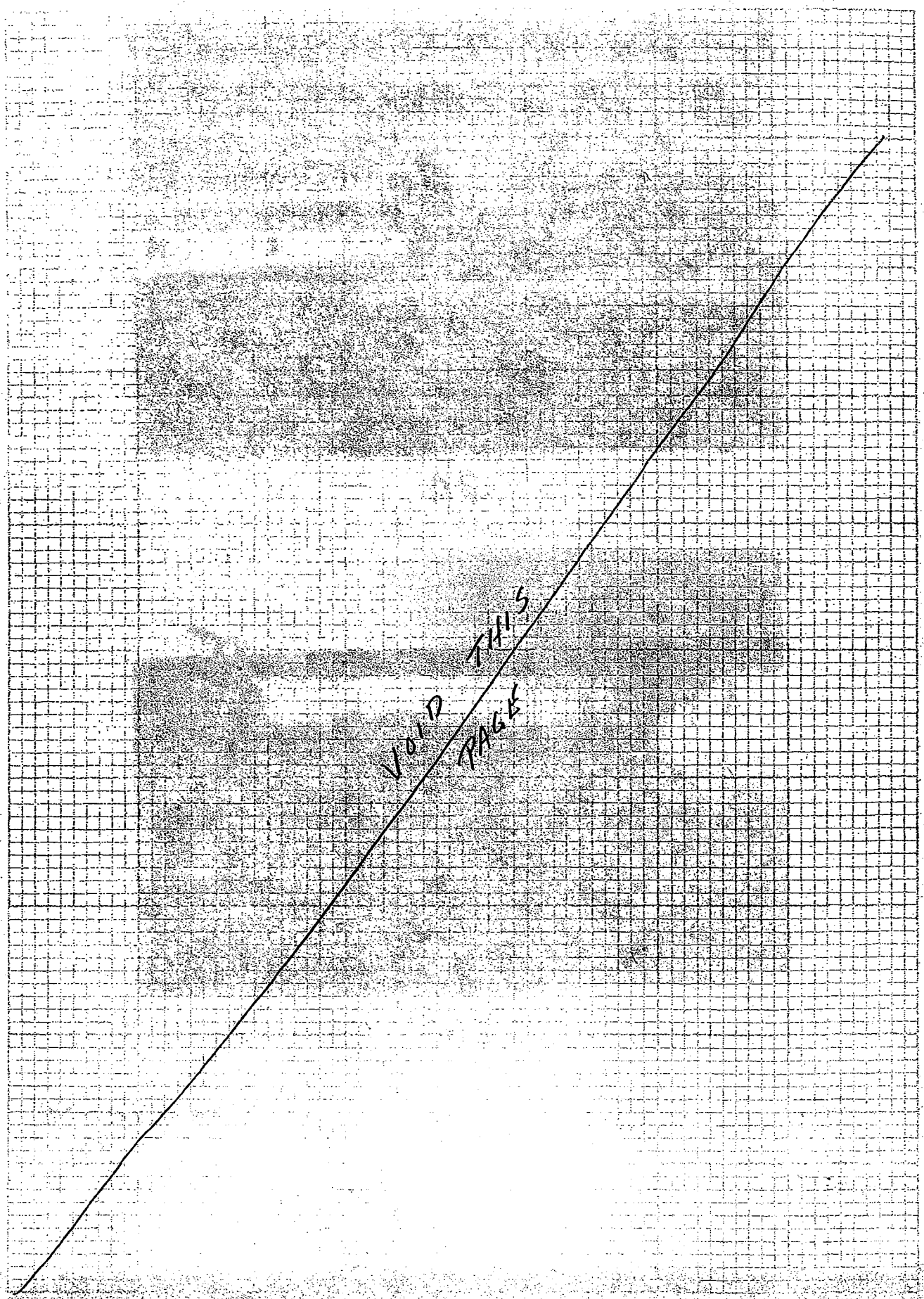
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TITLE NSWC CRANE **PROJECT NO.** 9060 **BOOK NO.** 1363 **13**

THURS. 2/13/03

Work continued from Page

0710 Hrs - Arrive @ BLDG 3245
- PREP DRAWING # 5491 OF BLDGS 171 & 166 to FAX to R. BASINSKI
- FAX DRAWING # 5491 to RALPH
- TALKED to RB, SENT up CONFERENCE CALL FOR 1430 Hrs

0805 Hrs - Arrive @ SWMU 16 - PARK outside FENCE/gates lock - will stake out borings outside South END OF site
- staked out 13 locations
- CHECK Existing well key # 34567
- CHECK locations OF SUMPS & proximity OF SUMPS to FENCE FOR WELL stake out - SUMPS INSIDE FENCE site MAP SHOWS them on the outside

1030 Hrs - Arrive @ BLDG # 3245
- CALL MR KLUESNER FOR ACCESS to SWMU 16 BLDG 165 - BLDG SHUT DOWN FOR MAINTENCE tomorrow - will have FREE ACCESS - NEED to call tomorrow FOR ACCESS through gate

1050 Hrs - Arrive @ SWMU 13 - locate WELL sites

1410 Hrs - LEFT FOR BLDG. # 3245

1420 Hrs - Arrive @ BLDG # 3245
- CONFERENCE call with R. BASINSKI, T. DENT Bill GATES Doug JOHNSON, Tim JOHNSTON, V. PLACHY MATT COCKRAN & B. BALKOVEC; SEE FAX PAGE 14
- Address SAMPLING locations @ BLDGS 171 & 166
- " moving MW locations @ SWMUS 13 & 16
- " site ACCESS ISSUES & ONGOING OPERATIONS

1550 Hrs - LOCATE SB01 → 06 & 09-14 @ SWMU 13 w/ T. BRENT THEN CONTINUE to MAP ABOVE locations & locate MW sites outside FENCE

1700 Hrs - LEFT SECURED FENCED AREA

1745 Hrs - FINISH locating 13MWT13, 14 & 19

1755 Hrs - LEFT CRANE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rogal DATE 2/13/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

14

Brent Thomas J CNIN

From: Basinski, Ralph [BasinskiR@ttnus.com]

Sent: Thursday, February 13, 2003 9:56 AM

To: Johnston, Tom; Cochran, Matthew; Plachy, Valerie; 'Bill Gates'; Brent Thomas J CNIN CNIN

Subject: NSWC Crane SWMUs 13 and 16 Sampling Locations / Access Issues

When: Thursday, February 13, 2003 2:30 PM-3:30 PM (GMT-05:00) Eastern Time (US & Canada).
Where: Main Conference Room

~~*~*~*~*~*~*~*~*

Terry Rojahn is currently conducting the utility clearance site visit. He has identified several issues. These include

1] Inadequate # of samples for PCBs at therimonal boilers at MFB

2] Access issues for several monitoring locations at SWMUs 13 and 16

3] General access issues due to ongoing operations and heightened security.

It may be necessary to add or move sample locations. A conference call will be held among Bill Gates, Tom Brent, Terry Rojahn, Ralph B, Tom Johnston, and Valerie P. At the end of the conference call we hope to have determined the locations of additional samples and whether any sample locations have to be moved. Also any modifications to the QAPP (Submittal of the revisions to the QAPP is being held up until it is determined whether any additional modification must be made to the QAPP).

Field sketches made by Terry are attached for use in the meting.

<<Field Sketch for PCB Samples MFB.pdf>>

FRI 2/14/03

Work continued from Page

0700 Hrs - Arrive @ BLDG # 3245
Paperwork & wait for D. Johnson to deliver
Key to access SWMU 16

0805 Hrs - T. Brent received key to access gate to
BLDG 146 - went w/ T.B. to BLDG 146
Took unlocked gate & returned to BLDG 3245
T.B. located sampling sites for wells next to
East & West sumps, etc. @ SWMU 16

0905 Hrs - Return to BLDG # 3245 - inform T. Brent of
my return so that he could secure gate @ BLDG 146

0920 Hrs - Arrive @ SWMU 13 - check in with Mr Kluesner
- Locate 13 monitoring well sites
- Photo Boiler removal areas near BLDGs 171 & 166

1125 Hrs - Finish @ SWMU 13 check out w/ Mr Kluesner

1205 Hrs - Arrive @ Public Works
- Adjust maps to reflect changes in well locations
- Add soil boring locations for BLDGs 171 & 166
- Adjust Dig Permit Request to reflect the
addition of 6 more soil borings @ SWMU 13

1238 Hrs - Arrive @ BLDG # 3245
- Demob SUV & clean
- Prep. to depart to Airport
- Check out w/ T. Brent

1335 Hrs - Left Crane → Remainder of day TRAVEL

— END —

Work continued to Page

SIGNATURE Terry Boyd DATE 2/14/03

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MON 3/24/03

Work continued from Page

TRAVEL DAY

1325 Hrs - Arrive @ Main gate (Bloomington) obtain badges - Matt Cochran, Bob Balkovec & T. Rosahn

1338 Hrs - Arrive @ BLDG 3245 (Field Office) Start opening boxes & coolers to organize EQ. & sample containers

1430 Hrs - Pick up Dig Permit for SWMU 13 Problem w/ SWMU 13 Public works having trouble getting on-site.

1500 Hrs - Return to BLDG 3245 - Drillers arrived
TIM BOSHMER - Foreman
DAVE SCHRECENGOST - Driller
JON KEIFER - Helpers
CHAD MAHAFFY -
TONY MAYRER -

Drillers organize supplies

1600 Hrs - H&S meeting

1715 Hrs - Finish H&S meeting
Prep. EQ for DPT work tomorrow
Leave message for R. Basinski on Day's events

1755 Hrs - Left Base

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE T. Rosahn DATE 3/24/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

B 100 P ©

ON SITE
TTNUS - M. Cochran, Bob Balkovec, T. Rosahn
B-M - T. Boehmer, D. Schreckenhost, J. Keifer, C. Mahaffey, T. Maykot & J. Akers

TUES 3/25/03 SUMMARY

KICK OFF MEETING W/ T. Brent, C. Freeman & Army
RECEIVE KEY TO SWMU 16 & 13
RECEIVE DIG PERMIT FOR SWMU 13
GAVE HES to JEFF AKERS
SAMPLE BORINGS
135801 → 135806

INSTALL - 13MW T15 SEE N.B. # 2555

GPCS GENERATED
LAUCKS - 0963 & 0964
TRIANGLE - 0965

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TUES 3/25/03

Work continued from Page AM Weather mild & sunny PM mild w/period of heavy rain start @ 1400 Hrs

0700 Hrs - Arrive @ BLDG 3245
Prep. to sample W/DPT @ SWMU 16

0800 Hrs - Arrive @ Kick off meeting w/ Tom Brent & C. Freeman; Army represented by Frank Mitchell & Mike Reach (x3546)
They presented maps w/ limited access do to material handling. Also, received 3 keys (T. Brent, B. Balkovec & T. Kolahan) for access to S. Gate @ SWMU 13 & Gates @ SWMU 16
Others @ meeting included T. Boehmer & D. Schegengost of B-M & M. Cochran, B Balkovec & T. Rojahn of T+NUS
No access to SWMU 16 until Thursday 3/27/03
Have to switch focus from SWMU 16 to SWMU 13

0840 Hrs - Stop at Public works to try to hurry up SWMU 13 dig permit - Donna very helpful will call gas co. & us when permit is finished
1200-1300 Hrs

0910 Hrs - Arrive @ SWMU 13 to show MW locations to B-M (T.B. & D.S.) & T+NUS (M.C. & B.B.)
Select location 13MWT15 to start when dig permit is obtained - meanwhile will start setup of drilling rig

1130 Hrs - Lunch

1200 Hrs - Prep. to sample @ SWMU 13
Pick up Dig Permit

1230 Hrs - Arrive @ Boring locations near BLDG 166
Begin sampling @ 1240 hrs end @ 1420
See CoCs 0964, 0963 & 0965

1500 Hrs - Return to BLDG 3245 for packing & paperwork

1800 Hrs - Left site

1830 Hrs - Drop off samples ship to Laucks on Fed. Ex Airbill # 8316 7332 7269

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 3/25/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREW:
TANUS - M. COCHRAN, B. BACKOVEC & T. BJAHN
B-M - D. SCHREGENGOST, J. KEICER, C. MAHAFFY,
T. MAYCEK & J. AKERS

SUMMARY WED 3/26/03

INSTALLED: 13MWT17 & 18 SEE NB #2555

SAMPLED SOIL BORINGS - 135807 &
135809 → 135813

ALSO, COLLECTED RINSATE & SOURCE BLANKS
FOR TAP WATER & DI

COFCS GENERATED
LAWCKS - 0968, 0970
TRIANGLE - 0966

DI IS NEAL REAGENT GRADE WATER
NEAL DIAGNOSTICS
14 ALMEDA AVE
E. PROVIDENCE, RI 02914
LOT # 0107313
EXP DATE 01-2004

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 50505 MADE IN USA

WED 3/26/03

Work continued from Page Am sunny & mild PM - Same

0650 Hrs - Arrive @ BLDG 3245
Prep. to sample @ SWMU 13
0730 Hrs - Arrive @ SWMU 13 - set up to sample Soil Borings
M.C & T.R sampled 135809 → 135813
SEE CoFCs 0966 & 0968
1000 Hrs - Finish sampling @ SWMU 13
1015 Hrs - Return to BLDG # 3245
- FAX CoFCs to Laucks
- " " " OFFICE
- Call T. Patton order soil auger & bucket bits to sample @ 135814 - Refusal w/ DPT
- Called office left message w/ R. Basinski
1200 Hrs - Lunch
1230 Hrs - Return to BLDG # 3245
- Prep. to collect Source Blanks & Rinsate
SEE CoFC # 0970
- M.C. & B.B. collect samples @ 135807
- TR collected S.Blanks & Rinsates
- Package samples for shipment on CoFCs 0966 & 0965 for Triangle & 0968 & 0970 for Laucks
1740 Hrs - Left Base for FED. EX. Drop off the following:
Triangle samples on AB# 8316 7332 7247
Laucks samples on AB# 8316 7332 7258
1930 Hrs - Arrive @ Motel

END

SIGNATURE [signature] DATE 3/26/03
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CREWS - SAME AS 3/26/03 p 20

THURS. SAMPLE SUMMARY 3/27/03

INSTALLED : 13MWT 10, 12 & 16 SEE NB #2555

SAMPLED SOIL BORINGS : 165B01 → 11, 14-17 & 4

COCCS GENERATED

LAUCKS : 0959 & 0960

TRIANGLE : 0962

SCIENTIFIC SINCERY PRODUCTS, CHICAGO 60605 MADE IN USA

THURS. 3/27/03

Work continued from Page AM Sunny & mild PM - Same

0700 Hrs - Arrive @ BLDG # 3245

0730 Hrs - Try to access 2nd Gate @ BLDG 146 Contractor lock not in place yet - Return to BLDG 3245 Informed C. Freeman - she will take care of the problem (called Frank Mitchell)

0810 Hrs - Access 2nd Gate - Maintenance opened Gate M.C. & T.R.
Collected soil samples @ 165B01 → 07 & 165B41
Water level @ sump near 165B14 @ 4' w/ TD @ 8'

1130 Hrs - Lunch

1200 Hrs - Return to BLDG 3245
Refrigerate samples; check in @ office

1310 Hrs - Return to SWMU 16
Collected soil samples 165B08 → 11 & 165B14 → 17

1615 Hrs - Secured 2nd gate w/ Contractors lock
Return to BLDG #3245
Package samples taken this date on CoFCs 0959 & 0960 for shipment on FED. EX. Airbill # 8316 7332 7236

1830 Hrs - Drop off samples @ FED. EX.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 3/27/03

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CREW - SAME AS 3/26/03

J. ALLEN & C. MAHAFFY LEFT FOR HOME @ the END OF DAY.

FRI. 3/28/03 SUMMARY

INSTALLED 13 MWT 11, 21, 22, 25 & 26, SEE NB 2655

SAMPLED - 21 SOIL BORINGS SEE P. 25

SUMP @ SWMU 16 (16SB40) - WATER @ 5'

TD = 8'

COCs GENERATED

LAUCKS: 0961, 0972, 0981

TRIANGLE: 0967 & 0971

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 62605 MADE IN USA

FRI 3/28/03

Work continued from Page Weather Partly cloudy & windy/cool 50's

0700 Hrs - ARRIVE @ BLDG. 3245
PREP to SAMPLE SOILS
0745 Hrs - Arrive @ SWMU 16 set up to sample soils
SAMPLE 16SB 12, 13, 31, 30, 29, 22 & 25 SEE CoC 0972
SAMPLE 16SB 25, 24, 23, 18, 19, 21, 27 & 28 SEE CoC 0961
SAMPLE 16SB 28, 20, 35, 37, 38, 39 & 40 SEE CoC 0981
1500 Hrs - Finish collecting soils and leave SWMU 16
1510 Hrs - Arrive @ BLDG # 3245
PACKAGE & SHIP samples for LAUCKS LAB
collected on above CoCs
1730 Hrs - LEAVE BASE FOR FED EX.
1800 Hrs - DROP OFF SHIPMENT @ FED EX on AB#
8316 7332 7225
1020 Hrs - SENT FAX to Hugh Prentice of Laucks - w/ CoCs - samples
collected this date - FOR SAT. Pick up.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 3/28/03
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CREW - THUS - M. COCHRAN, B. BALKOVIC & T. ROSIAK
B-M - D. SCHREGENGOST, J. KEIFER & T. MAYREC

SAT: 3/29/SUMMARY

INSTALLED: 13MWT 01, 02 & 05

SAMPLE: SURFACE WATERS
13SW01-07, 09 & 10
13SD01-10, 17, 18, 22 & 23
ADDED

GPCS GENERATED
LAUCKS: 0973, 0980, 0975 & 0978

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60656 MADE IN USA

SAT 3/29/03

Work continued from Page Weather Cloudy & cold 30's

0650 Hrs - Arrive @ BLDG #3245
Prep for surface water & sed sampling
Checked BLDG 3260 for water quality EQ.
Found only Cali. solutions & Turbidity meter
0815 Hrs - Checked @ BLDG 41 for peristalic pump & YSI - Found @ signed form
0855 Hrs - Returned to BLDG 3245
Calibrated YSI
Finish prep for sampling surface waters & sediments
1000 Hrs - Arrive @ SWMU 13
Sample: 13SD22, 01, 02 & 23; and 13SW01 & 02
1200 Hrs - Break for lunch
1300 Hrs - Return to BLDG 3245
Prepare bottle sets for remainder of day's sampling effort
1400 Hrs - Arrive @ SWMU 13
Sample: 13SW/SD 03, 04, 05, 06, 07, 09 & 10 &
13 SD 08, 17 & 18
1800 Hrs - Complete sampling this date
1810 Hrs - Arrive @ BLDG 3245
Paperwork & secure samples
1900 Hrs - Left site for Hotel.

EHA

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rogers DATE 3/29/03

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CREWS: SAME AS ON P. 26

SUN 3/30/03 SUMMARY

INSTALLED: 13MWT01, 03, 04 & 08; SEE NB 2555

SAMPLED: SURFACE WATER - 13SW12 & 13

SEDI - 13SD11→16, & 19→21

SOIL - 13SB08-SS & SB

CORCs GENERATED

LAUCKS: 0980, 0978 & 0979

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

SWH 3/30/03

Work continued from Page Weather Cloudy & Cold 30°s

0650 Hrs - Arrive @ BLDG #3245
PREP. to sample SW/SD @ SWMU 13

0900 Hrs - Arrive @ SWMU 13
SAMPLE Locations
13 SW/SD 11 - Dry collect SD only
13 SW/SD 12 & 13
13 SD 14 → 16 & 21

1200 Hrs - Return to BLDG #3245 - Lunch

1235 Hrs - Return to SWMU 13
SAMPLE Locations 13 SD 20 & 19

1335 Hrs - Return to BLDG #3245
PAPERWORK & Sample Handling

1840 Hrs - LEAVE BASE FOR Hotel
Stop FOR GAS & Supply PURCHASE

2120 Hrs - PAX OFFICE FRI. SHIPMENT COCs
0961, 0972 & 0981

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 3/30/03

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CREWS & SAME AS ON P.26

MON 3/31/03

Installed 13MW T 14 & 19

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

MON. 3/31/03

Work continued from Page

WEATHER: mostly sunny & 40's

0650 Hrs - Arrive @ BLDG #3245
PAPERWORK & PACKAGING
CHECK IN @ OFFICE; FAX CofCs to Ed Sedlmyer for distribution

1400 Hrs - CHECK Drilling Locations w/ Tom Brent for restoration & revegetation; relocate 13MWT20 & 09 to DPT locations.
CHECK IN W/ OFFICE (ED) checked w/ Laucks ok to sample tomorrow
CHECK SWMU 16 - SWL locations dry; ~~key~~ (TC) BLUE Lock on Back Gate for access to Existing wells & SW/SDs
Return to BLDG - secure office; pick up samples.
Rig stuck @ 16MWT13; will have to relocate and inform PW.

1700 Hrs - LEFT BASE for SAM'S CLUB & LOWES - for supplies, stakes & ~~cold tar~~ (TC) cold tar to patch Barcholes in Asphalt @ SWMU 16

1845 Hrs - Return to Hotel.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 3/31/03

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CLEWIS: SAME AS P. 26

INSTALLED: 13MWT09, 20, 23 & 24

SAMPLED: SW/SO @ SWMU 16

SEE CORCS 0983 & 0982

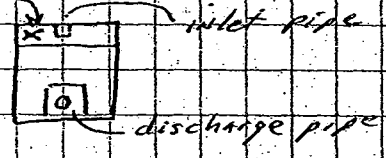
SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

TUES.

Work continued from Page

Sunny & 70's

0650 Hrs Arrive @ BLDG 3245
Prep to sample SW/SD @ SWMU16
Talk to Tom regarding sump next to BLDG 188
sample behind divider



0815 Hrs - Talk to Mean. to bring dozer through North gate - He oked
0830 Hrs - Check in w/ drill crew
0930 Hrs - Access dozer to BMWT09 w/ boards on road crossings
0947 Hrs - Talked to Donna @ PW about moving BMWT13 - she will get it cleared will talk to her on Monday

1000 Hrs - Return to BLDG #3245
Called F. Mitchell regarding work @ BLDG 146 NEXT WEEK - He said it looks good through May however there is work sch. @ BLDG #145 so he would have to talk to Mike Koch to see if that would impact us - he would get back to Tom B.
1020 Hrs - Arrive @ SWMU 16
Sample 165011, 02, 10, 04 & 05
1135 Hrs - Break for Lunch
1200 Hrs - Return to BLDG Pick up Additional supplies
1215 Hrs - Arrive @ SWMU 16
Sample 165008, 09, 06, 03 & 165W0101
1505 Hrs - Arrive @ BLDG #3245 prep. samples for shipping on COCs 0982 & 0983
1730 Hrs - Drop of Samples on FED Ex. AB# 8316 7332 7199

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/1/03
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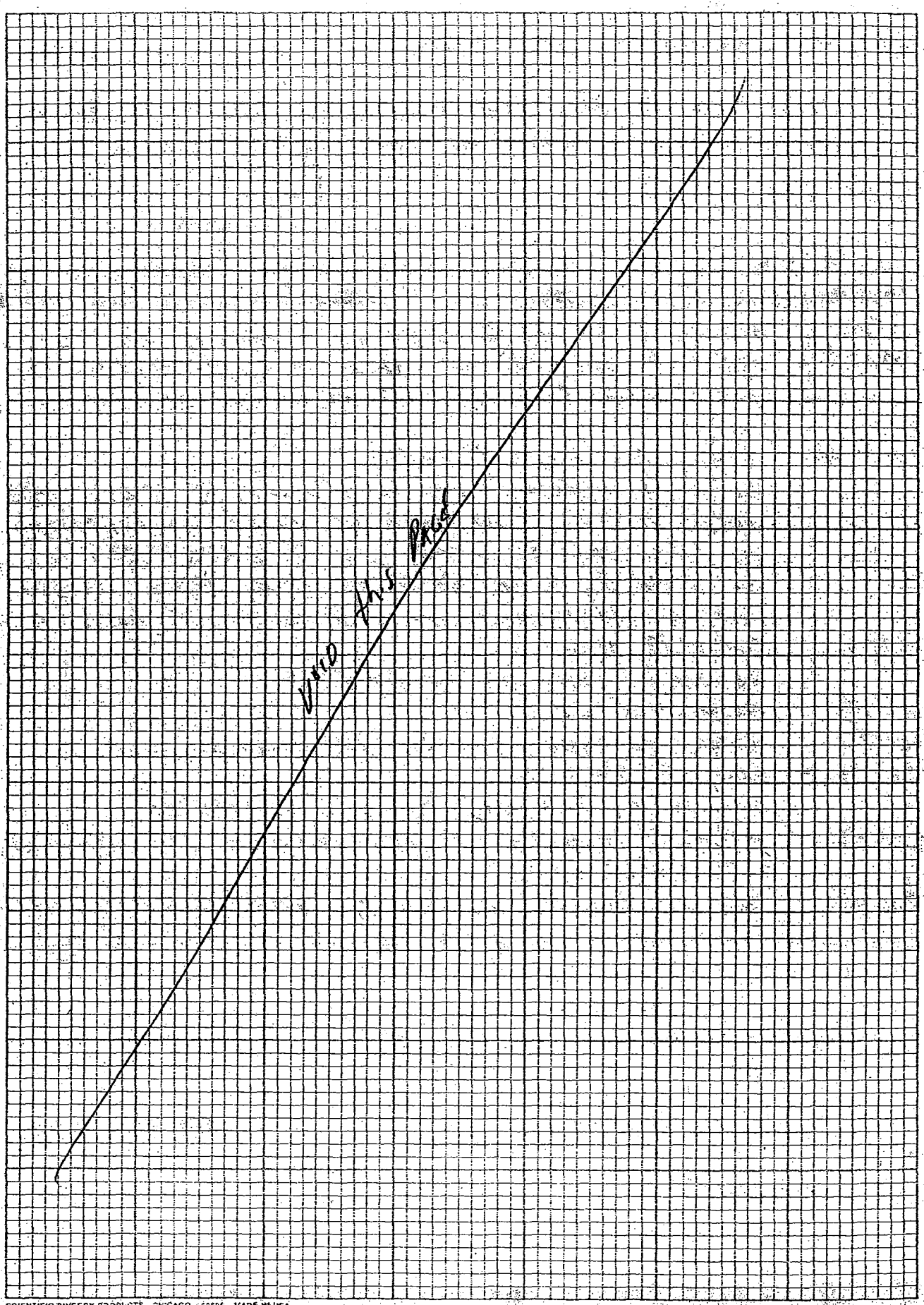

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

WED APRIL 2, 2003

Work continued from Page

0700HRS - Arrive @ BLDG #3245
General House Cleaning @ BLDG 3246
FAX C-C 0982 & 0983 to LAB & OFFICE
0915HRS - Left Base For Airport

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE DATE 4/4/03

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T+N US - B. Blackwell & T. Rojahn
BLM - D. Schreckenpost, Jan Keiser, J. Akers, T. Mayer & C. Mahaffy

MON 4/7/03 SUMMARY

- Travel Day
- Installed: 13MWT06 SSS MB 2535
- Sampled: Bushfos RB0407030 1 @1615 SS. muddy Bottom
  RB0407030 2 @1630 dr. stand
- ~~Also on site survey crew (TD)~~

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 66605 MADE IN USA

MON 4/7/03

Work continued from Page Cool & Overcast

TRAVEL DAY

1245 Hrs - Arrive @ BLDG # 3245
Organize newly delivered coolers + Eq. shipments

1330 Hrs - Check in @ PW - ok to install 13 MWT 13

1345 Hrs - Check in @ main gate for picture badge - cannot get picture badge - but will receive a laminated long term badge check back Wed or Thurs.

1410 Hrs - Return to BLDG # 3245 - check on operations @ BLDG 265
M. Kluesner said may be finish operations @ 1630 Hrs. but check @ BLDG 165 first.

1440 Hrs - Check on Drillers - gone to escort dozer pick up to SWMU 13 - D.S. arrived

1510 Hrs - Return to BLDG 3245
Prep labels for Rinsates

1615 Hrs - Collected Rinsate of S.S. Mixing bowl
RB04070301 w/ Reagent Grade H_2O by NEKL
Lot # 0109313 Exp. 01-2004

1630 Hrs - Collected Rinsate of Disposable Plastic Trowels
RB04070301 w/ same Reagent Grade H_2O as above

- Labeled & Tag Rinsate containers & secure in Frig
- Prep for surveyors to arrive tomorrow

1900 Hrs - Left Site

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

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SIGNATURE [signature] DATE 4/7/03

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CREWS
TT NICUS & B-M SAME AS ON PAGE
B.T.&R - M. Cooper & Cory Allen

4-8-03 SUMMIT
INSTALLED - 16MWT 01 SEE NB 2355
SEE PAGES 40 & 41 FOR RULES TO ACCESS MFB
JK & CM - WORKED ON WELL PADS @ SWMA 13
SURVEYORS - LOCATE SW150 @ SWMA 13 OUTSIDE FENCE

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

THES. 4/8/03

Work continued from Page

Cool & OVERCAST

0655 Hrs - Arrive @ BLDG #3245
Prep. for surveyors

0730 Hrs - Surveyors arrive - Matt Cooper & Corey Allen
Give H&S Training w/ Work Permit
Show surveyors SWMU 13

1000 Hrs - Survey crew to work outside of MFB 5&D/SVC locations - Got DRILLING CREW inside SWMU 16

1025 Hrs - Meet w/ T. Brent - said someone saw someone w/ a GPS inside Berthing Zone @ BLDG 165 - CHECK in w/ Mr. Klassen - He didn't know anything about it. Also checked w/ Guard at North Gate

1105 Hrs - Meet w/ Leah Clinton (Head of Security) Worked out ground rules for subs accessing SWMU 13 - She will get E-Mail to T. Brent.

1130 Hrs - Unlock gate @ SWMU 16 to let drilling crew out for lunch

1200 Hrs - Lunch

1300 Hrs - Meet w/ survey crew & drilling crew to discuss access rules @ SWMU 13
- Wait for E-mail from Leah Clinton
- Tally soil samples taken & appropriate DUPs & MS/MSDs need to take @ SWMU 16
- Prep. CoC's for tomorrow & Check in w/ OFFICE
- Receive E-Mail from Cris Freeman & Leah Clinton

1700 Hrs - Left Base

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/8/03

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Freeman Christine D CNIN
From: Freeman Christine D CNIN
Sent: Tuesday, April 08, 2003 4:18 PM
To: 'ClintonL@crane.army.mil'
Cc: Brent Thomas J CNIN; 'Johnson, Douglas G'; Mitchell Frank CNIN
Subject: RE: Contract Work in MFB

Leah,
Code 095 acknowledges receipt of your instructions (Tom had to leave for the day). The contractors will receive a copy of this email.

The following are the names of the contractors conducting work in MFB:

TtNUS:

Robert Balkovec
Terry Rojahn
Bowser-Morner:

Dave Schrecengost
Tony Mayrer
Jon Keifer
Jeff Akers
Chad Mahaffy
Bledsoe Tapp & Riggert, Inc.:

Matthew Cooper
Corey Allen

Thank you for you assistance.

---Original Message---

From: **Johnson, Douglas G [mailto:JohnsonD@crane.army.mil]**
Sent: Tuesday, April 08, 2003 15:53
To: Freeman Christine D CNIN
Subject: FW: Contract Work in MFB
Importance: High

---Original Message---

From: **Clinton, Leah K**
Sent: Tuesday, April 08, 2003 3:45 PM
To: 'brent_t@crane.navy.mil'; Mitchell, Frank E; Johnson, Douglas G; Wininger, Terri L; Roach, Michael D; Baker, Sheryl G; Kluesner, Marvin J; Voorhies, John D; Guard Supervisors
Cc: Helms, Mark E; Shearin, Walter F; Meals, Sterling W; Thomas, Norman R; XO; SS Personnel
Subject: Contract Work in MFB
Importance: High

BACKGROUND: TTNUS (contractor) is currently performing work in the MFB > area. We must make sure that:

- access controls are maintained in all of our operational areas
- contractors are granted the necessary access in order to perform > requested work and that access is consistent with safety and security requirements

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

Work continued from Page

- contractors are made aware of and comply with key and access control requirements
- persons performing access control (both CAAA guards and in-house personnel) are given the proper guidance necessary to adequately perform their duties

TTNS employees or other contractors performing work in the area shall:

- provide the name(s) of the contract employees or a list of supervisors who can "vouch" for the identity of the contract employees (so we may provide this information to the guard force).
- check in and out with the guard/access control person prior to entering and upon leaving MFB (the guard is located at the gate nearest bldg 165). Contractors are not required to check in/out if a guard is not/no longer on duty (e.g., after hours or on weekends when there are no operations in the area).
- call the bldg 165 supervisor (854-1790) to notify him/her that contractors will be working in the area and to obtain any approvals/prohibitions concerning movement in/around/behind the general area of bldg 165 (as provided by Mr. Mike Roach on a color-coded map). For convenience, the guard will make the phone in the guard house available for this purpose. The contractor shall not go in/around/behind bldg 165 without specific approval in advance by the bldg 165 supervisor. Approval shall be obtained on a case-by-case basis.
- go around to the opposite gate and enter the area (nearest bldg 174) (where a contractor cored lock has been installed). The contractor shall secure the gate behind him/her. The contractor shall not permit anyone other than his/her own employees to enter the area at the same time (i.e., no "piggybacking").
- exit thru the same gate he/she entered, secure the gate behind him/her, and "check out" thru the gate guard.
- control keys assigned to them. Making duplicates is unauthorized.
- turn in all keys immediately upon completion of requested work.

ALL: Similar written/detailed instructions must be provided to all contractors working in our areas and coordinated with all parties concerned. I will be happy to provide you advice and assistance if you are preparing similar instructions for contract work being performed in your area of responsibility.

Mr. Brent: Please acknowledge receipt and provide the names of the contract employees who can enter our areas on an unaccompanied basis (e.g., a roster that we can furnish to the guards so we know who is working for TTNS on this project or a list of supervisors who can "vouch" for TTNS employees)

Leah Clinton
CAAA Security Officer
DSN 482-3960
(812) 854-3960

"Only Our Best For the World's Best"

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE DATE 4/8/03

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Crew same as on p. 40

4/9/03 Summary

Installed - 16MW04 & 05

Sampled - 16SB26, 32, 33, 34 & 36

Collected RB040903001

JK & CM - worked on well pads @ SWMU 13

Surveyors - Locate SW/SD & SBs @ SWMU 16

Poured 1 pad by hand @ SWMU 13

Late inside buffer zone.

SCIENTIFIC BINDERS PRODUCTS, CHICAGO 60605 MADE IN USA

WEO 4/9/03

Work continued from Page

Cold 40's & overcast.

0655 Hrs - Arrive @ BLDG 3245
Give Drillers E-Mail from Ms Clinton
Discuss said E-mail on pp 40 & 41

0740 Hrs - Arrive @ North Gate MFB talk to
Guard leave copy of E mail - let
Guard know that J. Keiken & C. Mahaffy
will be working inside

0755 Hrs - Let J.K & C.M inside MFB from S. Gate

0810 Hrs - Return to BLDG 3245 - meet w/ surveyors
• Recon swmu w/ survey crew

0845 Hrs - Return to BLDG # 3245
Discuss well installation @ 13MWT13
w/ T. Brent - may have to block main road

0915 Hrs - set up @ swmu 16 to sample soil
Collect samples @ 16SB 26, 32, 33, 34 & 36

1130 Hrs - Finish soil sampling Break for Lunch

1210 Hrs - Return to BLDG # 3245
• Collect Rinsate from core sleeve (RB04090301)
@ 1230 Hrs
• Prep samples collected for shipment to
Laucks, ~~via~~ on C.o.C.s 0984 & 0986 via
FED. EX. AB# 8316 7332 7063
• Clean up

1800 Hrs - Left site

1830 Hrs - Drop off samples @ FED EX.
B. Balkovec remained on site to oversight
drillers working in pad inside the BLDG 165
Buffer Zone

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE [signature] DATE 4/9/03

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CREW
TINUS - B. BALKOVEC & T. COLAHAN
B-M - D. SCHREECHGOST, JOHN KEIFER & T. MAYER

4/10/03 SUMMARY

INSTALLED - 16MW103

SAMPLED - 13SB14 & 09
16SW02 & 07

DECIDE ON INSTALLATION OF 13MWT13 W/ TRACK RIG
WEEK OF 4/21 @ ORIGINAL SITE.

MFB BUFFER ZONE OPEN SAT & SUN
CHECKED W/ JIM KLUESNER

POUR PADS @ SWMU 13 - 16 PADS

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE **PROJECT NO.** 9060 **BOOK NO.** 1363

THURS. 04/10/03

Work continued from Page

MILD & SUNNY

0700 Hrs - ARRIVE @ BLDG # 3245
FAX COCs FROM YESTERDAY to E. SEDLMYER
PREP to SAMPLE E. SUMP (165WO2); CHECK IN @ OFFICE

0835 Hrs - ARRIVE @ SWMU 16
Collect MS/MSD @ E. SUMP (165WO2) @ 0850 Hrs

0955 Hrs - LEAVE SWMU 16 FOR BLDG 3245
Label & Tag Containers From 165WO2 & secure in Frig

1105 Hrs - Lunch

1130 Hrs - Return to BLDG - Prep. to sample SWMU 13
Collect samples @ 135814 & 09 w/ B. Balkovec

1320 Hrs - Arrive @ SWMU 16
Collect W. Sump sample (165WO7 & Dup)

1450 Hrs - Return to BLDG # 3245
Prep samples for SHIPMENT on
COCs 0987 & 0969 for Laucks &
COC 0985 for Triangle

1500 Hrs - Drop of Samples @ FED EX
AB# 8316 7332 7166 to Laucks
AB# 8316 7332 7177 to Triangle

1605 Hrs - Return to Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/10/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREW - SAME AS PAGE 44

09/11/83 SUMMARY

INSTALLED MONITORING WELL 16 MWT 02 SEE NB #2555

DEVELOPED & INSPECTED 3 WELLS @ SWMU 16

WES-14-4-83

WES-14-3-83

WES-14-5-83

DRILLERS - ALSO, dug out pads @ SWMU 16

Painted 11 wells & bollards @ SWMU 13

& Hand paved pad @ SWMU 09

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

FRI 04/11/03

Work continued from Page Mild & Sunny Temp 60's

0650 Hrs - Arrive @ BLDG #3245
Fax CofCs to Ed Sedlmyer
Clean up office area
Decon whale pumps
Prep vehical for well development
Call Ed Sedlmyer
1010 Hrs - Get Extended Pass from main Gate w/ B.B
1030 Hrs - Return to BLDG 3245 - Give Tom list of weekend works for weekend work letter
1055 Hrs - Lunch
1130 Hrs - Return to BLDG #3245
Call in Hrs to office
Call Denny - straw supplier. he will see how much he has (bale count) and get back to me
1210 Hrs - Start surging @ WES-14-4-83
Develop / purge from 1224 to 1253 remove 24 gals
Final Turbidity = 8 NTUS ; Well Inspection @ 1300 Hrs
1315 Hrs - Return to BLDG #3245
Decon whale pump & pick up for purge H2O containers
1400 Hrs - Start surging @ WES-14-3-83
Purge from 1416 Hrs - 1501 Hrs ; Dry out 3 times
Removed 10 gal. Final Turbidity = 32 NTUS
Well Inspection Completed @ 1506
1515 Hrs - Start surging @ WES-14-5-83
Purge from 1523 to 1602 Hrs ; almost dry out @ 1548
stop to let well recharge (Turbidity was on the rise)
Allowed well to recharge & turbidity dropped to 12 NTU
Removed 34 gals ; Finish Well Inspection @ 1607
1620 Hrs - Return to BLDG #3245
Dump Purge Water & Decon Whale Pumps
Check YSI calibration ; B.B. checking on Drillers @ SWMU 13.
1800 Hrs - Left Base

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty Rogers DATE 4/11/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREWS - SAME AS P. 44

Summary 4/12/03

Drilling - Installed 12 PADS & Placed Bollards & Protective Casings

All pads poured & Painting Completed @ both SWMU's

6 WELLS Developed @ SWMU 13
13MW17 26, 06, 18, 15, 10 & 11

SCIENTIFIC BINDERY PRODUCTS CHICAGO 50605 MADE IN USA

SAT. 4/12/03

Work continued from Page

Mild & Sunny Temp 70's

0635 Hrs - Arrive @ BLDG # 3245
Obtain to Dev. wells while drillers prep to pour pads - Cement truck due @ 0700 Hrs.

0700 Hrs - Arrive @ S. Gate
Wait for drillers to arrive w/ concrete truck

0730 Hrs - No drillers yet - They Arrived @ 0755 Hrs to pour pads
Will set up @ 13MW T26 @ South Gate to Develope

0735 Hrs - Start surge @ 13MW T26 - Dry out 4 times
Start Purge Time = 0745 Hrs Vol. Purged = 4 gal
End Purge Time = 0847 Hrs Final NTUS = +1000 V. Slow recharge

0900 Hrs - Start surge @ 13MW T06 Dry out 4 times
Start Purge = 0905 Vol. Purged = ≈ 1.8
End Purge = 1013 Final NTUS = +1000

1035 Hrs - Start surge @ 13MW T18 Dry out 3 times
Start Purge = 1044 Vol. Purged = 7 gal
End Purge = 1127 Final NTUS = +1000

1143 Hrs - Start Surge @ 13MW T15 Dry out 3 times
Start Purge = 1146 Vol. Purged = 9 gal
End Purge = 1235 Final NTUS = +1000

1245 Hrs - Break for Lunch

1330 Hrs - Get Gas

1355 Hrs - Return to BLDG 3245; Decon Pumps & dump Dev. H2O

1450 Hrs - Surge 13MW T10 Purged Dry 3 times
Start Purge = 1515 Vol. Purged = 7 gal
End Purge = 1604 Final NTUS = +1000

1625 Hrs - Start Surge @ 13MW T11 Purged Dry 3 times
Start Purge = 1629 Vol Purged = 8 gal
End Purge = 1723 Final NTUS = +1000

1745 Hrs - Return to BLDG # 3245
Decon Pumps & Dump Dev. H2O

1830 Hrs - Leave Base

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE DATE 4/12

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREW: B. BALKOVAC & T. CONLAN
Drilling crew left this date ~ 0.840 hrs

SUMMARY 4/13/03

WELL ID	START PURGE	END PURGE	VOL. PURGED	TIMES DRIED OUT
13MWT01	0850	1003	7 gal	5 Times (BB)
13MWT03	0851	0932	4 gal	3 Times (TC)
13MWT02	1005	1101	4.5 gal	3 Times (TC)
13MWT07	1116	1205	8 gal	3 Times (BB)
13MWT05	1123	1205	4 gal	3 Times (TC)
13MWT08	1358	1445	12 gal	3 Times (TC)
13MWT04	1356	1456	4 gal	3 Times (BB)
13MWT12	1511	1551	5 gal	3 Times (TC)
13MWT16	1517	1605	4 gal	3 Times (BB)

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

Sun 4/13/03

Work continued from Page

Weather - Mill & Sunny high 60's & 70's

0720 Hrs - Arrive @ BLDG #3245
Prep. Vehicles for Well Development - Cali. Instruments
Drillers Prep to Leave Base - complete all related
paperwork; get gate Key; etc.

0830 Hrs - Arrive @ SWMU 13
Develope 13MWT01, 03, 02, 07 & 05 (See Page 58)

1220 Hrs - Arrive @ BLDG #3245
• Dump Purge H_2O & Decon Water Pumps

1245 Hrs - Lunch

1310 Hrs - Prep. Vehicles for return to develope wells

1325 Hrs - Development @ SWMU 13
13 MWT 08, 04, 12 & 16

1615 Hrs - Finish Clean up @ SWMU 13

1625 Hrs - Return to BLDG #3245
• Clean offices (4 rooms & Hallway)
• Decon Water Pumps & Dump Purge Water
• Unload vehicles

1715 Hrs - Left Base for Hardware Store

1830 Hrs - Left Manards - Purchased PE tubing foot valves
tamper, nails etc. for Well development & site
restoration work

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/13/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SUMMARY 4/14/03

WELL ID	START PURGE	END PURGE	VOL PURGED	TIMES PUMPED WELL DRY
13MWT17	0825	0847	24 gal	—
13MWT21	0908	0947	10	3
13MWT22	1008	1046	4.5	3
13MWT25	1100	1133	2.5	3
13MWT24	1255	1337	7.5	3
13MWT23	1353	1432	6.5	3
13MWT20	1450	1531	5.0	3
13MWT09	1547	1633	17.0	3
13MWT19	1654	1735	6.0	3

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

MON 4/14/03

Work continued from Page

0653 Hrs - Arrive @ BLDG #3245
- Prep Vehicles for Well Dev
- Call Matt Cooper (Surveyor) to come later - after 13MWT13 is installed
- Call T. Patton - track missing bladder tool & order Peristaltic Pump -
- Call PID - see P. 52 for wells developed @ SWMU

1150 Hrs - Lunch

1215 Hrs - Return to BLDG #3245
Call office - no answer
Make reservations for return trip 4/21-30/03

1235 Hrs - Return to SWMU 13
See P. 52 for wells developed

1745 Hrs - Finish clean up at SWMU 13 return to BLDG #3245
Clean EQ & Dump Purge H2O

1800 Hrs - Leave Base

EOD

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/14/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SUMMARY 4/15/93

WELL ID	START PURGE	END PURGE	VOL PURGE	TIMES PURGED WELL DRY
13MW101A	0809	0852	100 gal	3
16MW102	0929	1010	4.5 gal	3
16MW103	1025	1109	6.0 gal	3
16MW105	1245	1402	21.0 gal	3
WES-14-01-83	1246	1340	10.0 gal	1
16MW104	1425	1508	9.0 gal	3
16MW101	1525	1605	1.5 gal	3
WES-14-02-83	1623	1718	20.0 gal	3

SCIENTIFIC BINDERY PRODUCTS CHICAGO E0605 MADE IN USA

TUES. 4/15/03

Work continued from Page

0605 Hrs - Arrive BLDG #3245
- CHECK IN w/ T. Brent - up date on Progress & Bubba Henderson
- Cal: Instruments & CHECK YSI
- PREP. VEHICLES FOR WELL DEV.
- Order 2nd Turbidity Meter From T. Patton

0800 Hrs - Arrive @ SWMU 13 FOR 13MWT 14 Development
0915 Hrs - Arrive @ SWMU 16 DEV. 16MWT02 & 03
1130 Hrs - Arrive @ BLDG. #3245
- Empty Purge H_2O
- Pick up Batteries for YSI (showing low battery)

1200 Hrs - LUNCH
1230 Hrs - RETURN to SWMU 16
DEVELOPE 16MWT01 - 05; WES-14-01 & 02

1725 Hrs - FINISH CLEAN UP @ SWMU 16
1730 Hrs - RETURN to BLD # 3245
- Dump Purge H_2O
- CLEAN INSTRUMENTS
- PAPERWORK
- CHECK IN w/ R. BASINSKI @ OFFICE

1815 Hrs - LEFT BASE

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/15/03

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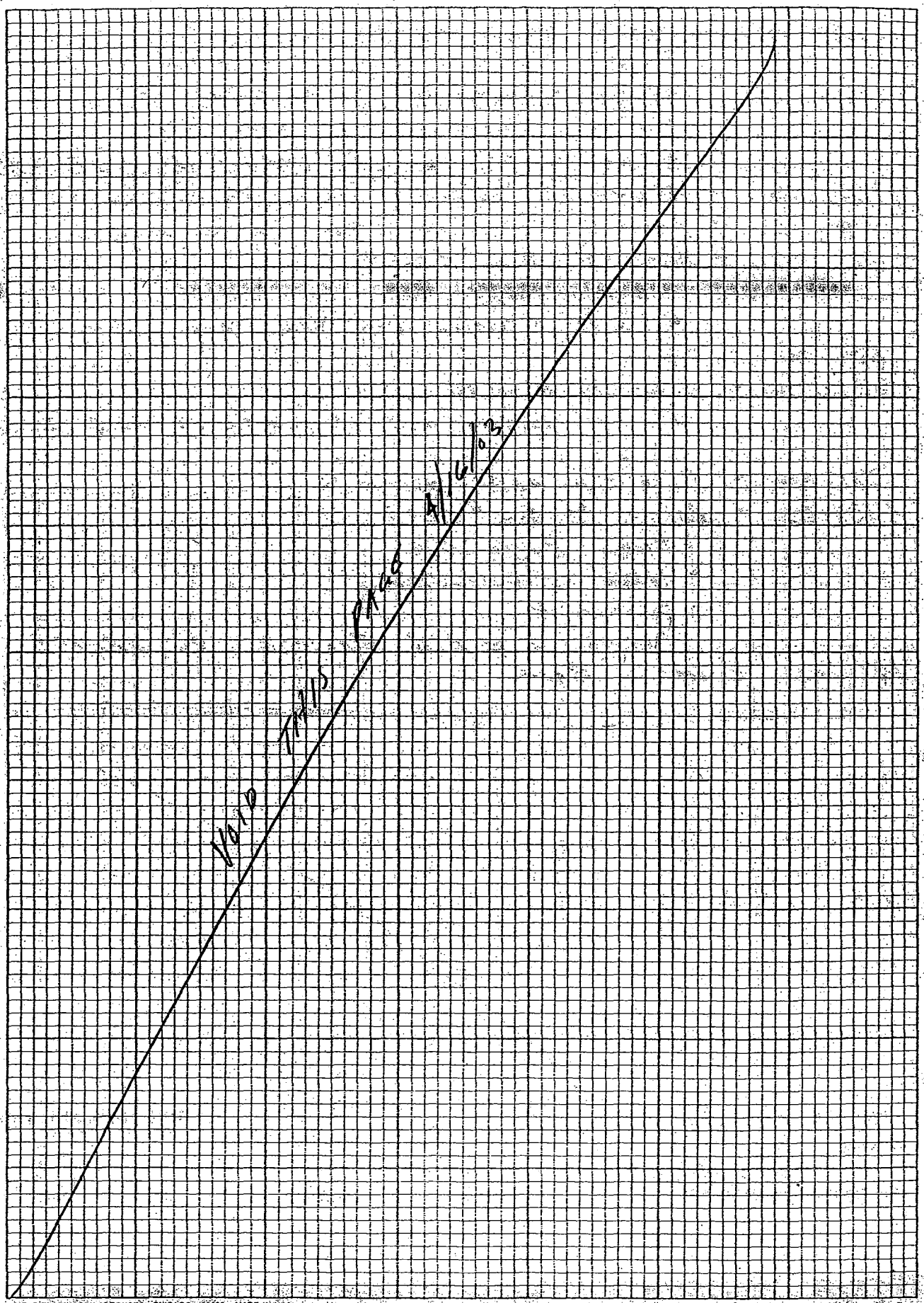

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

WED 4/16/03

Work continued from Page

0655 Hrs - Arrive @ BLDG #3245
- Decon inhale pumps & bucket bits
- Called Denny & set up straw delivery for Wed.
- Clean up office space
- Pull together paper work to take to P.H. office
- Clean out vehicles

0850 Hrs - Left Base

Remainder of Day = Travel
- Made Stop @ Enterprise in Martinsville, IN and reserved a pick up truck for the week of May 5th.

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE [signature] DATE 4/16/03

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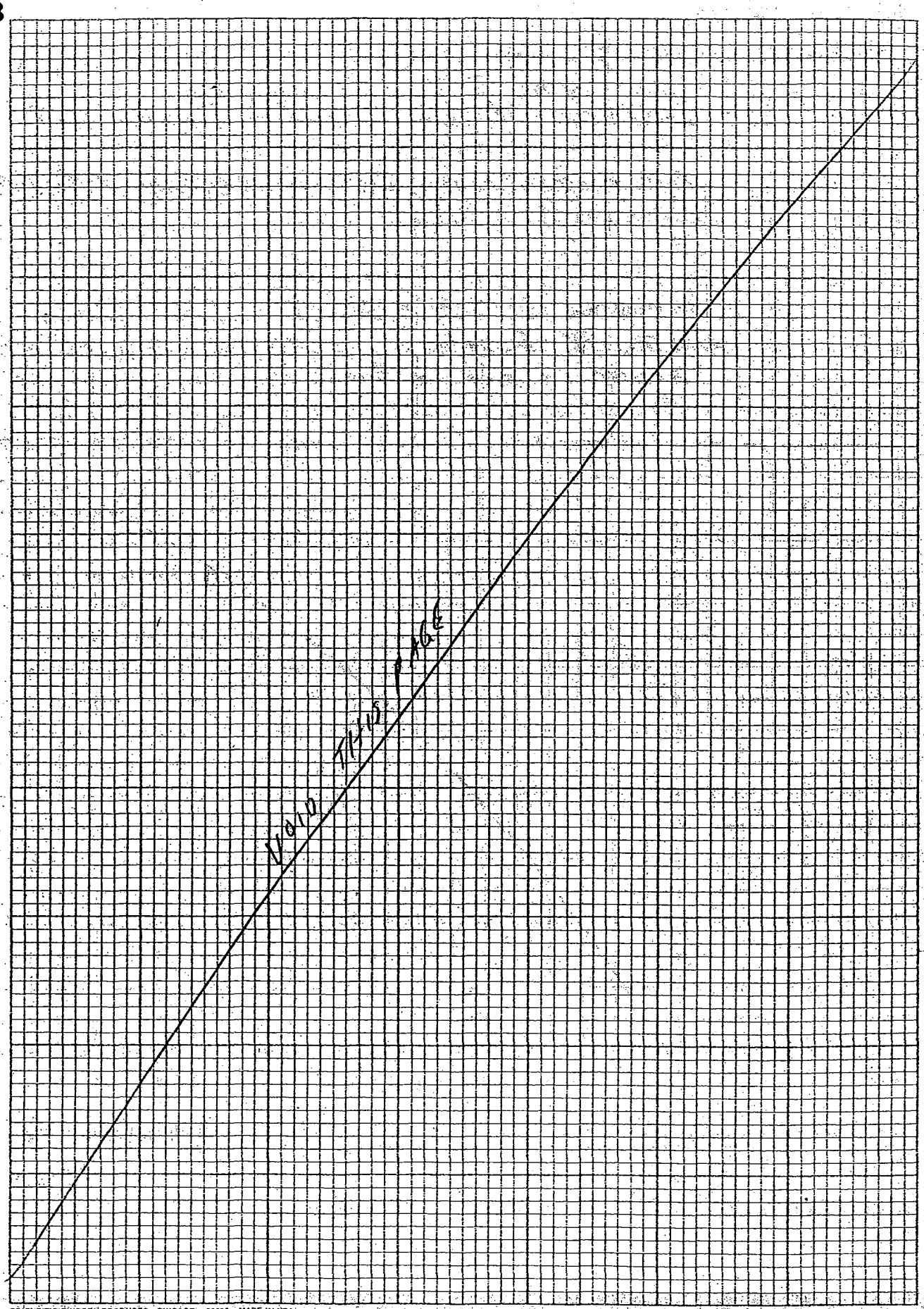

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

Work continued from Page

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

CREW: Bob Balkovec & Terry Rojahn

Mon 4/21/03

WELL ID	TIME	W.L.
WES-14-01-83	1505	31.49
02	1445	19.75
03	1457	19.98
04	1500	27.61
05	1502	33.47
13 MW T01	1512	25.61
02	1450	8.33
03	1453	27.88
04	1510	11.04
05	1455	30.66

Weather: Cool & overcast

SCIENTIFIC SINDERY PRODUCTS, CHICAGO 60505 MADE IN USA

Mon 4/21/03

Work continued from Page

Travel Day

1000 Hrs - Arrive Indy Airport
1115 Hrs - Check in @ Hotel
1145 Hrs - Pick up supplies @ Sams Club & Lowes
1300 Hrs - Arrive @ BLDG #3245
Check in w/ T. Brent
Calibrate YSI & prep. to purge 16 MWT01
1445 - 1512 Hrs - Take Round of Water Levels @ SWMW 16
1515 Hrs - Purge 16MWT01
Dry ~ 5 min. purge 1.1 L see Low Flow Purge Data Sheet
1550 Hrs - Return to BLDG #3245
PREP. SAMPLE SETS, Check in @ OFFICE w/ T. JOHNSTON
Go over well development sheets - determine which wells to purge via bladder or peristaltic pump.
1700 Hrs - Left Base

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/21/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

TUES 4/22/03 SUMMARY

WELL ID	START PURGE	END PURGE	SAMPLE TIME	
16GW10101	*	*	0900	
16GW10201	0828	0945	0946	
16GW0501	0900	1040	1045	MS/MSD
16GW10401	1243	1435	1437	
RB0422030I	—	—	1630	Teflon & Silicon Tubing Rinsate for Peristaltic Pump

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

TUES 4/22/03

Work continued from Page

Weather - Cool & Mostly Cloudy

0650 Hrs - Arrive @ BLDG 3245
Pick up sample Groundwater

0745 Hrs - Arrive @ SWMU 16
SEE PAGE 62 & C of C # 0988

1600 Hrs - Return to BLDG # 3245
Call office - check in w/ Ty Johnston
Call Denny Wagner - set up steam delivery for tomorrow 0700 Hrs
Collect Rinsate Blank - RB042203 01 (Tubing)
Check Calibration on YSIs

1730 Hrs - Leave Crane

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/22/03

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WED 4/23/03 SUMMARY

WELL ID	START PURGE	END PURGE	SAMPLE TIME
16GW0401	0723	0810	0811
16GW0101	0750	1122	1130

INSTALLED: 13MWT13 SEE NB #2330 FOR DETAILS

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

WED 4/23/03

Work continued from Page AM - Cold & Partly Sunny, PM Sunny & Mild

0630 Hrs - Arrive @ BLDG #3245
Prep. to sample groundwater
0702 Hrs - Arrive @ BWMU 16
SEE PAGE 64 & CoC # 0988
1515 Hrs - Arrive @ BLDG #3245
- Paperwork & Package Samples on CoC # 0988 for shipment via FED EX AB# 8316 7332 7155
- Decon Bladder Pumps
- Check in w/ T. Johnston
- CHECK CALIBRATION on YSIs
1700 Hrs - Left Base for FED EX
1730 Hrs - Drop off samples (7 coolers) @ FED EX

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/23/03

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B 100 P.©

THURS. 4/24/03 SUMMARY

WELL ID	Start Purge	END PURGE	SAMPLE TIME	COMMENTS
RB04240301	NA	NA	0830	RINSATE OF BLADDER PUMP & TEFLON TUBING
16GW0201	1041	1200	1201	
16GWT0501	1045	1255	1300	Also FD0424 0301
16GW0301	1433	1630	1632	

Installed 2nd well @ location 16MWT01 to replace dry well

SCIENTIFIC BINDERY PRODUCTS, CHICAGO S0565 MADE IN USA

THURS. 4/24/03

Work continued from Page WEATHER - Mostly Cloudy & 50's

0630 Hrs - Arrive @ BLDG #3245
Prep. to meet Denny Wagner
0650 Hrs - Arrive @ Crane Gate meet w/ D. Wagner
Escort him to SWMU 13 @ 0715
• Unload stand @ SWMU 13
0748 Hrs - Return to BLDG #3245 ; Pick TB04240301 @ 0800 Hrs
Prep. to sample groundwater @ SWMU 16
Collect Pump & teflon Tubing Insets @ 0830 Hrs
T. Johnston call wants to install deeper well
@ 16MWT01 - original went dry
1000 Hrs - Arrive @ SWMU 16
CHECK Location for NEW well 16MWT01
Sample Groundwater SEE P. 66 & COC #0991
1718 Hrs - Return to BLDG #3245 B.B. still @ 16GW0301
• Paperwork
• Cal: YSI
• Dump Purge H_2O
• Decon Bladder Pump
• B.B. Arrive @ 1845 Hrs
1910 Hrs - Leave BLDG #3245
EOD

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/24/03

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FRI. 4/25/03 Summary

WELL ID	Start Purge	END Purge	SAMPLE TIME	Comments
RB0425030I	NA	NA	0810	Results of Peristaltic RE tubing & Silicon Tubing
13GWT2601	0804	1020	1022	
16GWT0301	0940	1130	1135	
13GWT2101	1237	1345	1346	Dup F0042503O1
13GWT2501	1110	1210	NA	pumped dry

Drillers - Pour pad @ 16MWT06 and DEMOB

16MWT06 - Located next to dry well 16MWT01

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

FRI. 4/25/03

Work continued from Page (Sunny & Heavy rain & cool (50°s))

0630Hrs - Arrive @ BLDG 3245
- Prep. to sample Groundwater @ SWMU 16
- Call Surveyors - inform them that all work have been completed - they will check their schedual
- Called T. Johnston w/ 4/24/03 summary
- Called in Hours to L. Yeager

0740Hrs - Check in w/ PAM @ Break BLDG. for BLDGs 145 & 146 OK to work @ SWMU 16 today

0745Hrs - Return to BLDG #3245 to wait for drillers
- Noone work inside gate @ BLDG 146 so gate is locked - need to wait on drillers to give them access to SWMU 16 to pour well pad
- Collect Rinsate Blank for PE tubing & Silicon for SWMU 13 @ 0810 Hrs

0840Hrs - Drillers arrive

0845Hrs - Arrive @ SWMU 16
- Drillers to pour pad @ NEW 16MWT01 (Finish @ 1010Hrs)
- T.R. set up @ 16MWT03 with tent
  Start Purge @ 0840 Hrs
  END Purge @ 1130 Hrs
  Sample Time @ 1135 Hrs
  (Renumbered 16MWT06)

1605Hrs - Return to BLDG #3245 to package samples for shipment via FED EX (AOT 8316 7332 7144); samples on COC #0991.

1730Hrs - Left Base

1800Hrs - Drop off samples @ FED. EX.

1816Hrs - Pick up supplies @ Lowes

1845Hrs - Return to Motel

END

SIGNATURE [signature] DATE 4/25/03

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SUN 4/27/03 SUMMARY

B.B sampled 13GWT0001, 1001 & 1101
Finished sampling 13GWT0201

T.R Finished sampling 13GWT0501, started sampling
13GWT0601 & Purged / sampled 13GWT0701
& 13GWT1201

SCIENTIFIC SINDERY PRODUCTS CHICAGO 60605 MADE IN USA

SAT 4/26/03

Work continued from Page AM - Cool & Sunny PM - Mild & Sunny

0630 Hrs - Arrive @ BLDG #3245
PREP. to sample Groundwater; Check YSI Cal.
0730 Hrs - Arrive @ SWMU 13

WELL ID	Start Purge	END PURGE	SAMPLE TIME	COMMENTS
13MWT06	0745	0843	NA	PUMPED Dry
13MWT03	0745	1145	1146	
13MWT01	0912	1022	1024	
13MWT05	1117	1349	NA	PUMPED Dry
13MWT25	NA	NA	1230	purged 4/25/03
13MWT02	1246	1535	1536	
13MWT08	~~1543~~ 1412	1542	1545	

1638 Hrs - Return to BLDG #3245
Pick up well dev. supplies
1700 Hrs - Start well development @ 16MWT06
Start Purge = 1700 Hrs
END Purge = 1746 Hrs
Vol. Purged = 13.5 gal
Purged Dry 3 times
1805 Hrs - Return to BLDG #3245
Prep to Leave Base
1831 Hrs - Left CRANE
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/26/03
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SEE SAMPLE SUMMARY FOR 4/27/03 ON PAGE 70

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60305 MADE IN USA

SUN. 4/27/03

Work continued from Page

0730 Hrs - Arrive @ BLDG #3245
Prep. to sample groundwater, check YSI Cal.
0815 Hrs - Arrive @ SWMU13
0835 Hrs - Start sampling 13GWT06 - Extremely slow recharge
0910 Hrs - Start sampling 13GWT05
0955 Hrs - Finish " "
1020 Hrs - Start purge @ 13MWT07
1200 Hrs - Start sampling 13GWT0701
1305 Hrs - Start purge @ 13MWT12
1710 Hrs - Start sampling 13GWT1201
1815 Hrs - Pump down 13MWT06 into Explosives Container
1835 Hrs - Return to BLDG #3245
• Seal Samples in Frig
• Clean & mop office areas
1930 Hrs - Leave Base
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE DATE 4/27/03
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Surveyors - Matt Cooper & Corey Allen
FINISH SURVEYING @ SWMUS 13 & 16

Sample Summary 4/28/03

Well ID	Start Purge	End Purge	Sample Time	Comments
13GWT0901	0740	0910	0911	Collected Dup
FD0428030	↓	↓	0000	DUP OF ABOVE
16GWT0601	0835	0930	0932	SEE Comments on P.75 may have to resample/collect additional sample, well ID may change
13GWT2401	1311	1455	1456	
13GWT2001	1205	1605	1606	

NSWC Crane, IN

Bledsoe Tapp & Riggert - Surveyors Daily Sign-In

(± 1hr Drive / Prep. Time Per Day)

MC

DATE	NAME (print)	TIME IN	TIME OUT	TOTAL HOURS *	SITE/S WORKED ON
4/8/03	Corey Allen	7:00	4:45	12	#13
4/8/03	Matt Cooper	7:00	4:45	12	#15
4/9/03	Matt Cooper	7:30	1:00	7.5	#16
4/9/03	Corey Allen	7:30	1:00	7.5	#16
4/28/03	Matt Cooper	8:00	7:30	11.5	#13 + 16
4/28/03	Corey Allen	8:00	7:30	11.5	#13 + 16

** Include total daily hours to be charged (travel, time on site, etc.)*

Sites = SWMU 13 – Mine Fill B
SWMU 16 – Cast High Explosives Fill/B146 Incinerator

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

MON 4/28/03

Work continued from Page

Weather - Mostly sunny & 60's Late Afternoon Rain

0630 Hrs - Arrive @ BLDG #3245
Prep to sample groundwater

0815 Hrs - Arrive @ SWMU 16 - 2nd well @ Location 16MWT01
Start Purge @ 0835 (Surveyors Arrive @ 0850 Hrs left them in gate)
END " @ 0930
Start Sampling @ 0932 - still draw down in well but will sample anyway to obtain groundwater incase well dries out and doesn't recover in tight formation as did the 1st well installed @ this location.
WELL DRY @ 1015 Hrs

1035 Hrs - Arrive @ BLDG #3245
Prep to sample GW @ SWMU 13

1100 Hrs - Arrive @ SWMU 13
let surveyors into area (MED)

1130 Hrs - Set up @ 13MWT20
Problem w/ BLADDER PUMP (water siphoning out of flow cell and back into well - switched to peristaltic Pump)
Start purge @ 1205 ; @ 1345 B. B. took over @ well - T.R. returned to BLD #3245 to package samples for shipment.

1400 Hrs - Arrive @ BLDG #3245
- Package samples for shipment on CoFCs 993 & 992
- T. Johnston called - spoke with him regarding the disposition of the 1st well @ location 16MWT01 & what to ID the 2nd well @ same location - will talk again tomorrow @ 0830 CT.

1745 Hrs - Left Base for FED. EX.

1815 Hrs - Deliver samples under CoFCs 0992 & 0993 to FED EX. (AB# 8316 7332 7133)
B. Balkovec - stayed @ site w. surveyors to secure buffer area around BLDG #145
left site ~ 1900 Hrs

Work continued to Page

SIGNATURE [signature] DATE 4/28/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 4/29/05

WELL ID	Start PURGE	END PURGE	Vol PURGED	COMMENTS
13GWT1401	0755	0925	0926	
13GWT2501	—	—	—	Collect Additional Vol.
16GWT0601	—	—	—	Collect Additional Vol.

ALSO DEVELOPED 13MWT13, SEE P. 77 FOR DETAILS.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60603 MADE IN USA

Tues - 4/29/03

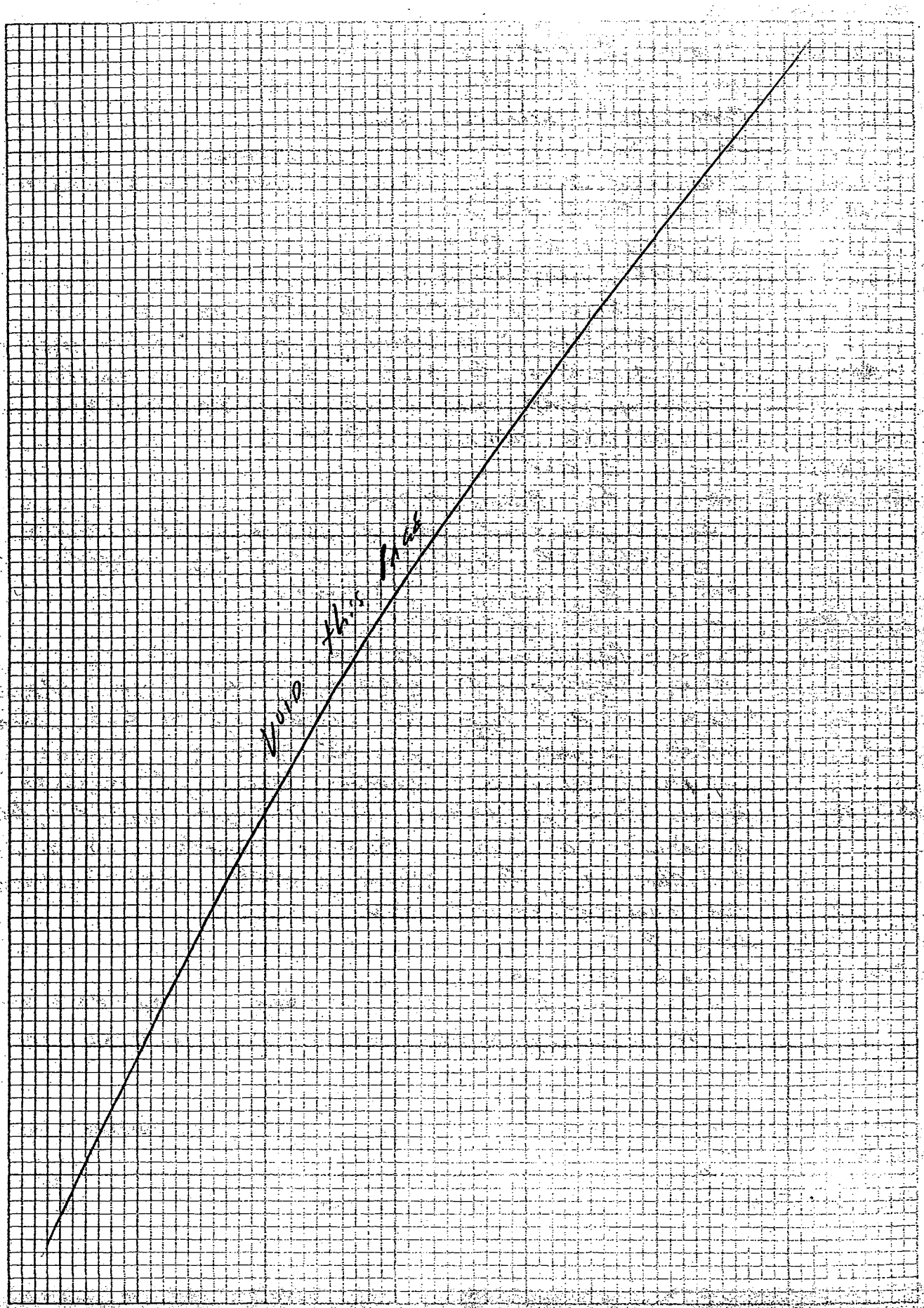
Work continued from Page

0636 Hrs - Arrive @ Bldg #3245
Fax CoFCs 992 & 993 to office & lab
Paperwork; Organize files
Check Cal. on YSI
0830 Hrs - Conference call w/ T. Brent, Ed Seolmyer, T. Johnston & T. Cohnn
0950 Hrs - Arrive @ SWMU 16
16MWT06 - W.L. @ 26.95
16MWT01 - W.L. @ 25.70
Start Sampling 16MWT06 @ 1002 Hrs
Dry @ 1037 ~3L collected VOCs & ~2.5L of Glass bottles
1040 Hrs - T. Brent arrived @ SWMU-16 - showed existing wells needing work; and discussed 16MWT01 & 06
1120 Hrs - Left SWMU 16, Arrive Bldg #3245
1135 Hrs - Lunch @ CAF.
1210 Hrs - Return to Bldg #3245
• Call T. Johnston - ok to ship samples collected 4/29/03 @ 16MWT06 w/ today's collection
• Prep. to develope 13MWT13
1250 Hrs - Arrive @ 16MWT06
• Start Development 1308 hrs
End Development 1353 hrs; vol. Purged 17 gals
• Removed pad forms @ 13MWT13, 19 & 19 then went to ~~gate M~~ (TC) S. gate @ MFB and someone by passed our lock - informed security @ N. Gate
1430 Hrs - Arrive @ Bldg #3245; Told T. Brent about the lock
Remainder of Day - Package samples for shipment and clean-up; Prep. Turbidity meter (malfunctioning) for shipment to U.S. ENV.
1645 Hrs - Left Base
1715 Hrs - Arrive @ FED. EX.
SHIP SAMPLES ON CoFC #0994 on AB #8316 7332 7122
SHIP TURBIDITY METER ON AB #8316 7332 7111

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/29/03
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE



SCIENTIFIC BINDERY PRODUCTS CHICAGO 60625 MADE IN USA

WED - 4/30/0

Work continued from Page

0640 Hrs - Arrive @ BLDG # 3245
FAX CoCs to OFFICE & LAB (0994)
CLEAN OFFICE AREA (mw); Prep. Paperwork to return to Pit.
CLEAN OUT VEHICALES
0755 Hrs - LEAVE OFFICE (BLDG 3245) For Airport
0820 Hrs - Stop @ ABELLS Nursery - check on bulk for sand
$35/YD, will load pick ups.
1030 Hrs - Arrive @ Airport
Remainder of day travel
END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE [signature] DATE 4/30/05

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

MON 5/05/03

WELL ID	TIME	W.L.	
WES-14-01-83	1757	31.00	
02	1551	14.23	
03	1443	18.80	
04	1437	26.80	
05	1800	32.59	
16MWT 01	1422	25.19	
02	1433	6.55	
03	1430	27.20	
04	1426	8.05	
05	1428	29.77	
06	1420	22.33	
13MWT 01	1730	6.21	
02	1732	17.15	PVC WRECKED @ stick up
03	1728	8.19	Bollards NEED repaired
04	1737	12.98	
05	1733	5.42	
06	1720	15.11	
07	1741	3.12	
08	1738	3.17	
09	1650	7.74	
10	1636	13.65	
11	1638	7.87	
12	1639	7.88	
13	1610	3.62	
14	1612	13.25	
15	1631	12.88	
16	1629	8.49	
17	1628	8.70	
18	1633	19.06	
19	1615	8.31	
20	1646	4.22	
21	1626	7.69	
22	1624	7.44	
23	1645	7.45	
24	1642	8.45	
25	1622	16.00	
26	1619	9.10	

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

MON. 5/05/03

Work continued from Page Hot & Sunny (Low 90's)

TRAVEL DAY

1515 - ARRIVE @ BLDG #3245 ; AFTER trip to Lowe's pick up HARDWARE FOR WELL

- PREP to take water levels & REPAIR EXISTING WELLS @ SWMU 16

1415 Hrs - ARRIVE @ SWMU 16
- Collect water levels
- REPAIR WELLS WES-14-04-93 NEW pad
  WES-14-03-93 FIX CAP FOR locking
- REPAIR 1CS807 w/ cold patch others REPAIRED by M. Cochran

1554 Hrs - LEAVE SWMU 16
1556 Hrs - Stop @ BLDG 3245 FOR Drinking water
1607 Hrs - Check in @ N. Gate SWMU-13 (MES)

13MW25
Start Purge @ 1702
END Purge @ 1708 (Dried out WELL)
Pumped ~1 gal

13MW70C
Start Purge @ 1720
END Purge @ 1724 (Dried out WELL)
Pumped ~1.5 gal

1747 Hrs - Finish W.Cs @ SWMU 13
1755 Hrs - Arrive @ SWMU 16
Returned to get two wells that were in need of equalization
Lids on to tight @ WES-14-01 & 05-93
1800 Hrs - Arrive @ BLDG #3245
CLEAN UP & unload Pick up Truck
1825 Hrs - LEAVE BASE

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Pope DATE 5/5/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P ©

SAMPLE SUMMARY 5/06/03

WELL ID	Start PURGE	END PURGE	SAMPLE TIME	COMMENTS
13GWT1601	0748	0840	0842	
13GWT2301	0840	1240	1242	
13GWT1801	0938	1340	1342	
13GWT2201	1400	1540	1542	
13GWT1501	1445	1700	1702	
13GWT2501	REPURGED 5/5/03			added to sample collected 5/06/03 @ 1430 Ammonia & Nitrates
13GWT0601-F	RERUN 5/6/03			

Collected Filtered Metals @ 1735 hrs 5/6/03

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

TUES 5/06/03

Work continued from Page

WEATHER Mostly Sunny TEMP. 80°F

0640 Hrs - Arrive @ BLDG #3245
Prep. to sample groundwater
Load Pick up
Calibrate YSI & La Motte
0815 Hrs - Arrive @ SWMU 13
0840 Hrs - Begin Purge @ 13MWT23
End Purge @ 1240 Hrs ; Vol purged = 22.1 L
1242 Hrs - Sample 13GWT2301
1400 Hrs - Begin Purge @ 13MWT22
End Purge @ 1540 Hrs ; vol. purged = 10.6 L
1542 Hrs - Sampled 13GWT2201
Removed pad forms @ 13MWT22 & 23
1650 Hrs - Check in on B.B. - get sample log sheets - start sample summary on page 82
1720 Hrs - Remove form @ 13MWT16
1735 Hrs - Sampled Filtered Metals @ 13MWT06
1750 Hrs - Return to BLDG #3245
Secure samples in Frig.
Clean up
Unload Pick-up Truck
Leave messages for both Ralph & Tom on progress made today & yesterday
1830 Hrs - Left Base

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 5/6/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Sample Summary 5/7/03

WELL ID	Start Purge	End Purge	Sample Time	Comments
36WT1301	0730	0945	0941	ALSO DUP FD0307030301
36WT1701	0750	1020	1022	MS/MSD
* 36WT2501	—	—	1300	*Filtered Metals Only
36WT1901	1155	1395	1397	
* 36WT0601	—	—	1700	*Ammonia & Nitrate only

* slow recharge wells purged day 5/5/03

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

WED 5/7/03

Work continued from Page Weather overcast to rain (Heavy @ times)

0640 Hrs - Arrive @ BLDG #3245
PREP. to sample Groundwater
Check YSI meter

0730 Hrs - Arrive @ SWMU 13 - 13MWT17
Start Purge @ 0750 Hrs
END Purge @ 1020 Hrs. Vol. Purged = 15.2 L
Start Sampling @ 1022 13GWT1701

1300 Hrs - Sampled Filtered Metals @ 13GWT2501

1335 Hrs - Returned to BLDG #3245
Unloaded Pick up Truck

1400 Hrs - Lunch

1495 Hrs - Return to BLDG #3245
- Called Ralph B. & Tom J. give them progress report.
- Paperwork & Prep. Samples for shipment to FED. EX. on AirBill 8316 7332 7074 & C.O.C # 6995

1630 Hrs - Left Base for FED. EX

1700 Hrs - Drop of 2
Samples to Laucks on AB# 8316 7332 7074
EQ. to U.S. ENU on AB# 8316 7332 7100

B.B. Remained @ site to sample for Ammonia & Nitrate @ 13MWT06 (Inside Berm for BLDG # 265)

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 5/7/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Day Summary 5/8/93

Surface water samples collected - 13SW0801 & 13SW2101

Well Sites Restoration locations completed:

13MWT 21, 17, 16, 12, 11, 25(ok), 26, 22 & 10

Start Restoration @ 13MWT 18 & 24

SW samples on CoC #0996

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60655 MADE IN USA

THUR 5/8/03

Work continued from Page

WEATHER - Mostly Cloudy & 60's

0700 Hrs - Pick up computer disk & Drinking Water @ Wal-Mart
0745 Hrs - Purchase SEED & A yard of Top Soil @ ABELL NURSERY
0815 Hrs - Arrive @ BLDG #3245
- B.B. check cali. on YSI
- Prep. to do site restoration @ SWMU 13 & TO
And Surface Water Sampling @ Location 8 & 11
0840 Hrs - Check surface water locations @ SWMU 16
After yesterdays rain - locations not conducive to sampling (DRY)
0855 Hrs - Return to BLDG #3245
0910 Hrs - Collected 135W0801
0935 Hrs - Collected 135W1101
0950 Hrs - Began Site Restoration
Did 13MWT 21, 17, 16, 12, part of 11, 25 (ex) & 26
1145 Hrs - Left SWMU 13 for Lunch; B.B. stayed @ SWMU 13
1210 Hrs - Arrive @ BLDG #3245
Check in w/ R. Bisinski
1250 Hrs - Leave BLDG for ABELL'S Nursery
1410 Hrs - Return to SWMU 13
Restored 13MWT 11, 15 and part of 18
B.B. Restored 13MWT 22
1630 Hrs - Return to BLDG #3245
Prep. samples for shipment on COC #0996
1715 Hrs - Left Base for FED. EX
1745 Hrs - Drop of samples at FED. EX AB #8316 7332 7085

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 5/8/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 5/09/03

SLUG TESTING FINISHED @
13MW17, 11, 26 & 15

RESAMPLED SVOCS @ 13MW109 & 20

SCIENTIFIC SINDERY PRODUCTS, CHICAGO 60505 MADE IN USA

FRI. 5/9/03

Work continued from Page

0630 Hrs - Arrive on Base
- B.B. check cali. on VST
- FAX COFC to OFFICE & LAB
- PREP. to Collect Groundwater Samples

0750 Hrs - Arrive @ 13MWT09 after check in w/ N. Gate Guard
Start Purge @ 0816
END Purge @ 0958
Sample Time @ 1000 For 13GWT0902 & FD0509030 1

13MWT20
Start Purge @ 1103
END Purge @ 1503
Sample Time @ 1505 For 13GWT2002

1545 Hrs - Finish @ SWMU 13 - Arrive @ BLDG #3245
Packaging & Paperwork
Unload Pick up

1635 Hrs - Leave site for Fed. Ex.

1700 Hrs - Drop off Samples on COFC # 0989 & FED EX.
AB# 8316 7332 7096

1715 Hrs - Arrive @ ABECL Nursery
Purchase 1 yard of Top Soil

1805 Hrs - Arrive @ BLDG #3245
Park Pickup under Port & Ride Back
to motel w/ B.B.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 5/9/03

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Summary 5/10/03

B.B SLUG TESTED : 13MWT08, 14 & 20 & started 13MWT02

Restored the following locations 13MWT01 → 08 and
Finished restoration @ 13MWT09

Purchased 2 yards (2 trips) of Top soil & 50 lbs
Bag of Seed.

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

SAT. 5/10/03

Work continued from Page Mostly Cloudy 70'S & Humid

0650 Hrs - Arrive @ Site (BLDG #3245)
Call Security & BLDG #1665
Also, track Package shipped 5/8/03 - (OK)
0720 Hrs - Arrive @ SWMU 13
Restore 13MWT06, 03 & 01
0930 Hrs - Left Base for ABELLS Nursery
1003 Hrs - Purchase Black Top Soil 1 yard @ Nursery
1045 Hrs - Return to SWMU 13
Spread Soil @ 13MWT05 & 08 (07 OK)
1200 Hrs - Heavy Rain Break for Lunch
1245 Hrs - Return to SWMU 13
Seed & Hay @ 08; AB will seed & Hay 13MWT04 while TK picks up seed & Soil
1430 Hrs - Left Site for seed & Soil
1510 Hrs - Arrive @ Good Earth (ABELLS out of top Soil)
1552 Hrs - Arrive @ ABELLS for seed
1640 Hrs - Return to SWMU 13
Finish Hay & seed @ 13MWT18
1730 Hrs - Return to BLDG #3245
Clean up - will pick up supplies this evening
1800 Hrs - Left Site

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tony Kogel DATE 5/10/03

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LOCATION	W.L	TIME	
13MWT01	5.82	1359	
02	17.10	1350	
03	8.88	1401	
04	12.75	1449	
05	4.13	1505	
06	15.62	1402	
07	3.10	1500	
08	2.97	1448	
09	7.40	1405	
10	13.11	1443	
11	7.78	1458	
12	7.58	1407	
13	3.18	1516	
14	13.08	1514	
15	12.63	1432	
16	8.61	1420	
17	8.09	1423	
18	19.04	1436	
19	6.80	1524	
20	4.00	1410	
21	7.34	1421	
22	7.25	1420	
23	7.17	1412	
24	8.23	1413	
13MWT 25	16.61	1417	~FLOW RATES
SG 01	1.73	1354	<1 gpm
02	3.64	1355	1-5 gpm
03	1.96	1517	1-5 gpm
04	2.38	1518	1-5 gpm
05	3.89	1520	<1 gpm
06	2.37	1523	<1 gpm
07	1.50	1414	<1 gpm
08	5.05	1419	5-25 gpm
09	4.15	1429	5-25 gpm
SG 10	4.78	1455	20-50 gpm (cannot get to weir downstream of gauge to measure flow) - Bank too steep & slippery
13MWT 26	8.93	1415	

SUMMARY 5/11/05

TR: ECO ASSESSMENTS @ SWACKS 13 & 16

RESTORE - 16 MWT 01, 06 & 05
13 MWT 22 &
BEGIN @ DECON AREA

BB = SLUG TEST
16 MWT 01, 04 & 05
Continued @ 13 MWT 02
RESAMPLE WELLS 8
16 MWT 04
WES 14-02-03

TR/BB - Round of W.L. @ SWMU 15

SCIENTIFIC SINDERY PRODUCTS CHICAGO PROOF MADE IN USA

TITLE NSWC CRANE **PROJECT NO.** 9060 **93**

BOOK NO. 1363

SUN 5/11/03

Work continued from Page Mostly Cloudy, 70's & Windy

0645 Hrs - Arrive @ ~~SWMU~~ TA BLDG #3245
Call Security for work @ BLDG 148 & MFB

0710 Hrs - Site Restoration @ SWMU-16
Restore 16MWT01 & 02 & 05

0930 Hrs - Start Eco. Assessment
Take 15 Photos & Cover Type Area

1145 Hrs - Finish Eco. Assessment @ SWMU-16

1150 Hrs - Return to BLDG #3245 for Lunch

1220 Hrs - Arrive @ SWMU-13
Restoration @ 13MWT24
Start Eco. Assessment

1350 Hrs - Start Water Levels & Staff Gauge Measurements
SEE P. 92; Pick up Form number

1525 Hrs - END Water Levels. - Resume Eco Assessment
Take Photos 16 → 33

1730 Hrs - Complete Eco. Assessment
BEGIN Restoration @ Decon Area
SPREAD SEED & Hay

1810 Hrs - Return to BLDG #3245
Drop off number in area behind BLDG #3245
Prep. to LEAVE

1845 Hrs - Left Site

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 5/11/03

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MON 5/12/03 SUMMARY

B.B. FINISHED SHEY TEST @ 13MWT02

B.B/TR RESTORATION @ DECON AREA, 13MWT10,14&19

TR RESTORATION @ 13MWT20

DEMOB FOR 9060

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

MON 5/12/03

Work continued from Page

0715 Hrs - Arrive @ Wal Mart - Purchase Hacksaw for Mustard Gas Site & drill bit

0740 Hrs - Arrive @ Good Earth for 1 yd of top soil

0801 Hrs - Left " "

0845 Hrs - Arrive @ BLDG #3245

SEND Faxes to LAB & OFFICE

Some OFFICE clean up

Check in w/ Tom Brent

0930 Hrs - Arrive @ Swing 13 - Detour on Rte 45

Restore - 13 Mw-10, 14, 19, 20 & Decon

1445 Hrs - Return to BLDG #3245

Meet w/ Tom Brent to store core boxes & straw bales

1600 Hrs - Return to BLDG #3246 area storage of straw

1630 Hrs - Arrive @ Mustard Gas Site

Attempt to drill hole for well tag OTOC - drill not heavy duty enough for the task - put tag inside well lid & cut grounding rod @ Mustard Gas site flush w/ ground.

1530 Hrs - Return to BLDG #3245 for Demob

- Prep. samples on COC # 0997 for shipment
- Prep. EQ. for shipment to PTH Warehouse & U.S. Environmental on FED EX AB# 8243 8234 9739 & 8243 6234 9740 respectively
- Clean & mop office space
- Inventory EQ. & Supplies
- Clean out Pick up truck

2030 Hrs - Left site for Motel

Note: B.B. Left site @ 1800 Hrs to Drop of Samples and EQ @ FED.EX. (Sample on AB# 828074028990)

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

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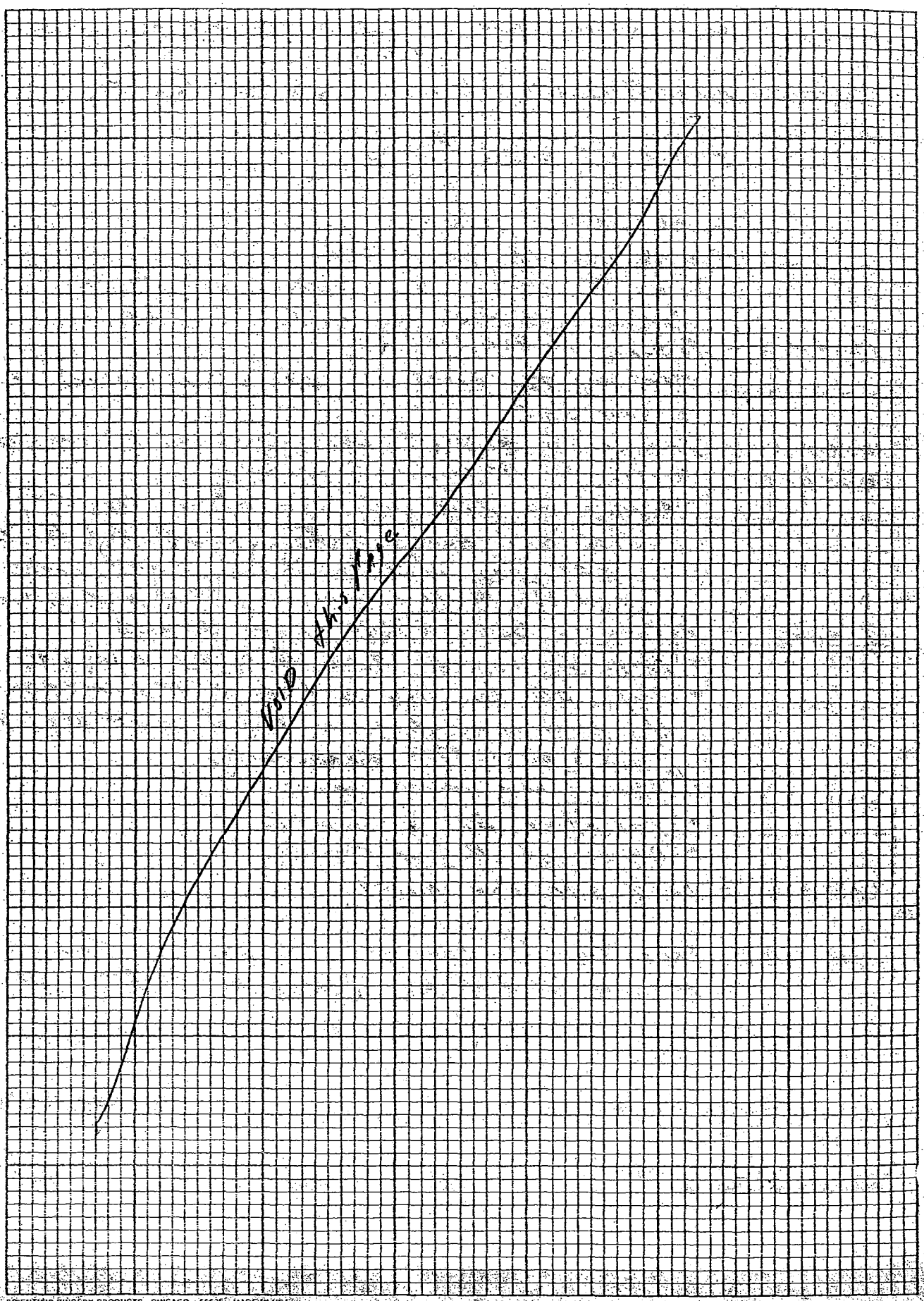

SCIENTIFIC BINDERY PRODUCTS.. CHICAGO 65625 MADE IN USA

TUES 5/13/03

Work continued from Page

TRAVEL DAY (only)

5
10
15
20
25
30
35

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

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DATE 5/13/03

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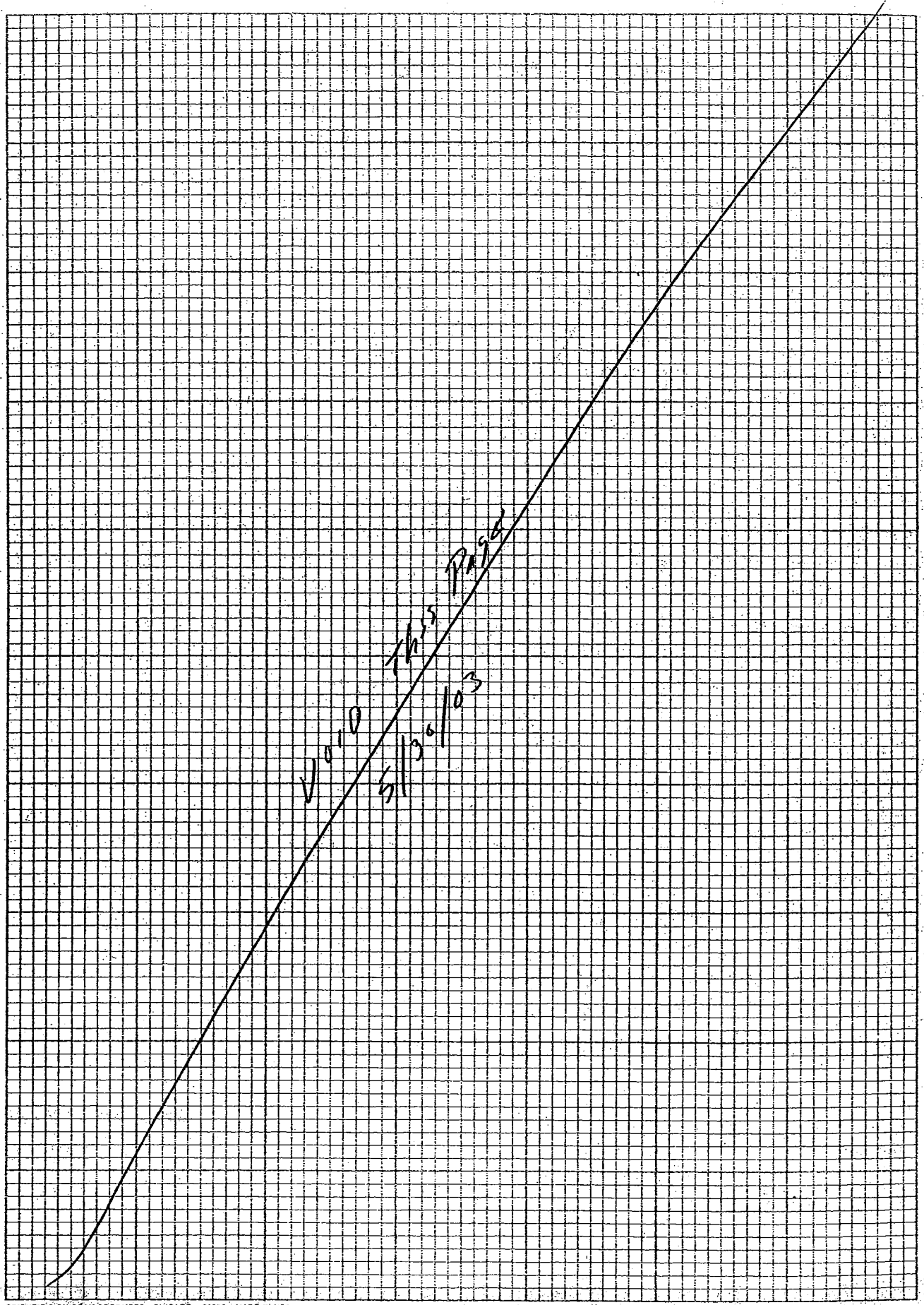

SCIENTIFIC BINDERY PRODUCTS, CHICAGO, 60605 MADE IN USA

FRI - 05/30/03

Work continued from Page

WEATHER : 75°F & SUNNY (ON SITE WORK @ SWMU 7 FRR)
1600 HRS - LEFT BLDG FOR SWMU 16

WELL ID	W.L.	TIME
WES-14-01-83	31.00	1714
WES-14-02-83	14.56	1654
WES-14-03-83	19.83	1710
WES-14-04-83	27.27	1718
WES-14-05-83	33.05	1716
16MWT01	22.70	1656
16MWT02	12.18	1706
16MWT03	28.07	1704
16MWT04	13.14	1659
16MWT05	30.39	1701
16MWT06	15.92	1658

1730 HRS - RETURN TO BLDG #3295

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 5/30/03

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APPENDIX D.1.2
SWMU 16
SITE LOGBOOK
ROUND 2

From: Rojahn, Terry
Sent: Wednesday, October 15, 2003 4:07 PM
To: 'Tom Brent'
Cc: Basinski, Ralph
Subject: RE: Bowser Morner personnel Participating in Fieldwork Starting October 20, 2003 at NSWC Crane

Tom, the following personnel from Bowser Morner need clearance, however not all of them will be starting work on October 20, 2003:

Tim Boehmer	Dayton, OH
Ken Boehmer	Dayton, OH
John Davis	Dayton, OH
Jon Keifer	Dayton, OH
Maynard Laati	Dayton, OH
Dennis Sinic	Dayton, OH
Robert Trader	Dayton, OH
Todd Wollenhavpt	Dayton, OH
Nick Post	Dayton, OH
Tony Mayrer	Dayton, OH
Joshua Dean	Toledo, OH
James Walsh	Toledo, OH

All the above are US citizens.

Just a heads up...you should be receiving a lot of coolers and equipment over the next few days.

—Original Message—
From: Basinski, Ralph
Sent: Wednesday, October 15, 2003 2:34 PM
To: 'Tom Brent'
Cc: Rojahn, Terry; Cochran, Matthew; Wudkwych, Frank; Ramser, Fred; 'Bill Gates'; Goldman, Mary Lou
Subject: TtNUS Personnel Participating in Fieldwork Starting October 20, 2003 at NSWC Crane

The following Tetra Tech NUS, Inc. personnel will be participating in fieldwork at NSWC Crane SWMUs 1, 13, and 16 starting October 20, 2003

Terry Rojahn
Matt Cochran
Frank Wudkwych
Fred Ramser
Robert Balkovec

All of these staff are located at Pittsburgh, Pennsylvania office of Tetra Tech NUS.

The award for the drillers has been made to Bowser-Morner. Terry Rojahn is in contact with the driller and will send an e-mail to you with the list of drillers and their home office locations.

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

Work (

Basinski, Ralph

From: Basinski, Ralph
Sent: Tuesday, October 07, 2003 2:30 PM
To: Cochran, Matthew; Rojahn, Terry; Schubert, Jeff
Cc: 'Bill Gates'; 'Tom Brent'; Johnston, Tom; Goldman, Mary Lou
Subject: Access for Fieldwork at SWMUs 13 & 16

Terry, Jeff, and Matt

Tom and Bill informed me of the following.

SWMU 13 – No operations will be occurring that will limit access. Follow the procedures developed last time in regards to access.

SWMU 16 - Operations will be occurring. The Army has agreed to limit operations to Monday through Thursday on alternate weeks. SWMU 16 cannot be accessed during that time. No operations will occur on Friday, Saturday, and Sunday. SWMU 16 is fully accessible during that time. Please note that the Army is working the 4-10s in order to accommodate our fieldwork at SWMU 16. Therefore, we need to make sure that any schedule changes are communicated to the Tom and the Army as soon as known. Also, we should inform Tom as soon as our work at SWMU 16 is complete so that the Army can revert to their normal schedule.

Ralph

-----Original Message-----
From: Basinski, Ralph
Sent: Tuesday, October 07, 2003 1:57 PM
To: 'Tom Brent'
Cc: 'Bill Gates'; Johnston, Tom; Cochran, Matthew; Rojahn, Terry
Subject: Fieldwork at SWMUs 13 & 16

Tom

As you are aware we are scheduled to be in the field starting October 20, 2003 at SWMUs 13 and 16. Currently we are in the office mobilization and planning phase.

During the last field event we ran into access issues at SWMUs 13 and 16 due to operations occurring at these facilities. Can you find out anything about the operations schedules from October 20 through mid-December. This information would be useful for planning purposes.

Also, during the last field event, security / access procedures were established for TtNUS and subcontractor staff. Was anything written regarding these procedures? If something written is available, please provide a copy or call me to discuss.

Ralph

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

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SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

Monday 10-20-03

Work continued from Page

700 Hrs - Arrive @ Pitt Airport
TRAVEL DAY
1300 Hrs - Arrive @ NSWC CRANE
OBTAIN BADGE
1315 Hrs - Arrive @ BLDG 3245
OPEN & BEGIN to ORGANIZE EQ & SUPPLIES
SHIPMENT
MISSING SOME RENTAL EQ. - BLADDER PUMP,
(2) M-Scopes, (1) YSI ETC.
1400 Hrs - DRILLERS ARRIVE - UNLOAD SUPPLIES & EQ
1415 Hrs - T.R. & F.R. ARRIVE @ PUBLIC WORKS
OBTAINED Dig PERMITS
1) WEST side OF SWMU 13 MINE FILL B
~10 WELLS CLEARED FOR drilling
2) MUSTARD GAS SWMU 1 Complete Site
1445 Hrs - RETURN to BLDG. #3245
MEET W/ DRILLERS JON KEIFER, DENNIS SLUIC &
TODD WOLLENHAUPT - NEEDED to get
badged @ Bloomington Gate
1520 Hrs - DRILLERS RETURN - go to check out drilling
locations W. OF MINE FILL B
1650 Hrs - RETURN to BLDG #3245
PAPERWORK, PREP FOR H&S MEETING FOR tomorrow
1745 Hrs - LEFT BASE

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature]

DATE 10/20/03

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

10/21/03

Bonser Morrick

- Receive HES Training
- Recon Well Locations W of Mine Fill B
- Purchase Supplies For Decon Pad
- Build Decon Pads
- Obtain 20 slot screens
- Track Down Bulldozer to construct Roads to Wells @ Mine Fill B (W. Side)

SAMPLING:

- Conducted Seep Search W side of Mine Fill B - Seep 13SP04 Found
- Conducted Trenching Activities - MC & Evl

SCIENTIFIC BINDERY PRODUCTS CHICAGO SHEETS MADE IN U.S.A.

TUES. 10-21-03

Work continued from Page

0655 HRS - ARRIVE @ BLDG #3245
H&S SITE SPECIFIC TRAINING
T-NUS — BOWSER MORNER
MATT COCHRAN MC — TIM BOEHMER (TB)
FRED RAMSER FR — JON KEIFER (JK)
FRANK WUDKWYCH FW — TODD WOLLENHAUPT (TW)
T. ROJAHN T.R — DENNIS SINIC (DS)
• EQUIPMENT INSPECTION
• GO OVER WORK PERMITS

0910 HRS - T.B, JK, MC FR & TR RECON W. SIDE OF MINE FIELD B; T.B. UNABLE to comment Rotasonic Rig to drill in AREA unless ACCESS ROADS ARE CONSTRUCTED.
CHECK IN WITH OFFICE - MC. will coordinate Road construction W. T. BRENT & NSWC CONS FORESTER

1100 HRS - T.R. & FR check in w/ Public Works to SEE IF other AREAS CAN be CLEARED besides W. SIDE OF MINE FILL B - Public Works still having problems to complete SWMU 16 by 10/25/03 & REMAINDER OF MINE FILL B by 10/27/03
DONNA Zollman told T.R. that WELLS & Borings inside MINE FILL B WERE not located - T.R. & F.R. will locate & get back to Public Works when job is ACCOMPLISHED.

1200 HRS - LUNCH

1230 HRS - RETURN to BLDG #3245
• M.C. & F.W. TRENCH (2) SEEPS & (1) SW location, w/ backhoe & dig ONE SW location W. SHOVEL
• RECON & OK Road construction FOR ACCESS to drilling locations W OF MINE FILL B W/Rotasonic T. BRENT & FORESTER CONFIRM - BE CAREFUL & AVOID all SHAGBARK hickory TREES (ADULT & SAPling)

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 10/21/03
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Brent Thomas J CNIN
From: Johnson, Douglas G (PKI) [DOUG.JOHNSON1@US.ARMY.MIL]
Sent: Tuesday, October 07, 2003 3:56 PM
To: Clinton, Leah K (PKI); Voorhies, John D (PKI); Roach, Michael D (PKI)
Cc: Brent Thomas J CNIN
Subject: FW: TtNUS Participants in Fieldwork at SWMUs 1, 13 & 16

Partial list of TetraTech employees that will be conducting fieldwork @ MFB and 146. Will provide the names of the drilling crew as soon as Tom forwards.

—Original Message—

From: Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]
Sent: Tuesday, October 07, 2003 2:27 PM
To: Johnson, Douglas G (PKI)
Subject: FW: TtNUS Participants in Fieldwork at SWMUs 1, 13 & 16

Doug,

Here's the partial particulars. Current plan is to begin work at B146 on Friday, October 24, 2003. I'll pass along the names of the drillers once I get them. Note that SWMUs 1, 13, & 16 are Mustard Gas Burial Grounds, Mine Fill B, and B146, respectively.

Thanks,
Tom

—Original Message—

From: Basinski, Ralph [mailto:BasinskiR@ttnus.com]
Sent: Tuesday, October 07, 2003 2:13 PM
To: Brent Thomas J CNIN
Cc: 'Bill Gates'; Rojahn, Terry; Cochran, Matthew; Johnston, Tom; Goldman, Mary Lou
Subject: TtNUS Participants in Fieldwork at SWMUs 1, 13 & 16

The following Tetra Tech NUS, Inc. personnel will be participating in fieldwork at NSWC Crane SWMUs 1, 13, and 16.

Terry Rojahn
Matt Cochran
Frank Wudkwych
Fred Ramser
Robert Balkovec
All of these staff are located at Pittsburgh, Pennsylvania office of Tetra Tech NUS.

The award for the drillers will be made shortly. Once the award is made the driller will be requested to provide a list of staff and their office locations.

The fieldwork is scheduled to start on Monday, October 20, 2003.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

Brent Thomas J CNIN

From: Brent Thomas J CNIN
Sent: Thursday, October 16, 2003 1:41 PM
To: Johnson Douglas G CNIN
Subject: FW: Bowser Morner personnel Participating in Fieldwork Starting O ctober 20, 2003 at NSWC Crane

Doug,

As promised, here is the list of drillers who will be working with the Tetra Tech folks on the upcoming fieldwork at B146 and MFB. Please distribute to CAAA Security. As a reminder, they will begin mobilizing here on Monday, October 20, 2003. The 1st shift will end on Wednesday, October 29, 2003. Please let me know if you have any questions.

Thanks,
Tom

-----Original Message-----
From: Rojahn, Terry [mailto:RojahnT@ttnus.com]
Sent: Wednesday, October 15, 2003 3:07 PM
To: Brent Thomas J CNIN
Cc: Basinski, Ralph
Subject: RE: Bowser Morner personnel Participating in Fieldwork Starting O ctober 20, 2003 at NSWC Crane

Tom, the following personnel from Bowser Morner need clearance, however not all of them will be starting wor on October 20, 2003:

Tim Boehmer (TM) Dayton, OH
Ken Boehmer Dayton, OH
John Davis Dayton, OH
Jon Keifer (JK) Dayton, OH
* Maynard Lahti (ML) Dayton, OH
Dennis Sinic (DS) Dayton, OH
Robert Trader Dayton, OH
Todd Wollenhaupt (TW) Dayton, OH
Nick Post (NP) Dayton, OH
Tony Mayrer Dayton, OH
* Joshua Dean JD Toledo, OH

* James Walsh JW Toledo, OH
All the above are US citizens.

Just a heads up...you should be receiving a lot of coolers and equipment over the next few days.

-----Original Message-----
From: Basinski, Ralph
Sent: Wednesday, October 15, 2003 2:34 PM
To: 'Tom Brent'
Cc: Rojahn, Terry; Cochran, Matthew; Wudkwych, Frank; Ramser, Fred; 'Bill Gates'; Goldman, Mary Lou

Subject: TtNUS Personnel Participating in Fieldwork Starting October 20, 2003 at NSWC Crane

The following Tetra Tech NUS, Inc. personnel will be participating in fieldwork at NSWC Crane SWMUs 1, 13, and 16 starting October 20, 2003

Terry Rojahn
Matt Cochran
Frank Wudkwych
Fred Ramser
Robert Balkovec

All of these staff are located at Pittsburgh, Pennsylvania office of Tetra Tech NUS.

The award for the drillers has been made to Bowser-Morner. Terry Rojahn is in contact with the driller and will send an e-mail to you with the list of drillers and their home office locations.

L. Clinton - 854-3960

Brent Thomas J CNIN

From: Johnson, Douglas G (PKI) [DOUG.JOHNSON1@US.ARMY.MIL]
Sent: Monday, October 20, 2003 9:37 AM
To: Clinton, Leah K (PKI)
Cc: Voorhies, John D (PKI); Brent Thomas J CNIN
Subject: TetraTech Fieldwork @ MFB

Leah,

Just wanted to make you aware that TetraTech personnel conducting fieldwork usually work until dark. Are there any special procedures we need to implement for after normal hours-work?

If after hours work is a problem, please let me or Tom Brent know.

Doug Johnson
Environmental Protection Specialist
SJMCN-SF
Crane Army Ammunition Activity
(812)854-1481
DSN 482-1481

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

10/21/03 Cont

Work continued from Page

- T.R. & F.R. - problems accessing Mine Fill B; security @ North Gate need E-Mail to confirm our access - T. Brent got access E-Mail to Gate via D. Johnson & L. Clinton see pages 106-108
- TR & F.R. → Accessed Mine Fill B @ 1500 Hrs & Talked w/ Mr. Kluesner; Told Mr Kluesner about drilling & sampling activities in area - Mr Kluesner said extraction maybe completed in ~1 week & BLDG #165 Buffer Zone will not be needed
- TR & F.R. - Lay out 5 well & 10 Boring locations within Mine Fill B
- TR & F.R. - Return to Public Works to let Donna know that above was accomplished

1640 Hrs - Return to BLDG #3245
- Paperwork
- Check on sediment & soil containers w/ Ana Ho - should arrive tomorrow
- Check in @ P&F office - T. Johnston - report progress w/ accessing Mine Fill B; decision to build roads w. of Mine Filled B.; & progress w/ seep search & trenching

1730 Hrs - Left site for Lowes (F.R. & TR) & Sams (F.W. & MC) to purchase supplies.

1840 Hrs - Return to Hotel.

END

SIGNATURE [signature] DATE 10/21/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

T+NUS - Crew same as 10/21/03 P. 105
MB - " " " " P. 105

10/22/03 SUMMARY

Drilling:

- Bull Dozer Arrived this date
- Installed 13MW740
- Start Installation of 13MW740
- Site Access completed on W. side of Mine Fill B to Access wells on sewer utility corridor
- See Note Book 2555 for Details

Sampling Completed:

SEEPS	SURFACE WATER	SEDIMENT
13SP0101	13SW1601	13SD290004 (13FD010220302)
13SP0201	13SW1401 (13FD010220301)	13SD310004
13SP0301	13SW3101	13SD300004
13SP0401	13SW2201	13SD280004
	13SW1302 (13FD010220303)	
	13SW1202	
	13SW3001	

COCs = 4801, 4802 & 4803; SHIPPED THIS DATE ON AB # 8412 2491 1051 to LAUCKS

SURFACE WATER LOCATIONS THAT WERE DRY:
13SW29, 13SW15 & 13SW28

DRY SEEP: SEEP LOCATION A down grade of 13SW15.

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

WED 10/22/03

Work continued from Page

WEATHER - Mostly Sunny TEMP 60's; mild

0650Hrs - ARRIVE @ BLDG #3245
- CHECK IN w/ R. BASINSKI
- " YSI & LaMotte
- INVENTORY BOTTLE SHIPMENT
- REV. to Sample SW/SD

0820Hrs - CHECKED ACCESS AREAS W. OF MINE FILLS FOR CLEARING FOR ROTASONIC RIG - MARKED TREES NOT to BE REMOVED (TREES 7" DBH); NO SHAGBARK HICKORIES WERE REMOVED

0930Hrs - START SAMPLING SURFACE WATER & SEDIMENT @ SWMU 13; FRANK, MATT & TERRY

1130Hrs - LUNCH

1200Hrs - REFRIGERATE SAMPLES @ BLDG #3245 TAKEN thru FAX - SECURED IN REFRIGERATOR

1230Hrs - RETURN to SWMU 13 CONT SAMPLING SW, SD & SEEPS

1630Hrs - RETURN to BLDG #3245
PREP. SAMPLES collected this date FOR SHIPMENT ON CoCs 4801, 4802 & 4803 to LAUCKS ON AB# 0212 2491 1051

1800Hrs - LEFT BASE FOR FED. EX

1835Hrs - DROP OFF SAMPLES @ FED. EX

1900Hrs - RETURN to Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 10/22/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

T+NUS / BM - CREWS SAME AS 10/21/03 P. 105

10/23/03 SUMMARY

SAMPLING: SURFACE WATER (SW) & SEDIMENT (SD)

SW:

13SW08, 10, 18, 19, 20 & 27

SD:

13SD24, 25, 26, 27

SAMPLES SHIPPED VIA FED. EX AB # 8412 2491 0813
ON COCCS 4804 & 4805

DRILLING SUMMARY

Installed 13MWT40

Installed upper casing @ 13MWT41

SEE NB # 2555 POC Details

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60601 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

THUR. 10/23/03

Work continued from Page

WEATHER - Mostly Sunny TEMP 60°F

0700 Hrs - ARRIVE @ BLDG #3245
- Prep. to sample SW/SD @ SWMU 13
- Check YSI Cali.
- Calibrate LaMotte
- FAX CoFCs FROM 10/22/03 to Laucks Lab & OFFICE (E.S.)

0830 Hrs - Check in @ N. GUARD Gate @ SWMU 13 (out @ 0900

0850 Hrs - Begin sampling SW/SD @ SWMU 13

1100 Hrs - LUNCH

1150 Hrs - ARRIVE @ BLDG #3245
SECURE MORNING SAMPLES IN Frig.

1215 Hrs - RETURN to SWMU 13 cont sampling SW/SD

1450 HRS - RETURN to BLDG #3245
- PACKAGING + PAPERWORK OF SAMPLES ON CoFCs 4804 & 4805
- Contact DONNA (Public Works) SWMU 16 will not be cleared for this weekend's work (drilling)
- Dig Permit for SWMU 13 inside bldg fenced

Dig Permits

- TALK w/ R. BASINSKI - Progress report
- CLEAN / ORGANIZE FIELD OFFICE

1745 Hrs - F.W. & M.C. LEFT Site to Deliver SHIPMENT to FED. EX (SAMPLES ON CoFCs 4804 & 4805)
T.R. REMAINED on Site - PAPERWORK, etc. to WAIT on drilling CREW & F.R.

1845 Hrs - LEFT BLDG 3245 for Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 10/23/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P.©

THUS - SAME CREW
BM - JK, DS, TW & NEW ARRIVAL Nick Post

10/24/03 SUMMARY

SAMPLING: Collected

SW	SD
13 SW 3201	13 SD 32 & 16 SD 19, 11, 16, 18
16 SW 1701	15, 14, 21 & 22
16 SW 1801	
16 SW 1401	
16 SW 2101	

SAMPLES SHIPPED VIA FED. EX AB# 8412 2491 0824
ON COCs 4806 & 4807.
* Conducted SEER SEARCH NONE FOUND THIS DATE. @ SWMU 16

Drilling:
- Nick Post on site this Date - FC gave him HES
- Unstitled 13MW-37
- Drilled to 40' BGS @ 13MW-38, Cured 25-40' BGS
- See Notebook #2555 for Additional Detail

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

FRI 10/24

Work continued from Page

WEATHER Mostly sunny, Temp 60's

0655 Hrs - ARRIVE @ BLDG #3245
- FAX COFCs to OFFICE & LAB (LAUCKS)
- GIVE T. Brent personnel NAMES FOR WEEK END WORK
- CALL IN TIME FOR MC, FW, FR & TR
- PREP FOR SW/SD SAMPLING
- CALL Sandy checked on Nitrite Standard - SHOULD HAVE MORE
- FW & MC. will grab samples @ 13 SW/SD 32

1000 Hrs - LEFT FOR SW/SD sampling @ SWMU 16 (TR)
Sampled 16SD19 & SW/SD17 - CONDUCTED SEEP SEARCH

1200 Hrs - LUNCH

1220 Hrs - ARRIVE BLDG #3245 - Drop OFF & Refrigerate samples
- Called TRAVEL - MAKE ARRANGMENTS FOR NOV 3-12th
- Called LAUCKS - Check on THURS. DELIVERY ... MISSING
- Called Public Works - CHECKED ON Dig Permits
- CANNOT get into SWMU 16 - Flags up
- MAY FINISH SWMU 13 by Monday

1315 Hrs - ARRIVE @ SWMU 16 - Con't sampling SW/SD

1630 Hrs - RETURN to BLDG #3245
PREP. SAMPLES FOR SHIPMENT
ON COFCs 4806 & 4807

1750 Hrs - LEFT BASE FOR FED. EX

1830 Hrs - Drop OF Samples FOR SAT DELIVERY @
FED EX UNDER AB #8412 2491 0824

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

THINGS - SAME

BM - DS, TW & NP

10/25/03 SUMMARY

SAMPLING:

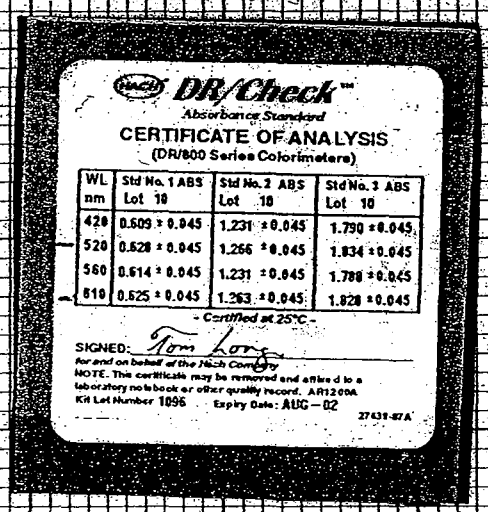
MC & FW - Collect SW1505
16SW1501, 16SW1501201, 16SW1501301 &
16SW2001.

MC, TC & FW - Collected GW
16GW0202 & 16GW0502

1 of 3 coolers shipped 10/23/03 was lost by FEDEX
LAB still checking on it @ Seattle.
2 of 3 found this date

Drilling:

Installed Isolation Casing @ 13.4 ft 38
Afternoon rain delay
See NB 2555 for additional Detail



SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

SAT 10/25/03

Work continued from Page Overcast w/ Periods of Rain

0650 Hrs - Arrive @ BLDG #3245

- Prep to Finish SW/SD sampling @ SWMU 16
- Prep to Collect GW samples @ SWMU 16

Cali. Additional YSI & LaMotte meter

Cali. PID

Determine order of well sampling w/ relationship to hits & MNA

Check out NA meter DR/890 Colorimeter

1) Absorbance Solution For Inst. Performance Verification

Program #	nm	Standard 1	Standard 2	Standard 3
42	420	0.629	1.216	1.850
52	520	0.612	1.267	1.832
56	560	0.586	1.204	1.760
61	610	0.581	1.243	1.839

2) Accuracy Check For Nitrite using NO_2^--N Standard = 5mg/L

- 5.00mL of 250mg/L NO_2^--N Standard dilute in 250mL Vol. flask
- Above took 10mL of dilute (500mg/L) & diluted in 500mL " " to make 0.100mg/L NO_2-N
- Ran test using above Dilute - Results 0.091 Should read between 0.090 & 0.110

1200 Hrs - Lunch

1245 Hrs - Prep for GW Sampling @ SWMU 16 @ 1400 Hrs

FW on 16GW0202

MC & TR on 16GW0502 - ~~Collected~~ Ran NA Parameters

1800 Hrs - Arrive @ BLDG #3245

Clean up; bring in meters; decon bladder pump etc.

1900 Hrs - Left NSWC Crane for Motel

SMD

SIGNATURE [signature] DATE 10/25/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

TT HUS - SAME CREW
BM - JK, DS, TW & WP

DRILLING:

Grouting top off casings & wells
Installed 1 PAD @ 13MT37

SAMPLING:

GW @ SWMU-13
WES-10-04-83
WES-14-01-83
16MWT62

Laid out soil boring @ SWMU 16

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 50605 MADE IN USA

Work continued from Page

WEATHER - OVERCAST AM SUNNY AFTERNOON & COLD

0650 Hrs - ARRIVE @ BLDG #3245
PREP to SAMPLE GW @ SWMU 16
Cal. INSTRUMENTS, etc.

0830 Hrs - ARRIVE @ SWMU 16
ASSIST MC with set up @ 16 GW01
F.W. to SAMPLE @ 16GW04

1015 Hrs - SET UP @ 16GW02 - to RUN NA w/ ER.

1131 Hrs - Finish Running NA @ 16GW02
Lay out All 9 Soil Borings @ SWMU w/ ER

1330 Hrs - Lunch

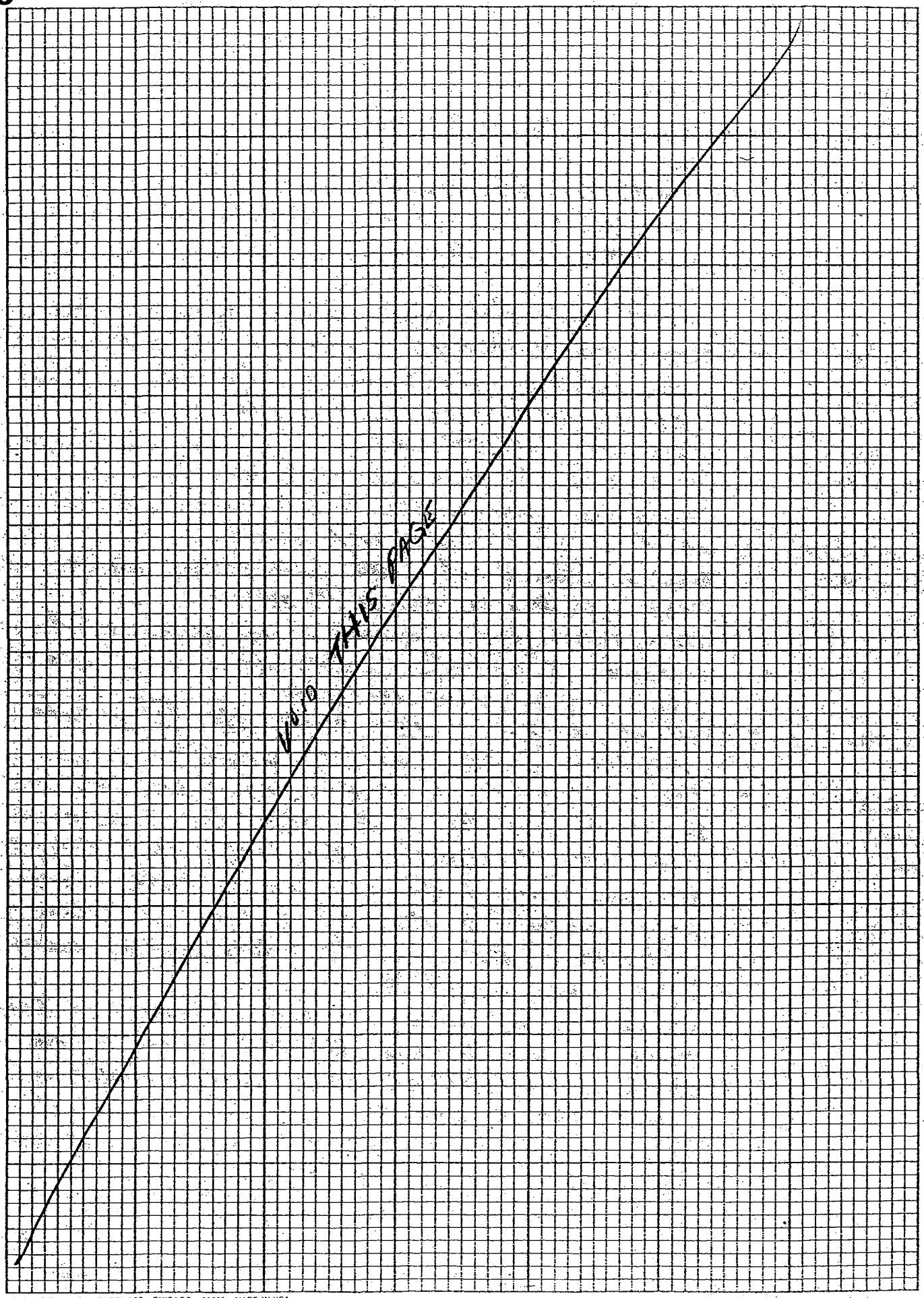
1400 Hrs - PR to check on drillers
TR PAPERWORK, ORGANIZE OFFICE & FIELD DOC.

1750 Hrs - LEFT NSWC CRANE FOR Motel

END

SIGNATURE | DATE

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

Mon. 10/27/03

Work continued from Page Weather AM Cold PM Sunny

0700 Hrs - Arrive @ BLDG #3245
- Cali Instruments
- Check on Dig Permit
- Problems Associated w/ Dig Permits Talk to T. Brent
  SWMU 13 - Production
  SWMU 16 - Security
- Start Pair for Well Dev. - check pumps

0915 Hrs - Talked to T. Brent - Public work must think to existing wells need cleaned - will go check if proposed are cleaned

0918 Hrs - Leave for SWMU 13

0923 Hrs - Check in @ N. Gate SWMU 13 Guard
Check for ~~clearance~~ TR utility flags inside SWMU 13

0956 Hrs - Check out @ N. Gate w/ Guard

1020 Hrs - Talk w/ Tom Brent - NO water/sewer located on West side/inside fence @ SWMU 13
- Tom called PW - checked in w/ Compressed Air & Sewer & Water personnel also if they need any access help we would be available

1100 Hrs - T. Brent & T.R - met with Max @ N. Gate
Assisted with locating utilities

1215 Hrs - Left Mine Fill B - Max to sign work permit

1220 Hrs - Arrive @ P. Works - All signed but compressed Air

1230 Hrs - Talked to T. Brent - Tom said that Compressed Air personnel would be signing after lunch

1300 Hrs - Picked up ~~Crew~~ DIG Permit - Drilling Crew off Stand By ~1310 (Returned to BLDG #3245)
- Check in w/ Officer R.B.
- Checked in w/ Lauks - Coolers arrived in Temp.
- More Coolers & Unpreserved HDPE on the way
- Check in w/ Microseeps - sending additional bottle sets & coolers
- Called U.S. Environmental for working Geopumps
- Fax Cals to Lauks & Office

SIGNATURE Tom Hyatt DATE 10/27/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREWS SAME AS on 1/4

SAMPLING:

13 SWLS 01, 28, 09, 25, 07, 24 & 26 sampled this Date

LAUCKS samples shipped on COC's #4804, 4811, 4813 & 4814 via FED EX AB# 8412 2491 1040

MICROSERPS samples shipped on COC #4812 via FED EX AB# 8412 2491 0846

DRILLING:

Stand By All Morning

39' of Isolation Casing Installed @ 13 minutes

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

10/27/03 Cont

Work continued from Page

- PACKAGING & SHIPPING
  1) LAUCKS (10 COOLERS) AB# 8412 2491 1040
     COPCs # 4808, 4811, 4813, & 4814
  2) MICROSEEPS (1 COOLER) AB# 8412 2491 0846
     COPC # 4812
  3) US ENVIRONMENTAL AB# 8412 2491 0835
     GEOPUMP

1715 Hrs - LEFT NSWC CRANE FOR FED EX

1800 Hrs - DROP OFF SAMPLES @ FED EX

1820 Hrs - PURCHASE PAPER TOWELS, Zip Lock bags & drinking WATER @ SAMS

— END —

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Troy Rogers

DATE 10/27/03

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

CREWS SAME AS ON P 114

SAMPLING

13GWT 24, 23 & 19 sampled THIS DATE
ALONG with 2 Source Blanks
LABELS SAMPLES SHIPPED ON COC # 6815
VIA FED EX AB# 8412 2491 1030

DRILLING

Set two Isolation Casings @ 13MWT 45 & 35 and
Drilled shallow WELL 13MWT 32 to TD.

SCIENTIFIC SINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

TUES 10/28/03

Work continued from Page

0700 Hrs - Arrive @ BLDG. #3245
Call Metals (YSI, Turb. & PID)
Refax COCs to Lucks
Prep. to sample GW @ SWMU 13 & run MNA
0810 Hrs - Arrive @ Mine Fill B After checking in w/Gua
Set up @ 13MWT23 & 24
Run NA on both wells
1050 - 1115 Hrs - Run NA @ 13MWT24
1200 Hrs - Lunch
1230 Hrs - Return to BLDG #3245
Refrigerate samples from 13MWT24 & Pick up
supplies
1355 Hrs - 1438 Hrs Run NA @ 13MWT23
1450 Hrs - Finish cleaning inside Mine Fill B
1500 Hrs - Check in w/ N. Gate Guard... Report everyone
out of Mine Fill B including Drilling Crew
1515 Hrs - Arrive @ BLDG #3245
- Unload Rental Car
- TK Collect Trip Blank TB10280301
- FW & TK Collect Source Blanks
1) SB10280301 - Drilling Water
2) SB10280302 - DI Water Reagent Grad Water
NEIL Lot# 0807253
EXP 08-2004
- Check in w/ R. Basinski - Regarding work
- Packaging & Shipping
1755 Hrs - Left NSWC Crane for Fed. Ex.
1832 Hrs - Drop of Samples on AB # 8912 2491 1030

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Pa

SIGNATURE

DATE 10/28/

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREW: THUS: F. Cruser & T. Cosgrove
BM = JK, DS, TW & NP

Drilling: Complete installation of BMW T32

SAMPLING: None this date - Travel Day

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

WED. 10/29/03

Work continued from Page

0655 Hrs - Arrive @ Bldg #3245

- Fax Corr 4815 to Laucks & Office from Yesterday's Sampling Effort
- Submit Personnel Names to T. Brent for Next Shifts Passes
- Organize Office
- Sweep & Mop Office Area, Lab & Bathroom & path to Bathroom.

0930 Hrs - Left NSWC Crane for Airport

Remainder of Day: Travel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 10/29/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

HACH DR/Check™

Absorbance Standard

CERTIFICATE OF ANALYSIS

WL nm	Std No. 1 ABS Lot 43	Std No. 2 ABS Lot 43	Std No. 3 ABS Lot 43
420	0.618 ± 0.050	1.199 ± 0.050	1.770 ± 0.050
520	0.617 ± 0.050	1.220 ± 0.050	1.804 ± 0.050
560	0.593 ± 0.050	1.212 ± 0.050	1.756 ± 0.050
610	0.621 ± 0.050	1.227 ± 0.050	1.786 ± 0.050

- Certified at 25°C -

SIGNED: Patrick J. Nelson

for and on behalf of the Hach Company

NOTE: This certificate may be removed and affixed to a laboratory notebook or other quality record. AR663A

Kit Lot Number 3281 Expiry Date: Feb 2005

27633-07A

DR 890

HACH DR/Check™

Absorbance Standard

INSTRUMENT READING

WL nm	Std No 1 ABS Lot 43	Std No 2 ABS Lot 43	Std No 3 ABS Lot 43
420	0.622	1.223	1.804
520	0.618	1.240	1.797
560	0.596	1.187	1.734
610	0.594	1.213	1.792

RECORD INITIAL VALUES IN ABOVE TABLE

NOTE: This certificate may be removed and affixed to a laboratory notebook or other quality record. AR663A

Kit Lot Number 3281 Expiry Date: Feb 2005

27634-07B

DR 850

52 0.646 1.234 1.815

61 0.627 1.238 1.809

MC's Crew - Set up on 13 Mar 29 (ATV Crew)
See Mar 29 for Details

FR's Crew - Set up & start drilling @ 13 Mar 29
See Mar 29 & 23 for Details
(Motorola Crew)

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

MON 11/03/03

Work continued from Page

1425 Hrs - ARRIVE @ BLDG 3245
• CAL: YSIs ; Problem w/ PH SENSOR ON 98F047848

1500 - 1545 Hrs - HES FOR J. WALSH & J. DEAN
M. LAHTI WAS A NO SHOW - to ARRIVE tomorrow

1600 Hrs - PREP. FOR WORK DAY, OF 11/04
PREP. to INSTALL PUMPS
CHECK DR Colorimeters w/ Absorbance Standards
CHECK IN w/ R. Basinski
1820 Hrs - LEFT SITE (BLDG #3245) FOR Hotel
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty Hart DATE 11/3/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P ©

Crews:

TH NCS - F.W., F.K., M.C. & JK

BM - ML, JK, D.S., TW, NP, JW & JD

Summary 10/4/03

SAMPLING:

DEVELOPE WELLS

13MWT 42, 40, 37 & 32

DRILLING:

INSTALLED 13 MWT 29

13 MWT 28 ~~Casing only~~ (?) Isolation Casing

13 MWT 39

13 MWT 38 Isolation Casing

SEE Notebooks #2565 (MC) & 2553 (ER) For Details

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

TUES 11-04-03

Work continued from Page WEATHER Mostly Sunny TEMP High 70's Low 90's

0650 Hrs - Arrive @ BLDG #3245
Prep to HES Train M. Lanti
0700 - 0800 Hrs - Training (HES) M. Lanti
0830 Hrs - Receive M.L HES Paperwork
Prep. to Develop Wells
0845 Hrs - Show M.L SWMU 13
0930 Hrs - Arrive @ 13MWT42
Develop Well Start = 0939
Stop = 1021 Volume Purged (3L) dry out 3 times
1035 Hrs - Arrive @ 13MWT40
Start = 1053
End = 1145 Volume Purged (115 gal) dry out 3 times
1200 Hrs - Lunch
1230 Hrs - Arrive @ BLDG #3245
Decon Pumps & Call Office
1315 Hrs - Return to SWMU 13 Well 13MWT37
Start = 1329
End = 1417 Volume Purged (10 gal) dry out 3 t
1426 Hrs - Arrive @ 13MWT32
Start = 1435
End = 1522 Vol. Purged (8 gal) dry out 3 times

1540 Hrs - Return to Bldg #3245

- Run Nitrite Standard on DR 850 (Hach Colorimeter)
  Read = 0.093
- Repair - pH probe on 98F0478AB sonde
- Decon - whole pumps
- Start Prep. for GW Sampling

1750 Hrs - Left BLDG #3245 For Motel
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE DATE 11/4/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CLEANS: SAME AS ON P. 130

SAMPLING: SEE TABLE ON P. 133

DRILLING:

Drilled & Installed the Following:

13MWT3C
13MWT31 } MC NB#2526

13MWT38
13MWT27 } FR NB#2555

SCIENTIFIC SUNDRY PRODUCTS . CHICAGO 60605 MADE IN USA

WED 11-5-03

Work continued from Page

WEATHER Mostly Cloudy Temp 40's

0655 Hrs - ARRIVE @ BLDG #3245
PREP to SAMPLE GW

0810 HRS - ARRIVE @ SWMU 13

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS *(SAMPLER)
13GWT2502	0830	0925	15.2 L	DRY	*(TR)
13GWT2102	0825	0950	22 gal	0950	*(FW) MS/MSD (TE NA)
13GWT1702	0945	1045	6 L	1047	*(TR) NA 13FD110503 01
13GWT4001	1455	1630	22 gal	1630	*(FW)
13GWT4201	1535	1619	3 L	DRY	*(TR)

NOTES:
- CHECK IN W/ BLDG 165 VIA PHONE - to mob ultrasonic through buffer zone to 13MWT43 & 44 (OK)
- CHECK IN W/ LAB
- CHECK IN W/ R. BASINSKI

1730 Hrs - RETURN to BLDG #3245
Drop off EQ
PARKWORK
WAIT FOR FW

1800 HRS - LEFT NSWC CRANE
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 11/5/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary 11-6-03

CREWS - SAME AS ON P. 130 ~~except ck is off site~~ (TO)

Drilling

SEE NB 2565 MC
SEE NB 2555 FR

Sampling

SEE tables on P. 135

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

THURS 11-6-03

Work continued from Page WEATHER - OVERCAST & TEMP LOW 40's

0655 Hrs - ARRIVE @ BLDG #3245
PREP to SAMPLE GW

0815 Hrs - CHECKED IN w/ N. GATE GUARD & MINEFILL 8

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GMT2502	11-5-03		15.2 L	0845	(TR) PURGED (11-5) start sampling ON 11-6 (Explosives only)
13GWT0502	0920	1320	21.7 L	1320	(TR) NA RUN
13GWT4201	11-5-03		3 L	1500	(TR) PURGED (11/5) start sampling ON 11-6 (All but metals)
13GWT3701	1400	1550	2.3 gal	1550	(EW)

WELL DEVELOPMENT

SAMPLE ID	Start DEV	END DEV.	VOL. PURGED	COMMENTS
13MWT29	0827	1000	22 gal	—
13MWT39	1043	1140	65 gal	—
13MWT38	1300	1650	3 gal	Will cont Developing on 11/7

1600 Hrs - Picked up Dis Permit for SWMU 16 @ Public Works
1615 Hrs - Return to BLDG #3245
- PAPERWORK & PREP. SAMPLES FOR SHIPMENT ON COFC # 4816 VIA FED EX AB # 8412 2491 0625
- CHECK IN w/ Ralph BASINSKI
- CHECK IN w/ LAB talked to H. PRENTICE; also CONFIRMED SAT. DELIVERY

1845 Hrs - Drop off Samples @ FED EX.
1915 Hrs - FAX COFCs to OFFICE & LAB FROM Hotel

END

SIGNATURE [signature] DATE 11-06-03
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SUMMARY 11-7-03

CREWS - SAME AS ON PAGE 130, EXCEPT JK IS OFF SITE TODAY

Drilling:

SEE NB 2565 MC

SEE NB 2555 FR

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

FRI 11-07-03

Work continued from Page Weather - Partly cloudy Temp High 30's

0650 Hrs - Arrive @ BLDG # 3245
- Call YSI; Prep to sample GW @ SWMU 13
- Give MC & ER priority w/ 's to install first @ SWMU 16
- Check Lock out Tag @ SWMU 16 for 16 MWT 13 & 15; Not sure so T. Brent will make calls to confirm that the lines (ele.) were turned off
- Call in Hrs to Pittsburgh

0845 Hrs - Check on FW; gave him charge # for GW sampling & Pers.

0910 Hrs - Arrive @ 13 MWT 29

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	TIME SAMPLED	COMMENTS
13GWT2901	0935	1205	15 L	1205 (TK)	NA RUN
13GWT3901	0913	1400	5.1 gal	1400 (FW)	
13GWT4201					(FW) Completed sampling
13GWT2502					(TK) Collected Partical Misc. E

1400 Hrs - Setup @ 13GWT2502 collected partical misc. explosive
Very slow recharge well.

1435 Hrs - Check on drilling progress @ SWMU 16

1455 Hrs - Arrive @ BLDG # 3245
- Check in w/ office - R. Basinski (Progress Report) + T. Johnston (Status of Mustard Gas Start up)
- Made travel arrangements for return next shift (Nov 17-26) - Also talked to Seth G. About travel arrangements for next shift
- Call Laucks (Mike Baxter) - gave MB tracking No. for SAT shipment
- Paperwork @ Packing for samples on CoC 48

1835 Hrs - Drop off samples @ Fed Ex (AB # 8412 2491 0618

1852 Hrs - Fax copy of CoC to Mr. Baxter @ Laucks Lab from Hotel.

SIGNATURE [signature] DATE 11-7-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary 11-8-03

Crew Same as on P. 130

Drilling: See NB 2565 MC
See NB 2555 FR

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 50605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

SAT 11-08-03

Work continued from Page

Weather: mostly sunny Temp high 30's

0655 Hrs - Arrive @ BLDG #3245; Collect Trip Blank TB11080301 @ 0700
Prep for GW sampling @ SWMU 16

0810 Hrs - Let FW inside SWMU 16

0900 Hrs - Arrive @ 13GWT25 - Finish collecting Misc. Explosives
Let Mlakar in to secure protective casing @ 13MWT27

0930 Hrs - Exist Minefield @ (SWMU 13)

0945 Hrs - Arrive @ SWMU 16 to setup on WES-14-03-83

SAMPLE ID	Start Purge	End Purge	Vol Purged	Sample Time	Comments
16GW0302	1015	1215	12.1L	1215	(TK) RAN NA
16GWT0602	0908	1308	5.1 gal	1308	(FW) Will run NA 11/9
16GWT0902	1430	1640	14.8L	1640	(TK) RAN NA
16GWT0102	1455	1800	4.2 gal	NA	(FW) Will sample 11/9

Note - Attempt to develope 16MWT14 today - Well Dry

1805 Hrs - Left SWMU 16 for BLDG #3245

1807 Hrs - Arrive @ BLDG #3245
- Secure samples in Frig.
- Unload Meters, etc.

1820 Hrs - Left BLDG #3245 for Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 11/8/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SUMMARY 11-09-03

CREW SAME AS ON P. 130

SAMPLING: SEE P. 141

DRILLING:

MC's CREW (NB#2565)
Install 16MWT10 & 16 (2nd shallow well
1st well T14 was Dry)

FR's CREW (NB# 2555)
Install - 16MWT08 & 15

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 69605 MADE IN USA

SUN 11-09-03

Work continued from Page Weather - Mostly Sunny Low 40's

0655 Hrs - Arrive @ BLDG #3245
- Prep for GW sampling & NA @ SWMU 13 (TR)
- (FW) Prep to Purge 13GWT38
- FAX R. Basinski - Status for GW Sampling & Well installation thus far.

0840 Hrs - Arrive @ SWMU 16
Setup @ 16MWT06 to run NA

0910 Hr - 1000 Hrs - Run NA @ 16MWT06

1035 Hrs - Sample VOCs @ 16MWT01 Sample ID 16GWT0102
- Well was purged on 11-08-03 by FW

1100 Hrs - Arrive @ BLDG #3245
Paperwork & Lunch
Prep. to Dev. Wells @ SWMU 16

SAMPLE ID	Start Purge	End Purge	Vol Purged	Sample Time	Comments
16GWT0102	←	11/8/03	→	1035	(TR) Purged 11/8 - Sampled 11/9 VOCs
16GWT0302	1425	1635	21 gal	1635	(FW)
13GWT3801				NA	(FW) Purged only with sample 11/10

Wells Developed

Sample Loc	Start Dev	End Dev	Vol. Purged	
16MWT12	1355	1500	35.7 L	(TR)
16MWT9	1540	1648	17 gal	(TR)

1700 Hrs - TR check on FW @ 16MWT03 work out return time to open gate

1715 Hrs - TR Arrive @ BLDG #3245
- Clean & Mop Floors
- Paperwork
- MC to get FW out of SWMU 16 fence

1820 Hrs - Left NSWC Carne for Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 11-9-03

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Summary of 11/10/03

Same crew as on p 130
AL & Kevin today

Sampling see p 143

Drilling:

MC: Crew (NB #2365): Installed 13 MW17 & 44

FR's crew (NB #2335): Installed 13 MW17 & 41

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 50605 MADE IN USA

MON. 11/10/03

Work continued from Page

WEATHER - Partly Sunny Temp MID 40's AM ; MID 60's PM

0655 Hrs - ARRIVE @ BLDG # 3245

- Prep to sample GW
- Check in w/ office Ralph Rosinski
- Fax CoC # 4817 to ED Sedlmayer
- Call Instruments
- Ask Chris Foreman to ask Public Works to hold off on reconnecting street light @ SWMU 16 around 16 MWT 13 & 15 well installation location

0930 Hrs - Stop @ Public Works to discuss moving location of 13MWT47

0945 Hrs - Arrive @ 13 MWT03

SAMPLE ID	Start Purge	End Purge	Vol. Purged	Sample Time	Comments
13GWT3801	(← 11-09-03 →)			0915	(FW)
13GWT0302	1005	1209	10.9L	NA	(TK) will sample 11/11
13GWT0702	1120	1330	2.2gal	1330	(FW)

1225 Hrs - Finish Cleanup @ 13 MWT03 After completion of [illegible] will sample tomorrow

1230 Hrs - Check on FW

1245 Hrs - Arrive @ BLDG #3245

- Check in w/ ED Sedlmayer on QT Samples
- Give list of TANUS personnel to start next shift for Gate Passes
- Prep for Well Development

1340 Hrs - Arrive @ 13 MWT36

Start purge 1400 Hrs END PURGE 1502 Hrs VOL PURGED 29.4L

1515 Hrs - Check on FW ; FR is working nearby will let FW out Gate

1530 Hrs - Arrive @ 13MWT25 - Collect additional sample volume for Total Metals & Hg

1600 Hrs - Return to BLDG #3245, Empty SUV to carry coolers to FED Paperwork & Packing CoC # 4818 (Trucks) & CoC 4819 (Microscopes) Trucks on AB# 8412 2491 0375 & Microscopes on AB# 8412 2491 0386

1840 Hrs - Drop off Samples @ FED-Ex

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 11-10-03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SUMMARY OF 11/11/03

CREW - SAME AS ON P. 130 EXCEPT DOR MIL left 11/10.

DRILLING:

MC'S CREW = INSTALLED 13MWT 34, 16MWT 07 & 13

FR'S CREW = INSTALLED 16MWT 11

SAMPLING: SEE P. 145

SCIENTIFIC BINDERS PRODUCTS CHICAGO

TUES 11/11/03

Work continued from Page WEATHER: Lt Showers & Temp 50's

0653 Hrs - ARRIVE @ BLDG #3245
- PREP to RUN NA & sample
- PREP FOR WELL DEV.

0805 Hrs - ARRIVE @ 13MWT38 to RUN NA (0824-0908 Hrs.)

0925 Hrs - (TK) Filled Total Metals From 13MWT25 - Started Filling on 11/9
(FW) SET UP @ 13MWT03 to Sample

0940 Hrs - TK ARRIVED @ 13MWT03 to assist FW w/ Sampling AND RUNNING NA

1130 Hrs - LEAVE FOR LUNCH / FINISH @ 13MWT03

1215 Hrs - REFRIGERATE SAMPLES @ BLDG #3245

1235 Hrs - ARRIVE @ 13MWT41
- Only 1.6' OF WATER IN WELL will let well set until start of Next shift to develope

1315 Hrs - Return to BLDG #3245
- Check in @ OFFICE Talked to Ralph & ED
- Collect Trip Blank TB11110301 @ 1315

1400 Hrs - ARRIVE @ 16 FOR DEVELOPMENT

WELL ID	START DEV	END DEV	Vol. Purged	Comments
16MWT10	1420	1650	12.4 L	(FW)
16MWT16	1435	1545	4.5 L	(TK)

1600 Hrs - ARRIVE @ BLDG #3245
- Unload CAR
- PAPERWORK & Packaging FOR SHIPPING SAMPLES on COC #4820
- Sweep & Mop Floors (Field office Bathroom Hallway & LAB)
- FW to drop of sample shipment on AB #8412 2891 0397
- MC cleaned drain & car port area

1830 Hrs - LEFT SITE FOR HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE T. Royal DATE 11/11/03

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SCIENTIFIC BINDERY PRODUCTS, CHICAGO 69863 MADE IN USA

TITLE

PROJECT NO. 9060

BOOK NO. 1363

WED. 11/12/03

Work continued from Page

TRAVEL DAY ONLY
BAID

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE		DATE 11/12/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Summary 11/17/03

Drilling Crew: Jon Keifer
Dennis Sims
Todd Wollenhaupt } Rotasonic Scott's Crew
Nick Rust
Jim Walsh } ATV Matt's Crew
Joshua Dean

Tunnel Crew: Matt Gallian
Jim Goeckel
Scott Greek
T. Rohan

Matt's Crew - set up on 13 MW T35
Scott's Crew - " " " 13 MW T28

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60655 MADE IN USA

Mon 11-17-03

Work continued from Page

1405 Hrs - Arrive @ BLDG #3245
- Hold H&S Specific Training for Scott Grier & Jim Goerdt

1500 Hrs - Arrive @ Public Works
- Check on Monitoring well location 13 MW47 Moved to end of tree line OK w/ Public works - Donna Z. checked on

1525 Hrs - Arrive @ SWMU 13 - S/SW J. G. Around SWMU - Attempt to dev. 13 MW47 - Access wet - need to let utility road dry out very slippery.

1635 Hrs - Return to BLDG #3245
Cal. YSIs
Prep sample sets
Paper work

1800 Hrs - Left Crane for Hotel

END

SIGNATURE [signature] DATE 11/17/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary 11/18/03

No Drilling performed this date to the hour

Sampling see p. 151 - Repurge 13 minutes (S.G.) @ 1345 hrs

Crews see p. 148

SCIENTIFIC BINDERY PRODUCTS CHICAGO

Tues 11-18-03

Work continued from Page Weather: Mid 50's & Rain

0702 Hrs - Arrive @ BLDG #3245

- Prep to sample Groundwater & Develope Wells
- Talk w/ Tom Johnston

0930 Hrs - Arrive @ SWMU 13 & set up @ 13 MWT12 JG & TR

Start Purge = 1002

End Purge = 1402 Vol. Purged = 21.4L

Sample Time = 1408 RAN & NA

1400 Hrs - M.C. sampled 13SW1102

Monitoring Well Development

Well ID	Start Purge	End Purge	Vol. Purged	Comments
13MWT27	1230	1403	33.6L	(TR) Dry out 3 times
13MWT41	1500	1505	4L	(MC) Dry out well
13MWT34	1500	1658	52.4L	(SG & TR) Dry out well & remove 5 gals in 3 times

1600 Hrs - Assist S.G. with development @ 13MWT3

1720 Hrs - Check out of SWMU 13 @ North Gate

1730 Hrs - JG, SG & T.R. meet MC. @ BLDG #3245

Secure all samples in Frig.

Drop of meters inside BLDG

Check in w/ K. Basinski

1800 Hrs - Leave BLDG 3245 for Hotel

END

SIGNATURE [signature] DATE 11-18-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SUMMARY 11-19-03

CREWS SAME AS ON P. 148

SAMPLING SEE P. 153

DRILLING:

MATH'S CREW = Complete 13 MW 1 35 & Start 47

SCOTT'S CREW = Complete 13 MW 1 28

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

WED. 11/19/03

Work continued from Page

WEATHER = Mostly Sunny AM 40's PM 50's

0650 Hrs - Arrive @ BLDG #3245
- Prep. to sample groundwater

0908 Hrs - Arrive @ SWMU 13

0815 Hrs - Start Sampling Dis. Metals @ 13MWT25 - Purged Dry 11/18

WELL ID	Start Purge	End Purge	Vol. Purged	Time Sampled	Comments		
13GWT2602	0855	1135	13.2L	1140	(TR)	RAN	NA
13GWT2003	0828	1228	24.6L	1235	(JG)	"	"
13GWT3201	1409	1539	8.25L	1543	(JG)		

1315 - 1429 Hrs - Ran NA @ 13MWT20

1440 Hrs - Return to BLDG #3245
- Drop off samples in Frig.
- Prep SUV for Development

1525 Hrs - Arrive @ 13MWT33
Start Dev = 1542 Hrs
End Dev = 1633 Hrs
Vol. Purged = 12.8L

1650 Hrs - Return to BLDG #3245
Prep. Paperwork (COC # 4821) & samples for shipment on FED EX AB# 8412 2411 0401

1745 Hrs - Left Crane for FED EX.

1820 Hrs - Drop off Samples @ FED. EX.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 11/19/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary 11/20/03

Crews: Same as on P. 148; except T. Bachmeier released

Drilling: Completed BMWT 47; and worked on well pads.

Sampling: See P 156

SCIENTIFIC SUNDRY PRODUCTS CHICAGO 60605 MADE IN USA

THURS 11-20-03

Work continued from Page

WEATHER - Mostly Sunny Temp 40°s AM / 60°s PM

0655 Hrs - Arrive @ BLDG #3245
- Prep for GW Sampling
- Assist S.G. w/ Well Dev. Prep.
- Select wells to sample for JG & TK
- T. Johnston Called - discussed drilling & sampling status
- Fax C of C #4821 to LAB & OFFICE (A. Ho & E. Sedlmyer)

0910 Hrs - Arrive @ N. Gate Check In w/ Guard

SAMPLE ID	Start Purge	END Purge	VOL Purged	Sample Time	Comments
13GWT1102	0930	1050	7.65 L	1055	(TR) RAN NA
13GWT1002	0917	1317	18.6 L	1322	(JG Purge) TR RAN NA & Sampled until 1558 Hrs
13GWT1602	1404	1534	8.2 L	1537	(JG)
13GWT2502	←	11/18/03	→	1610	(TR) Finish Collecting Dissolving & Nitrate NH4 NO3 & Ammonia

WELLS DEV BY SG

WELL ID	Start DEV	END DEV	Vol DEV
13MWT45	1020	1205	7.25 gal
13MWT31	1330	1455	11 gal
13MWT30	1550	1650	7.5 gal

1700 Hrs - Returned to BLDG #3245
- Checked in w/ T. Johnston talked for ~35 min
- Unloaded EQ & Samples
- Labeled bottles from 13MWT25

1815 Hrs - Left Crane for Hotel

END

SIGNATURE

DATE 11-20-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary 11-21-03

CREWS: SAME AS ON P. 148

DRILLING: Install isolation casing @ 13MWT46
SEE NB 2555 (SG)
Work on well pads cont
ABANDON 16MWT1A SEE NB #2565

Sampling: SEE P. 157

MC: Slug Testing (NB 2565)

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

FRI 11-21-03

Work continued from Page

WEATHER - Mostly Sunny & 50's

ARRIVE BLDG 3245 @ 0655 Hrs

- PREP. FOR WELL DEV & WELL SAMPLING
- PREP. WEEK END PERSONNEL LIST FOR T. BRENT

0820 Hrs - ARRIVE @ SWMU 16

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	Comments
TB1121030 1	—	—	—	0700	TRIP BLANK (TR)
16GWT1001	0842	0957	7.5 L	1003	JG WELL SAMPLER, TC RAN
16GWT1201	1148	1313	9.5 L	1316	↓ ↓
16FD1121030 1	"	"	"	0000	DUP FROM 16GWT12

WELL ID	START DEV	END DEV	VOL PURGED	COMMENTS
16MWT11	0845	0947	28 L	(TR) SLOW RECHARGE (DRY OU
16MWT07	—	—	—	DRY WELL
16MWT08	1316	1338	15 gal	(Dry out) TR & MC
16MWT13	1520	1700	41 L	MC & SG
16MWT15	1610	1720	8 gal	MC & SG

1620 Hrs - TR ARRIVE @ BLDG #3245 W/ J.G.

- PREP SAMPLES FOR SHIPMENT ON COC #4822 ON FED EX AB # 8412 2491 0607
- CALL LAUCKS LAB - TALK TO H. PUCHTLER - ASPECT SAT. SHIPMENT
- ATTEMPT TO CALL - T. JOHNSTON & R. BASINSKI

1790 Hrs - LEAVE CRANE FOR FED EX

1815 Hrs - DROP OFF SAMPLES @ FED EX ON ABOVE AB #. FAX COC #4822 FROM HOTEL @ 2200 HRS TO LAUCKS

END

SIGNATURE Terry Rogers

DATE 11-21-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Chicago same as on p 148

Drilling: Complete Installation on 13 MAR 85
See WB 2595 for Details
Remainder of day Well Pad Construction

M.C (WB 2565) - Step Testing

Sampling See p. 159

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

SAT 11-22-03

Work continued from Page WEATHER - Partly Sunny & warm 60°s

0703 Hrs - Arrive @ BLDG # 3245
- Prep to sample GW w/ Bladder Pump
- Coordinate w/ M.C. (Slug Testing) as to which wells to sample so that samplers don't interfere w/ slug tests
- Calibration & Decon of Bladder Pump

0910 Hrs - Arrive @ SWMU 16
(TR) Purge well # 16MWT16 ; (JG) to setup on 16MWT13

0940 Hrs - Return to BLDG # 3245
- to pick up Dev. Eq. to Dev. 16MWT17
- waited for M.C. so that he could access SWMU 16

1020 Hrs - Arrive @ SWMU 16 w/ MG - set MG Dev. Sheets on 16MWT11 & 10 to assist slug test

1040 Hrs - Arrive @ 16MWT17 to Dev
Start Dev = 1100 Hrs
End Dev = 1230 Hrs
Volume Dev = 54 L

SAMPLE ID	Start Purge	End Purge	Vol Purged	Sample Time	Comments
16GWT1301	0927	1157	17.65 L	1200	(JG) TR RM NA
16GWT0901	1422	1612	10.6 L	1614	(JG)
16GWT0502	1446	1615	10.0 L	1617	(TR)
16GWT1601	0926	0926	1.0 L	1745	(TR/JG) Min. Vol. very slow recharge Purged Dry @ 0925. Allowed to recharge & sampled @ 1745 Hrs w/ JG.

WELL ID	Dev. Start	Dev. End	Vol Purged	Responsible Person
13MWT28	1020	1110	3.259	(S.G.)
16MWT17	1100	1230	54 L	(TR)

1810 Hrs - Arrive @ BLDG # 3245
- Secure all samples in Lab Frig.
- Unload EQ

1830 Hrs - Left Crane

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 · MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 11-22-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREWS: SAME AS ON P. 148

Drilling & Complete well pad @ 13 MAY 86 & DEMOB

MC - Slug Testing

Sampling - SEE P. 160

SCIENTIFIC BINDERY PRODUCTS

SUN 11-23-03

Work continued from Page WEATHER: Mostly Cloudy 60's

0700 Hrs - Arrive @ BLDG #3245
- Prep. to sample groundwater / develope & Run NA

0915 Hrs - Collect Addition Sample Parameters From 16MWT16 (Explosives) - This is a very slow recharge well Purged 11/22/03.

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	TIME SAMPLED	COMMENTS
16GWT1601	←	11-22-03	→	0915	(TR) collected additional Parmet. Explosives & Dis metals
13GWT4101	1025	1030	1.5 L	1530	(TR) Very slow yielding well sampled - Expl & Misc. Explo
13GWT0402	0942	1042	5.9 L	1044	(JG)
13GWT0102	1215	1315	6.7 L	1320	(JG) MS/MSD
13GWT0802	1330	1505	5.0 L	1515	(SG) TR RAN NA
13FD11230301	0000	"	"	—	(SG) DUP of 13GWT0802

WELL ID	START DEV	END DEV	VOL. PURGED	COMMENTS
~~13MWT41~~ (TR)				
13MWT44	1100	1153	10 gal	TR & SG
13MWT43	1230	1347	21.6 L	TR

1530 Hrs - Sample @ 13MWT41
1600 Hrs - Run NA @ 13MWT08
1705 Hrs - Complete NA @ 13MWT08
1730 Hrs - Collect more AQ samples @ 16MWT16 w/ JG
1800 Hrs - Return to BLDG #3245
- Secure samples in Frig.
- Clean & Mop Bathroom, Hallway, LAB & Field Office

1908 Hrs - Left BLDG #3245 for motel.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE DATE 11-23-03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

B 100 P ©

CCONT: TIMES ONLY
M. COCHRAN
J. GOERDT
S. GRIER
T. ROSAHN

MC - SLUG TESTING SEE NB 2565

SCIENTIFIC BINDERY PRODUCTS.. CHICAGO 50605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

Mon 11-24-03

Work continued from Page

Weather - Cold 30's; Overcast w/ Flurries

0655 Hrs - Arrive @ Site
- Check in w/ R. Basinski
- Pick to Dev Monitoring Well
- Fax Office (E.S.) CoC # 4822
- Paperwork / Assign wells to JG & SG

0945 Hrs - Check in w/ N. Gate Guard

1000 Hrs to 1200 Hrs - Sample (Complete) 13GWT4101 (went under fence due to wet)

1210 Hrs - Check out w/ N. Gate Guard

SAMPLE ID	Start Purge	END Purge	Vol Purged	SAMPLE TIME	Comments
13GWT4101	←	11-23-03	→	1000	(TK) Completed sampling from 11/23/03
13GWT1402	0935	1105	2.9 L	1115	(SG)
13GWT3101	0943	1113	12.7 L	1118	(JG)
13GWT3001	1415	1605	26 L	1615	(SG)
13GWT3301	1330	1730	21.7 L	1732	(JG) Sampled Explosives only well dry will complete 11/25

1225 Hrs - Lunch

1300 Hrs - Arrive @ 13MWT47 to Dev
Start Dev. = 1335 Hrs
END Dev. = 1445 Hrs
Vol. Dev. = 48 L

1515 Hrs - Return to BLDG # 3246
- Package & Ship Samples on CoCs & Laucks = 4824 & 4825 (FED EX AB# 8412 2491 0580.
Microseeps = 4826 (FED EX AB# 8412 2491 0592)

1800 Hrs - Left Crane for FED EX

1835 Hrs - Drop of Samples @ FED EX (MC & TK)

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 11/24/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREW - SAME AS ON P 162

MC, - Slug Testing SEE NB# 2565

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60695 MADE IN USA

TUES 11-25-03

Work continued from Page

WEATHER: Partly Cloudy & Cold (Temp 30°s)

0655 Hrs - Arrive @ Bldg #3245
- PREP to SAMPLE GROUNDWATER
- FAX OFFICE & Lab. CoCs
- CHECK IN w/ R. BASURSKI

0920 Hrs - CHECK IN w/ Guard @ N. Gate

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT 3301	←	11/24	→	0845	(JG) Completed this date
13GWT 1302	1016	1146	10.9 L	1150	(JG) TK RAN NA w/SG
13GWT 1502	0945	1345	18L	1347	(TK) TOC MS/MSD & Dup RAN NA
13GWT 2701	1005	1415	85.4 L	1425	(SG)
13GWT ~~ED 11250301~~	—	—	—	0000	(TK) TOC Dup of T13

1500 Hrs - Return to BLDG #3245 - Start PREP to SHIP SAMPLES on CoC #4827 (AB# 8412 2491 0570)

1640 Hrs - Arrive @ 13MWT13 RUN NA w/SG.

1725 Hrs - Finish Running NA @ 13MWT13

1740 Hrs - Return to BLDG #3245
- PREP. SAMS EQ. to return to US ENVIRONMENTAL on FED. EX AB # 8412 2491 0412
- CLEAN OFFICE, Bathroom, hallway, LAB, Etc. & MOP
- Work on PAPERWORK
- JG took Samples to FED EX & MISC. EQ Also
- Shipped mini trolls to Pittsburgh OFFICE on FED EX AB # 8412 2491 0423
- M.C. & S.C. - Clean Verticals & back of BLDG #3245 & Dr
- ORGANIZE OFFICE
- INVENTORY SAMPLE CONTAINERS

2030 Hrs - LEFT CRANE

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE DATE

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

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ENTIFIC BINDERY PRODUCTS.. CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

WED 11-26-03

Work continued from Page

0715 HRS - FAX COPC #4827 to LAUCKS LAB & Pittsburgh OFFICE

0800 HRS - TRAVEL to INDIANAPOLIS Airport

REMAINDER on day = TRAVEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature]

DATE 11-26-03

DISCLOSED TO AND UNDERSTOOD BY | **DATE** | **WITNESS** | **DATE**

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SCIENTIFIC SINDERY PRODUCTS., CHICAGO 60665 MADE IN USA

WED 12-03-03

Work continued from Page CREW: J. GOERDT, S. GUIER & T. LOJAHN

1400HRS - ARRIVE @ NSWC CRANE
- CALI YSIs
- PREP. to Collect Rinsate Blanks

SAMPLE ID	TIME	SAMPLER	Comments
TB12030301	1500	TR	TRIP BLANK
16RB12030301	1520	JG	BLADDER PUMP
13RB12030301	1535	SG	PERISTALTIC TUBING (PE
13RB12030301-F	1535	SG	" " (
16RB12030302	1600	SG	PERISTALTIC TUBING (TE

REAGENT Grad Water - NERL Lot # 0807253 EXP. DAT - 8/04

1700HRS - TRAIN JG to RUN NA

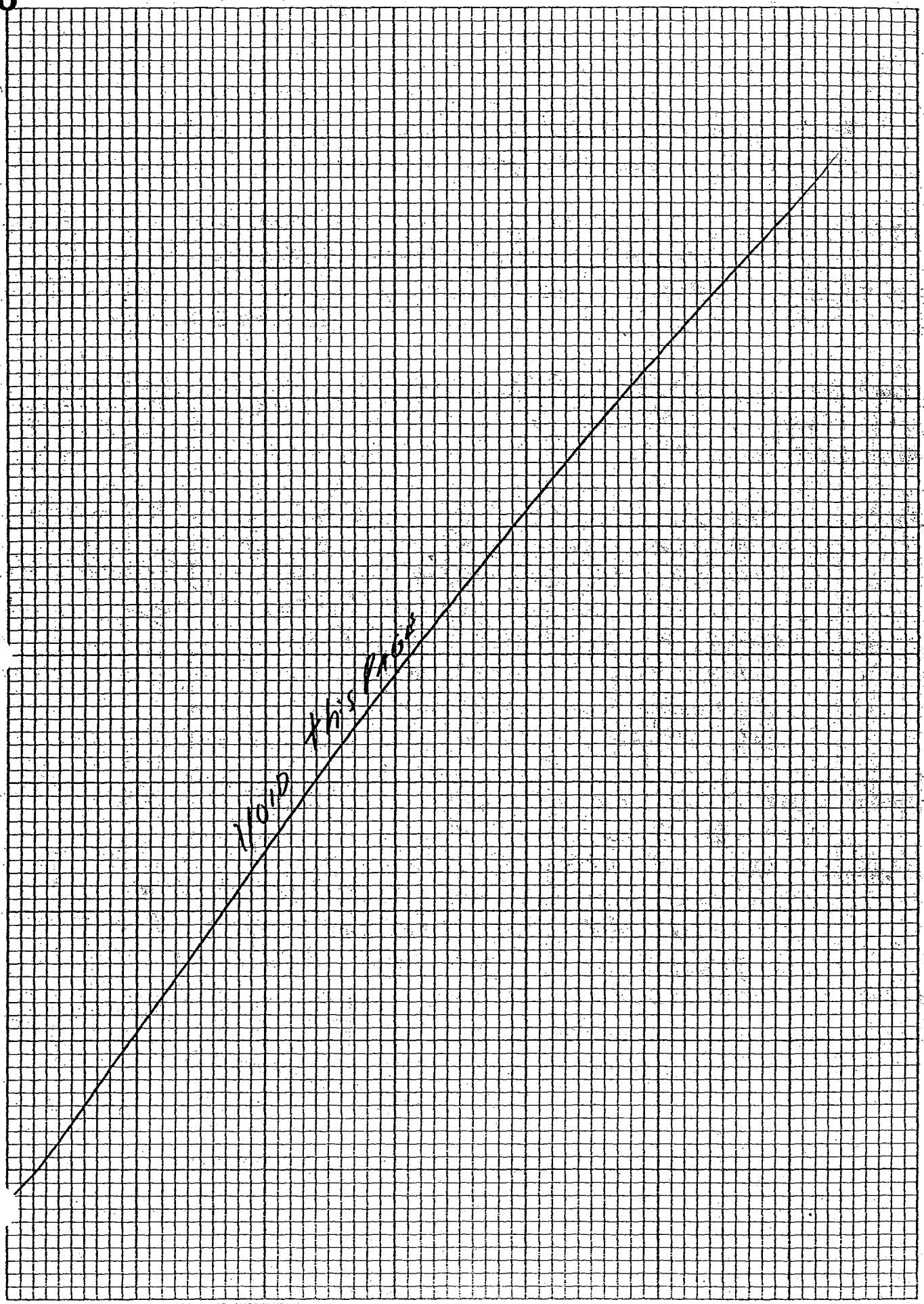
1806HRS - LEFT CRANE FOR HOTEL

END

SIGNATURE

DATE 12-3-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS, CHICAGO 50605 MADE IN USA

THURS. 12-04-03

Work continued from Page Weather: Overcast, Periods of Lt Rain & Hig 70

0655 Hrs - Arrive @ BLDG #3245
Prep. to Sample Groundwater

SAMPLE ID	Start Purge	End Purge	Vol Purged	Sample Time	Comments
13GWT0902	0835	1015	9.0 L	1018	(JG) NA Can
13FD12040301	"	"	"	0000	(JG)
13GWT4301	0900	1040	3 gal	1050	(SG)
13GWT3401	0955	1145	10.5 L	1150	(TC) NA Can
13GWT2202	1340	1455	7.5 L	1510	(JG) NA Can
13GWT4401	1430	1650	4.0 gal	1700	(SG)

1330 Hrs - Return to BLDG #3245 - Check in @ Office & Secure Sam
- Prep. to Develope Monitoring Wells
- Assist S.G. w/ Bladder Pump @ 13MWT44
  SG having trouble getting it going

1520 Hrs - Arrive @ 13MWT46 to Dev.
Start Dev. = 1533 Hrs
End Dev. = 1707 Hrs
Vol. Purged. = 84L

1720 Hrs - Assist S.G. w/ Clean up @ 13MWT22 then check on SG @ 13MWT44

1805 Hrs - Return to Bldg #3245
- Check in w/ R. Basinski - left message
- Unload NA Eq & Inst. secure inside Bldg #3245
- Receive Paperwork from SG & JG

1830 Hrs - Left NSWC Crane

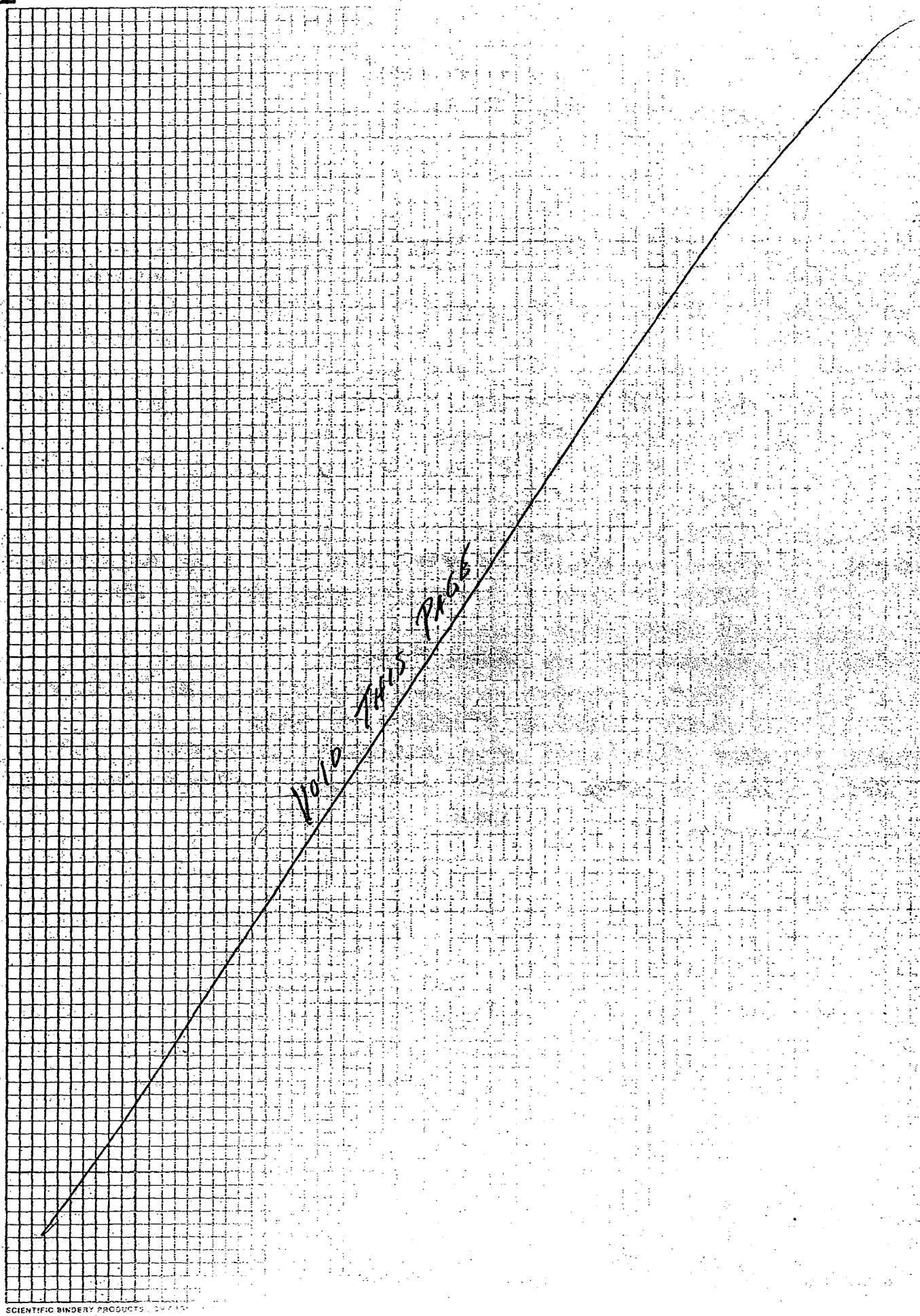
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 12-4-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS

TITLE NSWC CRANE

FRI 12/05/03

PROJECT NO. N9060

BOOK NO. 1363

Work continued from Page Weather - Overcast Periods of Rain & High 30's

0655 Hrs - Arrive @ BLDG # 3245

- Prep to sample soils

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
16RB12050301	—	—	—	0800	Rinsate on Bucket Bi
16GWT0701	0900	1025	7.65 L	1027	(JG) Ran NA
16RB12050302	—	—	—	1130	Rinsate on Bucket Bi

PURGED this Date 2 WELLS (16MWT08 (JG) & 16MWT11 (SG)) BUT not sampled (went Dry)

0900 Hrs - Arrive @ SWMU 16 - start clearing gravel from sampling Bore Hole 47 → 50.

- TR & SG sample soil borings 16SB42 → 50 SEE CoFC # 4829

1300 Hrs - Finish soil sampling

1315 Hrs - Check on JG @ 16MWT08 - ~6' of standing water in well. Well is also a slow recharge well - Decided to bail dry

1400 Hrs - Returned to BLDG # 3245

- Prep. samples for shipment on AB # 8412 2491 0434. CoFCs include # 4828 & 4829

1730 Hrs - Left BLDG # 3245 for Federal Express w/ JG

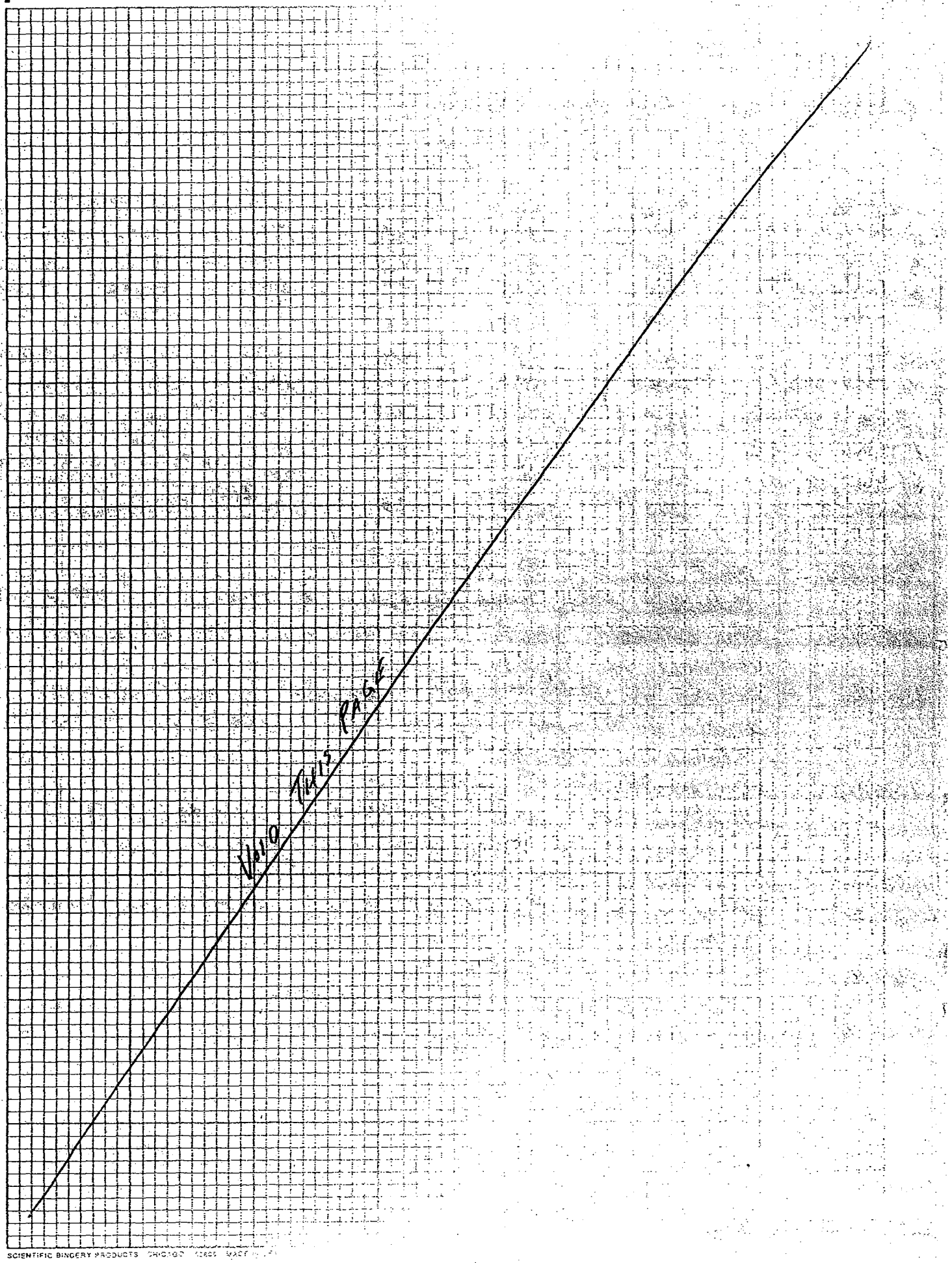
1800 Hrs - Drop of samples @ Fed. Ex. 1854 Hrs Fax Lauck's CoFs

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE			DATE 12/5/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE



SCIENTIFIC BINDERY PRODUCTS CHICAGO

SAT. 12-06-08

Work continued from Page Weather - Sunny Mostly & 30's

0655 Hrs - Arrive @ BLDG #3245

- Prep. to sample sumps & GW @ SWMU 16

SAMPLE ID	Start Purge	End Purge	Vol Purged	Sample Time	Comments
TB12060301	NA	NA	NA	0700	TRIP BLANK
16SW0102	NA	NA	NA	0905	TR/SG N. Sump
16SW0202	NA	NA	NA	0935	TR/SG E Sump
16FD12060301	NA	NA	NA	0000	FROM 16SW0202
16SW0702	NA	NA	NA	1008	TR/SG W. Sump
16GWT1501	0950	1350	21.6 L	1352	JG Can NA Dup
13GWT0202	1210	1345	5 gal	DRY	(SG) Will collect 12/7
13GWT0602	1510	1628	2 gal	DRY	(SG Start Collecting 12/7
16GWT0801	1320 (12/5)	1330 (12/5)	9L	1030 (12/6)	(TC) Sampled VOCs; Explosives 1L; Start Total Metals & Hg
16GWT1101	1515 (12/5)	1600 (12/5)	1.25 g	1330 (12/6)	(TC) Sampled VOCs, Explosives 1L; & Metals & Hg (Total)

1030 Hrs - Start sampling @ 16MWT08
Collected VOCs, 1L of Explosives & started Total Metals & Hg

1145 Hrs - Stop collecting sample @ 16MWT08 - DRY WELL will continue on 12/07

1200 Hrs - Return to BLDG #3245 - Checked in w/ R. Basinski; Checked on Shipment from 12/5 - made it to FED EX Station in Seattle

1330 Hrs - Started sampling @ 16MWT11
Milked well until 1500 Hrs - Collected VOCs, 1L of Explosives & Total Metals & Hg - well dry

1515 Hrs - Rechecked 16MWT08 well still dry

1530 Hrs - Check on J.G. @ 16MWT1501 - Almost done sampling & running MNA

1600 Hrs - Return to BLDG #3245
- Paper work & unload Rental

1730 Hrs - Left BLDG #3245 for Hotel

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 12/6/08

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLE SUMMARY 12-7-03

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	START SAMPLING	COMMENTS
16GWT1101	← Purged 12-05 →			1000	(TA) Collected M.Exp & [illegible] metals
13GWT0202	← Purged on 12-06 →			0850	(JG) FULL sample, [illegible]
13GWT0602	← Purged on 12-06 →			1300	(TA) Collected 500m OF Exp sampl
13GWT2801	0930	1400	3.5 gal	1410	(SG) Start sampling well dry after Expl. collected Well continue to recover started [illegible]
13GWT1802	1155	1535	16.45 L	1538	(JG) RAN [illegible]
13GWT4501	1515	1755	4 gal	NA	(SG) Will start sampling 12/8/03

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60635 MADE IN USA

SUN 12-07-03

Work continued from Page WEATHER - Mostly sunny High 40's

0655 Hrs - ARRIVE @ BLDG #3245
- PREP to sample GW @ SWMU 16
- Assign work to SG & JG

0815 Hrs - ARRIVE @ SWMU 16
- Tighten down well caps

0910 Hrs - Attempt to sample 16GWT08 - Collect some sample on 12/6 see page 175 - well still dry this date

1100 Hrs - Collected additional sample from 16GWT11 - Misc. Explosives & Filtered Metals - Well dry

1130 Hrs - LUNCH

1200 Hrs - Check on JG @ SWMU 13

1215 Hrs - Put Lock on 13MWT24

1230 Hrs - Check on SG - will be ready to sample @ 1400 Hrs - will return to run MNA @ 13MWT28

1300 Hrs - Collect 0.5L of sample @ 13MWT06 until well dried up.

1330 Hrs - Return to well 13MWT28 @ 1400 Hrs start to run MNA

1400 Hrs - Well 13MWT29 - water level @ pump intake - SG will move to 13MWT45 & finish sampling 13MWT28 tomorrow

1510 Hrs - Assist SG with setup @ 13MWT45

1535 Hrs - Start Dev. @ 13MWT35
Start Purge = 1535 Monitored Recovery until = 1625
END Purge = 1555
Vol. Purged = 14.5L

1635 Hrs - Finished cleanup @ 13MWT35

1640 Hrs - Check on JG & assist w/ 13MWT18

1720 Hrs - Check on SG & assist w/ 13MWT45

1800 Hrs - Left SWMU 13 for BLDG #3245
- Unload Vehicle
- Clean office space, bathroom, hallway, labs etc.

1830 Hrs - Left Offices for Hotel

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 12/7/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P ©

SAMPLE SUMMARY 12-8-03

Soil : Collected PCBs @ Soil Borings 16 - 25
SEE CoFCs 4831 & 4832

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13RB12080301	NA	NA	NA	0740	BUCKET BIT
13RB12080302	NA	NA	NA	0937	BUCKET BIT
13RB12080303	NA	NA	NA	1500	BLADDER PUMP
13GWT3601	0840	1040	13L	1050	VG MS/MSD RAN MNA
13FD12080303	"	"	"	0000	DUP OF 13GWT3601

Continued to collect Additional sample @ :
13MWT28 = Complete sample collection this date
13MWT45 = Collected 1.5L of Explosives & Misc Expl.
13MWT06 = Collected ~500ml completed the collection of Explosive sample

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60595 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. N9060

BOOK NO. 1363

MON 12-08-03

Work continued from Page Weather - Partly Cloudy & High 30°s

0658 Hrs - Arrived @ BLDG #3245

- Prep to sample soils @ SWMU 13
- Collected 13RB12080301 @ 0745 Hrs

NERL Reagent Grade H_2O Lot # 0807253 Exp. 8/04

0848 Hrs - Start Collecting Soil Samples @ SWMU 13

1115 Hrs - END " " " @ SWMU 13

1130 Hrs - LUNCH

1200 Hrs - Arrive @ BLDG #3245

- PAPER WORK & SHIPPING OF SAMPLES ON COCs:
  #4831 → 4834 to LAUCKS TESTING LAB
  #4835 to MICROSEERS INC.
- LABEL SOILS SAMPLES

1730 Hrs - LEFT NSWC CRANE FOR FED. EX.

1800 Hrs - Drop off samples @ FED. EX.

LAUCKS samples on AB # 8412 2491 0560

MICROSEERS samples on AB # 2410 2491 0559

END

SIGNATURE Terry Rogal

DATE 12-8-03

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SAMPLE SUMMARY 12-09-03

SAMPLE ID	START PURGE	END PURGE	SAMPLE TIME	VOL PURGED	COMMENTS
13GWT4601	0900	1122	1124	11.2 L	(JG)
13GWT4701	0930	1100	1110	9.4 L	(JG)
13GWT3501	1483	1530	NA	12 L	(JG) DRIED OUT WELL
13GWT2501	← SEE 12/7 →		1645	12/7	JG/TC collected total metals
13GWT0602	← SEE 12/6 →		1730	12/6	JG/TC collected total metals

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TUES 12-09-03

Work continued from Page Mostly Cloudy & 50°S Temp

0700 Hrs - ARRIVED @ BLDG #3245
- ASSIGN WORK to J.G. & S.G.
- FAX COPCS to OFFICE & LAUCKS LAB

0800 Hrs - PREP. to visit sites w/ B. Gates, T. Brant, & R. Basinsa AND C. FREEMAN
Sites visited included:
- SWMU 18: BLDGS #104, #105, #198 & #200
- OLD GUN TUB
- Roads & Grounds - SWMU 15
- Pond - SWMU 8
- SMUU-20

1300 Hrs - RETURN to BLDG #3245
Roughed out sample location maps for BLDGS 104, 105, 198, 200 & ~~SMUU~~ SWMU 20 for B. Gates, T. Brant & R. BASINKI

1600 Hrs - Joined JG and prep. to sample 13GWT05 & 06

1645 Hrs - Collect Total metals & Hg and complete misc. Explosive sample @ 13GWT05 - and well bailed out

1730 Hrs - Arrive @ 13MW106 - Sample for Total Metals & Hg and well bailed out

1785 Hrs - Returned to BLDG #3245
Secure samples in Frig; drop off misc. Eq.

1815 Hrs - LEFT NSWC CRANE

END

SIGNATURE Terry Nagel
DATE 12-09-03
DISCLOSED TO AND UNDERSTOOD BY
DATE
WITNESS
DATE

SAMPLE SUMMARY 12 10 98

SAMPLE ID	SAMPLE TIME	PICKED DATE	COMMENTS
13GWT3501	1145	12/9	FULL SUITE COLLECTED (TKE, JG)
13GWT4501	1300	12/7	Nitrate + Nitrite, Ammonia & Filtered Metals & Hg
TB12100301	1500	N/A	TK
RB12100301	1510	N/A	TK/JG Disposable Bailer

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. N9060

BOOK NO. 1363

WED 12-10-03

Work continued from Page

Weather: Overcast Periods of Rain & 30's

0653 Hrs - Arrive @ BLDG #3245
- Paperwork C&C #4836, etc.
- Start office clean-up
- Start prep. of EQ clean up & shipment prep.
- (JG) drilled screw holes in well tags 13MWT9-26 in prep. to secure the wells tags
- Start clean up in Storage Room / Garage

1100 Hrs - Lunch

1130 Hrs - Arrive @ No Gate Notify Guard of our access

1145 Hrs - Start sampling 13GWT35

1300 Hrs - " " 13GWT45 for Filtered Metals & Hg, and Nitrate Nitrite & Ammonia

1400 Hrs - Arrive @ BLDG #3245
- Talked to Ralph Basinsko - ask me to set up the revegetation / restoration w/ Jacobi Sodding
- Talked to Jacobi (Dave Fulkerson) and set up Friday 1/9/12 for work / site access
- Paperwork: Packaging / Shipping prep. for samples on 4836

1630 Hrs - (JG) to work on securing well tags & sample 13GWT06
(TR) To drop off samples & Rental EQ @ FedEx

1720 Hrs - Drop of samples on C&C #4836 FedEx AB# 8412 2491 0526
US Environmental EQ shipped on FED EX AB# 8412 2491 0537

AND

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Roach

DATE 12-10-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE Summary 12-11-03

NOTES: TALKED to Mr SLAVEN NO PRODUCTION @ BLDG #165 today & tomorrow.

OK to take in REVEGETATION/RESTORATION CREW.

Collected Nitrate + Nitrite and Ammonia sample from 13GWT0602.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 59935 MADE IN USA

TITLE NSWC CRANE
THURS 12/11/03

PROJECT NO. N9060
BOOK NO. 1363

Work continued from Page OVERCAST & Cold

0650 HRS - ARRIVE @ BLDG #3245 - Arranged for restoration to take place to
- DECON ALL WHALE PUMPS & HAND AUGER EQ.
- PREP. SOME EQ to RETURN to Pittsburgh
- GENERAL OFFICE CLEANUP - JG SECURING WELL tags on 13MWT WELLS

0930 HRS - START TAKING PHOTOS OF CORE BOXES
1130 HRS - LUNCH
1200 HRS - RETURN to BLDG #3245 - cont. taking PHOTOS OF CORE boxes
1330 HRS - FINISH PHOTOING CORE BOXES
T. BRENT will help deliver core BOXES to storage facility - Loaded Gov. TRUCK w/ core boxes (~1/3 of total)
1600 HRS - Complete delivering core boxes to storage (MAG 1970)
15 core boxes REMAIN FOR NEXT shift ~ 65 MOVED.
1615 HRS - Collected Nitrate & Nitrite / Ammonia @ 13MWT06
Sample ID 13GWT0602.
1630 HRS - ARRIVE @ BLDG #3245
- PAPERWORK & PACK SAMPLES FOR SHIPMENT on FEDEX
1715 HRS - AB # 8412 2491 05 04
DROP OFF Samples ON COC # 4837 @ FED. EX.
ALSO, SHIPPING peristaltic PUMP to US ENVIRONMENTAL ON FED. EX AB# 8412 2491 0490
1735 HRS - ARRIVE @ MOTEL

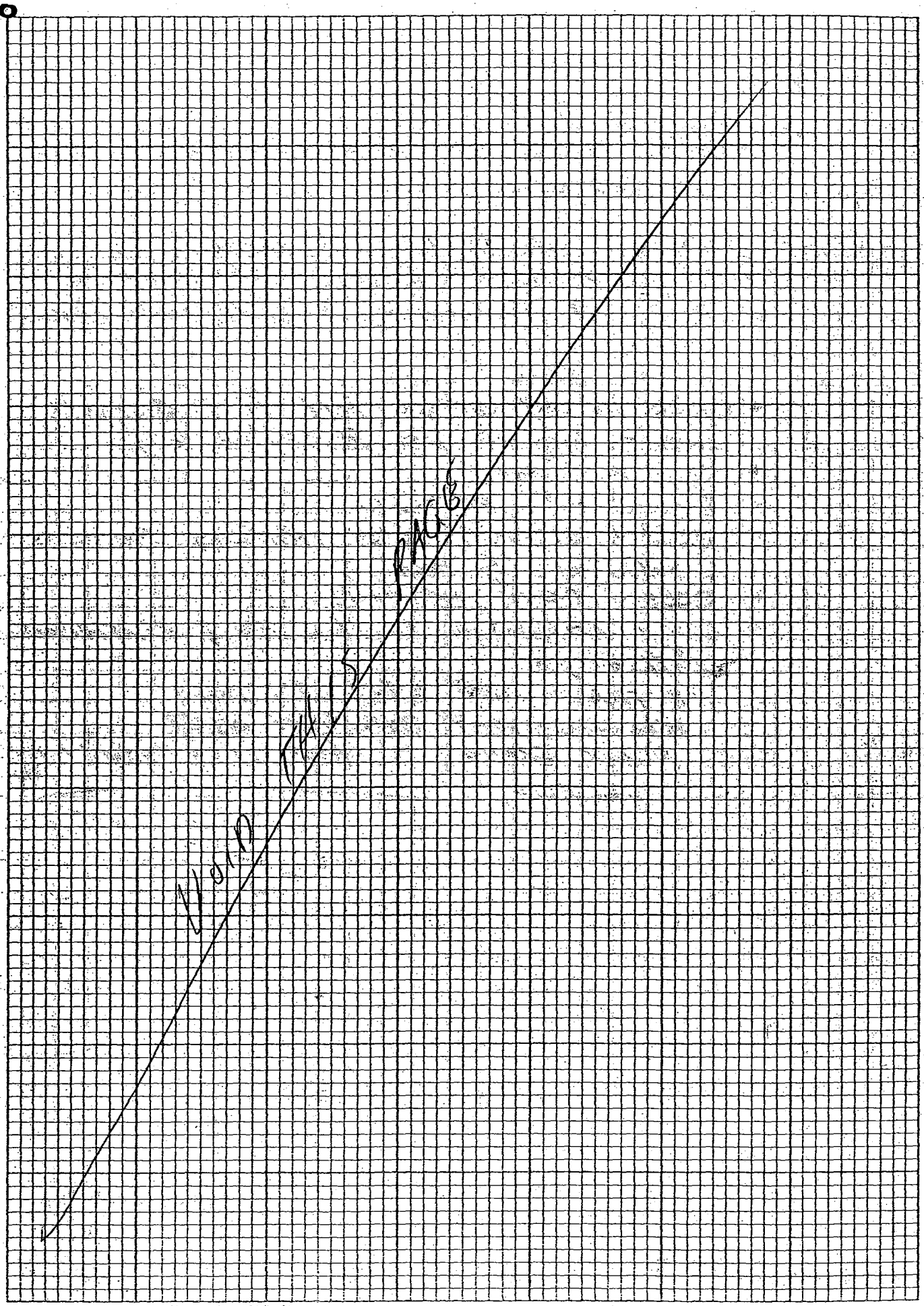
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Bryant DATE 12/11/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. N9060

BOOK NO. 1363

FRI 12/12/03

Work continued from Page

0650 Hrs - ARRIVE @ BLDG #3245
- Start Packing EQ & PAPERWORK to Ship to Pittsburgh
- OFFICE ORGANIZE

0800 Hrs - Meet w/ Site Restoration CREW
- Ground to hard to dig will have to postpone Restoration to later date (Possibly spring)

0830 Hrs - Return to BLDG #3245
- Check in w/ OFFICE talk to R. Basinski - inform him of Site Restoration delay
- CALL in time
- Clean out VEHICLE
- CLEAN OFFICE LAB Hallway Storage Room & Bathroom & More
- CLEAN DRAIN out back
- Finish Preparation to ship EQ & PAPERWORK to Pittsburgh
  - OFFICE - AB# 8412 2491 0478
  - WAREHOUSE - AB# 8412 2491 0467

1130 Hrs - LEFT NSWC CRANE to Check out of Hotel & FED EX Dropoff.

END

Work continued to Page

SIGNATURE [signature] DATE 12/12/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

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Synoptic Water Levels @ SWMU 13 OU
1/28/04

WELL ID	TIME	W/L	WELL ID	TIME	W/L
1	1347	7.55	35	1424	63.96
2	1357	16.24	36		
3	1344	9.98	37		
4	1408	14.09	38		
5	1404	5.78	39		
6	1342	11.91	40		
7	1417	4.21	41		
8	1412	3.88	42		
9	1337	8.77	43		
10	1421	14.96	44		
11	1427	8.76	45	1505	72.75
12	1430	10.75	46		
O.S. 13			47		
O.S. 14					
15	1443	14.59			
16	1501	11.01			
17	1458	8.89			
18	1446	20.21			
O.S. 19					
20	1333	5.00			
21	1508	9.09			
22	1516	8.18			
23	1331	8.50			
24	1328	9.25			
25	1523	7.05			
26	1326	10.05			
27	1491	9.31			
28	1339	79.63			
29					
30					
31					
32					
33					
34	1512	5.42			

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

Mon 1-19-04

Work continued from Page

Morning - Worked on SWMU 1

1230 Hrs - Prep to do water levels @ SWMU 13
TK - all well measurements inside security fence & All staff gauge measurement & install SG11
FR - to do all measurements of wells outside of the security fence @ SWMU 13

1620 Hrs - Meet w/ FRED @ BLDG #3245 FRED got tied up with the drillers and couldn't do well measurement, we will complete the measurement tomorrow & within the 24 Hrs. of start time (1319 Hrs)
• Prep. to develope monitoring well 16 MW17B

1730 Hrs - TK assisted FR w/ well development & returned to BLDG #3245 to prep. ship of samples from SWMU 1.

SEE Notebook # 1340 (SWMU 1)

SG	Time	Wt.	Flow		
1	1401	1.77	Stagnet	W 0.15 x D 0.35	
2	1351	3.68	0.35 X 1.3	22sec/1'	
3	1602	1.87	ICE Pool	1x3' →	(0 Flow Discharge other side of Road)
4	15.15	2.45	0.02 x 0.35	4sec/1	
5	15.39	3.90	0.01 x 0.25	3sec/1	
6	1531	2.35	1'x1' Stagnet Pool		
7	13:19	1.47	Stagnet		
8	1519	5.08	0.01 x 0.3	1sec/1'	
9	1452	4.15	0.06 x 0.9	2sec/1'	(2 streams merg @ culvert)
10	14:33	4.82	0.05 x 1.6	3sec/1'	
11	1554	2.74	0.1 X 1.2	6sec/1'	

BHD

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 1/19/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Synoptic Water Levels @ SWMU 13 OU
1/19/04 & 1-20-04

WELL ID.	TIME	WL	
1	1347	7.55	
2	1357	16.24	
3	1344	9.98	
4	1408	14.09	
5	1404	3.78	
6	1342	11.91	
7	14.17	4.21	
8	14.12	3.88	
9	13:37	8.77	
10	1421	14.96	
11	14.27	8.76	
12	14.30	10.75	
OS 13	11.28	4.93	
OS 14	11.04	14.17	
15	14.43	14.59	
16	1501	11.01	
17	1458	8.89	
18	1446	20.21	
OS 19	1058	10.96	1-20-04
20	1333	5.00	
21	1533	9.09	
22	1516	8.18	
23	1331	8.56	
24	1328	9.25	
25	1523	7.05	
26	1326	10.05	
27	1441	9.31	
	139	79.63	

WELL ID	TIME	WL	
35	1424	63.96	
36	900	19.26	1-20
37	913	14.37	1-20
38	911	61.90	1-20
* 39	920	14.25	1-20
40	941	18.55	1-20
41	940	66.58	1-20
42	949	21.14	1-20
43	1002	8.50	1-20
44	1007	64.57	1-20
OS 45	1505	72.75	
* 46	925	58.10	1-20
* 47	1115	7.32	1-20
32	1039	9.52	
31	1052	10.65	1-20
33	1048	10.63	1-20
19		10.96	

19	1058	10.96	1.20
30	1109	11.72	1-20
29	1122	5.82	

SCIENTIFIC RINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

THE 1-20-04

Work continued from Page

F. RAMSER completed the synoptic water level measurements (SEE P. 190) @ SWMCL 13.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 1-20-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SUMMER 16 SYNOPTIC WATER LEVELS

WELL ID	WL L	TIME
WES-14-1-83	31.99	10:32
WES-14-2-83	15.36	0935
WES-14-3-83	20.00	1047
WES-14-4-83	28.39	1041
WES-14-5-83	34.18	1038
16MWIT01	19.12	0945
02	10.94	1024
03	28.34	1021
04	13.11	1015
05	31.44	10.18
06	17.41	0947
07	DRY	1003
08	27.03	1005
09	13.88	1006
10	22.05	1010
11	96.30	1012
12	20.13	1044
13	10.25	1025
14	ABANDONED	
15	53.23	1026
16	32.93	0956
17	15.35	1000
18	26.65	0931 TD 104.5

SAT. 1-24-04

Work continued from Page

0700 Hrs -
Arrive @ BLDG # 3245 - Prep. to sample 16MWT18 & take a complete round of water levels @ SWMU 16.
0900 Hrs - Arrive @ SWMU 16
• 0935 - 1047 Hrs - Run synoptic round of ~~synoptic~~ water levels
1100 Hrs - Start set up @ 16MWT18
Start Purge - 1115 Hrs
End Purge - 1305 Hrs (well dry)
Vol Purged - 8.6 L
Will sample well tomorrow after well recharges
1320 Hrs - Arrive @ BLDG # 3245
Prep. to sample wells @ SWMU 1
Remainder of day see NB # 1340 for N0845
charge #, CTO 315

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE
DATE 1-24-04
DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

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SCIENTIFIC BINDERY PRODUCTS

TITLE NSWC CRAN

PROJECT NO. 9060

BOOK NO. 1363

SUN 1-25-04

Work continued from Page

0700 Hrs - Arrive @ BLDG # 3245

PREP to SAMPLE 16MWT18

0853 Hrs - Begin sampling 16MWT18

1100 Hrs - Finish clean up @ SWMU 16 + Return to BLDG # 3245.

REMAINDER OF DAY SEE MGBG Note Book # 1346

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Troy Rogers

DATE 1-25-04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

VOID THIS PAGE

TITLE NSWC CRANE

MON 1-26-04

PROJECT NO. 9060

BOOK NO. 1363

Work continued from Page

SHIP SAMPLE 16GWIT1801 this date :

LAUCKS - COC # 4395 AB# 8412 2491 9971

MICROSEARS - COC # 4394 AB# 8412 2491 0993

DROP OFF @ FED.EX. @ 1845 HRS

SHIP

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] **DATE** 1-26-04

DISCLOSED TO AND UNDERSTOOD BY **DATE** **WITNESS** **DATE**

APPENDIX D.1.3
SWMU 16
SITE LOGBOOK
ROUND 3

NSWC CRANE

N7448

SWMU 13 & 16

1376

NSWC CRANE

PROJECT # ~~6878~~ (TO) 7448

CTO ~~0351~~ (TK) 0343

PROJECT TOM : RALPH BASINSKI

FOL - TERRY ROJAHN

Start Work - 7/8/04

END Work -

OTHER NOTE BOOKS

2577 - S. Cont:

2575 - J. Goerdt (Sampling)

2565 - C. LANEY

~~2575 - J Goerdt~~ (TK)

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

THURS 7-8-04

Work continued from Page

1615-Hrs Pick up Dig Permit # 4560 this date for WELLS only @ SWMU 13 - SEE opposite Page

END

5

10

15

25

30

35

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 7-8-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

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DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4572

REQUESTED BY: Tetra Tech NUS Joe/Ralph Barnett 412-921-9308	DATE: 7/9/04
WORK REQUEST ON E/S NO.: 153704	B-1998 & B-1996 on Hwy 77
WORK WILL BE PERFORMED BY: Tetra Tech NUS, Inc.	DATE (Start - on or about):

WORK DESCRIPTION
2 Soil borings & monitoring wells along Hwy 77 between Magazines 1998 & 1996. Sites are marked & drawing is attached.

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed 22 7/9/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR	N/A			7/9/04 dg
HIGH VOLTAGE ELECTRICAL	N/A			7/7/04 RHW
FIRE ALARM 22				7-14 NA
GROUNDING 22				
NATURAL GAS	N/A			7/9/04 dg
SECURITY ALARM 22	NA			7-14 NA
SEWER	N/A			7/9/04 dg
STEAM	N/A			7/9/04 dg
TELEPHONE	N/A			7/7/04 RHW
WATER	N/A			7/9/04 dg
SECOND ELECTRICAL	N/A			7/7/04 RHW
GENERAL DYNAMICS/NMCI	N/A			7/9/04 dg

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE: [signature]	DATE: 7/22/04
DIGGING PERMIT APPROVED BY: [signature]	DATE: 7/22/04

DISTRIBUTION:
ORIGINAL - Code 0075 File

TITLE NSWC CRANE

S. Cont
J. Gocrat
T. Rojahn

PROJECT NO. 7448

BOOK NO. 1376

THURS. 7-22-04

Work continued from Page

1230 Hrs - Arrive @ BLDG
- CHECK IN w/ T. Brent & C. Freeman
- OPEN EQ/METERS
- BEGIN OFFICE ORGANIZATION

1330 Hrs - Pick up Dig Permits 4562 (RENEWED FOR MFA) & 4572 SEE LEFT PAGE FOR SWMU 16 (WELLS along Hwy 77)

1350 Hrs - Recon decon (possible) locations outside MFA

1430 Hrs - CHECK prime location FOR decon site w/ T. Brent FORMER pesticide mixing bldg. - has wash RACK & IND SEWER.

1500 Hrs - Return to BLDG.
Compile SHIPPING lists FOR Sams & Hardware stores

1545 Hrs - LEFT SITE to check into motel & SHOP FOR SUPPLIES

1650 Hrs - PURCHASE SUPPLIES @ SAMS

1745 Hrs - RETURN to HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 7-22-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 7-23-04 :

WELL ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13GWT2903	0948	1123	10.9 L	1128	JG
13GWT1103	1545	1650	5.7 L	1652	TC
13GWT2603	1408	1738	21.8 L	1745	JG
13GWT2503	1250	1425	13.5 L	NA	PURGED DRY

Drilling Summary

- MOB DAY FOR drilling Crew J. Walsh, J. Dean & E. MANNAFEN (CM)
- S. Conti gave C.M H&S training
- Decon pad OKed by MAC MCA Fire Dept (got Hot Work Permit SEE NB # 1374 pp 8&9) & Army CAAA (B. Gillis).
- Set up decon behind bldg # 3245

T+NUS
S. Conti
J. Geordt
T. Rojahn

TITLE NSWC CRANE

FRI. 7-23-04

PROJECT NO. 7448
BOOK NO. 1376

Work continued from Page WEATHER Hot & Humid Temp High 90s

0710 Hrs - ARRIVE @ BLDG # 3245
- Organize office material
- Select wells for JG @ SWMU 13
- Tried several time to contact supervisor @ SWMU 13 - NO ANSWER
- Contacted Fire Department - to inspect decon location @ MFA
- Contacted Bob Gillis Army Safety - he said area for decon is outside of ARCs for BLDGs 160 & 155 so he would defer to the Fire Dept

0920 Hrs - S. Conti & T.R. ARRIVE @ proposed decon AREA for ~~BLDG #~~ MFA to MEET FIRE INSPECTOR.

0935 Hrs - MEET w/ Fire Insp. - OKED AREA but will MEET w/ S. Conti when drillers ARRIVE @ BLDG # 3245 + wright Hot Work Permit

0940 Hrs - Arrive @ BLDG #3245
- FED. EX dropped off dedicated Bladder Pumps
- Prep. to install bladder Pumps @ SWMU 13

1020 Hrs - start Bladder Pump Installation w/ S. Conti
Installed 13 MWT 09, 11, 15, 17, 21, 28, 34 & 45

1215 Hrs - Stop for lunch

1250 Hrs - Return to BLDG #3245
- Talked to D. Baker MFA Super. informed him that we will be drilling in MFA over the weekend.
- PREP FOR H&S training FOR one driller (CHAD MAHAFFEY)
- PREP. to SAMPLE GW
- Call for more Nitrogen & Check in w/ office (R. Basinski

1545 Hrs - Start Purge @ 13MWT 11

1652 Hrs - Begin sampling @ 13MWT11

1735 Hrs - Finish @ 13MWT11 CHECK ON JG. @ 13MWT26

1800 Hrs - Return to BLDG #3245, PAPERWORK

1830 Hrs - SECURED samples in Frig; J.G. ARRIVED, LEFT site for Hotel

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rojahn DATE 7-23-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 7/24/04:

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13GWT0603				NA	(JG)
13GWT0803	0923	1043	8.2 L	1045	(TC)
13GWT0403	1102	1202	6.0 L	1205	(JG)
13GWT0203	1318	1428	7.2 L	1435	(JG)
13GWT2503	—	—	—	1513	(JG) PUMPED 7/23/04
13GWT0503	1230	1630	16.5 L	1635	(TC)
13GWT0303	1605	1815	11.7 L	1825	(JG)

DRILLING SUMMARY:

DRILLED & SET 12MWT01 @ 34'

DRILLED 12MWT02 to 29.5' will set well on 7/25 PROBably @ 28'

TITLE NSWC CRANE

S. Conti, J. Goerdt, T. Rojaw — J. Walsh, J. Dean, C. Mahaffey

PROJECT NO. 7448

BOOK NO. 1376

SAT 7/24/04

Work continued from Page Weather AM - Mostly Cloudy Temp 70's, PM - Same

1705 Hrs - Arrive @ BLDG # 3245
- Prep to sample GW
- Paperwork & Pick wells for sampling this date

0900 Hrs - Arrive @ MFB

0923 Hrs - Start Purge @ 13MWT08

1115 Hrs - Finish @ 13MWT08

1130 Hrs - Lunch

1200 Hrs - Return to MFB

1230 Hrs - Start Purge @ 13MWT05

1730 Hrs - Finish @ 13MWT05

1735 Hrs - Check on J. Goerdt

1800 Hrs - Return to BLDG # 3245
- Refrigerate samples
- Drop of EQ, Dump Purge H_2O
- Organize office

1830 Hrs - Left NSWC Crane for Motel
- E-mail R. Basinski work summary for 7/23 & 24/04 from Motel

END

Work continued to Page

SIGNATURE Terry Rojaw

DATE 7/24/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 7-20-04:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT0603	(SEE PAGE 6			) 1405	(JG) START SAMPLING EXT (
13GWT0703	0920	1120	9.7L	1122	(TR) DUP 13FD072504
13GWT1203	0856	1211	17.6L	1218	(JG)
13GWT1603	1440	1540	5.4L	1547	(JG) Collected MS/MSD
13GWT2303	1420	1620	10.2L	1642	(TR)

DRILLING SUMMARY:

Set/installed 12MWT02 at 28' (drilled on 7/24)

Drilled/set/installed 12MWT08 @ 24'

Pulled out of MFA & disconnected rig.

TITLE NSWC CRANE

PROJECT NO. 1448

BOOK NO. 1376

SUN 7/25/04 Stop Raining @ 0900 Hrs

Work continued from Page WEATHER: AM - Mostly Cloudy 60's; PM - SAME w/ Rain

0700 Hrs - ARRIVED @ BLDG #3245

- PREP. to SAMPLE GW
- PAPERWORK & Pick WELLS FOR SAMPLING this DATE

0900 Hrs - ARRIVE @ MFB

0920 Hrs - BEGIN PURGE @ 13MWT07

1240 Hrs - FINISH SAMPLING @ 13MWT07 obtained 13FD07250401

1300 Hrs - LUNCH / RAIN

1345 Hrs - RETURN to MFB SET UP CANOPY @ 13MWT23

1725 Hrs - FINISH @ 13MWT23

1740 Hrs - ARRIVE @ BLDG #3245

SECURE SAMPLES & METERS

Assit J.G. in labeling MS/MSD

1800 Hrs - LEFT BLDG #3245 FOR Motel

- E-mail FIELD WORK SUMMARY to R. BASINSK from motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

ATURE

DATE 7/25/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 7/26/04:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT3002	0850	1040	9.4L	1042	(TC)
13GWT3302	0858	1038	8.0L	1043	(JG)
13GWT3302	1245	1645	18.6L	1650	(JG)
13GWT0603	(PAGE 6		)	(PAGE 8)	Cont to sample EXPLOSIVES

DRILLING SUMMARY 7/26/04:

RAIN DELAY ... H&S CLASSES, B-M'S CALLS

CREWS - ... EXCEPT CHIP LANEY ARRIVED 1245 HRS

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

MCN 7-26-04

Work continued from Page

0705 Hrs - Arrived @ BLDG #3245
- Prep to sample GW
- Paperwork & Pick wells for sampling this date

0830 Hrs - Arrived @ Monitoring Well 13MWT30
1130 Hrs - Finish sampling + clean up @ 13MWT30
1145 Hrs - Lunch
1230 Hrs - Arrive @ BLDG #3245
- Check in w/ R. Basinski
- Prep. samples for shipment on COFCs 0050 & 0051 & ship via FED EX AB #8447 8135 536
- Faxed labels & office copies of COFCs
- Called Bloomington Oxygen regarding Tues. delivery
- Discussed sch. w/ Chip Laney
- 5 Cont. to pick up hardware supplies

1430 Hrs - Prep. to install Bladder Pumps w/ C.L.
Installed Bladder Pumps 13MWT 13, 14, 31 & 47
1545 Hrs - Return to BLDG #3245
Load sample coolers
1555 Hrs - Left Bldg #3245 for FED. EX.
1630 Hrs - Drop off samples @ FED. EX. in Bloomington
1700 Hrs - Return to Hotel
- E-mail fieldwork summary to R. Basinski From Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 7/26/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLING SUMMARY 7/27/04:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT1903	0815	0950	8.3L	0954	JG
13GWT3202	0830	0950	8.0L	0954	TR MS/MSD
13GWT2902	1029	1149	10L	1152	JG
13GWT2203	1440	1550	6.2L	1554	JG
13GWT1403	1435	1625	12.5L	1628	TR
13GWT0603	(SEE	PAGE 6	)	(PAGE)	TR FINISH collecting 1L Amber FOR EX.

DRILLING SUMMARY 7/27/04:

Drilled, set & installed monitoring wells:

13MWT51 @ 16'
13MWT50 @ 25'
13MWT49 @ 9'

Drilled 13MWT48 to 9'

TITLE NSWC CRANE — ITOC: S. Conti, C. Laney, J. Goerdt, T. Rosahn; J. WALSH, J. DEAN, C. MAHALLEY

PROJECT NO. 7448

BOOK NO. 1376

TUES 7/27/04

Work continued from Page WEATHER AM: Mostly Sunny 65°

0650 Hrs - ARRIVE @ BLDG # 3245
PREP FOR GW SAMPLING
PAPERWORK & PICK WELLS FOR SAMPLING THIS DATE

0815 Hrs - ARRIVE @ 13MWT32

1110 Hrs - FINISH @ 13MWT32

1130 Hrs - LUNCH

1200 Hrs - ARRIVE @ BLDG # 3245

- RR PRE-CON MEETING MOVED TO THURS 0800 Hrs WAS SCH. FOR today @ 1300 Hrs
- Check in w/ R. BASINSKI - Already know about the meeting change
- SIGN RECEIPT FOR Nitrogen cylinders & SECURE in upright position along FENCE @ BLDG # 3245
- MEET w/ S. Conti discuss meeting change & C. Laney will stay w/ him the REMAINDER OF THE day to observe coring activities

1320 Hrs - CHECK IN ON JG ... dead car battery

1400 Hrs - Get car started AFTER purchase of cables @ on base gas station

1410 Hrs - ARRIVE @ 13MWT14

1710 Hrs - FINISH CLEAN up @ 13MWT14

1720 Hrs - Collect SAMPLE @ 13MWT06

1735 Hrs - ARRIVE @ BLDG # 3245

- Drop OF EQ.
- SECURE SAMPLES IN Frig

1745 Hrs - LEFT BLDG # 3245 FOR Hotel

- E-mail FIELDWORK SUMMARY to R. BASINSKI From Hotel
- PAPERWORK

END

ENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tony Rojas — DATE 7/27/04

DISCLOSED TO AND UNDERSTOOD BY — DATE — WITNESS — DATE

7/28 SUMMARY OF SAMPLING:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT1803	0901	1231	17.8L	NA	(JG) will cont Purge on
13GWT2103	1120	1300	8.9L	1300	(CL/TL)
13GWT1003	1364	1559	9.4L	1604	(JG)
13GWT4502	1430	1730	13.5L	NA	(CL) will sample 7/29 (

7/28 SUMMARY OF DRILLING:

Drilled, set & installed 16 MWT 19 & 20 @ 5-15'
Finish installation of 13 MWT 48 set @ 5-10'

WED 7/28/04

Work continued from Page Weather - Mostly Sunny 80°s

0655 Hrs - Arrive @ BLDG #3245
- Meet w/ T. Brent on Sch. - Printed out D. Johnstons
- Production sch.; Also, talked to R. Basinski regarding sch.
- Prep. FOR GW sampling Picked wells for JG, CL & TR

0830 Hrs - Mark Peterson Arrived @ BLDG #3245 for internal audit
- Work w/ M.P. answering question and producing doc. for audit.
- Had C.L. work w/ S.C. during questions period
- Showed M.P. decon ~~area~~ next to MFA, how to access MFB (S. gate) and drop bin off @ SWMU 16 where S. Conti and ~~M-8~~ B-M were drilling

1045 Hrs - Pick up C.L. @ SWMU 16
1100 Hrs - Arrive @ North Gate SWMU 13 & check into MFB w/ Guard
1120 Hrs - Start purge @ 13MWT21
- M.P. Audit sampling until completion of Well sampling @ 1325 Hrs

1335 Hrs - Finish cleanup @ 13MWT21
1350 Hrs - Pick up sandwich @ Subway
1410 Hrs - Return to MFB - 13MWT46
1430 Hrs - Start Purge @ Well 13MWT45
Assisted C.L. in set up
1500 Hrs - Returned to BLDG #3245 - C.L. stayed @ 13MWT45
- Prep samples for shipment
- M. Peterson - went over results of Audit w/ T.
- Shipment on Fed. Ex. AB # 8447 8135 5384
Samples on COC # 0052

1715 Hrs - Left BLDG for FED EX
1755 Hrs - Drop off samples @ FED. EX.
1830 Hrs - Return to Hotel
- Paperwork & E-mail R. Basinski Fieldwork summary

SIGNATURE Terry Rogal DATE 7/28/04
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLING SUMMARY 7/29/04 :

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT1803	(Purged	7/28	See Page 14)	0850	(JG)
13GWT3402	0827	1047	12.7L	1047	(CL)
13GWT3602	0934	1044	5.6L	1048	(JG)
13GWT3902	1235	1355	8.0L	1359	(JG)
13GWT1703	1240	1510	15.0L	1510	(CL)
13GWT4502	(PURGED	7/28	See Page 14)	1602	(CL)
13GWT1503	1340	1700	15.9L	1704	(TK)

Drilling Summary 7/29/04 :

Built Pads @ SWMU 16

Installed 12 MW's 3 (TK) (Drilled & set)

TITLE NSWC CRANE on page 13 **PROJECT NO.** 7448 **BOOK NO.** 1376

THURS. 7/29/04

Work continued from Page

Weather: Partly Sunny 80's

0645 Hrs - Arrive @ BLDG #3245
- FAX COAC # 0052 TO OFFICE & LAB
- Prep JG & CL for sampling - select wells

0800 Hrs - Pre Con Meeting for 600 Hill CL tracks @ BLDG #2

1010 Hrs - Return to BLDG #3245
- T. Brent to set up meeting w/ Doug Johnson @ BLDG ~~#3245~~ TA 146 to mark Boring locations inside the BLDG.
- Prep for Locating Borings @ BLDG #146
- Talk to R. Basinski

1100 Hrs - Arrive @ SWMU 16
ID Borings 90-97 & Dis. samples 79 & 80

1140 Hrs - Return to BLDG #3245
- Paperwork
- Report to R.B. about meeting w/ Tom & Doug @ BLDG 146
- Prep f. sample GW @ MFB

1215 Hrs - Left Bldg #3245

1225 Hrs - Lunch

1305 Hrs - Stop @ Public Works Donna not in

1320 Hrs - Arrive @ 13MWT15

1740 Hrs - Finish @ 13MWT15

1800 Hrs - Arrive @ BLDG #3245
Secure samples in Frig.
Paperwork

1830 Hrs - Left BLDG #3245 for Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ted Nagel DATE 7/29/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P ©

SAMPLING SUMMARY 7/30/04:

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13GWT4202	0904	1016	4.9L	NA	(JG) DRY WELL
13GWT3702	0853	1102	9.4L	1102	(CL) DUP 13FD070304
13GWT4902	0940	1120	8.8L	1124	(TR)
13GWT4602	1210	1330	7.6L	1333	(TC)
13GWT2702	1314	1604	8.6L	1608	(JG)
13GWT2004	1546	1746	12.0L	1749	(JG)
13GWT3802	1538	1713	7.5L	NA	(CL) Dry will sample 7/31/04

DRILLING SUMMARY 7/30/04:

Drilled set & Installed 12MWT 39 @ 34'

CREWS SAME AS ON PAGE 13

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

19

FRI 7/30/04

Work continued from Page

Weather Mostly Cloudy High 70's

0705 Hrs - Arrive @ BLDG #3245
- Prep for GW Sampling
- Pick wells for sampling
- Call R. Basinski leave message on 7/29/04 Fieldwork summary

0845 Hrs - Arrive @ MFB
Install Bladder Pumps (Dedicated) @ 13MWT40 & 46
C.L. Installed 13MWT37

0920 Hrs - Set up @ 13MWT40 after well's bladder pump inst

0940 Hrs - Start Purge @ 13MWT40

1145 Hrs - Finish sampling & cleanup @ 13MWT40

1210 Hrs - Start Purge @ 13MWT46

1400 Hrs - Finish cleanup @ 13MWT46

1410 Hrs - Check w/ C.L. Problem starting purging with Reuseable 1 3/4" Bladder Pump
Determined that the o-ring for the Top Spool was missing

1430 Hrs - TR - went to the office to get o-ring

1505 Hrs - Drop off o-ring and prep pump for sampling for chip.

1530 Hrs - Return to BLDG #3245
Prep samples for shipment to Lancks on COC 0053 via Fed. Ex. AB# 8447 8135 3

1730 Hrs - Leave BLDG #3245 for Fed. Ex

1815 Hrs - Drop off samples @ Fed. Ex.

1855 Hrs - Return to Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] **DATE** 7/30/04

DISCLOSED TO AND UNDERSTOOD BY **DATE** **WITNESS** **DATE**

SAMPLING Summary 7/31/04

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT42OZ	(SEE	PAGE	18)	0822	(JG)
13GWT41OZ	0820	0825	1.5L	NA	(JG) DRIED OUT
13GWT28OZ	0834	1234	11.3L	1234	(CL)
13GWT38OZ	(SEE	PAGE	18)	1442	(CL)
13GWT35OZ	1455	1519	13.0L	NA	(JG) DRIED OUT
13GWT43OZ				NA	(JG) DRIED OUT
13GWT09O4	1540	1710	7.9L	1710	(CL)

DEV. Summary 7/31/04

WELL ID	START DEV	END DEV	VOL PURGED	COMMENTS
13MWT51	0850	0936	7gal	Dried out 3 times
13MWT50	0955	1047	5.0gal	Dried out 3 times
13MWT49	1307	1334	18.0gal	Dried out 3 times
13MWT48	1401	1415	26gal	Recharge kept up with wheelex pump

DRILLING Summary 7/31/04

Drilled, set & installed 12MWT13 @ 20'
Bearings went bad on swivel... Rig down for remainder of the week end.

TITLE NSWC CRANE ON PAGE 13 PROJECT NO. 7448 2

BOOK NO. 1376

SAT 7/31/04

Work continued from Page Mostly Cloudy high 70's Low 80's

0650 Hrs - Arrive @ BLDG #3245
- Prep for GW Sampling & Well Development
- Select wells to be sampled for JG, CL & TK

0800 Hrs - Arrive @ 13MWT41
0835 Hrs - Finish @ 13MWT41
0840 Hrs - Meet w/ JG and proceed to 13MWT51
0850 Hrs - Start Purging / Dev. 13MWT51
0936 Hrs - End Dev @ 13MWT51
0955 Hrs - Start Purging / Dev. @ 13MWT50
1047 Hrs - End Dev @ 13MWT50
1105 Hrs - Dump Dev H_2O in Ind. Sewer
1120 Hrs - Lunch
1150 Hrs - Decon Whaler Pump & Foot check valve
1307 Hrs - Start Dev. @ 13MWT49
1334 Hrs - End Dev. @ 13MWT49
1401 Hrs - Start Dev. @ 13MWT48
1415 Hrs - End Dev @ 13MWT48
1430 Hrs - Dump Development H_2O @ Ind. Sewer Swmu
1455 Hrs - Start Purging @ 13MWT35
1519 Hrs - Finish Purging @ 13MWT35
1540 Hrs - Check on CL @ 13MWT28
1600 Hrs - Return to BLDG #3245
- Clean out vehicle
- Decon Whaler Pump & Foot check valve
- Restock containers in Office
- Paperwork
- CL. Left Site ~ 1800 hrs

1820 Hrs - Left Site (BLDG #3245) w/ JG.
E-mail Fieldwork & summary to L. Basinski from Hotel
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 7/31/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLING SUMMARY 8/1/04:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT4402	(SEE PAGE 20		)	0816	(TR/SC)
13GWT3502	(SEE PAGE 20		)	0825	(JG)
13GWT4302	(SEE PAGE 20		)	0850	(JG)
13GWT4402	0913	1143	7.6L	1143	(CL)
13GWT5101	1016	1416	29.3L	1420	(JG)
13GWT1303	1407	1547	11.5L	1547	(CL)
13GWT4702	1641	1811	7.8L	1811	(CL)
13GWT0103	1618	1818	13.0L	1821	(JG)

DEVELOPMENT SUMMARY 8/1/04

DEVELOPED: 12MWT01, 02, 08, 13, 31 & 39

THINGS CREW SAME AS ON PAGE 13

TITLE NSWC CRANE B-M-CREWS GWS

PROJECT NO. 7448

BOOK NO. 1376

SUN 8/1/04

Work continued from Page Weather - Mostly sunny High 80°s

0705 Hrs - ARRIVE @ BLDG #3245
- Assign wells to sample for CL, NG & TR
- Prep to sample GW & DEV wells @ SWMU 12

0805 Hrs - Arrive @ 13MWT41 w/ S.C.

0816 Hrs - SAMPLE 13MWT41 BEGAN

0930 Hrs - FINISH @ 13MWT41 - INFILL RECHARGE VERY SLOWLY

1011 Hrs - Start Development @ 12MWT01

1026 Hrs - Finish DEV @ 12MWT01, Purged 28 gal, H2O Clear

1100 Hrs - Start DEV. @ 12MWT03

Dry out 3 times, H2O Brownish

1151 Hrs - Dry out 3rd time; Purge 16.75 gal

1205 Hrs - Lunch, CHECKED IN W/ R. BASINSKI

1230 Hrs - DECON WHALE PUMPS & PICK UP ADDITIONAL SUPPLIES @ BLDG #3245 Dis Basket, Rope, ETC, Dum DEV

1343 Hrs - RETURN to SWMU 12 to Purge the remaining 4 wells

WELL ~~SAMPLED~~ ID	Start DEV.	END DEV	VOL DEV	Comments
12MWT37	1353	1448	3 gal	Dry out 3x; color-BRN
12MWT39	1505	1605	8.5L	Dry out 3x; color-BRN
12MWT08	1620	1713	10.5 gal	Dry out 3x; color-Clear
12MWT02	1725	1750	30 gal	RAPID RECHARGE; color-cl

1810 Hrs - Return to BLDG #3245
Unload RENTAL SUV - clean instruments

~1900 Hrs - JG & C.L. Return to BLDG #3245
ASSIST in unloading & cleaning VEHICALS & EQ, ORGANIZE OFFICE

1940 Hrs - LEAVE BLDG #3245 FOR Motel
E-MAIL R. BASINSKI FIELDWORK SUMMARY From Motel.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 8/1/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

VOID THIS PAGE

MON 8/2/04

Work continued from Page

0715 Hrs - ARRIVE @ BLDG #3245

- PREP SAMPLES FOR SHIPMENT ON COC 0054 & 0055 VIA FED EX AB# 8447 8135 5400
- FAX COCs 0054 & 0055
  - OFFICE ED S. @0836; ALSO CALLED OFFICE CHECKIN W/ R.B. LAUCKS HUGH P. @0835

0930 Hrs - KICK OFF Dig Permits FOR BLDG #146 (SWMU 16); DPT WORK @ SWMU 13 done; Permit FOR SWMU 12 to up date 16 MWT 21 missing on DONNA'S MAP - WENT BACK to BLDG #3245 and PICKED up MAP WITH well shown AND delivered it to Donna Z. @ 1020 Hrs

C. LANEY & J. GOERDT - • DECON Whaler PUMPS & REUSABLE 1 3/4" Bladder PUMP
- PACKAGED SAMPLES FOR SHIPMENT ON AB # 8447 8135 5400
- CLEANED OFFICE, LAB, hallways + REST ROOM FLOORS.
- J.G. DROPPED OFF SAMPLES @ FED. EX.
- INVENTORIED SAMPLE Containers

1100 HRS - LEFT BLDG #3245 FOR AIRPORT (INDY)

REMAINDER OFF DAY TRAVEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rojahn DATE 8/2/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

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MON 8/9/04

Work continued from Page

~~0745~~ 1305 Hrs - ARRIVE @ BLDG # 3245 - TRAVEL DAY

- CHECK IN W/ R. BASINSKI
- CHECK ON DIG PERMITS @ PUBLIC WORKS
  - MFA & B almost ready - check back tomorrow morning
  - BLDG #146 SWMU 16 - NGGO another day
- CHECK ON CERT. CLEAN CERTIFICATES ON SWMU 16 PUMPS.
- GAVE JOSH DUTTON - SITE SPECIFIC HES TRAINING LEFT SITE ~ 1530 HRS
- C. LANCY & J. GOERDT PREP. FOR DPT WORK

1600 Hrs - CHECK SWMU 16 Boring location w/ SEWER MARKINGS FROM Public Works

1700 Hrs - CHECK boring locations @ SWMU 13 - MOWERS disturbed utility markers - will need to get SEWER & WATER REMARKED

1750 Hrs - RETURN to FIELD OFFICE BLDG # 3245

1800 Hrs - LEFT SITE FOR HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 8/9/04

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SAMPLING SUMMARY 8/10/04:

Collected soil samples @ 13 5 8 26, 28, 29, 31-44 & 46
Also, Collected 2 Source Water & 2 Rinsate Blanks

DRILLING Summary 8/10/04:

Drilled, set & installed Monitoring wells
12 MWT 23 & 24, Both @ 30'

TUES 8/10/04

Work continued from Page WEATHER - Mostly Sunny 80's

0645 Hrs - ARRIVE @ BLDG #3245
PREP. to MEET w/ PUBLIC WORKS & PAPERWORK & DPT EQ INSPECTION.

0715 Hrs - ARRIVE @ PUBLIC WORKS
- MFB Dig PERMIT DONE #4558 SEE PAGE 30, however... told Donna MOWERS disturbed pin flags @ MFB - ARRANGED to MEET MACS (SEWER & WATER location) @ 0815 - 0830 Hrs @ N. GATE
- MFA - Dig PERMIT almost READY - SECONDARY ELEC. only utility to check... will take ~ 1/2 hr
- Told Donna ABOUT small SECTION OF SEWER NEEDS Marked @ SWMU 16 North of BLDG #146
- ASKED ABOUT BATTERY SITE - only WATER out there will check w/ MACS on it AS WELL.

0750 Hrs - RETURN to BLDG #3245, Brief tailgate meeting
- Ask Stan to go to public works and WAIT FOR MFA dig permit should be READY By 0815
- CL & JG ARE READY to go to MFB

0810 Hrs - CL, JG, TR & J. Dutton (DPT operator) ARRIVE @ North GATE OF MFB to check in with guard - had ACCESS problems will work out later w/ T. Brent

0830 Hrs - Cable locators (MACS) ARRIVED @ North Gate - they WENT inside MFB - Tetra TECH got in ~0840 Hrs

0840 Hrs - MEET Cable locators inside MFB - REMARKED All boring locations

0955 Hrs - FINISHED locating SEWER & WATER @ MFB will MEET MACS tomorrow @ 0830 Hrs / BLDG 146

1005 Hrs - CHECK IN W/ DPT CREW - OK

1025 Hrs - Stop @ Public Works - Donna will call MACS boss FOR MEETING @ BLDG #146 tomorrow

1040 Hrs - RETURN to BLDG #3245
- T. Brent NEEDS VEHICAL INFO FOR VEHICAL PASSES
- Get driller VEHICAL INFO @ MFA
- " DPT " " @ MFB

1200 Hrs - RETURN to BLDG #3245 drop of VEHICAL INFO. FOR T. BRENT.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 8/10/04

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30

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4558

REQUESTED BY: Tetra Tech NUS Inc./Ralph Basinski 412-921-8366	DATE: 6/24/04
WORK REQUEST OR E/S NO.: 150740	Mine Fill "B"
WORK WILL BE PERFORMED BY: Tetra Tech NUS, Inc.	DATE (Start - on or about): 7/2/04

WORK DESCRIPTION:
22 Soil samples at various site in Mine Fill "B". Locations are marked with wooden stakes & orange flags & the number on the attached drawing. SWMU-13

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed Z2 6/24/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR Z2	N/A			per phone J. Beasley 8/10/04
HIGH VOLTAGE ELECTRICAL	NA			S.R. 7-6-04
FIRE ALARM Z2	NA			7-14-04
GROUNDING Z2	N/A			6-29/04 BA
NATURAL GAS	N/A			6/24/04
SECURITY ALARM Z2	NA			7/2/04 MH
SEWER	Yes	Yes		7-7-04 MG
STEAM	N/A			6-28-04 RT
TELEPHONE Faxed 6/24/03	N/A			7-5-04 RP
WATER	Yes	Yes		7-8-04
SECOND ELECTRICAL Z2	N/A			6-29/04 BA
Faxed 6/24/03 GENERAL DYNAMICS/NMCI	N/A	N/A		6-30-04

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	DATE: 8/10/04
DIGGING PERMIT APPROVED BY: Donna L. Goldman	DATE: 8/10/04

DISTRIBUTION:
ORIGINAL - Code 0975 File

TUES 8/10/04 Con't

Work continued from Page

1220 Hrs - LUNCH

1255 Hrs - RETURN to BLDG #3245

- PAPERWORK
- Check in w/ OFFICE T. JOHNSTON
- Order PID REPLACEMENT FROM US Environmental
- Unload Casing for deep wells - Global Drilling Supplies drop off for Bowser Morner
- Touch Base w/ Stan Lyn of EMI about SWMU
- Touch Base w/ Tom Dickson - Travel Plans for 8/1
- Receive samples from C.L & J.G
- Talked to T. Patton - Regarding malfunctioning PID & THURSDAY'S EQ. SHIPMENT
- Received E-mail for inside Bldg 146 use as Dig Plan See Pages 32 & 33
- Call from Ralph Basinski
  - Discuss EMI work & BLDG #146 work
  - T. Dickson Travel
  - H&S Plan for BLDG 146 & EMI work should have by THURSDAY
  - D. Westerhoff working on EQ list for inside BLDG #146

1630 Hrs - Collect Trip Blank TB08100401

1645 Hrs - Collect Source Blank (DI) SB08100401 (NERL Lot #

1700 Hrs - Collect " " TAP H_2O SB08100401

1730 Hrs - Collect Rinsate " Core Liner

1745 Hrs - Collect Rinsate " Disposable Trowel

PAPERWORK until JG & CL ARRIVE PREP. to LEAVE

1830 Hrs - LEFT BLDG #3245 FOR HOTEL

END

SIGNATURE Tony Pagnotti DATE 8/10/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

E MAIL to USE AS DIG PERMIT FOR B-146 FLOOR.

Sent: Thursday, August 05, 2004 1:28 PM
To: Brent Thomas J CNIN
Subject: RE: Emailing: B146 Interior DPT Locations Field Markup.pdf

Tom, to our knowledge, there are no utilities under the floor at B-146.

-----Original Message-----

From: Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]
Sent: Thursday, August 05, 2004 9:08
To: Thompson, Susan CIV NAVFAC MW Crane Det CROP2
Cc: Gates, William H CIV EFDSOUTH; Ralph Basinski (E-mail)
Subject: FW: Emailing: B146 Interior DPT Locations Field Markup.pdf
Importance: High

Susan,

Per my v-mail yesterday, I need some guidance on who clears utilities inside CAAA buildings. I understand that Zone 2 (or the PW Detachment formerly known as Zone 2) is responsible for this. We are needing to core through the floor inside B-146 to collect soils samples under the floor of the building. As such, we need to make sure that we're not going to hit any buried utilities under the building. Please get back with me as soon as possible.

Thanks,
Thomas J. Brent
Corrective Action Program Manager
Crane Division, Naval Surface Warfare Center (NSWC Crane)
Harnessing the Power of Technology for the Warfighter

-----Original Message-----

From: Basinski, Ralph [mailto:BasinskiR@ttnus.com]
Sent: Thursday, August 05, 2004 8:34 AM
To: Brent Thomas J CNIN
Cc: Bill Gates; Johnston, Tom; Rojahn, Terry
Subject: Emailing: B146 Interior DPT Locations Field Markup.pdf

<<B146 Interior DPT Locations Field Markup.pdf.pdf>> Tom:

Per our discussion, the mark-up figure showing the B146 interior DPT locations is attached to this e-mail. Terry Rojahn provided this mark-up based on the site visit made by you, Terry, and Doug Johnson. Please let me know if you need anything else for utility clearance by Zone II.

Ralph

<<B146 Interior DPT Locations Field Markup.pdf.pdf>>

Work conti

Brent Thomas J CNIN
From: Basinski, Ralph [BasinskiR@ttnus.com]
Sent: Thursday, August 05, 2004 3:45 PM
To: Brent Thomas J CNIN; Bill Gates
Subject: RE: Emailing: B146 Interior DPT Locations Field Markup.pdf

Tom

OK. We will keep a copy of the e-mail.

Ralph

-----Original Message-----

From: Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]
Sent: Thursday, August 05, 2004 4:35 PM
To: Bill Gates (E-mail); Basinski, Ralph
Subject: RE: Emailing: B146 Interior DPT Locations Field Markup.pdf

Bill/Ralph,

Other than what we have I don't know how to get a "dig permit." Perhaps we can check with Donna next week and see if she would cut us some sort of official dig permit. However, I think we're covered with this email.

Thanks,
Tom

-----Original Message-----

From: Basinski, Ralph [mailto:BasinskiR@ttnus.com]
Sent: Thursday, August 05, 2004 2:57 PM
To: Brent Thomas J CNIN
Cc: Bill Gates (E-mail); Johnston, Tom; Rojahn, Terry; Conti, Stanley
Subject: RE: Emailing: B146 Interior DPT Locations Field Markup.pdf

Bill and Tom,

I interpret that to mean "Drill at will".

Do Navy procedures call for issuing the equivalent of a "Digging Permit" in this case? Or are we to consider this the "Digging Permit?

Ralph

-----Original Message-----

From: Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]
Sent: Thursday, August 05, 2004 3:04 PM
To: Bill Gates (E-mail); Basinski, Ralph
Subject: FW: Emailing: B146 Interior DPT Locations Field Markup.pdf

Here is the official reply from "Zone 2."

-Tom

-----Original Message-----

From: Thompson Susan L CNIN (NMCI)

Work continued to Page

IFIC BINDER PRODUCTIONS CHICAGO MADE IN USA

SIGNATURE DATE 8/10/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

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DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4594

REQUESTED BY: Tetra Tech NUS, Inc. Ralph Rasinski 412-921-8305	DATE: 8/2/04
WORK REQUEST ON E/S NO.: 158106	Bldg 146 Area
WORK WILL BE PERFORMED BY: Tetra Tech NUS, INC	DATE (Start - on or about): 8/9/04

WORK DESCRIPTION: Soil borings to obtain surface & subsurface samples. Locations are marked with wooden stakes with pink/orange flagging & the corresponding number on the attached drawings (solid circles). All are inside fence except 1 at the east end of Area near the treeline.

EQUIPMENT TYPE: ☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed ZZ 8/2/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

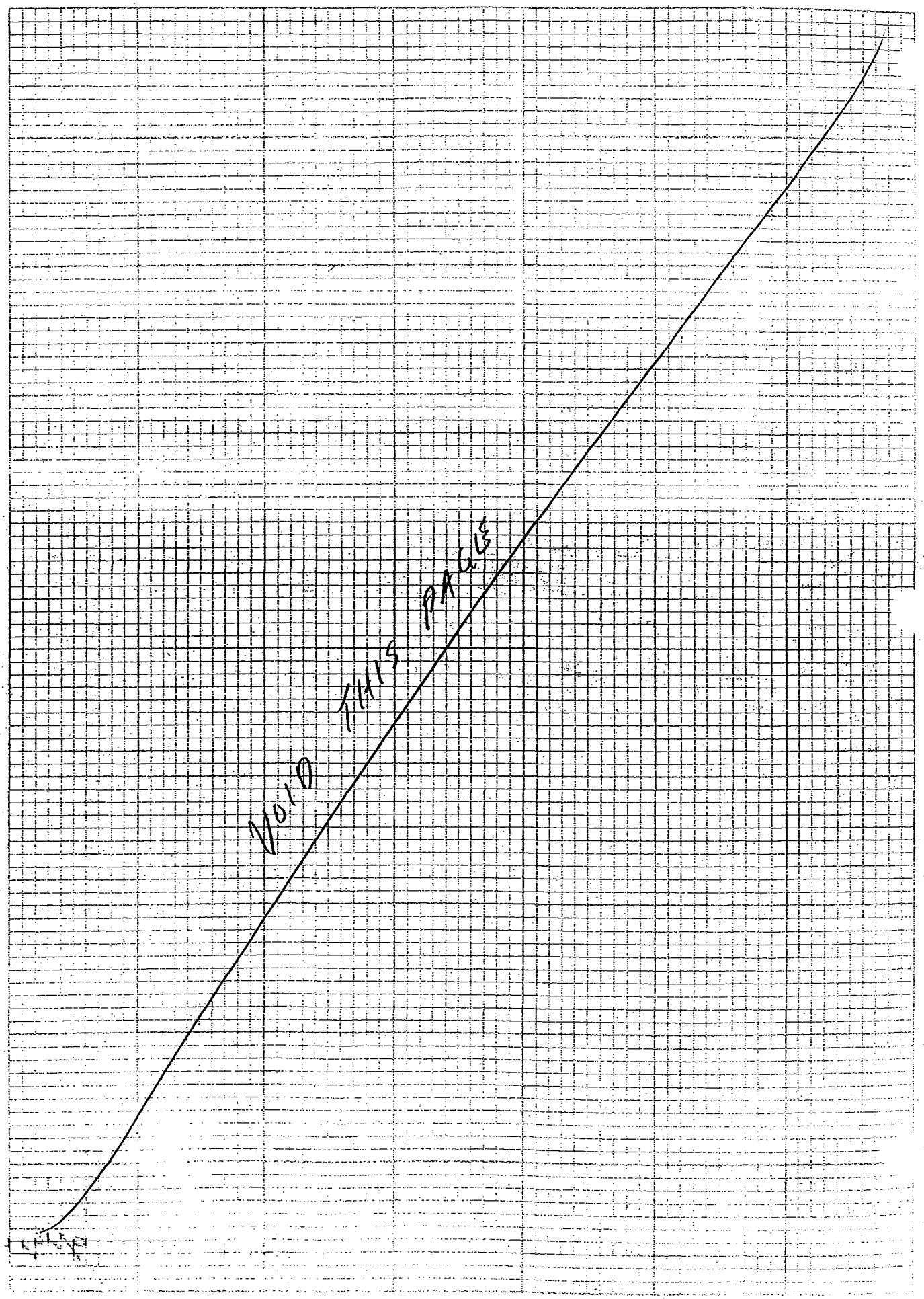
UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR ZZ	N/A			Per phone J. Beatty 8/10/04
HIGH VOLTAGE ELECTRICAL	Yes			5.7. 8-10-04
FIRE ALARM ZZ	Yes	Yes		8-9-04 MH
GROUNDING ZZ	N/A			8-6-04 BZ
NATURAL GAS Exp 8/23 DH08033044	YES	YES		8-5-04 RKH
SECURITY ALARM ZZ	NA			8-9-04 MH
SEWER MW 8/11/04	Yes	Yes		8-4-03 - MJ
STEAM ZS	N/A		SH	8-3-04
TELEPHONE Faxed 8/2/04	Yes	Yes		8-3-04
WATER MW 8/11/04	Yes	Yes		8-4-03 - MJ
SECOND ELECTRICAL ZZ	N/A			8-6-04 BZ
Faxed 8/2/04 GENERAL DYNAMICS/NMCI	N/A	N/A		8-11-04

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE: [signature] DATE: 8/11/04

DIGGING PERMIT APPROVED BY: [signature] DATE: 8/11/04

DISTRIBUTION:
ORIGINAL - Code 09Z5 File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TR SUMMARY 8/11/04:

Morning clearing locations w/ cable locators & Bird Dogging dig permit for sampling.
- Section of sewer line missed North of BLDG 141
- Isolated Fire Alarm - NO APARTMENT fire only one old pin flag.

SHIPPED SAMPLES ON COCs - 0056 - 0060 & 0062
VIA FED. EX. AB# 8447 8135 5410

SAMPLING SUMMARY 8/11/04:

Soil Borings Completed: 135B30, 45 & 47, 1C5B60, 61, 63, 64 & 65.

Drilling Summary 8/11/04:

Set permanent casing @ 12 MW 34 @ 31.5' and drilled, set & installed monitoring well 12MW10 @ 20'

CREWS - SAME AS Page 27

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

WED 8/11/04

Work continued from Page

WEATHER: Mostly Sunny 70's

0645 Hrs - ARRIVE @ BLDG #3245
- PHONE IN WORK SUMMARY FROM 8/10/04 to R. BASINSKI
- CHECK w/ T. Brent to Pick up VEHICLE PASSES

0715 Hrs - Pick up Contractor VEHICLE PASSES FOR TTNUS, EFS & B-M VEHICLES w/ T. BRENT

0740 Hrs - CHECK on Dig Permit FOR SWMU-16, NEEDS one signature for MCI - but All markings are complete CAN PICK UP AROUND 0930 Hrs

0800 Hrs - BRIEF H&S Tailgate w/ DPT CREW @ BLDG #3245

0815 Hrs - ARRIVE @ Gate to SWMU 16 to WAIT FOR Public Works Cable locator (MACS)

0835 Hrs - MEET MACS & CHECK IN w/ DAN @ Break BLDG

0840 Hrs - ARRIVE BLDG 146

0900 Hrs - LEAVE SWMU 16

0915 Hrs - Check in @ Public Works (Fire Alarm
NEED MCI signature & CHECK isolated ORANGE pin flag - that TTNUS pointed out

1030 Hrs - RETURN to Bldg #3245 - DPT CREW is Finished @ MFB

1100 Hrs - RETURN to Public Works
MCI still no signature on Dig Permit
& Fire Alarm not check yet

1130 Hrs - LUNCH

1205 Hrs - Check back w/ Public Works
Fire Alarm locator called in will meet him @ BLDG 146 - still waiting for MCI

1230 Hrs - MEET w/ Mike (Alarm locator) @ BLDG #146

1240 Hrs - MIKE marked out Fire Alarm cable

1250 Hrs - RETURN to Public Works

1300 Hrs - MCI SIGNED dig Permit #4594 SEE PAGE 35

1330 Hrs - Got DPT Crew inside SWMU 16 to start work

1345 Hrs - Check on drilling crew - drop off PID

1400 Hrs - RETURN to BLDG #3245
PAPERWORK

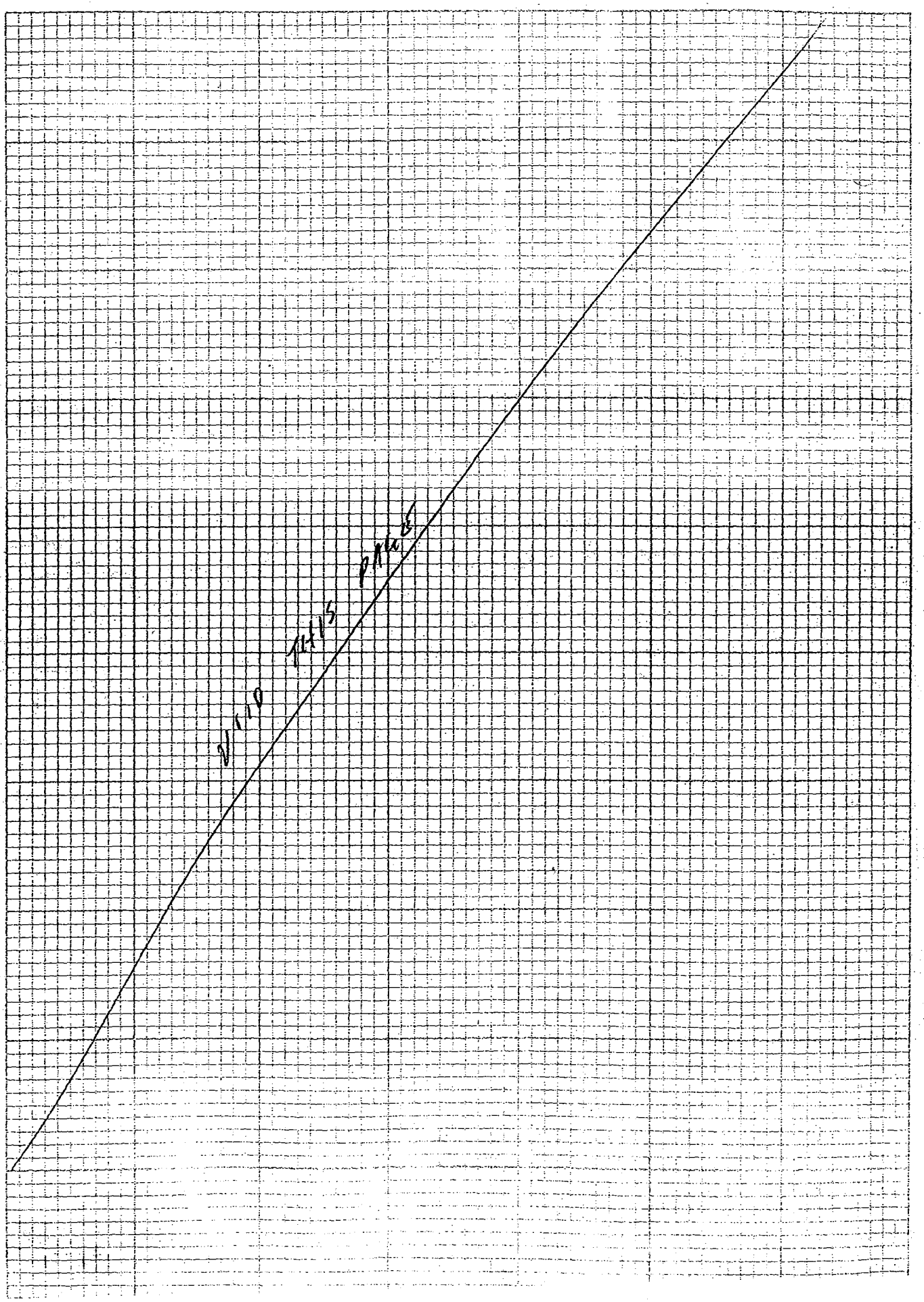
SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Troy Pagel

DATE 8/11/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE


pNa8
μ115
v110

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

WED 8/11/04 Con't

Work continued from Page

1605 Hrs - Arrive @ BLDG #146
Start COC for SWMU 16 samples
1700 Hrs - Return to BLDG #3245
Paperwork & Packaging samples on COCs 0056-0060 & 0062 for shipment on FED EX AB# 8447 8135 5410.
1730 Hrs - Left BLDG #3245 for FED EX
1805 Hrs - Drop off samples @ FED EX. and BAD P/D returned to U.S. ENV. on AB# 8447 8135 5421
1830 Hrs - Purchased supplies @ MENARDS

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE [signature]

DATE 8/11/04

DRILLING SUMMARY 8/12/04:

Drilled, set & installed 12MW-T40 @ 28'
Cont. Coring at deep well 12MWT34 from 40-58'

SAMPLING SUMMARY 8/12/04:

SAMPLED the following soil borings: 16SB52, 53, 55, 56
66-69, 71-73, & 75-78.

SHIPPED SAMPLES on COCs 0063-0066 via FED EX
AB # 8947 8135 5432

CREWS SAME AS Page 27

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

THURS 8/12/04

Work continued from Page

WEATHER: Mostly Sunny Temp in 70's

0650 Hrs - Arrive @ BLDG # 3245

- FAX COCs to LAB & OFFICE (0056-0060 & 0062)
- Talk w/ R. Basinski - SCH. for Drilling & Sampling NEXT SHIFT; ACCESS for sampling & drilling @ SWMU 12
- H. Prentice called regarding the amount of VOA samples to be collected this SHIFT - maybe A PROBLEM - he will look into it w/ his staff and CALL Ralph if there is a problem
- Called Ralph - heads up on conversation w/ Prentice
- PAPERWORK; TALK to T. Dickson (SCH.) & T. Patton (EQ.)
- H & S Tailgate - drilling w/ utility pin flags & markings IN MIND.
- RECEIVE FED. EX. equipment delivery

0930 Hrs - CHECK in w/ DPT CREW

1010 Hrs - Return to BLDG # 3245
PAPERWORK
TRIED to REACH MR BAKER @ MFA

1053 Hrs - Talked to Mr. Baker OK to check stakes & Public Work Pin Flags for drilling.

1100 Hrs - LEFT BLDG # 3245 FOR MFA

- Work on updating MFA digging permit - LB # 1374

1430 Hrs - Return to BLDG # 3245
Start PAPERWORK FOR DPT SAMPLING

1600 Hrs - Arrive @ BLDG # 146

- Assist DPT CREW in clean up

1635 Hrs - Return to BLDG # 3245
PAPERWORK & PACKAGE samples on COCs 0063-0066 FOR SHIPMENT VIA FED EX AB # 8447 8135 5432

1720 Hrs - LEFT SITE FOR FED. EX.

1750 Hrs - Arrive @ FED. EX DROP OFF SAMPLES

1805 Hrs - Arrive @ Sams Club - to Purchase supplies

1835 Hrs - Finish @ Sams

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 8/12/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

DRILLING SUMMARY 8/13/04

INSTALLED 12MWT39 @ 76-86'

START DRILLING 12MWT12 to 95'

SAMPLING SUMMARY 8/13/04:

SOIL BORINGS COMPLETED:

SWMU 16 - 16SB51, 54, 57, 58 & 59 & 62

SWMU 12 - 12SB12-15

PHONES & RADIO CHECK ON 600 HILL this date

CREWS SAME AS PAGE 41

TITLE NSWC CRANE

FRI 8/13/04

PROJECT NO. 7448

BOOK NO. 1376

Work continued from Page WEATHER: Mostly Sunny Low 70's High

0650 Hrs - ARRIVE @ BLDG # 3245

- UNLOAD SUPPLIES FROM SUV have brief tailgate
- FAX COCs 0063-0066 to OFFICE & LAB
- CHECK IN W/ T. Brent - will check out Radios & Phone @ 600 Hill today - CALLED RR will let T. Brent know when tracks are clear

0755 Hrs - Collect TB08130401

0800 Hrs - Collect RB08130401 Corer Sleeve

0815 Hrs - Collect RB08130402 Drilling Shoe

0830 - 1015 Hrs - Radio Check and Phone Check on 600 Hill For SWMU 12

1030 Hrs - Check Eq. (#2) ~~Same~~ RECEIVED 8/12 ; also drager tubes for Nitrogen Dioxide came today but no drager pump Tried to CALL T. Patton but Not in warehouse will try later.

1130 Hrs - Lunch

1200 Hrs - Prep DPT CREW to sample @ SWMU 12 - Go with CREW to help them get started sampling @ the battery site - Showed C. LANEY All Boring location inside MEA FENCED AREA AS WELL

1330 Hrs - Return to BLDG #3245 - to do paperwork for SWMU 16 samples - COCs 0067 & 0068 PACK SWMU 16 samples ON FED EX AB# 8447 8135 5443.

1600 Hrs - ARRIVE @ SWMU 12 (Battery site), CHECK IN W/ DPT CREW ... CREW Starting to clean up

1630 Hrs - Return to BLDG # 3245

- PAPERWORK COC # 0069
- PACKAGE SAMPLES FOR SHIPMENT ON AB# 8447 8135 5443

1720 Hrs - LEAVE BLDG # 3245 for FED EX.

1750 Hrs - Drop off samples @ FED EX

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE T. Brent

DATE 8/13/04

DISCLOSED TO AND UNDERSTOOD BY | **DATE** | **WITNESS** | **DATE**

Drilling Summary 8/14/04:

12MWT11, 12 & 16, SET & installed @ 14-24'
TDs 25'; and set up on 7-17.

SAMPLE SUMMARY 8/14/04:

Soil Borings Collected - 16SB85-89
GW Samples Collected - 13MWT48, 49 & 50
All Bladder Pumps installed @ SWMU 16

CHIGGERS / TURKEY MITES:

CREWS SAME AS ON P. 27

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

SAT. 8/14/04

Work continued from Page

WEATHER: Mostly Sunny MID 70S

0650 Hrs - ARRIVE @ BLDG # 3245 CL & TR soil sampling; JG, GW sampl

- PREP to SAMPLE Soils, DECON BUCKET Auger BITS; HES tailg
- Collect RB08140401 - 0830 Hrs

0850 Hrs - ARRIVE @ SWMU 16

PREP. to Locate sampling locations outside SWMU 16 FENCE.

- Locate SAMPLE Locations - IC 3885-89

1020 Hrs - Start sampling

1330 Hrs - FINISH @ SWMU 16 soil sampling

1335 Hrs - LUNCH @ SUBWAY

1400 Hrs - RETURN to BLDG # 3245

- SECURE soil samples / PAPERWORK
- PREP to INSTALL bladder PUMPS @ SWMU 16
- CHECK IN w/ R. BASINSKI
- REMOVE ticks off clothing - 1005

1515 Hrs - ARRIVE @ SWMU 16 - *mites or ticks on clothing

- INSTALL All bladder-pumps see PP. 46-49 for conti.
- Cut hubs close to ground @ Boring locations in grass & gravel lot

1730 Hrs - RETURN to BLDG # 3245

- REMOVED shoes & socks FOUND tinky mites on SKIN around ankels SEE PAGE 44.
- PAPERWORK; CLEAN out vehicles
- DECON Bucket Bits
- SEE PAGE 50 FOR Bladder pump design & filter
- General clean up
- SEE PAGE 51 FOR WELL Piece Protection steps

1830 Hrs - START leaving SWMU 12 - got drilling summary

1850 Hrs - CHECK on JG @ 13MWT48

JGs SUV Broke down (starter problem possibly)

1930 Hrs - ARRIVE @ BLDG # 3245

- SECURED samples FROM 13MWT50, 49 & 48
- CALLED SECURITY REGARDING JGs SUV
- JG CALLING AUTO FOR REPLACEMENT.

1945 Hrs LEAVE BLDG # 3245 FOR MOTEL.

Work continued to Page

SCIENTIFIC BOOKERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE

DATE 8/14/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SEVERN TRENT SERVICES

16MW02

QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

SEVERN TRENT SERVICES

16MW03

QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

SEVERN TRENT SERVICES

16MW04

QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

Work continued

QED PUMP CERTIFICATION

16MWT04

Quality Certification Manager

MAR 1 2004

Date

T1250

Pump Model

020402

Batch Serial Number

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

QED PUMP CERTIFICATION

16MWT06

Quality Certification Manager

MAR 1 2004

Date

T1250

Pump Model

020402

Batch Serial Number

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

QED PUMP CERTIFICATION

16MWT09

Quality Certification Manager

MAR 1 2004

Date

T1250

Pump Model

020402

Batch Serial Number

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

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SCIENTIFIC BINDERY PRODUC

SIGNATURE DATE

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SEVERN TRENT SERVICES

16MWT 10

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

SEVERN TRENT SERVICES

16MWT 11

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

SEVERN TRENT SERVICES

16MWT 02

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

Work continued from Page

QED PUMP CERTIFICATION

16MWT13

Quality Certification Manager: NSWC T.W.C. UNIT

Date: MAR 1 2004

Pump Model: T1250

Batch Serial Number: 020402

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

QED PUMP CERTIFICATION

16MWT15

Quality Certification Manager: NSWC T.W.C. UNIT

Date: MAR 1 2004

Pump Model: T1250

Batch Serial Number: 020402

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

QED PUMP CERTIFICATION

16MWT17

Quality Certification Manager: NSWC T.W.C. UNIT

Date: MAR 1 2004

Pump Model: T1250

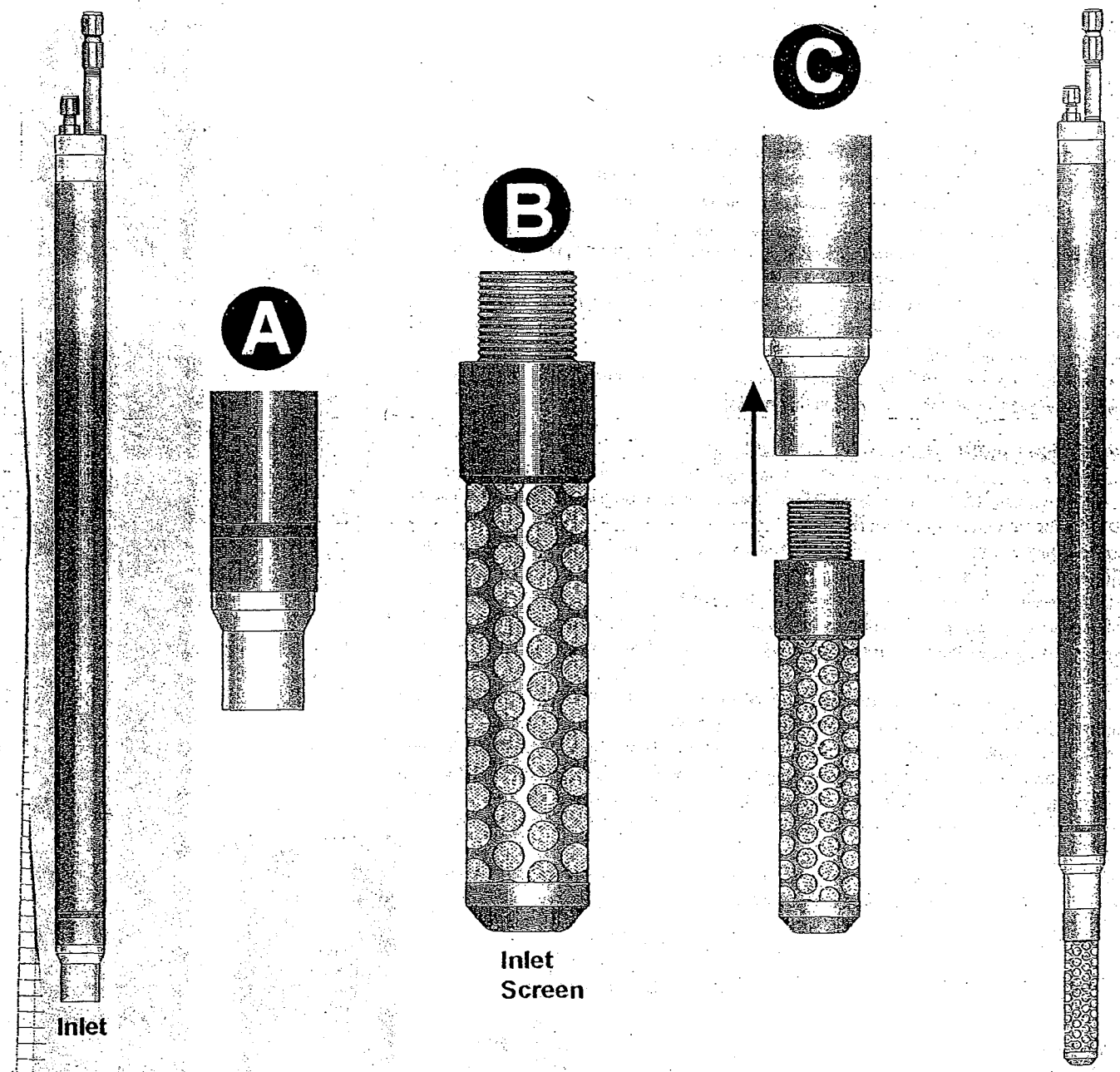
Batch Serial Number: 020402

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

Continued to Page

WELL WIZARD® Stainless Steel Pump Inlet Screen Attachment

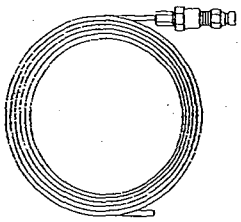
Thread screen (clockwise) into the threaded inlet of the bladder pump until snug.



WELL WIZARD® Well Cap Freeze Protection P/N 38458

Parts

Freeze Protection tube- 1/8" OD tube with brass quick-connect at one end.



Optional in-line filter for sites with serious concern with airborne contaminants.

Tubing Freeze Protection Instructions

There are two optional methods for preventing freezing blockage of the sample discharge tube above the frost line: a simple mechanical displacement method for 1/4" OD discharge tube, and a pressurized blowout method for both 1/4" and 3/8" OD discharge tubes.

Displacement Method (for 1/4" OD discharge tubing)

1. Immediately after samples have been collected, insert the small, 1/8" OD. freeze protection tubing down into the sample discharge tube to a depth equal to twice the depth of the local frost line, any extra tubing may be cut off and discarded. Before inserting the 1/8" OD tube into the sample discharge tube, seal the end of the brass fitting with your thumb to prevent escape of air during insertion. The insertion action will displace the water out through the end of the discharge tube.
2. After the 1/8" tube is fully lowered and the water has been displaced, remove your thumb from the tube and pull the 1/8" OD tube up slowly until it is out of the well. Shake or blow out the tube to remove any remaining water.
3. Store the freeze protection tube by hanging it in the well. Insert the tube into the small hole in the cap until the brass fitting at its end rests on the cap (Figure 3).

Blowout Method (for 1/4" and 3/8" OD tubing)

1. Immediately after samples have been collected, insert the small, 1/8" OD freeze protection tubing down into the sample discharge tube to a depth 2 feet greater than the depth of the local frost line. Any extra tubing may be cut off and discarded.
2. Turn the controller throttle fully counter-clockwise, so that very low or no pressure will be initially supplied to the 1/8" OD tube.
3. Make sure that the compressed gas source and pump controller are turned off at this time.
4. Connect the air supply hose from the pump controller to the freeze protection tube fitting (Figure 1).
5. Direct the discharge tube away from all personnel and into any desired collection container (Figure 2)
6. Turn on the compressed gas source and enter the controller into a prolonged discharge cycle, following controller instructions specific to your model of controller.
7. Slowly turn the controller throttle clockwise until the water in the discharge tube is displaced and flows out the end of the tube. High pressure is unnecessary and may spray personnel with contaminated water. When water ceases to flow from the discharge tube, pull the 1/8" OD tube out of the discharge tube while compressed gas flow continues, then disconnect the freeze protection regulator.
8. Store the freeze protection tube by hanging it in the well. Insert the tube into the small hole in the cap until the brass fitting at its end rests on the cap.

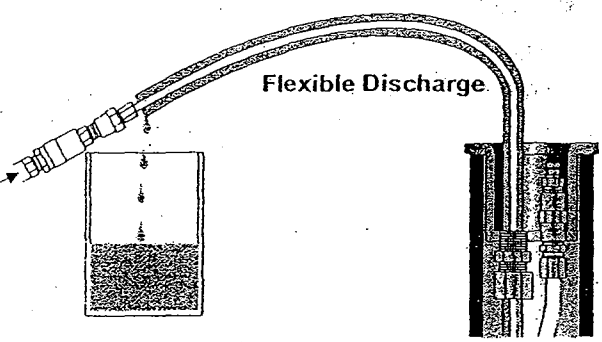


FIGURE 2

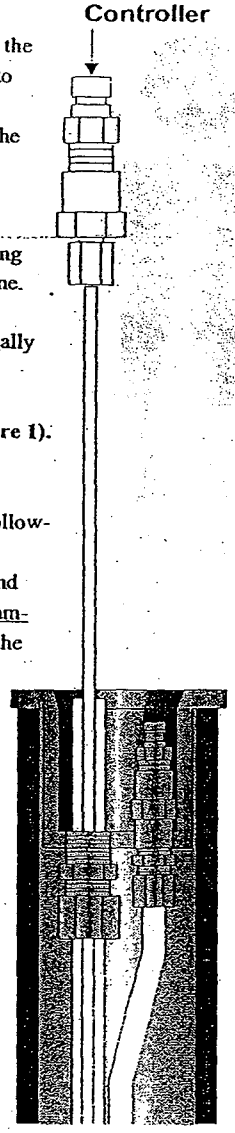


FIGURE 1

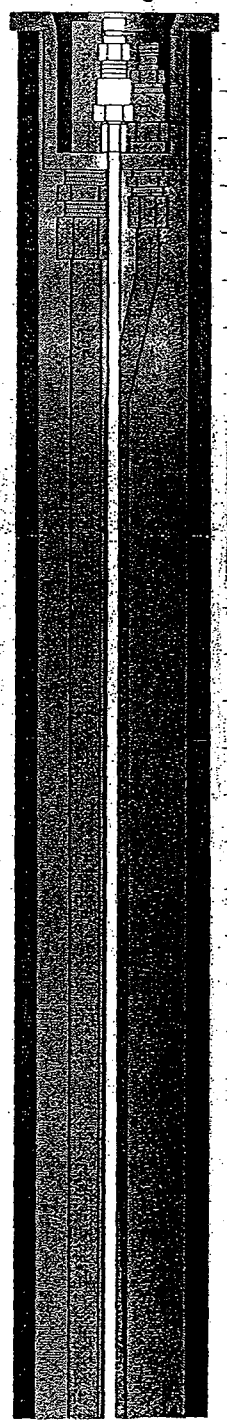


FIGURE 3

P/N 95190 REV. # 1-31-01

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

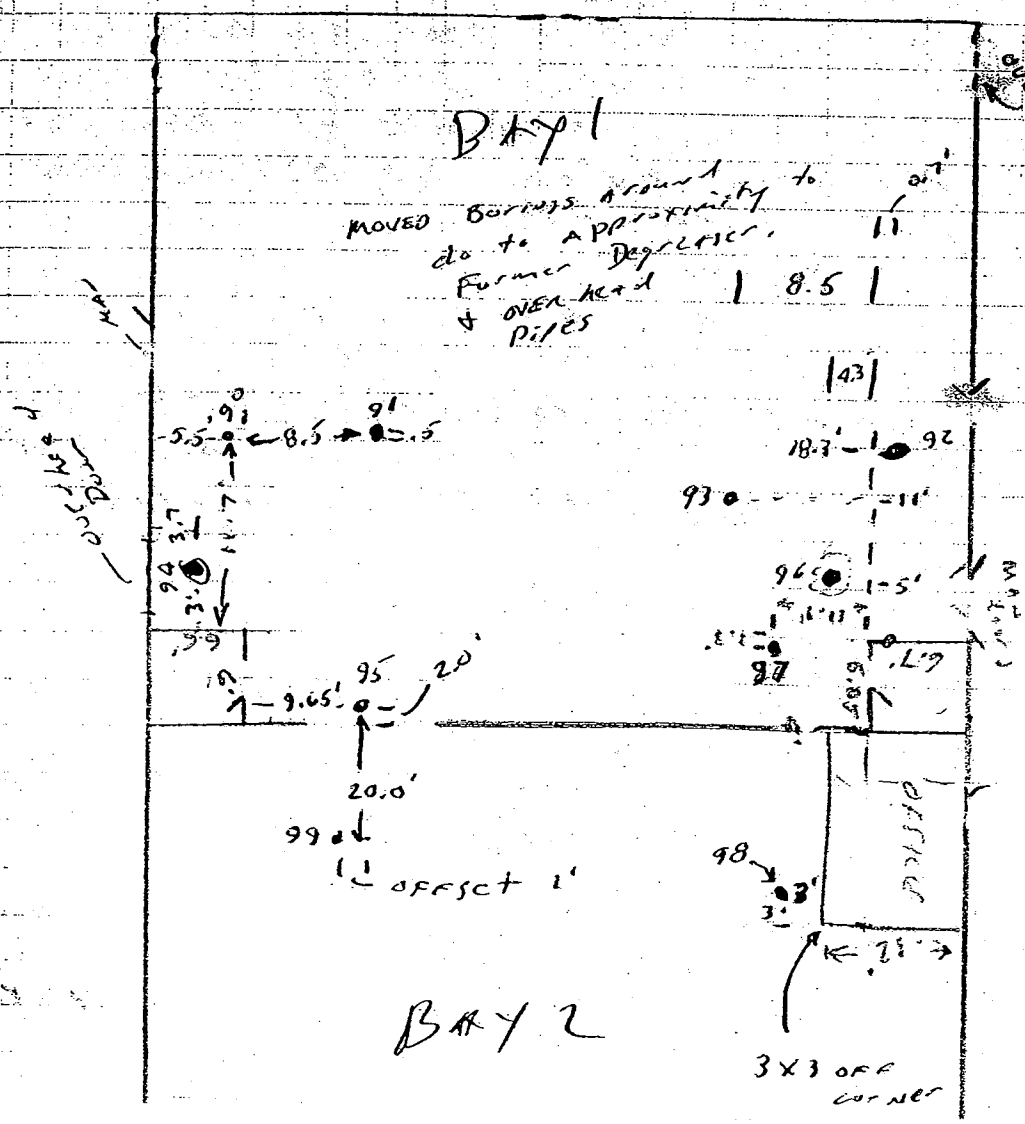
Drilling summary 8/16/04

- Installed 2nd well @ 12MW1T24A First well Dry
  → set @ 54'
- Remainder of Day - Clean up and prep to move to SWMU 16

Sampling summary 8/16/04

Collected Soil Boring samples @ 16SB90-99 inside BLDG #14C

SHIPPED samples collect 8/14-16/04 (COCs 0070, 0072 0073, 0075-0078, 0080 & 0081) via FED-EX. AB# 8447 0135 5844.



T. Dickson oversight - EMI Stanley Lynn & Robert Porges
Corer - Eric Westley From Capital Coring

TITLE NSWC CRANE **PROJECT NO.** 7448 **BOOK NO.** 1376

Mon 8/16/04

Work continued from Page

WEATHER - Mostly sunny w/ Temp in 70°

0655 Hrs - Arrive @ BLDG #3245
- PREP. to sample in B-146
- T. Dickson - Cali. CO meter
- PREP. to meet w T. Brent @ B-146
- MEETING @ B-146 w/
  T. Brent, T. Dickson, T. Rogan
  Frank Mitchell - Army
  Don Mills - Fire inspector (SEE Hot Work Permit on P
  Pam Gould - SUPERVISOR B-146
  Safety Specialist - (SEE SAFETY & Bldg availability Perm
  Charles Wesley on P. 57
- Fill out Contractor VEHICLE PASSES - for T. Brent to sign (Corer Eric Hesterley, T. Dickson & J. Gerdt New vehicle)

0915 Hrs - Escort Drilling Coring Contractor to B-146
- T. Dickson & T.R. open over head doors & man doors set up FANS to push & pull Fumes out of
- T. Dickson prep. monitoring instruments

1030 Hrs - DPT work begins - T.D. H&S oversight. Train C. Lewis
1045 Hrs - Left for BLDG #3245
- PAPERWORK

1200 Hrs - EMI personnel arrive Stanley Lynn & Rob Porges
- Go to B-146 and get T. Dickson - Tom will Escort EMI personnel while they are @ CRANE

1230 Hrs - Return to B-146 to oversight Bldg ~~until~~ and Corer (Eric) until DPT crew return from Lunch

1315 Hrs - DPT crew return
1330 Hrs - Return to BLDG #3245
PAPERWORK

1600 Hrs - Return to B-146 - help DPT crew clean up
1640 Hrs - Return to BLDG #3245
- PAPERWORK & Package samples on COCs 0070, 0072, 0073 0075 - 0078 & 0080 & 0081 for shipment on AB# 84478355

1800 Hrs - Leave BLDG #3245 for FED. EX
1830 Hrs Drop off samples @ FED. EX.

Work continued to Page

SCRIPTO BINDERS PRODUCTIONS CHICAGO 60606 MADE IN U.S.A.

SIGNATURE [signature] DATE 8/14/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

FLAME TOOL/HOT WORK PERMIT
NSWC CRANE 11320/19 (REV. 1-02)

ITEM	FROM	TO	ISSUED TO
EFFECTIVE DATES	8-16-04	8-20-04	☐ NSWC ☐ CAAA ☑ CONTRACTOR ☐ TENANT
TIME	0800	1500	NAME OF TRADE/CONTRACTOR/TENANT ACTIVITY: TETRA TECH

TYPE OF EQUIPMENT TO BE USED *(Cutting Torch, Arc Welder, etc.)*

CORE DRILL

PURPOSE OF USE

DRILL HOLES FOR CORE SAMPLES

WHERE USED *(Building/Structure/Other location)*

BLDG 196

☑ INSIDE
☐ OUTSIDE

INSTRUCTIONS OF THE FIRE SUPPRESSION/PREVENTION BRANCH, FIRE DEPARTMENT

☑ GENERAL FIRE PREVENTION INSTRUCTIONS ON REVERSE SIDE MUST BE COMPLIED WITH.

☑ IN ADDITION TO THE GENERAL FIRE PREVENTION INSTRUCTIONS ON REVERSE SIDE, YOU SHALL COMPLY WITH THE FOLLOWING:

☑ REMOVE ALL COMBUSTIBLES 35 FEET, ALL FLAMMABLE LIQUIDS 50 FEET, AND ALL EXPLOSIVES (UNLESS APPROVED TO STAY BY THE SAFETY DEPARTMENT (CAAA OR NAVY ESO) AND FIRE PREVENTION) 100 FEET FROM THE HOT WORK AREA.

1) FIRE WATCH REQUIRED WITH 30 MINUTES AFTER WORK COMPLETE

2) KEEP CORE DRILL AREA WET / DAMP

PERSON DESIGNATED AS FIRE WATCH *(NOT SAME PERSON AS PERMIT HOLDER)*

Thomas M. Dudzinski

REQUIRED FIRE EXTINGUISHER AT WORK SITE		OTHER FIRE PROTECTION STANDBY REQUIREMENT(S)
TYPE	SIZE	
☐ WATER ☐ CO_2 ☑ DRY CHEMICAL		

I have read, understand and will comply with the above "Instructions of the Fire Suppression/Prevention Branch, Fire Department"

SIGNATURE *(Permit Holder)* [signature] DATE 8/16/04

HAZARDOUS AREAS ONLY

I agree that the "Instructions of the Fire Suppression/Prevention Branch, Fire Department" stated above are adequate and area is safe to work in.

SIGNATURE *(Building Supervisor/Forman/Representative)* [signature] DATE 8-16-04

Permission is hereby granted the Trade/Contractor/Tenant Activity named above to use specified equipment in accordance with the "Instructions of the Suppression/Prevention Branch, Fire Department as stated above.

SIGNATURE *(Fire Department/Representative)* [signature] DATE 8-16-04

DISTRIBUTION: Original *(Code 0631 File)*
Yellow *(Work Site)*

TITLE

PROJECT NO

7

SAFETY & BUILDING AVAILABILITY PERMIT
NON-ROUTINE REPAIR OR MAINTENANCE
9ND-NWSCC 10470/1 (REV. 12-78)

FROM SAFETY SPECIALIST	TO TETRA TECH
ISSUED TO SAMK	DATE 8/16/04

PERMIT TO PERFORM THE FOLLOWING WORK

DESCRIPTION OF WORK

CORE DRILL FLOOR IN BLDG. CORE DRILL REQD

LOCATION AREA N/E (NKD) BUILDING 146	DATES FROM 8/16/04 THROUGH 8/21/04

APPLICABLE SAFETY PRECAUTIONS

☒ General Safety Instructions on the reverse side deemed adequate.

☐ In addition to the General Safety Precautions on the reverse side, comply with the following:

WET DRILL ONLY

BUILDING AVAILABLE AND WORK APPROVED

SIGNATURE *(Supervisor)* Pam Gould

SIGNATURE *(Issuing Safety Specialist)*

Drilling summary:

Set 13 3/4 hour casing for 16MW-TC1

Sampling summary 8/17/04

Complete Soil Boring - 165874
Purge & Sample monitoring wells - 16MW-T09, 10 & 15
& Purge 16MW-T13 (will sample 8/18/04)
Ship samples on COC 0082 via FED EX AB#
8497 8135 5822

SCIENTIFIC & ENGINEERING PRODUCTS CHICAGO 10025 MADE IN USA

Crews same as on Page 27

TITLE NSWC CRANE except J. Dutton Demobed on the 16th **PROJECT NO.** 7448

BOOK NO. 1376

TUES 8/17/04

Work continued from Page

WEATHER: Mostly sunny Temp in 70's

0650 Hrs - Arrive @ BLDG #3245
- Brief Tailgate
- Fax COCs to office & LAB
- Prep. for sampling GW @ 16MWT13
- Prep for T. Dickson while he helps C.O. collect soil samples @ 16SB74
- Paperwork / organize office / select wells for sampling

1040 Hrs - Arrive @ 16MWT13; T.D. will sample 16MWT15 so that TR can assist.

1110 Hrs - Start Purge @ 16MWT13
END Purge @ 1510 Hrs

1512 Hrs - Start sampling @ 16MWT13 - No pump dry will let recover and sample 8/18/04.

1530 Hrs - Finish clean up @ 16MWT13

1535 Hrs - Check in on JG

1545 Hrs - Arrive @ BLDG #3245
- Unload SUV
- Paperwork & Packaging
- Prep samples w/ COC #0082 to ship via FED EX AB# 8447 8135 5822
- Prep. U.S. Env. Equipment for shipment (Co meter, Auger kits & Cable Locator) on FED EX AB# 8447 8135 5833.

1800 Hrs - Left BLDG #3245 for FED EX

1830 Hrs - Drop off samples & EQ @ FED EX.

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE

DATE

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 8/18/04:

Sampled 16 MWT 13 (Purged on 8/17/04)

Shipped sample on COC 0083 via FED EX
AB# 8447 8135 5811

WED. 08/18/04

Work continued from Page

0645 Hrs - ARRIVE @ BLDG # 3245
T.D. PREP to SAMPLE 18MWT13
TR. Prep to Triangulate Soil Borings inside B-146
0700 Hrs - ARRIVE @ B 146 / SWMU 16
SAMPLE 16MWT13 (Purged 8/17/04) & TRIANGULATED SOIL
Borings @ B-146 - CHECKED IN & OUT w/ Charles
0820 Hrs - Return to BLDG # 3245
- PACKAGE & PAPERWORK OF SAMPLES ON COFC 0083
to be shipped VIA FED EX AB# 8487 8135 5811
- CHECK IN W/ OFFICE, S. Cont. & C. LANEY
- Bottle Inventory
- Check in w/ LAB - order Trip Blanks, discuss shipment on 8/17 & 18
- FAX COCs 0082 & 0083 to OFFICE & LAB.
- Clean & mop Floors
1030 Hrs - LEFT BLDG # 3245 FOR FED. EX
1165 Hrs - Drop off Samples on COFC # 0083 at FED. EX.
1230 Hrs - ARRIVE @ IHAY Airport - Remainder of day TRAVEL.

END

SIGNATURE Terry Rosahn DATE 8/18/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

VOID THIS PAGE

TITLE NSWC CRANE

CREW
J. Goerdt
T. Kosman

PROJECT NO. 7448

BOOK NO. 1376

6:

Mon - 8/23/04

Work continued from Page

1205 - ARRIVE @ BLDG # 3245

CHECK PSI ON ALL Nitrogen GAS Cylinders

- 2 EMPTY & 1 almost empty called IN Oxygen FOR REPLACEMENTS
- Assemble & Decon bladder pumps
- Prepare list of things to purchase
- Check in w/ OFFICE - Army maybe working NEXT WEEK @ MFA / may not have drilling ACCESS the week of 8/30 AS shown on Army SCH.
- REPAIRED anchor holes @ BLDG ~~# 3245~~ 146

1600 Hrs - LEFT SITE / BLDG # 3245 FOR Motel

END

Work continued to Page

SIGNATURE

DATE 08/23,

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SAMPLING SUMMARY 8/24/09:

MONITORING WELLS PURGED & SAMPLED:
16MWT06 & 12 and 16MW03

MONITORING WELLS PURGED ONLY: 16MWT11

TITLE NSWC CRANE

CREW
J. GOERDT
T. ROJAHN

PROJECT NO. 7448
BOOK NO. 1346

TUES. 8/24/04

Work continued from Page

WEATHER: Partly sunny, TEMP low 80's

0700 Hrs - Arrive @ BLDG # 3245; Collect Trip Blank TB082404-01
- Talk to T. Brent regarding B-166 & 155 SCH.
- Prep. For GW sampling @ SWMU 16; H&S Tailgate
- Check in w/ office (R. Basinski)
- Select wells to be sampled/purged this date
- Transferred Purge water from 1MW24 w/DYE from 8 gal containers to manageable 5 lb Polys

1000 Hrs - Arrive @ 16MWT11
End Purge @ 1125 Hrs & Clean up

1150 Hrs - Lunch

1125 Hrs - Arrive @ SWMU 16; 16MWT06

1335 Hrs - Finish @ SWMU 16 - 16MWT06 collected samples
Checked out J. G (will start sampling in 10 min)

1545 Hrs - Arrive @ BLDG # 3245
- Stocked containers in office
- Paperwork

1845 Hrs - Leave BLDG # 3245 for Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

B 100 P

SAMPLING SUMMARY 8/25/04:

Collected samples @ 16MWT11-E-17
16MW02, 04, 05

SHIPPED SAMPLES ON COC 0093 VIA FED EX AB#
8447 8135 5454

WEO 8/25/04

Work continued from Page

WEATHER: Mostly Cloudy Temp 80's hot & 7

0655 Hrs - ARRIVE @ BLDG #3245

- Prep. to collect groundwater @ SWMU 16
- H&S Tailgate
- Check in w/ R. Basinski
- T. Brent secured a Lock out / Tag out for Fed. night @ 12MWT09 & 30 Location - Also has D. Johnson looking into night work @ SWMU

0830 Hrs - ARRIVE @ SWMU 16

0855 Hrs - Start SAMPLING 16MWT11 (Purged 8/24)

0953 Hrs - Filled VOAs & ½L of EXPLOSIVES - Dicy will return later to check recharge / continue sampling.

1013 Hrs - Start Purging ~~Sampling~~ TK @ 16MW04

1120 Hrs - Start SAMPLING @ 16MW04

1150 Hrs - FINISH @ 16MW04

1202 Hrs - LUNCH

1230 Hrs - RETURN to BLDG #3245 to meet w/ Drilling Crew

- PAPERWORK
- CHECK IN w/ R. Basinski
- TALK to Donna Z. Regarding extention on GAS Tag @ MFA (Permit #4562) - Exp 8/31
- Get office set up for H&S Site Specific Training for new drillers

1400 Hrs - Arrive @ SWMU 16 to Cont sampling 16MWT11

1430 Hrs - Complete Filling of Explosive container

1443 Hrs - Return to BLDG #3245

- Collect Rinsate of Bladder Pump @ 1530 Hrs NERL DI, Lot #1209163 EXP: 12/04
- PAPERWORK & PACKAGE Samples on CoC #0085

1720 Hrs - LEFT BLDG #3245 FOR FED EX.

- Drop off samples @ FED EX on AB# 8447 8135 545

1950 Hrs

1800 Hrs - SHOP FOR H&S Supplies

1900 Hrs - Return to Motel

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE

DATE 8/25

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLING SUMMARY 9/26/04:

Collected samples @ 16MW-T05 & 16MW01
FINISHED collecting sample 16MW-T11 &
Purged 16MW-T16.

TITLE NSWC CRANE

J. Goerdt, T. Rojahn, S. Conti, C. Laney

Jim Walsh, J. Dean, C. Mahaffey, K. Bochmer, J. Davis, ~~Joe Wostenhaupt~~

PROJECT NO. 7448

BOOK NO. 1346

THUR. 8/26/04

Work continued from Page

Weather: Rain all morning

0655 Hrs - Arrive @ BLDG #3245; Fax COC 0085 to Lab & Supr. of Work on MEA all morning see LB 1374

1300 Hrs - C. Laney arrived
- Filled ~~him~~ CL in on days activities
- Prep. to sample GW @ SWMU 16

1420 Hrs - Arrive @ SWMU 16
CHECK IN w/ J.G.

1500 Hrs - Start collect metals @ 16MWT 11

1545 Hrs - Clean out well vault @ 16MWT 18 & found lid - well was damaged during snow removal

1610 Hrs - Arrive @ 16MWT 16

1640 Hrs - Finish clean up @ 16MWT 16 & 18; check on J.G.

1700 Hrs - Arrive @ BLDG #3245
- Refrig sample
- Unload vehicle

1730 Hrs - Leave BLDG #3245 for Lowes

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 8/26/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 8/27/04:

Collected sample @ 16MWT18 & started sampling 16MWT16 (low yield well).
Developed 16MWT19 & 20
Shipped samples on COC # 0087

DRILLING SUMMARY 8/27/04:

Installed 4 WELLS T35, T36, 07 & 18 @ SWMU 12

CREWS SAME AS IN PAGE 69

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

FRI. 8/27/04

Work continued from Page WEATHER:

0655 Hrs - Arrive @ BLDG #3245
- PAPERWORK
- BRIEF TAILGATE MEETING
- SELECT WELLS FOR SAMPLING
- CALL FED. EX. PACKAGE DELIVERED to Lucks Prior to 0900 Hrs AB# 8447 8135 5454
- PREP to sample GW & DEC WELLS 16MWT19 & 20

0950 Hrs - Arrive @ 16MWT16

1000 Hrs - Start sampling

1100 Hrs - WELL DRY will have to return later (TA or JG)

1115 Hrs - LUNCH

1145 Hrs - Arrive @ 16MWT18 to drop off lunch for JG

1205 Hrs - Arrive @ 16MWT20 to DEVELOPE

1315 Hrs - Finish @ 16MWT20

1316 Hrs - Arrive @ 16MWT19 to DEVELOPE

1450 Hrs - Finish @ 16MWT19

1505 Hrs - Dump Purge water @ #327 M.H.

1515 Hrs - Arrive @ SWMU12 to check on Drilling
Also, MATT SOLTIS ARRIVED FOR HES AUDIT

1600 Hrs - Return to BLDG #3245
Note From J.G. - Security system locked up on his Airscan

1615 Hrs - Checked on Sim @ SWMU16
NEED GAS cylinder & NEED to call security to let them know AVIS is BRINGING A Replacement

1630 Hrs - Dropped off Gas @ SWMU16 FOR JG.

1640 Hrs - Returned to BLDG #3245
- Called security & T. Brent to OK AVIS drop off NEW CAR / pick up each.
- PAPERWORK, PACKAGE samples; AUDIT ASSIST etc.

1730 Hrs - LEFT SITE FOR FED. EX. W/ MATT SOLTIS
LEFT JG. Keys to my SUV ie AVIS had problems

1800 Hrs - Drop off Samples on GFC #0087 to ship on AB# 8447 8135 5465.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 8/27/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLING SUMMARY 8/28/04:

COLLECTED SAMPLES @ 16MWT03 & 01, also purged 16MWT02 (will sample tomorrow). H&S Audit debriefing. Purchased PE Tubing in Bloomington

DRILLING SUMMARY 8/28/04:

SET isolation casing @ 12MWT30 & installed shallow well @ 12MWT19 @ 26'. Severe thunder storms in afternoon (no drilling).

CREWS SAME AS ON PAGE 67.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

SAT: 08/28/04

Work continued from Page

WEATHER: OVERCAST MORNING; SEVER thunder storm in the afternoon

0645 Hrs - ARRIVE @ BLDG #3245

- H&S Tailgate; went over Work Permits w/ Drillers
- Collected TB @ 700 Hrs
- PREP for GW Samplings
- Select wells to sample
- Decon (2) WHALER PUMPS
- Stay called BM personnel need Power @ B#3245 will wait until they arrive for their access.

1000 Hrs - ARRIVE @ SWMW16; check in on L.G.

1020 Hrs - Start Purge @ 16MWT02; Also H&S Audit debriefing.

1425 Hrs - Well dry to intake - will sample tomorrow

1435 Hrs - Finish clean up @ 16MWT02

- Rain delay - SEVER thunder storm

1520 Hrs - Sampled Explosives @ 16MWT16 - 1L glass amber ~ 1/3 FULL will cont tomorrow

1535 Hrs - ARRIVE @ B#3245
Unload VEHICLE - NEED ROOM FOR purchasing PE tubing in Bloomington

1600 Hrs - LEFT B-3245 FOR Bloomington

1730 Hrs - Purchase PE tubing in Bloomington

1800 Hrs - Return to Motel in BEDFORD

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Nagel DATE 8/28/

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Drilling summary 8/27/04:

Installed isolation casing @ 12MW17 31 & 32.
Installed monitoring wells 12MW17 09 & 30
IN AREA OF lock out / tag out.

SAMPLE SUMMARY 8/29/04:

Collected samples @ 16MW17 02, 19 & 20.
Cont sampling @ 16MW17 16.

CROWS SAME AS ON PAGE 01.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

Sun 8/29/04

Work continued from Page

WEATHER: Mostly Sunny Temp High 70s

0700 Hrs - ARRIVE @ BLDG #3245

- HES Audit DEBRIEFING @ Tailgate
- PAPERWORK - Prep. well sampling sheets
- ID all wells that were installed on SWMU 12 that will cont development today
- Prep. some BQ for development

0945 Hrs - Arrive @ SWMU 16

1000 Hrs - Start sampling 16MW T02 03 TO

1045 Hrs - Finish clean up @ 16MW T02 03 TO

1055 Hrs - ARRIVE @ SWMU 16 - WELL 16MW T20

1355 Hrs - Start Sampling 16MW T20

1530 Hrs - Finish Clean up @ 16MW T20

1540 Hrs - Arrive @ BLDG #3245

- Call R. Basinski (Response to message) @ Home
- Complete COC # 0086 FOR samples collected @ SWMU 16
- Unload ~~vehicle~~ TO vehicle
- Pick wells to be sampled tomorrow @ SWMU 1

1700 Hrs - LEAVE BLDG #3245 for Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 8/29/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

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TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

WED. 9/1/04

Work continued from Page

Monday 8/30/04 SEE Notebook # 1374 CT# 357

Tues. 8/31/04 SEE Notebook # 1374 CT# 357

WED. 9/1/04 TRAVEL DAY

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 9/1/04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SAMPLE SUMMARY 9/20/04:

REGON SHMLL 13 FOR VEG SAMPLING LOCATIONS.

SELECTED 9 SAMPLING LOCATIONS.

SCIENTIFIC SUPPLY PRODUCTS (CHICAGO) 10000 MADE IN U.S.A.

MON 9-20-04

Work continued from Page WEATHER: SUNNY & 70s

1400 Hrs - ARRIVE @ B3245 - TRAVEL DAY

- PREP. to STAKE OUT VEG. sampling locations
- CALL DAY ICE supplier PACK ENTERPRISES
  SET UP PICKUP ON TUES OF MIN AMOUNT 57 lbs

1520 Hrs • ARRIVE @ SWMU 13

SOF WELL 13MWT50 { 13VEG01 - HERB & Sugar Maple (SM)
13VEG02 - HERB & SM

SOF Sewer Line & MH 298 { 13VEG03 - WHITE OAK (WO)
13VEG04 - HERB, WO & SM

NOF MH 298 { 13VEG05 - HERB & WO

W. Slope DEPOSE 13MWT42 down from MH { 13VEG06 - SM & HERB

{ 13VEG07 - WO (UPGRADE FROM 13VEG05 & E OF 13MWT46 & 39.

13VEG08 - WO (ACORNES ONLY) @ Cluster 13MWT46 & 39

13VEG09 - ~75' WEST OF WELL cluster 13MWT37 & 38
WO saplings

Collect HERBACEOUS Plant for ID/VALCER specimen

1820 Hrs - LEFT BLDG #3245 for SAMS CLUB

1934 Hrs - PURCHASED ~~supplies~~ supplies @ SAMS CLUB

END

SIGNATURE Terry Royal DATE 9/20/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLE SUMMARY 9/21/04:

Collect 5 HERBACEOUS SAMPLES, 10 LEAF SAMPLES & 1 ACORN SAMPLE (13 VG 001 - 016).
SEE Plant Tissue Data Sheets & COCS 0095 & 0097 FOR Additional Information.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

TUES 9/21/04

Work continued from Page

Weather: Mostly Sunny & Temp High 70s Low 80

0640 HRS - ARRIVE @ BLDG #3245
- UNLOAD SUPPLIES
- PAPERWORK
- PREP FOR VEG. SAMPLING

0730 HRS - CHRIS FREEMAN NEEDED CONFORMATION sampling preform @ the SWMU 12 Battery Site

1300 HRS - RETURN to FIELD PREP FOR collecting VEG. SAMPLES

1330 HRS - BEGIN sampling VEG. tissue @ SWMU 13

1640 HRS - FINISHED collecting VEG. tissue @ SWMU 13 &
- RETURNED to BLDG #3245

Collected 5 HERBACEOUS PLANT SAMPLES
10 TREE LEAF SAMPLES
1 ACORN SAMPLE
1 RINSATE SAMPLE

SEE Plant Tissue Sample Log sheets for detailed INFORMATION.

- PREP. SAMPLES w/ TAGS & labels SECURE IN FRIDGE

1730 HRS - LEFT B 3245 FOR HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Troy Pogue

DATE 9/21/04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

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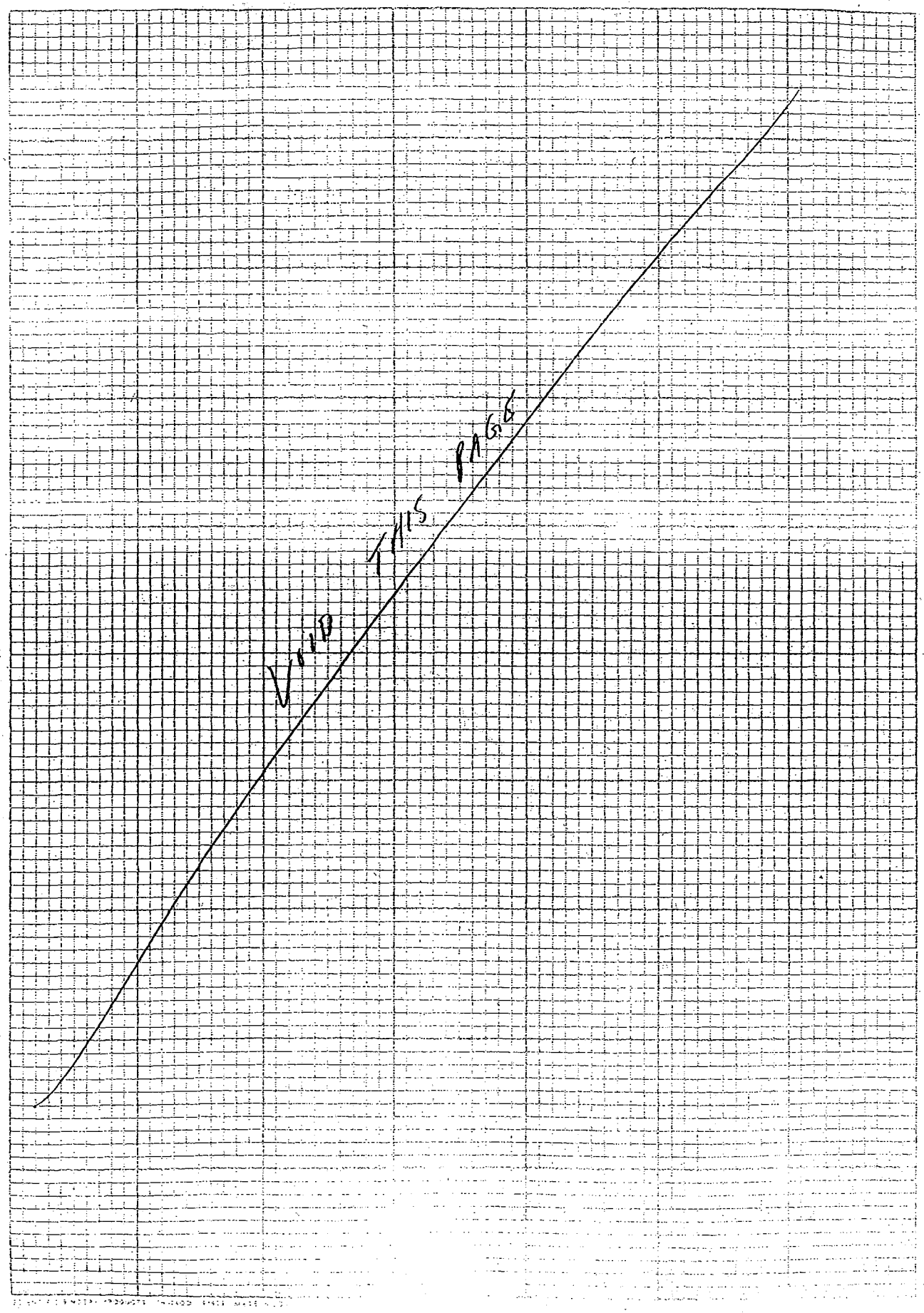
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TITLE NSWC CRANE

PROJECT NO. 7498

BOOK NO. 1376

9-22-04

Work continued from Page

1600 Hrs - PACKAGED & SHIPPED Plant tissue samples this date; samples on COCs 0095 & 0097
AB# 83663236 2343 Plant Tissue w/ DRY ICE
AB # 8447 8135 5720 Rinsate w/ ICE
1708 Hrs - LEFT B 3245 FOR FED. EX.
1740 Hrs - Dropped off Samples

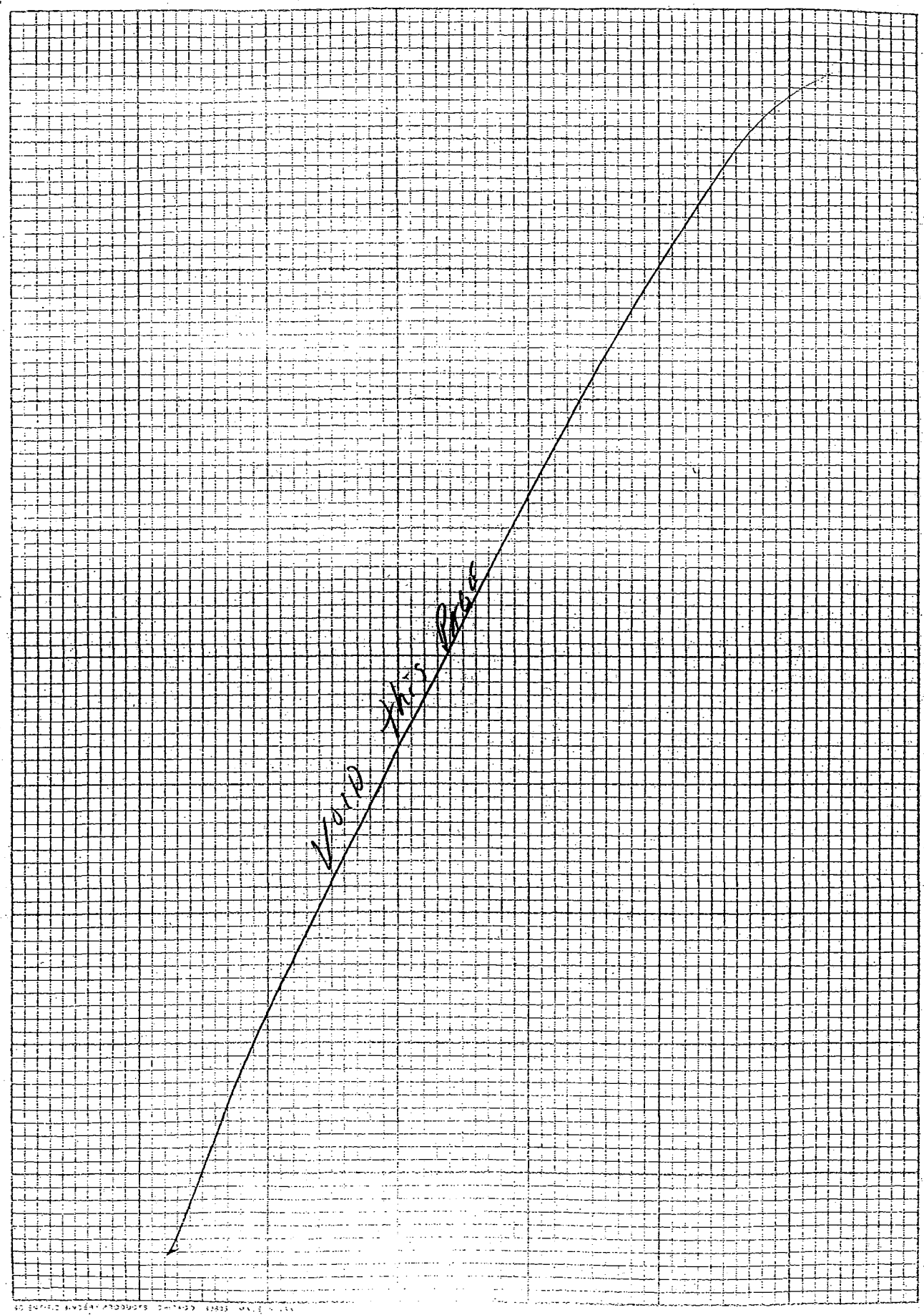
END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE [signature] DATE 9/22/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE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WED 9/29/04

Work continued from Page

Weather - Mostly Sunny & 60°

0645 Hrs - Arrive @ B-3245

Prep to Dev 16MWT21

0730 Hrs - Start Dev @ 16MWT21

0930 Hrs - End Dev @ 16MWT21

0940 Hrs - Return to B#3245 SEE NB 1374 page 63 for remainder of day info

END

SIGNATURE

DATE 9/29/04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SAMPLE SUMMARY 10/14/04:

SAMPLED 1650/1602; AND KICK OFF SURVEY OF MONITORING WELLS & SOIL BORINGS @ SWMU 13.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

THURS 10-14-04

Work continued from Page WEATHER OVERCAST w/ PERIODS OF RAIN & 50's

0700 Hrs - ARRIVE @ B 3245

- FAX CoCs 0119, 0120 & 0121 to LAB & OFFICE (E.S.)
- PREP. FOR SURVEYORS ARRIVE

0800 Hrs - SURVEYORS - Cory ALLEN & Gary Wood ARRIVE @ B-3245

- Discuss SURVEY APPROACH & ~~SEM~~ TC HES

0830 Hrs - ARRIVE @ SWMU 13

- SHOW CREW MWs & Soil borings

0935 Hrs - ARRIVE @ SWMU 12

- SHOW SURVEY CREW MWs & Soil borings
  Also, mark ACTUAL SAMPLE locations 12 SB 21-24 FROM OFFSET STAKES

1015 Hrs - SURVEY CREW to SET up control - Return to OFFICE to do PAPERWORK & Picked up Subway sub

1115 Hrs - MEET SURVEY CREW @ SWMU 13 S. Gate - let CREW in & OVERSIGHT SAME SURVEYING IN ALL NEW Soil borings.

1200 Hrs - Crew finished inside SWMU 13 will work outside ~~SM~~ TC SWMUs REMAINDER OF day - (i.e. WORK ON control and locate 13MW T48 → 51).

- REMAINDER OF DAY TC worked @ SWMU 12 (ID MONITORING WELLS & 11 OF 12 STAFF GAUGES) Also, Sampled 165016 @ 1335 & 125028 @ 1540

1710 Hrs - LEFT SITE FOR HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty Nagel

DATE 10/14/04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Sample Summary for 10/15/04

Purge only Monitoring wells

16MWT08 & 21

TITLE NSWC CRANE

PROJECT NO. ~~6878~~ 7447 (TR)

BOOK NO. 1374

FRI - 10/15/04

Work continued from Page

WEATHER - (TR) AM: OVERCAST & Cool - PM Partly Sunny

0700 Hrs - ARRIVE @ B3245

WORK on SWMU 12 until 0845 Hrs

0845 Hrs - ARRIVE @ B 3245

- Prep to SAMPLE GW @ SWMU 16
- CAL: INSTRUMENTS

1060 Hrs - ARRIVE @ SWMU 16 - 16MWT08

Start PURGE - 1130 Hrs <2' of WATER in WELL

END PURGE - 1320 Hrs (WELL DRY to PUMP INTAKE)

Vol. Removed - only 300ml w/ ~16 in tubing

1402 Hrs - Start Purge @ SWMU 16 - 16MWT21

1802 Hrs - END PURGE AFTER 4hrs FOR PURGING

WILL allow WELL to RECHARGE & SAMPLE tomorrow due to late hour & increased turbidity

1825 Hrs - ARRIVE @ B-3245

UNload METERS, ETC.

1845 Hrs - LEAVE B-3245 FOR Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 10/15/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Staff Gauges Installed 10/16/09:

SG #

SG01 - PK Nail on top of Culvert up gradient of 16SW/SD28

SG02 - Green & yellow metal Stake NEAR 16SD08

SG03 - " & " " " @ Fence between 16SD06 & 0

SG04 - PK Nail on top of Culvert NEAR 16SD05

SG05 - PK Nail on top of culvert @ Fence down gradient of 16SD03

SG06 - 3 holes drilled on top of Poly pipe (Center Pipe) West side of H-77

SG07 - Green & yellow stake on west bank of Stream NEAR 16SW/SD18

SG08 - 3 holes drilled on top of Poly pipe (South Pipe) on the up stream side of H-77

SG09 - Green & yellow metal Stake on the west bank of the stream just down gradient of 16SW/SD19

Sample Summary 10/16/09:

Collected 16TB10160401, 16SS8600002 (missing sample), 16GW72100 & Started sampling 16GW10802

TITLE NSWC CRANE

PROJECT NO. ~~6878~~ 7448 (TR)

BOOK NO. 1376

SAT - 10/16/04

Work continued from Page

WEATHER - Partly Cloudy & Cool (50°s)

0700 Hrs - Arrive @ Lowe's - Purchase supplies for marking (TR) the staff Gauges & installation of well tags

0825 Hrs - Arrive @ B-3245 - Collect 16TB101604 01

- Prep to collect GW samples & mark staff gauges & install well tags @ SWMU 16

0945 Hrs - Arrive @ SWMU 16

1000 Hrs - Collect 16 55 860002

1030 Hrs - Collect 16 GWT2101

1130 Hrs - Cont to purge out H_2O in tubing @ 16 MWT08 to obtain one casing vol.

1154 Hrs - Start collecting Exp. sample for 16 MWT08 Collected ~300ml before well was dry to pump

1315 Hrs - Installed well tag on stick ups ~~all~~ of the following wells 16 MWT 07, 08, 09, 10, 11, 12, 13, (TR) & 15 & 17

1425 Hrs - Marked staff gauges @ SWMU 16 See page 90 & ID monitoring wells T19 & T20

1700 Hrs - Finished marking staff Gauges 01 - 09 and Arrive @ B-3245

- Drop off Eq.

1715 Hrs - Leave B-3245 for Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 10-16-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 10-17-04:

UNSUCCESSFULL ATTEMPT @ SAMPLING 16 MAR 08

WELL CALL IT DRY.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

SUN 10-17-04

Work continued from Page

WEATHER - Mostly Sunny & TEMP 90's

0800 Hrs - ARRIVE @ B-7245

- PAPERWORK
- TRANSFER STAFF GAUGE INFO to SURVEYOR'S MAPS
- PREP to collect additional SAMPLE @ 16GWT08

1045 Hrs - Pick up Subway Sub for Lunch @ WELL

1105 Hrs - ARRIVE @ SWMU 16

- WATER LEVEL FOR 16MWT08 - 96.43 (TD 97.6)
- Prep. 3/4" PUMP FOR WELL 16MWT08

1140 Hrs - Start Pumping to collect SAMPLE

1240 Hrs - No WATER FROM PUMP tubing

1245 Hrs - Pull PUMP - Extract ~~only~~ TO < 50ml FROM tubing

Will call WELL DRY - No SAMPLES

Note - WELL RECOVERY in 24 Hrs < 0.2'

WATER column ~4' LESS than during 1st Round

1300 Hrs - LEFT SWMU 16 to WORK on SWMU 12 the REMAINDER OF THE DAY.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 10-17-04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Sample Summary 10/18/19

- Stake out contingency wells @ SWMU 12
- Ship samples on COCs # 0122 & 0123
  (Sample on COC # 0123 was from SWMU 12)
- Surveyors ~~CANCELED~~ CANCELED (TR) this date due to RAIN

SCIENTIFIC SUPPLY PRODUCTS CHICAGO 53601 MADE IN U.S.A.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

MON 10-18-04

Work continued from Page

WEATHER - RAIN, 50°C

0700 Hrs - ARRIVE @ B-3245

- PAINT METAL POSTS FOR STAFF GAUGES
- TRANSFER STAFF GAUGE INFO TO SURVEY MAPS
- PREP FOR STAKING OUT CONTINGENCY WELLS @ SWMU 12
- Prep. to install STAFF GAUGES & FREEZE PROTECTION @ SWMUS 13 & 16; FREEZE PROTECTION FOR dedicated bladder pumps
- PAPERWORK

1100 Hrs - LUNCH

1130 - 1425 Hrs - STAKE OUT CONTINGENCY WELLS @ SWMU 12 12 MWT 41, 43-50 Along RR tracks & TRANSMISSION line corridor

1435 Hrs - TALK to Donna Z. @ Public Works - Donna SAID dig permit should be ready by the 25th of Oct.

1500 Hrs - ARRIVE @ B-3245

- FAX J. SCHUBERT water level READINGS FOR SWMU 12
- FAX COCs #0122 & 0123 to OFFICE & LAB FOR this day's SHIPMENT
- Prep SAMPLES FOR SHIPMENT on AB# 8497 8135 5590

1610 Hrs - LEAVE B-3245 FOR FED. EX.

1650 Hrs - DROP OFF SAMPLE SHIPMENT @ FED. EX.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 10-18-04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

DRILLING ACTIVITIES 10/19/04:

SURVEY SBS & MONITORING WELLS @ SWMU 16

	Arrive	Leave
Cory Allen	0755	1130
Gary Wood	0755	1130

SAMPLING ACTIVITIES 10/19/04

Install FREEZE Protection @ SWMUS 13 & 16
Install additional staff gauges 12 → 18
& revisit old staff gauges and install PK nail
@ most culvert locations 1 → 8

Tues 10/19/04

Work continued from Page

WEATHER: OVERCAST & 50's

0700 Hrs - ARRIVE @ B-3245
- PAPERWORK
- PREP FOR STAFF GAUGE INSTALLATION @ SWMU 13 & FREEZE PROTECTION INSTALLATION @ SWMU 16
- WAIT FOR SURVEY CREW ARRIVAL - PLAN ON SURVEYING NEW BORING LOCATIONS & MONITORING WELLS 16MWT19, T20 & T21

0755 Hrs - SURVEYORS ARRIVE @ BLDG 3245
0815 Hrs - ARRIVE @ SWMU 16
- INSTALL FREEZE PROTECTION @ ALL DEDICATED BLADDER PUMP MONITORING WELLS

1032 Hrs - FINISH FREEZE PROTECTION INSTALLATION @ SWMU 16
- WAIT FOR SURVEYORS to FINISH INSIDE FENCED AREA @ SWMU 16

~~Hrs~~ (4)
1050 Hrs - SURVEY FINISH INSIDE FENCED AREA @ SWMU 16
1055 Hrs - ARRIVE @ B3245
- SIT SURVEYOR SIGN OUT SHEET outside of door for surveyors

1100 Hrs - LUNCH
1125 Hrs - ARRIVE @ SWMU 13 - to INSTALL FREEZE PROTECTION @ DEDICATED BLADDER PUMP WELLS
INSTALL ALL WELLS EXCEPT 13MWT02 w/ FREEZE Protection - will wait until after hours to install FREEZE Protection @ T21 WHICH is inside B-165 BUFFER ZONE

1410 Hrs - START INSTALLATION OF STAFF GAUGES @ SWMU 13
1735 Hrs - FINISH STAFF GAUGE installation & WAITED to get FREEZE Protection @ 13MWT01
1742 Hrs - ARRIVE @ B-3245
Drop off Nitrogen Cylinder
1750 Hrs - LEAVE B3245 FOR CAR WASH

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty Rogers
DATE 10/19/04
DISCLOSED TO AND UNDERSTOOD BY
DATE
WITNESS
DATE

B 100 P ©

VOID THIS PAGE

TITLE NSWC CRANE

PROJECT NO. 7498

BOOK NO. 1376

WED 10/20/04

Work continued from Page

0730Hrs - Arrive @ B 3245
- General Clean up
- Decon Bladder Pumps
- Prep (2) 1¾" Pumps & (1) ¾" Bladder Pumps for return to U.S ENV. on AB# 8447 8135 5605 INSULE PO# A3500
- Prep. Field Paperwork for return to Pittsburgh
- Clean & mop Floors - Offices, lab, Hallways & Bathroom
- Clean out SAV

1000Hrs - Prep. to leave B 3245 for FED EX

1035Hrs - Drop off FED EX Package

Remainder of Day - Travel

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE [signature] DATE 10/20/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

VOID THIS PAGE

TITLE

PROJECT NO. ~~6876~~ 7448 (TR)

BOOK NO. 1376

MON 10-25-04

Work continued from Page

TRAVEL DAY & WORKED @ SWMU-12

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rosil

DATE 10-25-04

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WITNESS

DATE

Sample summary 10/26/04

Collected SW samples:

16SW2601, 16SW3001, 13SW3301
13SW3002 & 13SW2802

Dry locations checked:
16SW19 & 16

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

TUES 10/26/04

Work continued from Page WEATHER - AM OVERCAST TEMP 60°S, STEADY RAIN IN PM

0700 Hrs - ARRIVE @ B-3245 16TB10260401 @ 0700 Hrs

- FAX R. BOSINSKI RR HES TRAINING SIGN OFF SHEET & WATER LEVELS FOR SWMU 12
- CALL XSI & LA MOTTE
- PREP. to SAMPLE SW @ SWMU 16

0930 Hrs - 16 SW 19 DRY

0955 Hrs - 16 SW 16 DRY

1105 Hrs - 16SW2601 Collected DUP & MS/MSD NITRATE & NITRITE

1200 Hrs - 16SW 3001 Collected DUP & MS/MSD EXPLOSIVES

1235 Hrs - LUNCH

1250 Hrs - END LUNCH

1305 Hrs - RED FLAGS up @ B-146

1312 Hrs - RETURN to B-3245

- PROCESS SAMPLES collected @ SWMU 16
- PREP. to SAMPLE SW @ SWMU 13

1510 Hrs - Collect 13SW3301 During Rain EVENT

1530 Hrs - Collect 13SW3002 " " "

1600 Hrs - Collect 13SW2802 DUP & MS/MSD During Rain EVENT

1650 Hrs - RETURN to B-3245

- PROCESS SAMPLES Collected @ SWMU 13

1830 Hrs - PREP. to LEAVE B 3245 FOR Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 10-26-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 10-27-04

Collected SURFACE WATER SAMPLES:

135W14, 15, 16 & 22

SHIPPED SAMPLES ON COCS 0124 & 0125

VIA FED EX AB # 8447 8135 6623

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

WED 10/27/04

Work continued from Page

WEATHER OVERCAST MILD & TEMP IN 60'S

0700 HRS - ARRIVE @ B-3245
- CALI YSI & LAMOTTE
- PREP to SAMPLE SW @ SWMUS 13 & 12
- CHECK IN W/ R. BASINSKI (PITT OFFICE)
- CHECK IN W/ T. BRANT

0830 HRS - C. ALLEN & G. WOOD OF BT&R CHECK IN WITH WORK @ SWMU 13 this Date
- FINISH PREPING SUV FOR SW SAMPLING

0920 HRS - STOP @ GAS STATION to REQUEST that the B3245 ICE MACH BE FILLED

0950 HRS - Collected 13SW1502

1028 HRS - Collected 13SW1402

1055 HRS - Collected 13SW2202

1125 HRS - Collected 13SW1602

1215 HRS - ARRIVE @ SWMU 12
- FINISH Collecting SW @ SWMU 13 ALL proposed locations have been sampled

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE Terry Rogers

DATE 10/27/04

DISCLOSED TO AND UNDERSTOOD BY

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USING THIS PAGE

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

SAT. 10/30/04

Work continued from Page

WEATHER: Mostly Sunny & mild (Temp 70's)

1600 Hrs - Start sampling @ 16MW108

1700 Hrs - Finish @ 16MW108

WELL NEEDS to RECHARGE, will continue tomorrow

1710 Hrs - Arrive @ B 3245

SECURE all samples in Frig

Drop off EQ

1730 Hrs - LEAVE B 3245 For Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE

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SAMPLE SUMMARY 10/31/04 :

Continued SAMPLING @ 16 MWT 03

SUN 10-31-04

Work continued from Page

WEATHER: Partly cloudy Temp 60's

1615hrs - Arrive @ SWMU 16

- Continue sampling for explosives @ 16MWT08 w/ Geotech - collect 200ml (total vol. collected since 10/30/04 = ~700ml)

1650hrs - Return to bldg 3245

Refrigerate sample container

Note: most of this date worked @ SWMU 12

END

SIGNATURE

DATE 10-31-04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLE SUMMARY 11/02/04:

Collect SURFACE WATER SAMPLES ©
16SW03, 06, 09, 12, 13, 16, 19 & 27

SHIP SAMPLES ON COCs # 0131, 0132 & 0133
VIA FED EX AB # 8997 8135 6601

COC # 0132 FOR SWMU 12 Groundwater Sample
FROM 12MW734

TUES 11-02-04

Work continued from Page WEATHER: RAIN & 60's

0650 Hrs - Arrive @ B-3245
- Cal. Meters (YSI & LaMotte)
- CHECK IN W / R BASIASKI
- FAX CoCs 0129 & 0130 to OFFICE & LAB
- Prep for surface water sampling @ SWMU 16

1000 Hrs - Collected Surface Water @ 16SW19
1045 Hrs - Collected " " @ 16SW16
1110 Hrs - Return to B-3245
- Drop off samples

1130 Hrs - Lunch
1215 Hrs - Arrive @ Visitors Center for Picture Badge
1305 Hrs - Arrive @ B-3245
- Prep for additional Surface Water Sampling
- Don Rain Gear

1330 Hrs - Arrive @ SWMU 16
1405 Hrs - Collect SW Sample 16SW13
1420 Hrs - Collect " " 16SW27
1440 Hrs - Collect " " 16SW12
1500 Hrs - Collect " " 16SW09
1520 Hrs - Collect " " 16SW06
1530 Hrs - Collect " " 16SW03
1550 Hrs - Return to B-3245
- Process samples
- Package samples on CoCs 0131, 0132 & 0133 for shipment on AB# 8447 8135 6601

1720 Hrs - Leave B-3245 for Fed Ex.
1800 Hrs - Drop off samples @ Fed Ex. → Go to Car Wash

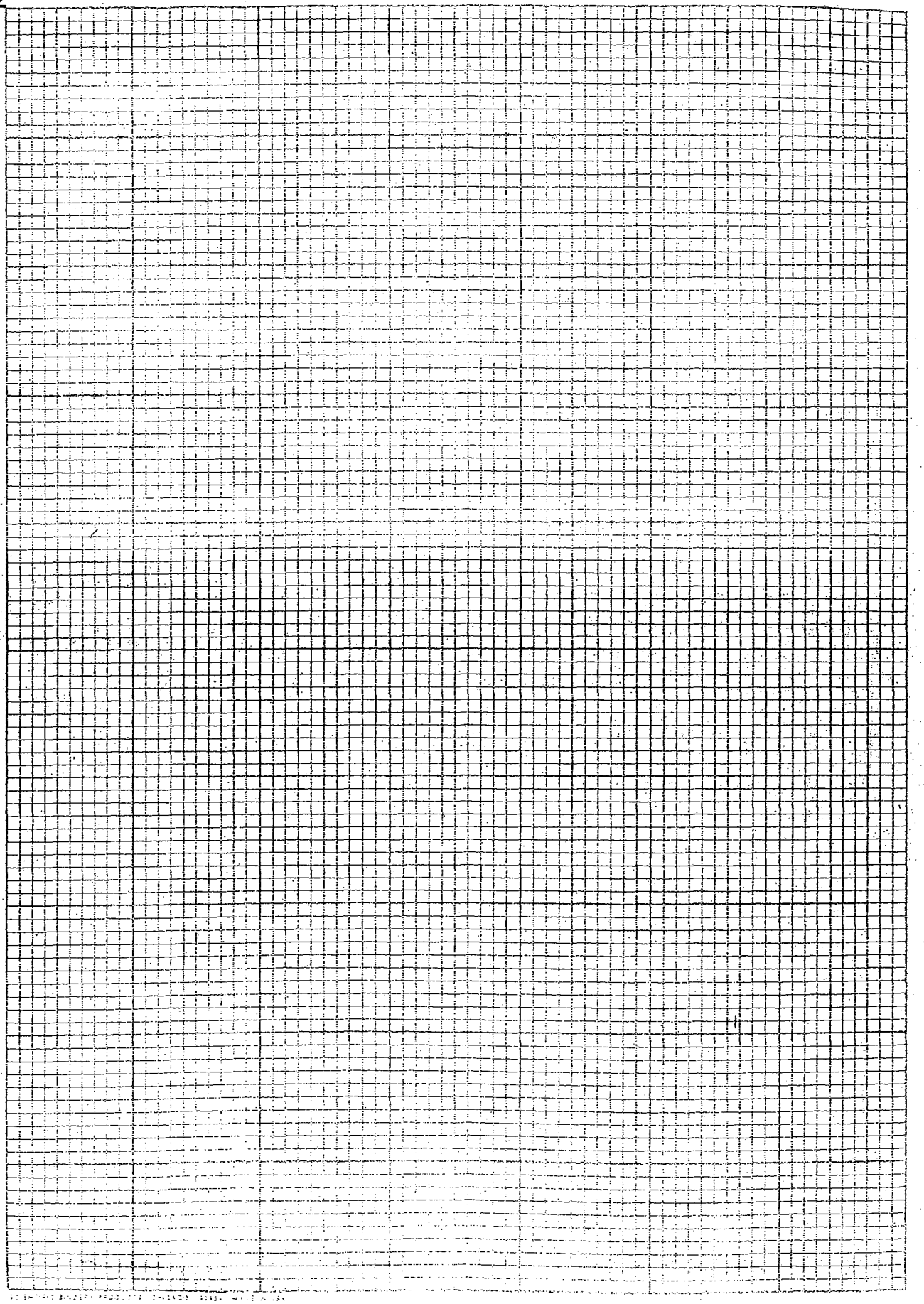
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rogel DATE 11-02-04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE



WED 11-03-04

Work continued from Page

0720 Hrs - Arrive @ B-3245

- Fax Codes to LAB & OFFICE (0131 & 0133
- Leave Daily Summary message on R. Basinski's Voice mail
- Clean office, Lab, hallways & bathroom
- Clean out Rental Car inside
- Prep. paperwork & office to travel to Pittsburgh

0930 Hrs - Leave B-3245 for Airport

Travel Remainder of the day

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE

DATE 11-03-04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

B 100 P©

SAMPLE SUMMARY 11-11-04:

COLLECTED SURFACE WATERS @

12SW 04, 05, 08, 10, 21, 23, 28 & 29

SHIP SAMPLES ON COCs 0135 & 0136 VIA

FED. EX. AB# 8447 8135 6586

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

THURS 11-11-04

Work continued from Page

WEATHER: RAIN 40's High 51°

0645 Hrs - ARRIVE @ B3245
- CALL YSI & LAMOTTE
- PREP to SAMPLE SURFACE WATER
- PAPERWORK

0910 Hrs - ARRIVE @ SWMU 16 Collected ~~grd~~ SURFACE WATER SAMPLES @ 16SW04, 05, 08, 10, 11, 23, 28 & 29
SEE COCs 0135 & 0136 for additional details

1215 Hrs - RETURN to B-3245
Drop off EQ & SAMPLES (REFRIGERATE)

1235 Hrs - LUNCH @ SUBWAY

1259 Hrs - RETURN to B 3245
- PROCESS SAMPLES FOR SHIPMENT ON COCs 0135 & 0136.
- PAPERWORK
- ORGANIZE OFFICE / CLEAN

1700 Hrs - LEAVE B 3245 FOR FED. EX.

1730 Hrs - DROP OFF SAMPLE SHIPMENT ON AB# 8447 8135 6586 @ FED EX

1810 Hrs - FAX OFFICE & LAB COPIES OF COCs FROM Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rogal

DATE 11-11-04

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SAMPLE SUMMARY 11-14-94:

SYNOPTIC WATER LEVELS MEASURED

@ SWMU 13 - SEE PAGE 117 &

STAFF GAUGES MEASURED

SEE PAGE 119

SCIENTIFIC BINDERS PRODUCTS CHICAGO 10938 MADE IN USA

TITLE NSWC CRANE

PROJECT NO.

BOOK NO. 1376

SUN 11-14-04

Work continued from Page

WEATHER: Mostly Sunny & 40°s

1205 Hrs - PREP to SAMPLE W.L. @ SWMU 13

MW ID	W.L.	TIME	PID READING	MW ID	W.L.	TIME	PID
13MWT01*	7.56	1649	0.0	T31	10.74	1720	0.0
T02	15.88	1644	0.0	T32	10.55	1716	0.0
T03	12.17	1652	0.0	T33	11.54	1725	0.0
T04	15.42	1619	0.0	T34*	6.45	1527	16.1
T05	8.73	1629	0.8	T35 (Bailer)	64.40	1605	0.0
T06	14.78	1655	0.0	T36	19.56	1433	0.0
T07	4.84	1616	0.0	T37*	14.71	1439	570
T08	3.87	1623	0.0	T38	62.33	1436	0.1
T09	8.64	1701	0.0	T39	13.84	1444	1.2
T10	16.11	1626	0.0	T40*	18.74	1454	13.5
T11*	8.82	1608	0.0	T41 (Bailer)	67.05	1456	1.9
T12	11.50	1602	0.0	T42	21.21	1500	0.4
T13*	4.40	1258	0.0	T43	9.70	1637	0.0
T14*	14.69	1735	0.0	T44	64.80	1634	0.0
T15*	15.49	1556	0.0	T45*	69.83	1530	31.0
T16	14.23	1541	0.0	T46*	58.25	1446	0.3
T17*	9.04	1538	7.9	T47*	7.02	1240	0.2
T18	20.52	1553	0.0	T48	10.02	1315 SC	0.0
T19	11.31	1728	0.0	T49	7.21	1315 SC	0.0
T20	5.23	1704	0.0	T50	~~3.77~~ 7.02 (FD)	~~1348~~ 1400 (FD)	0.0
T21*	9.20	1534	7.9	T51	3.77	1315 SC	0.0
T22	9.13	1523	0.4				
T23	9.25	1706	0.0				
T24	10.04	1709	0.0				
T25	6.79	1515	0.0				
T26	11.09	1512	0.2				
T27	9.86	1559	0.0				
T28*	7.8.38	1658	13.6				
T29	5.46	1255	0.0				
T30	11.37	1732	0.0				

* = DEDICATED Bladder Pump WELLS

SC = got W.L. from S. Conti

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

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SIGNATURE Terry Rogal

DATE 11-14-04

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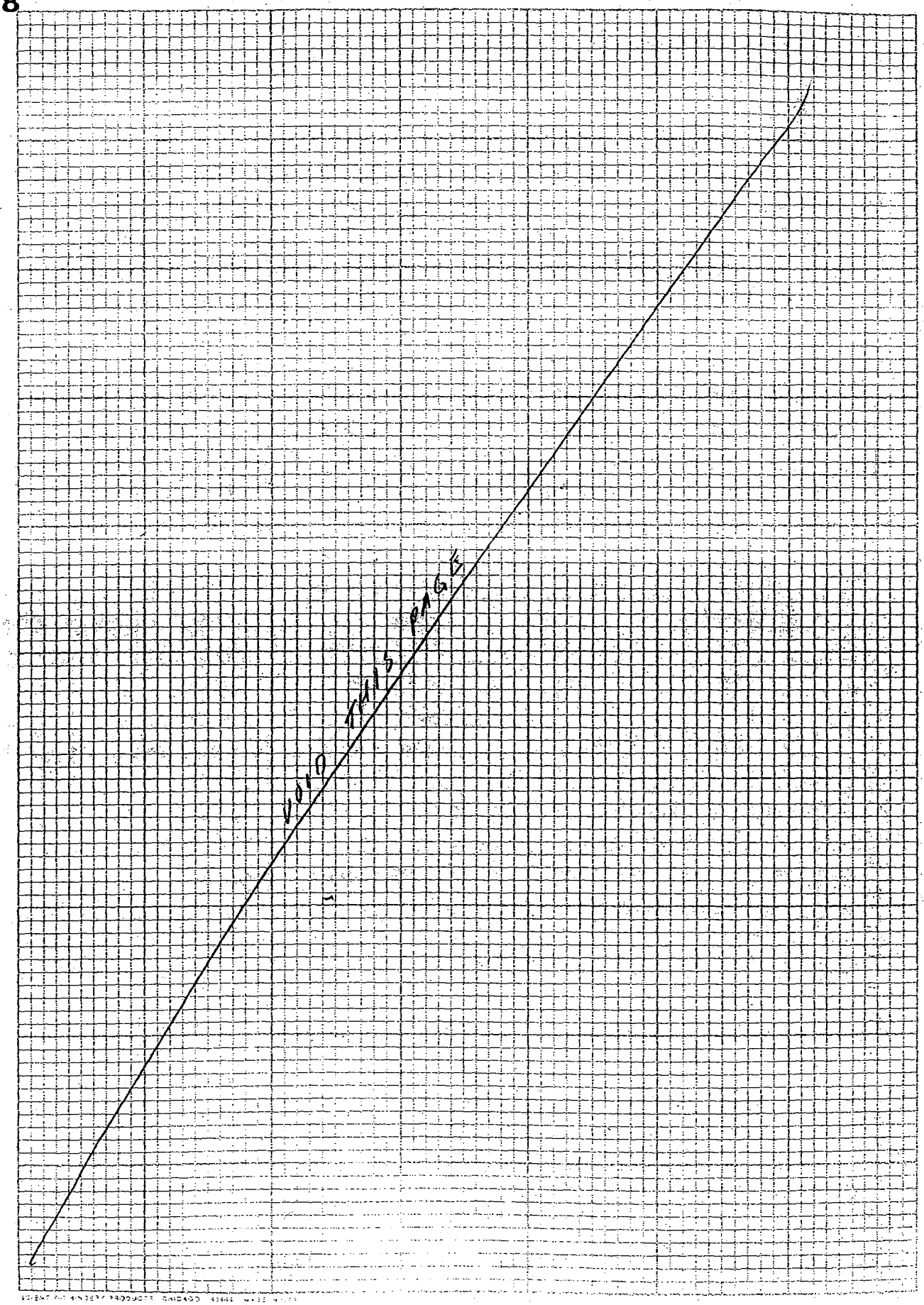
1010
1015
1020

SUN 11-14-04 Cont

Work continued from Page

STAFF GAUGE ID	WATER LEVEL	TIME	FLOW gpm ↓	FLOW: MEAS. OR ESTIMATE
1356 01	1.76	1643	<1gpm	<1gpm
02	3.71	1647	~5	~5-10gpm
03	1.95	1234	<5	~~<5 gpm~~ (FC) <5gpm
04	2.46	1254	1.5	SAME FLOW AS SG11 1.5
05	3.92	1301	<1	<1gpm
06	2.35	1304	<1	<1gpm
07	1.55	1712	—	stagnant / ponded
08	5.18	1520	5-20	5-20gpm
09	4.18	1549	12	0.03' x 0.9' 1ft/sec Bottom of Rocks
10	4.96	1613	5	0.03' x 0.8' ~~2ft~~ 2sec/ft
11	2.30	1246	1.5	1.5gpm MEAS. FLOW @ PIPE
12	6.87	1336	162	0.03x12' 1'/sec
(13) ~~1314~~	6.37	1324	20-30	~20-30gpm
(14) ~~1413~~	5.87	1356	15	15gpm (Bucket meas.)
15	3.97	1409	682	0.08 x 19' 1sec/ft
16	DRY	1416	—	DRY
17	DRY	1420	—	DRY
18	8.16	1310	242	0.03' x 18' 1sec/ft

1748 Hrs - Arrive @ B-3245

• Unload Pick up - Secure EQ.

1800 Hrs - Leave B 3245 for Bloomington

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 11-14-04

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VOID THIS PAGE

TITLE NSWC CRANE

PROJECT NO. 13765

BOOK NO. 7488

WED. 12/15/04

Work continued from Page

0700 HLS - Arrive @ B-3245, prep. to measure staff gauges @ SWMU 16.

Staff Gauge	W.L.	Time	Voc. Est.
16SG01			
02			
03			
04			
05			
06	3.20	8:24	30-50 gpm
07	44.7+1.64	9:30	3.5" x 3.5' 250cc/ft
08	3.86	817	20-30 gpm (bucket) - Both pipes
09	DRY	819	

0830 HLS - Stop @ Breakroom to check on status of B-146 - Pam called supervisor B-146 is in run mode for the next couple of months - need to do W.L. & staff gauges on a weekly basis.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 12/15/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

APPENDIX D.2.1
SWMU 16
FIELD NOTEBOOK
ROUND 1

NSWC CRANE

N9060

CTO 0279

SWMU: 13 + 16

2555

DRILLING

START: 3/24/03

END:

TABLE OF CONTENTS

Subject	Page

TITLE CRANE

PROJECT NO. 9060

BOOK

Work continued from Page SUNNY 70's

MON 3/24/03

1345 ARRIVE @ BLDG 3245. UN-PACK SUPPLIES

1500 BOWSER MORNER ON-SITE. T. BOEHMER HAS CREW UN-LOAD MATERIALS BY BLDG 3245

1555 TROBAUGH STATES W.S TRAINING W/ DRILLERS

1735 DRILLERS LEAVE SITE. WILL MEET @ BLDG 3245 @ 0700

1820 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bulkner

DATE 3/24/03

WITNESS

DATE

TITL CRANE

PROJECT NO. 9060

BOOK 2555

Work continued from Page SUNNY 50's

TUES 3/25/03

0650 ARRIVE @ BLDG 3745

0700 DRILLERS SHOW UP START BULDOZING DOWN PAD.

0735 CONDUCT REG INSPECTION W/ DAVE S. ON THE PUTRESCIBLE REG.

0800 GO TO MEETING W/ NAVY PLANNER TO DISCUSS ACCESS FOR 13+16

0850 BACK @ BLDG. 3745. UNABLE TO WORK @ SUMM 16 THU THURS. CAN SET UP @ SUMM 13 BUT NEED TO WAIT FOR UTILITY CLEARANCE & 1200 START.

1055 FINISH WALK THRU. DRILLERS SET UP ON 13MWT15.

1226 START DRILLING WITH SAMPLE OUT TO BEDROCK.

1245 DRILLERS @ 15'. HIT SILTSTONE @ 13'.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkema DATE 3/25/03

WITNESS DATE

TITLE CRANE

PROJECT I 9060

BOOK 2555

Work continued from Page SUNNY 60's

TUES 3/25/03

1305 DRILLERS START W/ 6" CASING

1316 DRILLERS @ 15'. SET UP TO REAM W/ 5" BIT TO 25' TO SEE IF WE HAVE A H_2O PRODUCING ZONE.

1326 START REAMING THE HOLE.

1335 DOWN TO 25'. WILL FLUSH OUT HOLE AND SEE WHERE WATER COMES TO

1345 WATER UP TO 17' BGS AND STILL DRILLING.

1352 WL @ 17' BGS. DRILLERS TO SET WELL @ 25'

1355 STARTING TO THUNDER + LIGHTNING. STOP DRILLING.

1506 RAIN STOPPED START SETTING WELL

1600 WELL SET @ 25'
SAND TO 13' (15-17 CHIPS
VOL CLAY 30'. HIGH BENT. TO 11'-4'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkema DATE 3/25/03

WITNESS DATE

TITLE CRANE PROJECT NO. 9060

BOOK 2555

Work continued from Page RAZLY SOS. WENDY

TUES 3/25/03

— MATERIAL USED:
GLOBAL #5 SAND
PURE GOLD MID CHIPS BENTONITE:
QUIK GROUT BENT. POWDER
- BOART LONGYEAR ASTM F480-88A
↳ PIPE + SCREEN PVC SCH 40.
SLOT SIZE .20

1610 DRILLERS PULL OFF. WILL DECON CASING BEFORE NEXT HOLE.

1621 DRILLERS SETTING UP ON. 13MW718.

1724 DOWN TO 20' CONT. SAMPLE.

1750 BACK @ BLDG. 3245 GOING OVER DAILY W/ DRILLERS

TODAY'S TOTALS:
OVB W/ SAMPLE 35'
ROCK W/O SAMPLE 10'
WELL INST. 25' 13MW715

1800 HEAD TO BLOOMINGTON GATE TO GET ANOTHER

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bulkner DATE 3/25/03

WITNESS DATE

TITLE CRANE PROJECT NO. 9060

BOOK 2555

Work continued from Page

TUES 3/25/03

PASS PER DAVES

1615 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bulkner DATE 3/25/03

WITNESS DATE

TITLE CRANE PROJECT NO. 4060 BOOK 2555

Work continued from Page COOL 50'S + SUNNY.

WED 3/26/03

0640 ARRIVE @ LATE. VEHICLE SEARCHED BY SECURITY

0650 ARRIVE @ BLDG 3245. DAVE S + JOHN F. INSPECT

0730 BACK @ BMWT18 SETTING UP TO CURE.

0751 START CURING.

0804 DRYWALLS CALLED TO 30'. WE RUN 12:50 MINUTES WILL FLUSH OUT HOSE W/ AIR THEN BEGIN UP CURE RUN

0841 W/L @ 13.0' BGS. WILL SET WELL @ 30'. SEEMS TO BE A GOOD H20 ZONE FROM 21.5'-25' V-WET.

0848 W/L @ 11.0' BGS ON BMWT15

0940 BMWT18 SET @ 30' 125 gal used
SLAG TO 18'
BENT CHIPS TO 16'
VOL CLAY TO 3'

0946 DRILL STUCK. DAVE S. CALLS T. BOEHMER

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulkner DATE 3/26/03
WITNESS DATE

TITLE CRANE PROJECT NO. 00 BOOK 2555

Work continued from Page 60'S + BREEZY

WED 3/26/03

WILL TRY TO GET A BACKHOE OR TOW TRUCK OUT.

1000 NEED TO GET A BOILER OUT TO THE SITE. 3 1000 GAL A DAY ON-SITE. DAVE S. WILL COORDINATE AND HAVE ONE DELIVERED TO THE SITE.

1030 TOLD T. ROSAHN ABOUT SITUATION. WILL WORK W/ M. COCHRAN + CONTINUE W/ OPT

1047 M. COCHRAN AGREES THAT WE SHOULD HAVE THE DRYWALLS SEND A DOZER TO THE SITE

1050 WE HEAD BACK TO BLDG 3245 TO SEE IF PUBLIC WORKS CAN SEND OUT A WRECKER TO PULL US OUT.

1100 M. COCHRAN TALKS W/ CHRIS A WRECKER WILL BE SENT TO MAINE FILL

1115 ARRIVE @ MAINE FILL B. SECURITY SAYS WE MISSED WRECKER. GO TO TRACK DOWN.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulkner DATE 3/26/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page SUNNY 60's.

WED 3/26/03

1130 GW @ BASE WORKING WITH HILL WRECKER READY AFTER LUNCH

1230 WRECKER ON-SITE.

1320 SAMPLED 135807 0002 w/ M.C.

1330 SAMPLED 135807 0010 w/ M.C.

1335 BACK w/ SUNZE RIG STILL STUCK

1425 RIG UNSTUCK

1433 DRILLERS DECON EQUIP

1448 DRILLERS SET UP ON BMWT17.

1520 DRILLERS STOP THEY NEED TO HELP DOT RIG.

1535 DRILLERS BACK. START DRILLING

1550 DRILLED TO 8' w/ 6" 5" FROM 8'-18' FLUSH OUT HOLE

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 3/26/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page

WED 3/26/03

1558 WATER TO 14' WILL INSTALL WELL @ 18'.

1627 WELL SET @ 18' 2 130 gal used
SAND TO 6'
BENT CHIPS TO 3'
VOL CALC TO —NA—

1630 WELL SET @ 17.5' SOME COLLAPSE.

1636 DRILLERS PULL OFF + HEAD TO DECON.

1656 DRILLING TOTALS.

CUB w/ SAMPLING 15'
ROCK DRILLING w/o SAMPLE 3'
ROCK CORING 10'
WELL INSTALLATION 17.5'

1700 BACK @ 3245 w/ DAVES.

1735 DRILLERS LEAVE SITE

1740 LEAVE SITE TO GET GAS (END OF DAY)

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 3/26/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page | COOL 40's - SUNNY

THURS 3/27/03

0640 ARRIVE @ GATE

0650 ARRIVE @ BLDG 3245 CH PADS

0705 DRILLERS ARRIVE ON SITE.

0740 ARRIVE @ SUMMIT B. DRILLERS NEED TO FINISH DECON. RAN OUT OF WATER YESTERDAY.

0745 @ 13MW17 WL = 6.7

0800 SET UP ON 13MW16. HAVE DRILLERS BLOW DOWN TO 15' BASED ON 13MW17.

0802 BLOW DOWN. DRILLERS HEAR SOMETHING FUNNY W/ THE ROD

0812 BLOW BACK UP. DRILLERS ADDED GREASE TO THE DRIVE SHAFT.

0817 START DRILLING USING 6" CASING

0836 DRILLERS DOWN 15' WILL START TO GET WELL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 | Work continued to Page

SIGNATURE Robert Balkema DATE 3/27/03
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TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page | WARM 60's - SUNNY

THURS 3/27/03

0902 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'
- NO NEED FOR VOL CLAY DUE TO SHALLOW DEPTH.
* HARDER DRILLING @ 12'

0913 DRILLERS PULL OFF AND SET UP ON 13MW12

0939 HIT ROCK @ 7'. WEATHERED S.S. CORED TO 10' WILL SET 6' @ 10'

1014 CORED TO 15' 10-14.5' HAVE WET SEDIMENT ~~GASOLINE~~ FLUSHED OUT MORE

1025 WATER @ 11 BGS WILL DRILL TO 20' AND SET WELL

1050 WELL SET @ 20'
SAND TO 8'
BENT CHIPS TO 4'
WILL NOT USE VOL. CLAY. -

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 | Work continued to Page

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Work continued from Page WARM 70° - SUNNY

THURS 3/27/03

1100 DRILLERS PULL OUT + HEAD TO DECEN.

1214 DRILLERS @ BLDG. 3245 FILLING UP HO/WATER

1245 BACK @ SUNNY 13.

1300 DRILLERS SETTING UP ON 13 MINUTE 10.

1314 REFUSAL @ 3' HIT CONCRETE.

1320 OFFSET A 2ND TIME + HIT CONCRETE

1328 OFFSET A 3RD TIME

1337 DOWN TO 5'.

1414 DOWN TO 15' PUSH. SAT @ 10-12.5' WILL SIT FOR A HALF HOUR TO SEE IF WATER COMES IN.

1448 HOLE STILL DRY. DOZER STARTS UP ON SITE.

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SIGNATURE Robert Balkwill DATE 3/27/03
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Work continued from Page WARM 70's

THURS 3/27/03

1442 HOLE IS DRY. WILL SEND 6" TO 15' THEN 5" REAM TO 30'.

1520 REAMED 15' - 20' WL @ 14' AFTER FLUSH

1530 REAMED 20' - 25' WL @ 14.2 AFTER FLUSH WILL SET WELL @ 25'

1620 WELL SET @ 25'
SAND TO 13'
BENT CHIPS TO 11'
VOL CAK TO 2'

1625 DRILLERS NEED TO DECON

1700 DRILLERS @ BLDG. 3245. GO OVER DAILY ACTIVITIES.

1730 DRILLERS LEAVE SITE

1750 LEAVE FOR FED-EX

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

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Work continued from Page Cool 50's V. Windy Some Clouds

FRI. 3/28/03

0640 ARRIVE @ FIRST GATE

0650 ARRIVE @ BLDG 3245 CAL PTOS

0715 DRILLERS ON SITE, LOADING UP WELL SUPPLIES.

0725 HEAD TO SWMU 13.

0730 BATTERY DEAD ON RIG

0755 DRILLERS SETTING UP ON 13MWT22

0839 4" SAMPLER TO 15' RT @ 6'. APPEARS TO BE A COLD ZONE FROM 6'-5' POSSIBLE WATER. WILL LET HOLE SIT TO SEE IF WATER COMES IN.

0845 WATER @ 14' BGS. WILL HAVE DRILLERS SET 6" TO 7' AND REAM 5" TO 15'. (7'-15')

0911 BLEW OUT HOLE THREE WL=18' BGS WELL SET WELL @ 15'.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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Work continued from Page 50's Cloudy & V. Windy

FRI. 3/28/03

0934 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'
- NO VOL CLAY -

0953 WILL SET UP ON 13MWT11 [redacted] BLOW DOWN TO 15' & SET WELL BACKED ON 13MWT12 TO 20' WL @ 7.2' BGS
13MWT16 TO 15' WL @ 7.0' BGS

1000 SET UP ON 13MWT11 DRILLERS TO SET 6" TO 5' THEN 5" REAM TO 15'.

1004 START W/ 6"

1008 DOWN TO 5'. START W/ 5" REAM

1017 DOWN TO 15'. DRILLERS FLUSH OUT HOLE

1040 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'
- NO VOL CLAY -

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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Work continued from Page V. WATER 2 OVERCAST 67°

FRI 3/28/03

1050 SETUP ON 13MW T21
WILL REAM W/ 5" TO 15' AND SET WELL
BASED ON 13MW T17 WL = 7.01' BGS

1105 REAMED TO 15'. WILL FLUSH OUT HOLE.

1120 WELL INSTALLED @ 15'
SAND TO 4'
BENT. CHIPS TO 2'
→ DRILLER TELLS ME HE LOST HIS CIRCULATION @ 14'-15'. SHOULD BE GOOD PRODUCER

1127 DRILLERS HEAD TO DECON.

1135 BREAK FOR LUNCH

1200 BACK @ BLDG 3245. DOING PAPERWORK

1240 BACK @ SOUTH 13. DRILLERS DECON PAD

1255 SET UP ON 13MW T25

1323 DOWN TO 14'. WILL REFLUSH W/ 4" CASING
POSSIBLE SCREEN @ 8' WILL 5" REAM

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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FRI 3/28/03

TO 15' & FLUSH OUT HOLE.

1338 WL @ 13' BGS WILL LET SIT TO SEE IF MORE COMES IN NOT SURE IF BLOW OUT REMOVED ALL OF THE DRILLING WATER

1406 WATER @ 13.25' AND RISING. WILL SET WELL TO SCREEN THE 8' WET ZONE. HOPEFULLY IT WILL PRODUCE.

1417 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'

1435 CHECKED ON 13MW T22. WL = 10.0' BGS
DRILLERS WILL SET UP ON 13MW T26.

1447 DRILLERS SET UP ON 13MW T26
WILL SAMPLE OUT TO 10' THEN GO TO 20'

1450 STAFF IN OUT @ 10' WILL GO TO 15'
W/ 4" CASING

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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FRI 3/28/03

1553 DRILL TO 20' FLUSHED OUT HOLE.
WL @ 19' AND RISING. WILL SET WELL.

1600 WELL SET @ 20'
SAND TO 8'
BENT CHIPS TO 3'
NO VOL CLAY TO NA

1610 STARTING TO THUNDER + LIGHTNING.

1658 DRILLING TOTALS

49' OF OVB + ROCK SAMPLING (5' RUN)
14' OVB NS
17' ROCK NS
80' WELL TEST
5 SANDBY
1 DAY DRILL

GO OVER DAILY W/ DAVE S

1705 DRILLERS OFF SITE.

1730 LEAVE FOR FED-EX.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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Work continued from Page CONT 30' + OVERCAST

SAT 3/29/03

0650 ARRIVE @ SITE

0705 DRILLERS ON-SITE.

0720 LEAVE FOR SUMM 13. DRILLERS STAY
NEED TO DECON

0750 CHECK W/ MENKEN KLUESNER BLDG 165
SUPERVISOR

0800 RIG SET UP ON 13MW07

0845 OVB TO 5' CORE 5'-15'
WL @ 5' WILL SET 15' WELL

0900 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'
- NO VOL CLAY.
WILL SET UP ON 13MW7
AND BLOW DOWN TO 16' + SET WELL

0917 SET UP ON 13MW05 SLIGHT INCLINED FROM

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SAT 3/29/03

13MW T05 WILL SET WELL @ 16'.

0435 WELL SET @ 16'
SAND TO 4'
BENT CHIPS TO 2'

0455 DRILLERS HEAD OVER TO BLDG. 3245 TO GET WATER TRUCK.

1024 SET UP ON 13MW T02.

1152 OUB TO 7' ROCK CORE TO 17'
FLUSH OUT HOLE AND LET SET.

1355 WL = 16.7' BGS 3' FEET UP WATER.
WILL GO DEEPER.

1452 DOWN TO 27'. LAST RUN HAD HIGHLY FRACTURED SHALE - S.B. (WATER BEARING)
LOOKS LIKE A GOOD PRODUCING ZONE.
W/L @ 23' BGS AFTER FLUSH OUT
WILL SET WELL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bulkner DATE 3/29/03

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Work continued from Page CLOUDS 40° CLOUDY

SAT. 3/29/03

1543 WELL SET @ 27'
SAND TO 15'
BENT CHIPS TO 13'
VOL CLAY TO 4'

1555 DRILLERS HEAD TO DECON.

1630 DECON FINISHED DRILLERS WAD WATER INTO RIG. DRILLERS WILL TRY TO SET THE RIG UP ON 13MW T08 HARD ACCESS.

1636 RAINING

1654 RIG STUCK. DRILLERS GET DOZER.

1728 RIG SET-UP ON 13MW T08 HAD TO MOVE 2100' TOWARDS BLDG 165 DUE TO MUDDY CONDITIONS

1737 HEAD TO BLDG. 3245 TO GO OVER DAILY ACTIVITIES & FILL UP W/ WATER

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SUN 3/29/03

1800 DRILLERS LEAVE SITE

1900 LEAVE SITE

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Work continued from Page WIND 31°

SUN 3/30/03

0655 ARRIVE @ SITE

0700 DRILLERS ON-SITE FILLING UP DECON TANK

0735 START DRILLING ON 13 MW TOP

0755 DOWN TO 10' PUSH SAT @ 8' WTR TO 15'

0811 DOWN TO 15' W/ 4" SAMPLER. WET ALONG THE SIDES OF THE HOLE WTR SET 6' TO 5' THEN REAM (5") 5'-15'.

0830 DOWN TO 15'. DRILLER LOSING WATER FLUSHED HOLE. WL 2 9' BGS. WTR SET WELL

0910 WELL SET @ 15'.
SAND TO 14'
BENT CHIPS TO 2'

0924 DRILLERS SET UP ON 13 MW TOP.

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Work continued from Page CONT 30'S V-WINDOW

SUN 3/30/03

0930 START DRILLING.

0945 DOWN TO 8'. HIT REFUSAL WILL SET 6" @ 5' DRILL ABOVE POSS. SATURATION @ 7-7.5'.

1000 PULL UP TO 15' W/ 5" WILL FLUSH OUT HOLE. WATER @ 13' AND RISING WILL SET WELL @ 15'

1017 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'

1030 DRILLERS HEAD TO DEEP RIV.

1120 SET UP ON BMW101
CHECKED WL ON BMW102 WL = 22' BGS.

1150 DOWN TO 40'. DIFFERENT LITH. THAN BMW102. POSS. MOISTURE @ 8'. HOLE COLLAPSED TO 6'. DRILLERS WILL OPEN HOLE BACK UP + LET SIT TO SEE IF THE WEATHERED S S WILL MAKE WATER.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

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SUN 3/30/03

1200 DRILLERS TIME A BREAK. HOLE OPEN TO 10'. WILL LET SIT TO SEE IF WATER COMES UP.

1254 WATER @ 6.5' BGS. WILL SET WELL @ 15'.

1335 WELL SET @ 15'
SAND TO [redacted] 3'
BENT CHIPS TO [redacted] 1'

1340 PULL OFF. WILL DRIVE OVER AND DEEP TWO LINE.

1410 DRILLERS THINK TO SET UP ON BMW103.

1438 NOT BACK FAR ENOUGH OFF OF THE WATER LINE. RIG STUCK.

1510 RIG PULLED OUT. WILL INSTALL WELL NEAR THE ROAD.

1512 WILL SEND 5" TO 15'. BASED ON BMW101 DETAILS.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

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SUN 3/30/03

1540 WELL SET @ 15'
SAND TO 3'
BENT TO 1'
- DRILLERS CLEAN UP. HEAD OVER TO DEWN.
PLAN TO MOB DOZER OUT OF FENCED
AREA.

1728 DOZER & RIG SET UP ON 13 MINUTE 14.

1740 HEAD TO BLDG. 3245.

1800 DRILLERS LEAVE SITE.

1830 LEAVE SITE. NEED TO FIGURE UP VERTICALS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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Work continued from Page CONT FROM 2095

MON 3/31/03

0655 ARRIVE @ BLDG. 3245

0700 DRILLERS ON SITE.

0750 BACK @ 13 MINUTE 14.

0852 DOWN TO 17.5' REFUSAL POSS. WATER
@ 9' BGS WILL LET HOLE SIT TO SEE IF
WATER COMES IN

0912 WATER COMING IN THE HOLE. M-SCADE
CAME UP WET. 2.1' WATER. SCRAPED
THE SIDE WALLS 3.8' OF SATURATION AROUND
THE SIDE WALLS.

0948 TALKED W/ M. COCHRAN. REGARDING
THE PLACEMENT OF 13 MINUTE 14. HE SUGGESTS
GOING 5' MORE FEET THEN PULLING OFF
THE HOLE. DRILLERS TO BEGIN 5' 23'.

1023 DOWN TO 23'. FLUSHED OUT HOLE.
WATER LEVEL @ 20' AND RISING.
WILL SET WELL @ 23'.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkovec
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TITLE N SWC CRANE

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Work continued from Page COLD 20° + SUNNY

MON 3/31/03

1050 WELL SET @ 23'
SAND TO 11'
BENT CHIPS TO 9'
[redacted] VOL CLAY. TO 2'.

1120 CLEAN UP + BREAK

1230 SET UP ON 13MW T19.

1252 DOWN TO 9'. HARD @ 8'-9'. WILL CORE THE REST.

1420 DOWN TO 19'. WL @ 17' AFTER FLUSH OUT. WILL INSTALL @ 19' TO SCREEN POSSIBLE SATURATION @ 13'.

1500 WELL SET @ 19'
SAND TO 7'
BENT CHIPS TO 2'

1530 PULLED OUT RIG. DRILLERS HEAD TO DETWN

1600 DRILLERS TAKE RIG OVER AND TRY TO SLEE UP ON 13MW T13.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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MON 3/31/03

1615 RIG STUCK.

1650 RIG OUT. M. COCHRAN RE-SET 13MW T13 TUMBLES THE ROAD T. ROSMAN NEEDS TO CLEAR UTILITIES BEFORE WE CONTINUE.

1700 DRILLERS GO OVER AND DROP OFF RIG.

1730 HEAD TO BLDG. 3245 TO GO OVER DAILY ACTIVITIES

1815 LEAVE SITE. DRILLERS LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Belkner DATE 3/31/03

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TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page WARM 50's - WINDY

TUES 4/1/03

0655 ARRIVE @ SITE.

0705 DRILLERS ON SITE

0720 LOU W/ MCCUEMAN TO TALK ABOUT LOCATION FOR 13MW103 + 13MW104. 13MW103 MOVED TOWARDS THE PUMP. T. ROSAHN NEEDS TO CONTACT PUBLIC WORKS.

0750 @ 13MW104 LOCATION. WILL NEED TO USE THE DOZER. MCCUEMAN WILL HELP.

0813 START DRILLING @ 13MW120

0850 DOWN TO 15'. WATER COMING IN. WILL WAIT TO SEE WHERE WATER COMES IN

0909 WATER LEVEL @ 13.5' BGS

0925 DOWN TO 20'. WILL SET WELL + STRUGGLE THE 13' SATURATION.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulthuis DATE 4/1/03
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TUES 4/1/03

0937 WELL SET @ 20'
SAND TO 8'
BENT CHIPS TO 2'

0943 DRILLERS HEAD TO DECON.

1007 DRILLERS SETTING UP ON 13MW104.

1040 DOWN TO 20'. LOOKED WITH THE WELL SET WELL @ 20'. BASED ON 13MW110. + LITHOLOGY SEEN @ 13MW114.

1050 WELL SET @ 20'
SAND TO 8'
BENT CHIPS TO 2'
WL ON 13MW114 = 14.5' BGS

1104 DRILLERS PULL OUT RIG. WILL CLEAN UP + SET UP ON 13MW123.

1215 DRILLERS SET UP ON 13MW123.

1312 SAMPLED TO 22'. WATER @ 16'? 2.5' OF WATER IN HOLE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulthuis DATE 4/1/03
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TUES 4/1/03

1320 WELL SET @ 21.5'
SAND TO 4.5'
BENT TO 7.5' WELL TO 2'

1337 SET UP ON BMWT24
WILL SET WELL @ 22' BASED ON
BMWT23 + BMWT26. W.L @ BMWT26
=14.8 BLS.

1345 START DRILLING

1410 DOWN TO 22'. CUTTINGS ARE LOOKING
SIMILAR TO BOTH T26 + T23.
W/L @ 19' AFTER BLOW OUT WILL
SET WELL.

1420 WELL SET @ 22'
SAND TO 10'
BENT TO 2'
PULL OFF + DECON.

1425 T. BRENT + CHRIS ON-SITE
SHOW THEM FINISHED WELLS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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TUES 4/1/03

1443 T. BRENT + CHRIS LEAVE SITE

1500 DRILLERS FINISHED DECON. HEAD
TO BLDG 3245

1610 DRILLERS LEAVE SITE

1730 LEAVE FOR FEDEX

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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WED 4/8/03

0700 ARRIVE @ SITE

0800 LEAVE FOR FED EX. 1400 FLIGHT

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SIGNATURE Robert Bulkner

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DATE 4/8/03

DATE

TITLE CRANE

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Work continued from Page COOL 50° + OVERCAST

THU 4/9/03

700 ARRIVE @ SITE

710 DRILLERS ON-SITE DRILLING PADS.

1500 RECEIVED GO AHEAD FROM PM + TALKED W MR. KLUESNER @ BLDG 165 O.K. TO START @ 1630 ON B MUNTOG JUST NEED TO CHECK IN @ 1630 FIRST.

1600 DRILLERS ROUNDING UP EQUIPMENT.

1700 SET UP ON B MUNTOG AFTER TALKING W/ MARVIN K. DRILLERS ALLOWED TO KEEP DRILLING ALSO.

1729 DOWN TO 15'. POSSIBLE SATURATION @ 6.5'. WILL SET WELL @ 15'.

1800 DRILLERS OVER @ DEEM. DOZER WAKED UP B MUNTOG SET @ 15'
SAND TO 3'
BENT TO 1'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bulkner

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DATE 4/9/03.

DATE

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BOOK 2555

Work continued from Page Work, 50's - Overcast

MON 4/7/03

1830 @ Bldg 3245 talking w/ Dave S. of B.M.

1840 Drivers off-site

1910 Leave Site

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bulkner DATE 4/7/03

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BOOK 2555

Work continued from Page Work 40's

TUES 4/8/03

0700 Arrive @ Bldg 3245 w/ P.J.D.

0720 Drivers All on-site.

0730 Head to Sumy 13. Will set up on 13mm-T13.

0740 Surveyors on-site. Direct them to Bldg 3245.

0830 Drivers unable to set up on 13mm-T13. Will need to re-locate or block traffic @ Hunt to set well. Will head to Bldg 3245 to see about getting into Sumy 16.

1000 @ Sumy 16. Drivers setting up on 16mm-T01. Talked w/ Matt Cochran regarding the movement of 13mm-T13. He suggests that we move my closer to the road. If not, we may eliminate.

1030 Start drilling @ 16mm-T01.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bulkner DATE 4/8/03

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Work continued from Page (COND 40'S - OVERCAST.

TUES 4/8/03

1147 @ 19' WILL FLUSH OUT HOLE + BREAK FOR LUNCH

1300 BACK @ 3245 NEED TO TALK W/T. BRENT ABOUT RECENT SUMM 13 ISSUES RELATIONS ACCESS AND NO-WORK ZONES

1330 BACK @ SUMM 16. W/L @ 16MW-TW = 16.5' BUS WILL GIVE 5 MORE FEET

1331 RIG DOWN. ELECTRICAL PROBLEMS

1344 BACK UP + RUNNING. WILL GIVE TO 24'.

1400 WELL WILL BE SET @ 24'

1420 WELL SET @ 24'
SAND TO 12'
BENT. CHIPS TO 11'
VOL CLAY - 4'

1430 HEAD OVER TO DECON

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Belhaver DATE 4/8/03
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TUES 4/8/03

1510 BACK @ SUMM 16
NEED TO MOVE 2 DUMPSTERS IN ORDER TO SET UP ON 16MW-TW4

1520 RIG SET UP ON 16MW-TW4.

1530 START DRILLING.

1535 HIT ROCK @ 4'. REFUSAL @ 5'

1637 DOWN 20' FLUSHED OUT HOLE
WILL SEE WHERE WATER COMES TO OVERNIGHT

1645 BACK @ BUSH 3245. GO OVER DAILY W/ DRILLERS

1710 DRILLERS OFF-SITE

1715 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Belhaver DATE 4/8/03
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TITLE CRANE

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BOOK 2555

Work continued from Page CRW 305 UNDERCUT

WED 4/9/03

0700 ARRIVE @ SITE. DRILLERS ON-SITE
ON P.J.D.

0738 BACK @ 16MW-04. WL IN HOLE = 15' BGS
WILL REAM TO 25' + SET WELL. VERY
RAINY. WANT TO MAKE SURE THE WELL WILL
PRODUCE IN DRY SEASON.

0829 WELL SET @ 25'.
SAND TO 13'
BENT CHIPS TO 12'
VOL CLAY TO 2'.

0848 DRILLERS HEAD TO DECON

START CONNECTING SOIL SAMPLES W/ T. RUSAKIN

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bultman DATE 4/9/03

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WED. 4/9/03

1120 DRILLERS DOWN TO 4' @ 16MW-03
BREAK FOR LUNCH

1300 BACK @ 16MW-05.

1330 CHECKED WL FOR 14-05-83 = 39.65' BGS
& 14-01-83 : 28.5' BGS. BOTH WELLS
SET @ 45'

1431 DOWN TO 40'. WILL SET WELL THERE
BASED ON NEARBY WELLS.

1510 WELL SET @ 39'
SAND TO 28'
BENT CHIPS TO 25'
VOL-CLAY TO 2'

1515 HEAD TO BLDG. 3345 TO DECON &
DISCUSS THE INSTALLATION OF 13MW-13.
WILL HAVE TO INSTALL IT ON SUNDAY.

1625 SET UP RIG ON 16MW-03. WILL
DRILL TOMORROW.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bultman DATE 4/9/03

WITNESS DATE

TITLE Crane

PROJECT NO. 4060a
BOOK 2555

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WED 4/9/03

1655 Let drillers in @ SWMW 13. Checked in w/ the Guard. Will be able to access restricted area @ 1730. T. Rutzhan wants me to hang around until drillers leave. Drillers work on lines outside buffer zone.

1730 Granted access inside buffer zone. Drillers start digging pads.

1905 2 more pads to dig.

1940 Drillers finish last pads.

2000 Leave site. Will take care of paperwork tomorrow. SWMW 13 secured

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SIGNATURE Robert Bulkner DATE 4/9/03

WITNESS DATE

TITLE Crane

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Work continued from Page Wind 30's & Sunny

THURS 4/10/03

0700 Arrive on-site.

0730 Discuss possibility of using a track rig to install 13MW13. M. Cochran will coordinate w/ D. Wozniak of Bunger Murner.

0805 Set up on 16MW13 03 Previously sampled to 35' w/ 165836. Drillers setting water tub.

0910 Down to 29'. Looks wet around 20' with cave to 34'.

0943 Down to 34'. Flush out hole

1023 Well set @ 35'
Sand to 23'
Bent. chips to 20'
Vol Clay to 2'
*Driller overdrilled a foot ok
mistake during clean out of hole.

1040 Pull off + head to Decon.

Work continued to Page

SIGNATURE Robert Bulkner DATE 4/10/03

WITNESS DATE

TITLE CRANE

PROJECT NO. 4060
BOOK 2555

Work continued from Page 55° + SUNNY

THURS 4/10/03

1200 CEMENT TRUCK ARRIVES @ SWMM13
DRIVERS WILL START W/ 13 MM T30 AND
WORK BACK TOWARDS THE SOUTH GATE

1406 DAVE S. OFFSITE TO MEET W/ GLOBAL SUPPLY
TRUCK.

1420 T. BRENT - C. FREEMAN ON-SITE TO
CHECK ON THINGS. WANTED TO KNOW IF
WE HAD PROBLEMS W/ CONCRETE TRUCK
GETTING INTO SWMM 13.

1433 T. BRENT - C. FREEMAN OFF-SITE.

1500 FINISHED ACCESSIBLE PADS. WILL TRY
TO POUR THE 2 BY THE BUS STOP
OUTSIDE OF SWMM 13.

1515 MEAD OUTSIDE TO POUR THE LAST TWO
PADS.

1760 BACK @ BLDG 3285. NO OTHER DAILY ACTIVITY
W/ DRIVERS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Belkner DATE 4/10/03
WITNESS DATE

TITLE CRANE,

PROJECT NO. 4060
BOOK 2555

Work continued from Page

THURS 4/10/03

1720 LEAVE FOR RED EX

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Belkner DATE 4/10/03
WITNESS DATE

TITLE CRANE

PROJECT NO. 4060
BOOK 2555

Work continued from Page

FRI 4/11/03

0700 ARRIVE @ SITE

0710 DRILLERS ON SITE.

0743 @ SWMU 16.

0755 SET UP ON 16MW103. W/ @ 16MW103 =25' BGS

0819 DOWN TO 13' WET @ 7 & 10.5'

0834 DOWN TO 14' WATER LEVEL @ 16.86'
YOU CAN HEAR WATER RUNNING INTO THE HOLE. WILL SET WELL @ 18' TO SHROUDLE THE 10' WET ZONE.

0854 WELL SET @ 18'
SAND TO 6'
BENT CHIPS TO 2'

0905 DRILLERS PULL OUT + HEAD TO DEUMI.
THEY WILL MOB ~~[illegible]~~ BOBCAT QUED TO SWMU 16 TO FINISH DIRECT PUSH

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bultman DATE 4/11/03
WITNESS DATE

TITLE CRANE

PROJECT NO. 4060
BOOK 2555

Work continued from Page

FRI 4/11/03

1000 GEAR UP TO DEVELOP W/ TROYAHNO

1815 LEAVE SITE. DRILLERS LEAVE SITE

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bultman DATE 4/11/03
WITNESS DATE

TITLE CRANE

PROJECT NO. 9060
BOOK 2555

Work continued from Page Cont 45° Sunny

Sat. 4/19/03

0635 Arrive on-site

0640 Drillers on-site Concrete truck supposed to show up @ 0700 to pour pads @ Sunny 13.

0850 Drillers go to meet concrete truck, will develop w/T. Rushing Reifer to look over B63 for development details

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkner
WITNESS

DATE 4/19/03
DATE

TITLE CRANE

PROJECT NO. 9060
BOOK 2555

Work continued from Page Cont 45°

Tues 4/22/03

0650 Arrive @ site. Gear up to collect GW samples

0755 Set up on 16MW101 to start sampling

0800 Start sampling 1

0807 Well dry unable to collect 4 vols.

0820 Set up on 16MW102

0828 Start pumping

0946 Sampled 16MW102

1230 Set up on 16MW104.

1243 Start pumping

1437 Sampled 16MW104.

1630 16MW101 dry leave for

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkner
WITNESS

DATE 4/22/03
DATE

TITLE CRANE

PROJECT NO. 9060

BOOK 2555

Work continued from Page

TUES 4/22/03

BLDG 3245.

1730 CHECK CALIBRATION FOR YSI

1730 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkovec

DATE 4/22/03

WITNESS

DATE

TITLE CRANE

PROJECT NO. 9060

BOOK 2555

Work continued from Page Cont 35°

WED. 4/23/03

0630 ARRIVE @ SITE. DENNY UNABLE TO MAKE IT TODAY. WILL ARRIVE ON-SITE TOMORROW.

0700 HEAD

0720 SETUP ON WELL 14-4-83

0723 START PUMPING

0811 START SAMPLING 16MW0401

0830 HEAD TO BLDG. 3245 TO PROCESS SAMPLES DRILLERS SHOULD BE ON-SITE @ 1000.

1000 DRILLERS ARRIVE ON-SITE
JOHN WEFER
CHAD MAHAFFY
DENNIS STARK
GO OVER HAS + CONDUCT PRE-INSPECTION.

1100 DRILLERS BREAK FOR LUNCH.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkovec

DATE 4/23/03

WITNESS

DATE

TITLE CRANE

PROJECT NO. 9060
BOOK 2555

Work continued from Page SUNNY + 60°

WED 4/23/03

1216 DRILLERS BACK + FINISH DECON.
HEAD TO SUMMIT3. WILL SET UP
ON 13MWT13.

1230. SET UP ON 13MWT13.
WILL SPLIT SPOON TO REFUSAL
THEN ROLLER BIT.

1238 START DRILLING

1336 WATER @ 10'.
HIT SPOON REFUSAL @ 13'
WILL DRILL TO 18' + SET WELL

1350 ADVANCED TO 14' WILL SET WELL @ 18'.

1500 WELL SET @ 18'
SAND TO 6'
BENT TO 2'
6" HOLE 0-14'

1510 DRILLERS CLEAN UP + START TO
DRIVE OUT PAD.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill DATE 4/23/03
WITNESS DATE

TITLE CRANE

PROJECT NO. 9060
BOOK 2555

Work continued from Page

WED 4/23/03

1600 DRILLERS OFF SITE

1630 HEAD FOR FEDEX + GAS FOR VEHICLE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill DATE 4/23/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page Cover 40's

THURS 4/24/03

0630 ARRIVED TO MEET W/ DENNY TO GET HAT

0900 ARRIVE BACK @ BLDG 3245
T. JOHNSTON WANTS TO REINSTALL 16MW101.

0930 TALK W/ T. BOEHMER. WILL AGREE TO SEND MORE SUPPLIES DOWN FOR AN ADDITIONAL 65 HR FOR 8 HOURS.

1000 HEAD TO SWMU16 TO SET UP ON 16MW101B REDRILL

1035 DRILLERS SET UP ON 16MW101B

1040 SET UP ON WES-14-03-83

1041 START PUMPING NEED 8.3L FOR 1 vol

1055 CHECKED ON DRILLERS DOWN TO 13' W/ HSA. WAS DRILLING AROUND 9'.

1132 DRILLERS DOWN TO 23'
HAD WET TUBE @ 9' THEN DRY AFTER AROUND 16'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 4/24/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page 50's SLIGHT DRIZZLE

THURS 4/24/03

1130 DRILLERS BREAK

1201 START SAMPLING ~~16MW~~ 16MW101 201.

1240 DRILLERS BACK. WILL CLEAN OUT HOLE & WAIT FOR MORE AUGER FLIGHTS

1330 HOLE OPEN TO 23'.
WATER 5' BGS. NOT SURE WHY
1ST 16MW101 IS DRY.

1345 FINISHED SAMPLING

1430 SET UP ON WES-14-03-83

1433 START PUMPING

1510 TALKED W/ JOHNSTON HE WANTS TO SET REDRILL 16MW101 @ 24'.

1515 DRILLERS AUGERED TO 25' W/ 4-25' AUGERS WELL SET WELL @ 25' TO SCREEN (165-17)

1630 WELL SET @ 25'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 4/24/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page

THURS 4/24/03

SAND TO 13'
BENT TO 4'
- CHROS TO 11'
- VOLCAN TO 4'

1632 START SAMPLING 16MW0301

1719 DRILLERS HEAD OVER TO BLDG 3245 TO CLEAN UP. T. ROJAHN GOES OVER TO 16MW101 REGRIL TO FIGURE OUT HOW BIG A PAD WE CAN INSTALL

1834 CLEAN UP + HEAD TO BLDG 3245-

1910 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Belknap DATE 4/24/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page 40's - PLATFORM

FRI 4/25/03

0630 ARRIVE @ SITE.

0720 HEAD FOR SWMU 13.

0800 SET UP ON BMW1726

0804 START PUMPING

1022 SAMPLING 13BMW1726

1105 SET UP ON 13MW1725

1110 START PUMPING

1152 WELL PUMPED DOWN TO TURBULENCE
3.25L PUMPED OUT 2L + 1 vol.
WELL LOWER TURBULENCE AND PUMP OUT WELL. WELL DID NOT STABILIZE.

1210 WELL DRY - REMOVED 5.25L
> 2 vols. WELL MOVE ON TO BMW1721.

1230 SET UP ON 13MW1721.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Belknap DATE 4/25/03
WITNESS DATE

TITLE CRANE

PROJECT NO. 9060
BOOK 2555

Work continued from Page 50° + RAIN

FRI 4/25/03

1237 START PUMPING

1346 START SAMPLING 13GW72101
COLLECT DUP FD04250301

1458 FINISHED SAMPLING

1730 HEAD TO FEDEX

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill

WITNESS

DATE 4/25/03

DATE

TITLE CRANE

PROJECT NO. 9060
BOOK 2555

Work continued from Page WARM 50's

SAT 4/26/03

0630 ARRIVE @ SITE. LOAD UP TO SAMPLE @ SWMU 13.

0718 BACK @ 13MW725.
W.L. = 17.31' TD 18.03'
VOLUME W.L. = 14.76 22% RECOVERY
2 438 ml TO WELL.
WAIT TILL 1000 AND RE-CHECK

0740 SETUP ON 13MW703

0745 START PUMPING

0855 RETURNED WELL PARAMETERS NOT STABLE

1145 HAD TO PUMP FOR 4 HRS. WELL NOT STABLE NTUS >10.

1146 START SAMPLING 13GW70301

1236 END SAMPLING HEAD OVER TO 13MW725 TO CHECK ON WL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill

WITNESS

DATE 4/26/03

DATE

TITLE Crane PROJECT NO. 9060
BOOK 2555

Work continued from Page Hot 70's

Sat 4/26/03

1228 WL @ 17.24' .07' RISE IN 5 HRS + 10 MIN

1230 START SAMPLING FOR EXPLOSIVES.

1232 WELL DRY FILLED 2 1/2 L.
WILL HEAD TO 13MW102

1246 START PUMPING ON 13MW102.

1535 END PURGE TURBIDITY <10 NTUS

1536 START SAMPLING.

1546 WELL RAN DRY BEFORE SAMPLING COULD BE COMPLETE. WILL SLEEP FOR RECHARGE.

1605 WL @ 13MW125 = 17.90'. WILL CHECK TOMORROW.

1700 HEAD OVER TO SUMM 16 TO DEWATER 16MW106.

1800 LEAVE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 4/27/03
WITNESS DATE

TITLE Crane PROJECT NO. 9060
BOOK 2555

Work continued from Page Warm 50's

Sun 4/27/03

0730 ARRIVE @ SITE

0825 2.35' = WL @ 13MW102
& 65' RECHARGE. WILL FINISH SAMPLING.

0830 RESUME SAMPLING. 6-0 NTUS

0940 SETUP ON 13MW104

0946 START PUMPING

1051 START SAMPLING 13MW104

1150 13MW140 & 13MW141 BOTH UNDER PRESSURE. J-PLUG ON TWO TUBES. WL RESTING ON BOTH. WILL COME BACK LATER.

1213 @ 13MW125 WL = 17.31'
WILL COLLECT ~~[illegible]~~ MORE VOL FOR EXP.

1370 WELL DRY. REMOVED 2 400 mls

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 4/27/03
WITNESS DATE

TITLE CRANE

PROJECT NO. 9060
BOOK 2555

Work continued from Page SUNNY 205

SUN 4/27/03

1240 SET UP ON 13MWT04 WL STABLE.

1245 START PUMPING.

1505 END PURGE REMOVED 12.2L 12 gals

1506 START SAMPLING 13MWT11

1556 SET UP ON 13MWT16

1 START PUMPING

1811 SAMPLING 13GWT1001

1940 MOVED OVER TO BLDG 3245

1942 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bultmann
WITNESS

DATE 4/27/03
DATE

TITLE CRANE

PROJECT NO. 9060
BOOK 2555

Work continued from Page SUNNY 205

MON 4/28/03

0630 ARRIVE @ SITE. GROUP W/ GW SAMPLE

START PUMPING @ 13MWT09

0911 SAMPLING 13MWT09
+ FD042803

1320 BACK @ 13MWT25. RESUME SAMPLING
WL = 12.28'

1325 WELL DRY. REMOVED 2 WELLS FOR MEMS.

1305 SET UP ON 13MWT24

1311 START PUMPING

1450 START SAMPLING 13GWT2401

1530 FINISHED SAMPLING

1537 RELIEVE TEAM R. CONTINUE ON 13MWT20

1606 START SAMPLING 13GWT2001

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bultmann
WITNESS

DATE 4/28/03
DATE

TITLE Crane

PROJECT NO. 4060

BOOK 2555

Work continued from Page Page 60?

Mon 4/28/03

1740 Finish Sampling

1745 Setup to sample 13mw02. Well too to fill metals.

1751 Well dry. Started sampling @ 1748 3.400 gals. With check on surveyors

1825 Surveyors finished. Leave Summit. Head to 3245 to unload samples + equip.

1900 Leave Site.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill

DATE 4/28/03

WITNESS

DATE

TITLE Crane

PROJECT NO. 4060

BOOK 2555

Work continued from Page Page 56?

Tues. 4/29/03

0630 Arrive @ site. Check on 13MW14

0750 Set up on 13MW14.

0755 Start pumping.

0425 End purge: Parameters stable

0426 Sampling 13MW14D1.

1023 Back @ 13MW02. WL = 17.38' With contractor to sample metals.

1032 Well dry. 2.400 gals removed

1130 With work w/ T.P. Development + Well restoration

1630 Leave for Fed-Ex.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill

DATE 4/29/03

WITNESS

DATE

TITLE CRANE

PROJECT NO. 4000

BOOK 2555

Work continued from Page 605 - SUNNY

TUES 5/6/03

0700 ARRIVE @ SITE

0715 CALL YSI - LAMOTTE.

0730 HEAD TO SUNNY 13 TO CONTINUE GW SAMPLING

0748 START PUMPING ON 13MW16

0842 START SAMPLING 13GWT1601

0930 SETUP ON 13MW16

0938 START PUMPING

1342 SAMPLING 13GWT1801. NEW FLOWER METHOD

1440 @ 13MW25 w/ 11.20 FINISH SAMPLING AMMONIA.

1445 SETUP - START PUMPING 13MW15.

1702 START SAMPLING 13GWT1501.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bulkner DATE 5/6/03

WITNESS DATE

TITLE CRANE

PROJECT NO. 4000

BOOK 2555

Work continued from Page

TUES 5/6/03

1800 HEAD BACK TO BLDG 3245

1830 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bulkner DATE 5/6/03

WITNESS DATE

TITLE CRANE

PROJECT NO. 4060
BOOK 2555

Work continued from Page 68 - Cloudy

WED 5/7/03

0640 ARRIVE @ SITE

0705 HEAD OVER TO SWMU 13.

0720 SET UP ON 13MWT1B

0730 START PUMPING

0947 START SAMPLING 13 GWT1301 + GWT1 DUP FD05070301.

1100 HEAD OVER TO BLDG 3245 TO DROP OFF SAMPLES

1150 SET-UP ON 13MWT19

1155 START PUMPING

1347 SAMPLING 13GWT1901.

1450 HEAD OVER TO BLDG 3245.

1700 @ 13MWT06. FIN DAY. MEMS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill DATE 5/7/03

WITNESS DATE

TITLE CRANE

PROJECT NO. 4060
BOOK 2555

Work continued from Page

1730 LEAVE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill DATE 5/7/03

WITNESS DATE

TITLE CRANE PROJECT NO. 9660
BOOK 2555

Work continued from Page 70's + [redacted]

5/8/03 Thurs

[redacted] Arrive @ Lyal Mart Pick-up Supplies

0740 Get load of top soil from nursery w/ T.R.

0810 Arrive @ site. Wait Reserve well location + collect remaining soil samples

1730 Head for home

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balhuer DATE 5/8/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9660
BOOK 2555

Work continued from Page 70's + Patrol

5/9/03 Fri.

0640 Gear up to conduct slug tests

0730 Set up on B-MW-17.

0900 Finished

0917 @ B-MW-15 waiting for WL to stabilize WL 9.04' initial WL @ 8.71'

0938 @ B-MW-15 initial WL 12.80' 12.50' w/ x-dr. will wait for stabilization

0958 WL @ 8.85' on B-MW-26.

1002 @ B-MW-11. will set up WL @ 7.28. initial WL @ 7.6' will allow WL to stabilize

1018 WL @ 8.97' on B-MW-26

1105 @ B-MW-26 WL 9.08' start falling head test.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balhuer DATE 5/9/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2355

Work continued from Page 205 + HUMBO

5/9/03 5/9/03

1143 START 13MWUT15 FALLING HEAD TEST.

1208 START 13MWUT11 FALLING HEAD TEST

1235 FINISH FALLING HEAD TEST @ 13MWUT15

1240 START RISING HEAD TEST

1255 STOP FALLING HEAD TEST FOR 13MWUT11

1259 START RISING HEAD TEST FOR 13MWUT11.

1347 @ 13MWUT15.

1350 STOP TEST.

1400 CHECKING ON 13MWUT11

1416 STOP TEST WL= 7.78'

1436 END TEST ON 13MWUT26 97% RECOVERED
START RISING WL= 8.67'

1438 START RISING HEAD TEST.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 5/9/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2355

Work continued from Page 205 + CONLOY

FROM 5/9/03

1730 FINISH TEST. ACCIDENTLY TURNED OFF TEST

1735 SET XDERS ON 13MWUT08 + 13MWUT02
HEAD BACK TO BLDG 3245

1800 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 5/9/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page Cool 50's & Drizzle

SAT 5/10/03

0700 ARRIVE @ SITE
TENTATIVE TO RUN SLUG TESTS:

CONDUCTED FALLING HEAD TESTS FOR

- 13MW030
- 13MW02 - FINISHED 5/11/03
- 13MW08
- 13MW14

CONDUCTED RISING HEAD TESTS FOR
- 13MW030
- 13MW08
- 13MW14

HELPED TIROSAN W/ WELL RESTORATION THROUGH OUT THE DAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulkner DATE 5/10/03
WITNESS DATE

TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page

1800 LEAVE SITE. WILL CHECK ON 13MW02 TOMORROW

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulkner DATE 5/10/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page 60's WEATHER SUNNY

SUN 5/1/03

0640 ARRIVE @ SITE.
GEAR UP TO CONTINUE SLUG TESTS @ SUMMIT.

0810 SET-UP + START FALLING HEAD TEST ON 16MW102

0816 END TEST

0817 START RISING HEAD TEST @ 16MW102

0835 SET UP + START FALLING HEAD TEST @ 16MW103.

0900 SET-UP @ 16MW104 WAIT FOR W/L TO STABILIZE.

0908 SET UP + START PUMPING ON 16MW103 NEED TO RE-SAMPLE SVOCs.

0924 START FALLING HEAD TEST @ 16MW104

0930 FALLING HEAD TEST FINISHED @ 16MW103

Work continued to Page

SIGNATURE Robert Balkner DATE 5/1/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page 60's + V. WEATHER.

SUN 5/1/03

START RISING HEAD TEST

1005 FINISH FALLING HEAD TEST @ 16MW104
START RISING

1012 RISING HEAD TEST @ 16MW103 COMPLETE

1044 FINISH RISING HEAD TEST ON MW104
FINISH REMOVING FORMS AROUND PADS

1340 SAMPLING 16GW102
SVOCs ONLY

1330 HEAD OVER TO SUMMIT 13. TO HEAD TR. W/ W.L MEASUREMENTS.

1540 FINISH UP. HEAD TO SUMMIT 16 TO SET UP ON WES - 14-02-03

1550 START PUMPING

1732 SAMPLING 16GW0202
SVOCs + METALS ONLY

Work continued to Page

SIGNATURE Robert Balkner DATE 5/1/03
WITNESS DATE

TITLE CRANE

PROJECT NO. 4060

BOOK 2555

Work continued from Page

SUN 5/11/03

1830 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill

DATE 5/11/03

WITNESS

DATE

TITLE CRANE

PROJECT NO. 4060

BOOK 2555

Work continued from Page SUNNY & WARM 60's

MON 5/12/03

0630 ARRIVE @ SITE. START PREWARM EQUIP

1000 GO W/ T.R TO FINISH RESTORATION

1630 BACK @ SUNNY 13. NEED TO DO WELL REPAIR ON TO2 & TO3.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill

DATE 5/12/03

WITNESS

DATE

APPENDIX D.2.2
SWMU 16
FIELD NOTEBOOK
ROUND 2

NSWC
CRANE

2565

10-21-03

TABLE OF CONTENTS

Subject	Page

TITLE 10-21-03

PROJECT NO.

BOOK

Work continued from Page

0700 - ON SITE

FTNUS H+S TRAINING CONDUCTED.

DISCUSSED DUMPING DECON/WATER/
PURGE WATER AT SWMU 9 -
TOM BRENT TO GET
PERMISSION

ACCESS TO ADDITIONAL DRILL
LOCATIONS NEEDED - T ROSAHN
+ M.G. COCKRAN TO CHECK

0800 H+S TRAINING COMPLETED
GO TO CHECK DRILL LOCATIONS

1000 CHECK WITH P. WORKS
ON UTILITY CLEARANCE FOR
TRUCK MOUNTED RIG NO
CLEARANCE GRANTED UNLESS
AN ACCESS ROAD CAN BE
BUILT TO CLEARED LOCS.
NO OTHER ACCESS
IS GRANTED AT THIS TIME
BASED ON DISCUSSION W/ P. WORKS

SCIENTIFIC SINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE

WITNESS

DATE

TITLE 10-21-03 (CONT.) PROJECT NO. BOOK

Work continued from Page

1100 - ~~1200~~ 1130 LUNCH.

1130 - RETURN FROM LUNCH.
INSTRUCTED DRILLERS TO
SET UP DECON PADS + BUILD
FORMS. MET W T. BRENT.
WILL MEET @ 2:00 TO
DISCUSS W FORESTER
POSSIBILITY OF BUILDING ROADS
FOR ACCESS TO DRILL LOCATIONS

~~1400~~ 1200 MGC + F. WUDKUYCH. GO
TO CHECK FOR SEEPS @ SWMU 13

1400 RETURN TO OFFICE. DISCUSS
ACCESS ISSUES W T. BRENT +
B. GATES. ASKED PERMISSION
TO USE BULLDOZER TO
CLEAR LOCATIONS @ SWMU 13.

1500 T. BRENT INDICATES OK TO
CLEAR LOCATIONS W DOZER IF
TREES ≥ 5" Ø NOT TOUCHED
+ SHAGBARK HICKORY NOT
IMPACTED

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE DATE 10-21-03

WITNESS DATE

TITLE 10-21-03 PROJECT NO. BOOK

Work continued from Page

1515 MGC + FCW GO TO SWMU 13
TO DIG SEEP AREAS W B-M +
BACKHOE. DUG SEEPS AT
3 LOCATIONS -
1) 13 SW15
2) SEEP DOWNSTREAM OF 13 SW15
3) 13 SW 29
- ALL LOCATIONS WILL BE SAMPLED
TOMORROW @ SWMU 13 AFTER
LOCATIONS ARE ALLOWED TO
STABILIZE FROM DIGGING

1700 RETURN TO OFFICE.
PROVIDE UPDATE TO OFFICE.

1730 LEAVE SITE FOR
DAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE DATE

WITNESS DATE

TITLE 10-22-03 PROJECT NO.

BOOK

Work continued from Page

0700 ON-SITE, SET UP TO START SAMPLING SURFACE WATER/SEDS @ SWMU 13. SAMPLED THRU A.M.

1100-1130 LUNCH

1130 RETURNED TO SWMU 13 TO CONTINUE SAMPLING

1630 RETURNED TO OFFICE TO PACK SAMPLES FOR DAY.

1800 LEAVE SITE FOR DAY - DRIVE TO FED EX. TO DROP OFF SAMPLES

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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0700 ON SITE, SET UP TO CONTINUE SW/SD SAMPLING @ SWMU 13

0800 START SAMPLING ACTIVITIES

1130-1200 LUNCH

1200 CONTINUE SAMPLING @ SWMU 13

1600 QUIT SAMPLING FOR DAY, PACK SAMPLES

1700 LEAVE SITE FOR DAY, DRIVE TO FED EX TO DROP SAMPLES.

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0700 ON-SITE. PREP. TO SAMPLE SURFACE WATER SEDS.

0850 DISCUSSED POSSIBILITY OF DISCHARGING CUTTINGS/DRILL WATER TO WOODS NEAR DRILL LOCATIONS. TOM BRENT + MGL INDICATED THAT WOULD BE ACCEPTABLE:

- ~ 250 GALLONS H_2O + 30 GALLONS OF WATER/CUTTINGS IS GENERATED FOR DEEP WELLS, LESS IS GENERATED FOR SHALLOW WELLS.

- DRILL WATER IS MOSTLY POTABLE THAT IS BEING DISCHARGED FROM HOLE.

0800 WENT TO SWMU 13 TO RESUME SAMPLING

0930 RETURN TO OFFICE, SET

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UP TO START SAMPLING @ SWMU 16.

1000 WENT TO SWMU 16 TO START SAMPLING.

1145-1205 LUNCH

1205 RESUME SAMPLING ACTIVITIES.

1600 STOP SAMPLING FOR DAY, START PACKING SAMPLES

1700 SAMPLES PACKED, MGL HELPS F. RAMSER PACK CORE BOXES T. ROJAHN + F. WUDKWYCH TAKE SAMPLES TO FED EX.

1830 LEAVE SITE FOR DAY

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0700 ON SITE

0800 MGC + FCW COLLECT REMAINDER OF SURFACE WATER / SED SAMPLES @ SWMU 16

1130 RETURN TO OFFICE W/ SAMPLES

1200-1230 LUNCH

1230 SET UP TO PERFORM GW SAMPLING AT SWMU 16

1400 GO TO SWMU 16 TO START GW SAMPLING

1730 COMPLETED SAMPLING FOR DAY, RETURN TO OFFICE

1830 QUIT FOR DAY LEAVE SITE

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0700 ON SITE, SET UP TO CONTINUE GW SAMPLING.

0830 MGC SETS UP ON 16GW01 TO SAMPLE

1630 COMPLETED SAMPLING FOR DAY AT 16GW01, MGC HELPS F. WOOKWYCH W/ WELL SAMPLING

1730 RETURN TO OFFICE

1800 LEAVE FOR DAY

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0700 ON-SITE SETUP TO COLLECT SURFACE WATER ~~[illegible]~~ mw SAMPLES AT SWMU 13.

0800 GO TO COLLECT SW SAMPLES @ SWMU 13

1130-1200 LUNCH

1230 RETURN TO ~~SAMPLING~~ OFFICE, DROP OFF SAMPLES, RETURN TO SWMU 13 TO COLLECT SW SAMPLES

1500 RETURN TO OFFICE, PACK SAMPLES FOR SHIPMENT.

1700 MGC CHECKS ON F. RANGER.

1745 RETURN TO OFFICE.

1800 LEAVE SITE FOR DAY

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0700 ON-SITE, SETUP EQUIPMENT

0800 SET UP TO SAMPLE @ SWMU 13. PURGED AND SAMPLED WELL 13 MWT24 IN THE A.M.

1200-1230 LUNCH

1230 RETURN, SET UP TO SAMPLE 13 MWT 19.

1700 13 MWT 19 SAMPLED. RETURN TO OFFICE TO UNPACK EQUIPMENT.

1815 LEAVE SITE FOR DAY

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1400 ON-SITE LOAD EQUIPMENT

1500 DRILLERS ON SITE FOR ATV RIG.

JAMES WALSH
JOSHUA DEAN

T ROJAHN PERFORMS HIS TRAINING

1545 TRAINING COMPLETED, SETUP TO FILL H2O TRUCK

1615 MOBILIZE TO DECON PAD TO CLEAN ATV RIG

1715 MOVE TO 13MWT29 TO SETUP.

1810 LEAVE SITE FOR DAY

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0700 ON-SITE.

0730 ON-SITE AT 13MWT29 TO START DRILLING.

1030 13MWT29 DRILLED + INSTALLED, DRILLERS TEAR DOWN + GO TO DECON

1130-1200 LUNCH

1200 RETURN, DRILLERS GET EQUIPMENT FOR WELL INSTALLATION

1300 SETUP ON WELL 13MWT41

1730 QUIT DRILLING FOR DAY. DRILLERS PLAN ON GETTING LARGER COMPRESSOR TO REMOVE CUTTINGS MORE EFFICIENTLY

VOID

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0700 ON SITE PREP EQUIPMENT + SETUP TO CONTINUE DRILLING

0800 RESUME CORING @ 13MWT41

0900 LOST BIT IN HOLE, STARTED TO TEAR DOWN, WILL MOVE ROTASONIC ON HOLE TO OVERDRILL + FISH OUT BIT

1000 SETUP ON WELL 13MWT36 TO DRILL + INSTALL.

1230 WELL 13MWT36 INSTALLED

1230-1300 LUNCH

1300 RETURN TO TAKE DOWN RIG + DECON

1400 DECON RIG

1430 MOVE ONTO LOCATION 13MWT31 TO START DRILLING

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1700 13MWT31 DRILLED + INSTALLED. DRILLERS TEAR DOWN + MOVE TO DECON. MGC RETURNS TO DO PAPERWORK IN OFFICE

1800 LEAVE SITE

VOID

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0700 ON SITE, SET UP EQUIPMENT & COMPLETE DAILY ACTIVITIES

0815 SET UP ON 13MWT33 TO START DRILLING

1130 13MWT33 DRILLED + INSTALLED TAKE LUNCH

1200 RETURN FROM LUNCH, DRILLERS DECON RIG

1330 MOVE ONTO LOCATION 13MWT30 TO START DRILLING

1345 PULLED OFF HOLE TO TOW ROTASONIC RIG OFF HOLE

1430 BACK AT 13MWT30 TO START DRILLING

1600 13MWT30 INSTALLED. MGC CHECKS ON SITE 16 CLEARANCE

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1600 (CONT.) CHRIS FREEMAN INDICATED THAT UTILITY CLEARANCE IS MADE FOR SITE 16. DRILLERS DECON + WILL MOVE TO SITE 16 TO STAGE EQUIP. FOR A.M. START.

~~100~~

1700 DRILLERS MOB TO OFFICE w/ EQUIPMENT

1800 LEAVE SITE FOR DAY

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0700 ON SITE, DISCUSS APPROACH FOR DRILLING SWMU 16

0730 MOB TO SWMU 16, SET UP ON WELL 16MWT14 TO START DRILLING

1030 16MWT14 DRILLED & INSTALLED DRILLERS TAKE RIG BACK TO DECON PAD TO FIX ANTIFREEZE LEAK & TO DECON AUGERS

1130 - 1200 LUNCH

1200 RETURN FROM LUNCH, DRILLERS WELD BIT.

1330 RETURN TO SWMU 16, SETUP ON 16MWT12 TO START DRILLING

1630 16MWT12 DRILLED & INSTALLED, GO TO DECON

1800 LEAVE SITE

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0700 ON SITE, PREP EQUIPMENT FOR DAY

0745 SET UP ON 16MWT09 TO DRILL + INSTALL WELL

1000 WELL INSTALLED, SETUP ON 16MWT17.

1200 - 1230 LUNCH

1230 RETURN FROM LUNCH, CONTINUE WELL INSTALLATION

1430 16MWT17 INSTALLED, RETURN TO DECON

1500 LEAK IN RADIATOR, DRILLER TO REPAIR WITH RADIATOR STOP LEAK.

1700 LEAK REPAIRED, MOVED ONTO LOCATION 16MWT10.

1800 LEAVE SITE FOR DAY

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0700 ON SITE, SET UP EQUIP. TO DRILL.

0730 MOB TO SWMU 16 16MWT10

0915 16MWT10 DRILLED, MOB TO 16MWT16 LOCATION TO DRILL WELL (NOTE: 16MWT16 IS DRY AT 25 FEET). IT WAS DECIDED TO INSTALL A DEEPER WELL AT THIS LOCATION TO MONITOR DEEPER GW.

1180 LUNCH

1200 RETURN FROM LUNCH, CONTINUE DRILLING @ 16MWT16

1530 16MWT16 INSTALLED, CLEAN UP SITE 16 AREA

1700 RETURN TO OFFICE

1800 LEAVE SITE FOR DAY

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0700 ON SITE, SET UP EQUIPMENT.

0800 MOB TO SWMU 13 TO DRILL 13MWT44

1230 LUNCH

1300 RETURN FROM LUNCH, CONTINUE DRILLING 13MWT44

1800 WELL INSTALLED

1830 LEAVE SITE FOR DAY

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0700 ON SITE SETUP EQUIP. TO DRILL FOR DAY, WILL MOB TO SWMU 13 (13MWT34) TO DRILL SHALLOW WELL. MOVED EQUIP + RIG OFF OF 13MWT44 LOCATION.

1030 13MWT34 INSTALLED, MOB TO DECON

1100-1130 LUNCH

1300 MOB TO SWMU 16 TO DRILL 16MWT13

1500 16MWT13 COMPLETE, MOB TO 16MWT07 TO DRILL

1700 16MWT07 DRILLED, CLEAN UP AREA + RETURN TO OFFICE W/ PAPERWORK

1800 LEAVE SITE FOR DAY

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1400 ON SITE, SETUP EQUIPMENT TO START DRILLING

1545 MOB TO WELL 13MWT35 TO START CORING. CLEANED OUT HOLE TO START CORING.

1700 QUIT FOR DAY

1800 LEAVE SITE

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0700 ON SITE, MOB EQUIP TO START DRILLING.

0800 SET UP AT 13MWT35. RAIN STEADY. DRILLERS WILL WAIT UNTIL RAIN DECREASES

1100 RAIN CONTINUES, DRILLERS DECIDE TO QUIT FOR DAY.

1100-1130 LUNCH

1130 RETURN FROM LUNCH, SETUP TO COLLECT SW & GW SAMPLES @ SWMU 13

1330 SETUP TO SAMPLE #3SW11

1430 13SW11 SAMPLED, SETUP TO DEVELOP 13MWT41.

1530 13MWT41 DEVELOPED, RETURN TO OFFICE TO PACK SAMPLES

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1800 LEAVE SITE FOR DAY

VOID

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0700 ON-SITE, SET UP EQUIPMENT TO DRILL @ SWMU 13 13MWT35

1100 LUNCH

1130 RETURN FROM LUNCH, CONTINUE DRILLING 13MWT35

1330 WELL INSTALLED, DRILLERS DECON, MGC GETS TOW TRUCK AT MAINTENANCE TO PULL OUT STUCK ROTASONIC RIG

1430 ROTASONIC RIG PULLED OUT

1530 SET UP ON 13MWT47 TO START DRILLING

1730 QUIT FOR DAY

1800 LEAVE SITE

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0700 ON-SITE, PREP EQUIPMENT.

0800 RESUME DRILLING 13MWT47

0900 13MWT47 INSTALLED, ~~MGC GO TO~~ CHECK ON DRILLERS INSTALLING PADS & PRO CASINGS

0930 MGC & T BOEMER (B-M) DRIVE TO MGBG TO SCOPE DRILL LOCATIONS

1030 RETURN TO SWMU 13, MGC GETS TOW TRUCK TO PULL OFF RIG FROM 13MWT47

1100-1130 LUNCH

1130 RETURN FROM LUNCH, ASSIST J. GOERDT WITH WELL SAMPLING

1330 CONCRETE TRUCK ARRIVES,

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START POURING PADS

1800 DONE FOR DAY

1830 LEAVE SITE

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0700 ON SITE, SET UP EQUIPMENT

0800 MGC + S. GRIER GO TO WELL 13MWT46 TO AWAIT DRILLERS TO SET CASING.

0900 MGC + ATU DRILLERS GO TO WELL 16 MWT14 TO ABANDON (WELL DRY TO DATE)

1000 16MWT14 ABANDONED. PRODUCTION STAFF AT SWMU 16 INSTRUCTED US TO STAY AWAY FROM BUILDING PERIMETER. WE ARE ALLOWED TO WORK ON WELLS ALONG BOUNDARY. WE NEED TO LET THEM KNOW HOW MANY STAFF ARE WORKING IN THE AREA AT A TIME.

1130-1200 LUNCH.

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1200 RETURN FROM LUNCH, ASSIST T. ROSTAN IN WELL DEVELOPMENT

1340 START DEVELOPMENT WELLS 16MWT13 + 16MWT15

1800 LEAVE SITE FOR DAY

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0700 ON SITE, PREPARE EQUIPMENT FOR SLUG TESTING

1000 START SLUG TESTING @ SWMU 16

1100 - 1130 LUNCH

1130 RETURN TO SWMU 16, CONTINUE SLUG TESTING (16MWT10)

1230 MOV TO SWMU 13 TO PERFORM SLUG TESTING (13MWT37 + 13MWT38)

1800 QUIT FOR DAY

1830 LEAVE SITE FOR DAY

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0700 ON SITE, DOWNLOAD ~~E~~ DATA FROM SLUG TESTING. DO PAY ITEMS FOR DRILLING.

0900 MOB TO SWMU 16 FOR SLUG TESTING, TESTED 16MWT09, 17&15

1330 RETURN TO OFFICE. DRILLERS PICK UP EQUIPMENT & LEAVE SITE

1345 DRIVE TO SWMU 13 TO SLUG TEST WELLS WHILE W.L. IN ~~16~~ WELL AT SWMU 16 RETURNS TO EQUILIBRIUM (16MWT15)

1400 MOC CLEANS UP ACCESS ROAD. CLEARS DITCHES OF H2O AT SWMU 13

1530 RETURN TO SWMU 16 TO CHECK WELL, STILL ~~RECOVERING~~ RECOVERING (16MWT 15)

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1600 SWMU 13. TESTED WELL 13MWT 42

1800 RETURN TO SWMU 16. PULL EQUIP FROM WELL 16MWT15. (NOTE HAD TO CLEAR AREA BEFORE A.M. MONDAY)

1830 LEAVE SITE TO SHOP FOR EQUIP

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0700 ON SITE, PREP EQUIP FOR SLUG TESTING

0830 AT WELL 13MWT33 TO SLUG TEST

1030 SETUP ON 13MWT30 WHILE 13MWT33 RECOVERS

1315 ~~PULLED~~ STOP TEST @ 13MWT33

1330 STOPPED TEST @ 13MWT30

1345 MOB TO 13MWT32 TO TEST

1500 13MWT32 TESTED.

1600 RETURN TO OFFICE, HELP PACK SAMPLES

1800 LEAVE SITE FOR DAY

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0700 ON SITE, PREP EQUIPMENT FOR SLUG TESTING

0830 WENT TO SWMU 13, CHECKED WELL 13MWT45 & 13MWT28 FOR RECOVERY BACK TO STATIC COULD NOT TEST YET

0900 AT WELL 13MWT34 TO TEST

1000 13MWT34 TESTED, MOVE TO 13MWT47 TO TEST

1345 MGG GOES TO MEET WITH JACOBY (SEEDING CONTRACTOR) TO DISCUSS LOCATIONS TO RESTORE

~~1600~~ 1530 RETURN TO 13MWT47, PULL TRANSDUCER FROM WELL

1600 RETURN TO OFFICE TO DUMP DATA + PACK EQ + SAMPLES.

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DATE 11-25-03

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NSWC CRAN

N9060

CTO 0279

SWMU 13 & 16

2555

DRILLING

START: 3/24/03

END:

TITLE PM CLEAR 705 PROJECT NO. 7060
10-20-03 BOOK

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0700 FWR
THRU FW } TRANS PERSONNEL ENROUTE
1300 TR } FROM PCH PA TO CRANE
1315 ARR AT CRANE NSWC TRANS
- UNPACKED SUPPLIES
- DRILLERS ARRIVED UNCOMPL
SUPPLIES AT LM DOWN

- GO TO UTILITIES

1600 DISCUSS DRILLING PRIORITIES
- START DRILLING @
13MWT 37, T38, T39, T40
T41, T42

+ DO SITE VISIT W/ DRILLER
FOR ACCESS PROBLEMS
- DRILL SITES IN THE
SOUTH, T38, T37, T39, T40
THO T41, T42.
CAN BE ACCESSED FROM
MAIN ROAD TO THE SOUTH
OF THE SITE
- DRILL SITES IN THE NORTH
WILL HAVE TO BE ACCESSED

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1700 THROUGH THE COMPOUND
1800 FWR FW TR LV CRANE NSWC
FOR HOTEL

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0700 FWR - FRED W. RANSER } TENS
TR - TERRY R. } ONSITE
MGC - MATT COCHRAN } TENS
FW - FRANK WAD. }

0715 DRILLERS ON SITE
- NO DRILLING ACTIVITIES TODAY DUE TO UTILITIES NOT CLEARED FOR TRUCK RIG. MAT MAKE ROADS FOR ACCESS TO ATV PTS W/ TRUCK RIG. SEE TR PROJECT NOTE BOOK FOR DEVELOPMENTS.

- WILL CLEAR ROAD/PATH FOR ACCESS

1745 FWR + TR LV CHAVE NSWC

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0700 FWR - TENS ARR AT FIELD OFFICE
DRILLERS ON SITE
TIM FIELD MANAGER
~~KEN~~ JON KEIFER LEAD DRILLER
TODD WOLLENHAUPT
DENNIS SINK

0956 SET RIG (TRUCK) ON 13MWT42
ROTOSONIC RIG

BEGIN USING 4" CORE CASING
- DRILLERS WERE GOING TO ATTEMPT INSTALLING 2" PVC WELL USING ONLY 4" CORE CASING
1100 CASING? W/O H_2O + W/O AIR
HOWEVER BECAUSE BED ROCK IS @ ~ 5'-8' TO OF WELL PROJECTED TO BE 25-35' DRILLERS SAY AIR OR WATER WILL BE NEEDED. ALONG W/ 6" CASING (TEMP) 0-10' BG
1130 BREAK FOR LUNCH
1200 - DRILLERS GO TO LAYDOWN TO GET
1300 H.D. DRILLERS ARR @ RIG ON 13MWT42
1320 BEGIN TO ADVANCE 6" TEMP CASING

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TITLE PM: 60s WINDY PROJECT NO.

10-22-03 WEDNESDAY BOOK

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1430 BEGIN ADVANCING 4" DRILL RODS BEYOND 10' USING WATER

1508 TD HOLE @ 13MWT42 TO 25' BGS USED WATER TO CORE CANNOT DETECT WATER PRODUCING ZONE. AIR PURGED HOLE MADE ABOUT 0.5' OF H_2O IN 16 MINS INSTALLED WELL SCREEN TO 11-21 SAND 9-25 BENT 6-9'

13MWT42 WELL MATERIALS

+ GLOBAL FILTER PACK NSF 800356 6400 QUARTZ SAND 10-30 SEP/18B 4 50# BAGS
+ PVC SCH 40 RISER
+ PVC 20 SLOT SCREEN
+ PURE GOLD MED CHIPS BENTONITE CETCO POLYMER-FREE NSF HYDRATED W/ 15 GALS H_2O

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SIGNATURE Fred M Ranser DATE 10-22-03

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TITLE PM: 60-50s PROJECT NO.

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1630 SET RIG ON 13MWT40 (SHALLOW WELL)

1640 BEGIN DRILLING DRY USING 4" PIPE.

1700 SWITCH RIG UP TO USING H_2O AND WILL SET TEMP 6" CASING TO 5' BGS. WILL STOP HERE. DRILLERS NEED TO MAKE BIT FOR 5' LENTH.

TODAYS TOTALS:

WELL	4" DRILL	6" DR	2" WELL
13MWT42	25'	15'	21'
13MWT40	5'		

NICK POST DRILLER WILL FILL IN FOR JON K. ON SATURDAY

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SIGNATURE Fred M Ranser DATE 10-22-03

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TITLE 10-2 03 THURSDAY PROJECT NO. 1060 BOOK 2555

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0700 PUR TEMPS

0730 DRILLERS ON-SITE JON K, TODD W. DENNIS S.

0800 WL @ 17.5' BGS @ 13MWT42

080 BEGIN TO INSTALL 6" TEMP CASING TO 5' @ 13MWT40

085 PROCEED TO DRILL W/ 4" CORE PIPE BEYOND 6" TEMP CASING.

- NOTE STREAM NEXT TO 13MWT40 IS DRY

0850 TD @ 25' @ 13MWT40 BLOW OUT H_2O

0855 MEASURED H_2O @ 25' BELOW DRILL PLATFORM

0906 WL ROSED TO 23' DECIDED TO INSTALL WELL @ 15'-25 13MWT40

SAND 12-25.5

BENT ~~10-15~~ 9-12

0930 GO TO DECON RIG + RODS

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SIGNATURE Fred Ramser

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TITLE PM: CLEAR GOS PROJECT NO. 1060 BOOK 2555

10-23-03 THURSDAY

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1035 BAILED DRY WELL 13MWT42

1100 WL @ 13MWT40 @ 15.5 bgs

DRILLERS BREAK FOR LUNCH

1105 BAILED 13MWT40 ~~DRY~~ DOWN TO 18.5 ft bgs w/ 8 bails SEEM TO MAKE PLENTY OF WATER

1110 WELL RECOVERED TO 17.5' BGS

1215 WL @ WELL 13MWT42 @ 18' BGS

1230 DRILLERS RETURN FROM LUNCH
- LOAD UP MORE WATER NEED TO GROUT ISOLATION CASING
CONT. TO DRILL @ 13MWT41

1345 SHOW DRILLER WHERE TO DUMP H_2O WASTE

1445 ENCOUNTERED A VERY SOFT MUDSTONE @ ~30' DOWN TO 40' BGS @ 13MWT41 WILL INSTALL THE 6" ISOLATION CASING FROM 0'-38' BGS

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TITLE PM: CLEAR 60's PROJECT NO. 9060

10-23-03 THURSDAY BOOK 2558

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1660 DRILLED DOWN TO 38' WITH 8" DRILL PIPE WORKED TO INSTALL THE 6" CASING, ~11" NOMINAL OUTSIDE DIA, LOWERED 30' OF 6" BEGIN TO MIX GROUT/SLURRY CEMENT/BENTONITE MIX

1700 BEGIN TO TREMIE THE CEMENT BENTONITE SLURY

1730 COMPLETED GROUTING IN 6" CASING BEGIN TO CLEAN UP

1800 SET R16 ON 13MWT37/38

1830 DRILLERS + FWR LV DRILL SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE T. Fred McAnser DATE 10-23-03

TITLE PROJECT NO. 9060

10-24-03 FRIDAY BOOK 2555

Work continued from Page

0700 FWR ON SITE, JON KEIFER ON SITE - DISCUSS DAILYS - DISCUSS IDW WATER HANDLING. TOM BRENT GAVE US THE PERMISSION TO DISCARD WATER (DRILLING FLUIDS) ONTO THE GROUND SURFACE NOTE: THIS IS ONLY IN THE WOODS IN SWMU 13

0815 DRILLERS EMPTY IDW H_2O + FILL UP W/ POTABLE H_2O

0830 MEASURE H_2O LEVEL IN 13MWT42 @ 18' BGS TD OF WELL = 21' BGS THREE FEET OF H_2O

0840 DRILLERS ~~BEGIN~~ SETUP TO ADVANCE PIPE 4" @ 13MWT37

0905 BEGIN TO ADVANCE 4" DRILL PIPE

1015 DRILLERS ON STANDBY

1020 MEASURE 22.5' BELOW SURFACE CASING THEN

1027 BAILED H_2O DOWN TO 23.3' BSC

1030 H_2O @ 22.3' BSC 1050 WL = 21.3

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE 10-24-03 Fred McAnser DATE

TITLE 10-24-03 FRIDAY PM: 50-60's SUNNY PROJECT NO. 906C BOOK

Work continued from Page 13MWT37

1100 WL = 20' 4" @ BSC. BREAK FOR LUNCH DRILLERS ARE EXPECTING A NEW EMPLOY.

1205 WL = 17' 3" @ BSC (45 MIN STANDBY)

NOTE: CASING @ 1.5' ABOVE GROUND SURFACE

WL = 17' BSC WL_{BGS} = 15.5

PROPOSE TO DRILLERS TO PLACE SCREEN 14.5 - 24.5

1300 DRILLERS RETURN TO DRILL SITE 13MWT37

CLEAN OUT HOLE TO 25' TO INSTALL WELL 14.5-24.5

SAND

1340 INSTALLED PVC WELL 13MWT37:

WELL SCREEN 14.5 - 24.5

SAND 11.5 - 25

BENTONITE 8.5 ~~8.5~~ - 11.5

1400 NICK POST DRILLER, JON ~~K~~ REPLACEMENT FOR CAT + SUN

1500 ADMINISTERED SSHS TRAINING TO NICK POST

SCIENTIFIC BINDERY PRODUCTIONS, CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer DATE 10-24-03

WITNESS DATE

TITLE 10-24-03 FRIDAY PROJECT NO. 906C BOOK

Work continued from Page

1505 MOVE/SET UP RIG ON 13MWT38 + APPROACH (DEEP)

- START BY ADVANCING 8" PIPE (TO ACCOMADATE THE ISOLATION CASING

1520 BEGIN TO ADVANCE THE 8" PIPE

1535 SWITCH OVER TO 4" PIPE TO DRILL DOWN TO 25' NO SAMPLING

1650 DRILLED TO 40' SAMPLED 25'-40' w/ 4" PIPE @ 13MWT38

TODAY TOTALS

	WELL	BORK w/ SPL	OB w/ SPL	BORK w/o SPL	OB w/o SPL
13MWT37	24.5	20'	5'	~~20~~	
13MWT38	–	15'	–	~~32~~ 20	5

CLEAN UP WATER TANK (TRUCK), PREP TO INSTALL 6" ISOLATION CASING @ 13MWT38

1830 PUL + DRILLERS LV SITE

SCIENTIFIC BINDERY PRODUCTIONS, CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer DATE 10-24-03

WITNESS DATE

TITLE AM: CLOUDY [CLOUDY @ 10am] PROJECT NO. 9060

10-25-03 SATURDAY BOOK

Work continued from Page

0700 FOR TENNIS ONSITE CALIBRATED PID
@ FIELD OFFICE
DENNIS SINK - DRILLER
TODD W. HELPER } BOWSER
NICK POST HELPER } MORNER

- LOAD H2O BOTH SUPPORT TRUCKS
- DRILLS

0800 GOTO SUMM 13. SITE 13MWT38

0830 BEGIN TO ADVANCE 8 1/2" PIPE

0910 TD 8 1/2 PIPE, BEGIN TO INSTALL 6" ISOLATION CASING
+ LOWERED 30' OF 6" CASING
TREMIE SOME BENTONITE/CEMENT SLURRY

1000 + PULLED 8" DRILL PIPE
CONTINUE TO TREMIE THE BENTONITE/CEMENT

1010 COMPLETED ISOLATION CASING 6"
@ 13MWT38, MOVE RIG + TOOLS
TO DECON INSTALLED 39.0' BGS.

1115 BREAK FOR LUNCH

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Eric M Ramer DATE 10-25-03

WITNESS DATE

TITLE PM: CLOUDY 505-605 PROJECT NO. 9060

10-25-03 SATURDAY RAIN BOOK

Work continued from Page

1244 WL @ 13MWT40 = 15.5' BGS

1300 DENNIS S. DOES NOT WANT TO TAKE THE RIG INTO THE WOODS DARK SKY RAIN THREATENING

1330 DRILLERS WILL WORK ON BUILDING PADS ON THE THREE INSTALLED WELLS

- GO OFF SITE TO GET SAKCRETE FOR PADS AND OTHER SUPPLIES.

STARTED TO RAIN @ 1430

1500 LIGHTING + THUNDER.

1525 DRILLER RETURNED TO SUMM 13

1530 THEY HAVE PAD + POST SUPPLIES BUT DUE TO THE LIGHTING + THUNDER WE DECIDED TO CALL IT A DAY.
SENT DRILLERS HOME.
TO DATES TOTALS: 40' OF ISOLATION CASEING INSTALLED

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Eric M Ramer DATE 10-25-03

WITNESS DATE

TITLE PROJECT NO. 7060

10-26-03 SUNDAY BOOK

Work continued from Page

0700 FWR - FIELD GEOLOGIST TITUS
- CAL PID
- DAILY ACT. SUMMARY

0720 DRILLERS ARR AT FIELD OFFICE
TOO WET TO DRILL, CONCERN THAT RIG WILL SLIDE OFF ORTIP OFF ROADS.
- DECIDED TO INSTALL PROTECTIVE CASING + 4'X4' PADS.

FWR - SWEEP FIELD OFFICE
MISC CLEAN UP

HELP TR DO ~~AT~~ MNA FIELD TEST KITS

1500 DRILLERS INSTALLED ONE PAD/PROT. @ 13MWT37, TOP OFF GROUT @ DEEP WELLS T38 + T41, SHALLOW WELLS T42+T40.

- WORK W/ TERRY R
NO DRILLING ACTIVITIES FOR REMAINDER OF DAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer DATE 10-26-03

WITNESS DATE

TITLE COLD 20s CLOUDY PROJECT NO. 7060

10-27-03 MONDAY BOOK

Work continued from Page

0700 FWR ARR @ FIELD OFFICE

0720 DRILLERS ARR @ FIELD OFFICE
- WILL COMPLETE TWO PADS at WELLS T42 + T40
- STILL UNCERTAIN ABOUT UTILITY CLEARANCE INSIDE SWMU 13 COMPOUND.

1000 DRILLER COMPLETED PADS AT WELLS T42+T40 @ SWMU 13
- STILL UNCERTAIN ABOUT UTILITYS INSIDE SWMU 13. TERRY R IS DISCUSSING ISSUE W/ TOM BRENT FACILITY POC.

1300 UTILITY CLEARANCE IS GOOD/SIGNED WERE OFF STANDBY.
- GLOBAL DELIVERY OFF 6" CASING AND OTHER WELL SUPPLIES.

1430 UNLOADED GLOBAL SUPPLIES

1451 SET UP RIG ON 13MWT45 DEEP WELL NESTED W/ T21. - WILL ADVANCE TO 20' BGS W/O SAMPLING.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer DATE 10-27-03

WITNESS DATE

TITLE PM. PARTLY CLOUDY 50's **PROJECT NO.** 9060

10-27-03 MONDAY **BOOK** 2555

Work continued from Page

1504 BEGIN TO ADVANCE 8" DRILL PIPE
@ 13MWT45 (AIR ONLY)
-SWITCH TO H2O @ 15'

1700 DRILLER LV. SITE (OFF BASE)
FWR CONTINUES TO LOG THE
CORES.

1800 FWR LVS BASE

TODAYS TOTALS

OB DRILLING w/o SPL = 10'

BORE DRILLING w/o SPL = 9'

BORE DRILLING w SPL = 20'

STANDBY: 700 AM THRU 1300 HR
~5 HRS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer

WITNESS

DATE 10-27-03

DATE

TITLE RAINY 40s **PROJECT NO.** 9060

10-28-03 TUESDAY **BOOK**

Work continued from Page

0700 FWR ARR @ FIELD OFFICE

0710 DRILLERS ARR @ FIELD OFFICE
JON K
TODD
DENNIS SINK
NICK P.
- LOAD WATER TRUCK

0800 CHECK IN @ NORTHERN GATE @ SUMM
- DRILLERS GO TO DECON PAD
-

0815 AT DRILL SITE 13MWT45
- PREP TO GROUT IN THE 6" ISOLATION
CASING.

0845 COMPLETED ISOLATION CASING @ 39' BGS
+ GO TO DECON PAD @ 13MWT
- 8" CASING
- 4" CA DRILL PIPE
- RIG MOVE TO 13MWT35

1040 BEGIN TO CORE w/ 4" DRILL PIPE
20-30' @ 13MWT35

1116 SPL TO 39 BREAK FOR LUNCH
AT 13MWT35

1200 DRILLERS GO TO GET MORE WATER

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer

WITNESS

DATE 10-17-03

DATE

TITLE RAINY 50s - 60s PROJECT NO. 9060
10-28-03 TUESDAY BOOK

Work continued from Page

LITHOLOGIC DESCRIPTION
WELL 13MW T35
19-39 FT BGS

19-20 GREY MED HARD SANDSTONE POORLY BEDDED (BIOTURBATION) CHARCOAL PLANT FOSSILS

20-21.5 DK GREY VERY SOFT SILT + CLAY W/ ROCK FRAGMENT (SHALE)

21.5-22.5 SILTSTONE ALT GREY + BLK THINLY LAMINATED ~~MED~~ SOFT VBR

22.5-25 GREY MED HARD/HARD BR POORLY BEDDED SANDSTONE BIOTURBIDATION RARE CHARCOAL/PLANT FOSSILS

27.5-29 -SILT STONE ALT GREY + BLK THINLY LAMINATION VBR

29-33 INTERLAYER SILT + SAND STONE PLANT FOSSILS/ CHARCOAL @ 31-32 V.BR

34-39 FINE TO MED LAMINATION MOD STONE MED-FINE BRD TO LAMINAT BRK

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer DATE 10-28-03
WITNESS DATE

TITLE RAIN 50s PROJECT NO. 9060
10-28-TUESDAY BOOK

Work continued from Page

SILTSTONE + CLAY STONE GRADING TO ~~FEW~~ VERY SOFT CLAY + SILT W/ ROCK FRAG MED BEDDED

1420 COMPLETED INSTALLATION OF 39' ISOLATION CASING 6" @ 13MWT35 + MOVE TO DECON EQUIPMENT - DRILL PIPE + RIG

1900 DRILLER WILL MOVE TO 13MWT32 20'
-WILL ATTEMPT TO INSTALL WITHOUT USING H_2O

1515 BEGIN ADVANCE ~4" DRILL PIPE ~ 5" HOLE. 13MWT32

1520 HIT BDRK @ ~2.5' WILL CONVERT TO USING H_2O TO DRILL.
- GO GET H_2O EQUIP
-

1600 ADVANCE 6" TEMP CASING (SURFACE) 5'
- NO RECOVER TO 10' SUSPECT IT TO BE WEATHER BDRK.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred M Ramer DATE 10-28-03
WITNESS DATE

TITLE RAIN 50s **PROJECT NO.** 9060

10-28-03 TUESDAY **BOOK**

Work continued from Page

1700 TD @ 25' @ 13MWT32 WILL ALLOW TO SIT OVER NIGHT TO STATIC H_2O LEVEL
DRILLERS LV SITE
- LOG CORE
- BOX CORE ETC

1730 FWR GO TO TENUS FIELD OFFICE
1800 FWR LVS NSWC

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott M Ramer DATE 10-28-03

WITNESS DATE

TITLE CLEAR 30's **PROJECT NO.** 9060

10-29-03 WEDNESDAY **BOOK**

Work continued from Page

0700 FWR @ FIELD OFFICE
- CLEAN UP
- PAPER WORK FOR DAILY ACT
- DRILLERS ON SITE

0745 GO TO 13MWT32 DRILL SITE

0800 WL IN 13MWT32 @ 9' BGS
DECIDED TO PLACE SCREEN @ 8-18' BGS, THEREFORE USE HOLE PLUG TO BACK FILL 20-25
SAND 20-5
BENTONITE SEAL 5-2
0820 INSTALLED WELL 13MWT32

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE DATE

WITNESS DATE

TIT PM: SUNNY 70's PROJECT NO. 906

NOV 3, 03 BOOK

Work continued from Page

0700 - 1430 FWR - ENROUTE FROM PGH TO CRANE

+ DRILLERS ONSITE (TRUCK RIG CREW)
- JON KEIFER
- DENNIS SINIC
- TODD WOLLENHAUPT
- NICK POST

} BOWSER MORNER

- DECON READY TO GO

1600 MOVE RIG ONTO 13MWT28 (DEEP WELL)
- DRILLED TO 17.5 w/o SPL
- DRILLED TO 17.5-37.5 w SPL
PLAN TO INSTALL 6" ISOLATION CASING TO 38.5

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Wanner DATE 11-3-03

WITNESS DATE

TITLE AM: CLEAR 60's PRO T NO. 906

11-4-03 BOOK

Work continued from Page

0700 FWR - ARR AT TENNS FIELD OFFICE
- CALIBRATE PID
- DAILY ACT SUMMARY

DRILLERS ARR.
- JON KEIFER
- TODD W.
- DENNIS SINIC
- NICK POST

0800 FWR + DRILLERS GO TO 13MWT28
- 15 MIN DELAY DUE TO GATE AT NORTH GATE

0815 REAM HOLE (13MWT28) TO 38.5 w/ 11" DRILLPIPE.

0930 COMPLETED INSTALLATION OF ISOLA CASING (6") TO 38.5' BGS, 39' BGS
- MARINARO L. OF BOWSER/MORN SUGGEST USING ROTO SONIC RIG IN WOODS
- BEGINS TO SMOOTH/CLEAR AREA FOR ACCESS
- PLAN TO SET UP ON 13MWT3 3

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred Wanner DATE 11-4-03

WITNESS DATE

TITLE 11-4-03 PM: SUNNY 203 PROJECT NO. 9060

BOOK

Work continued from Page

1200 SET UP ON WELL 13MWT39
- TEMP CASING TO 5'
- CORE BEGIN @ 5-15?

1320 BLOW OUT HOLE
WL = 20.5

1338 WL = 19.5 13MWT39

1345 WL ~ 19.0

1352 18.8

1355 DECIDED TO INSTALL WELL
@ 14-24 13MWT39

1450 NOTE - CORE STEM COLLASPED
IN HOLE TO CLEAN OUT HOLE BEFORE
WELL INSTALLATION
13MWT39 - SCREEN 14-24
SAND 11-25
BENT 8-11

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred K Ramsey DATE 11-4-03

WITNESS DATE

TITLE 11-4-03 PM: SUNNY 203 PROJECT NO. 9060

BOOK

Work continued from Page

1520 DRILLERS DECON EQUIP.
- MOVE TO 13MWT38
- CASING INSTALLED 10-25-03

1535 BEGIN TO LOWER 4.5 DRILL PIPE

1800 CORED TO 80' @ 13MWT38

TODAYS TOTALS:

13MWT39: 24' PVC WELL
2.5' OB DRILL W/O SPL
22.5 BORE DRILL W SPL

13MWT38 40' BORE DRILL W/SPL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred K Ramsey DATE 11-4-03

WITNESS DATE

11-5-03

BOOK

Work continued from Page

0700 FUR ARR AT FIELD OFFICE
DRILLERS JON K
TODD
DENNIS S.
NICK

+ DISCUSS SCREEN INTERVAL
w MATT COCHRAN. FOR DEEP WELL T38
+ SUGGEST PLACE IN SCREEN
@ 55-65
(WL IN 13MWT38 @ 44' BGS)
BACK FILL 80 → 68
SAND PACK 68 - 52

0945 INSTALLED WELL 13MWT38
· SCREEN 55-65
SAND 68-52
BENTONITE ~~CHIPS~~
PURE GOLD
WILL COMPLETE THE WELL WITH
VOL CLAY TO 5' FROM SURFACE

BELOW SAND PACK
BENTONITE 80-68

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

WITNESS

DATE 11-5-03

DATE

TITLE TM. COUNTY COLD 405

PROJECT NO. 9060

11-5-03

BOOK 2555

Work continued from Page

1000 CORING BIT LOST IN HOLE
AT ATV DRILL SITE 13MWT4,
- TRUCK RIG WILL ATTEMPT
TO RETRIEVE THE BIT USING
4" CORE/DRILL PIPE.
- RIGS STARTED, DECIDED TO
MOVE TRUCK RIG TO SHALLOW
WELLS INSIDE COMPOUND
1030 - RIG GETS STUCK MOVING TO
13MWT34.

1200 GET RIG UN-STUCK. DECIDED TO
LET THE ATV RIG DO 13MWT34
BREAK FOR LUNCH PLAN TO MOVE
TO 13MWT27
CLEAN OFF RIG

1320 SET UP RIG ON 13MWT27

1330 BEGIN TO DRILL w/ 4½ DRILL PIPE

1500 INSTALLED 13MWT27
- SCREEN 10-20
SAND 7 - 21
BENT. 2 - 7'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

WITNESS

DATE 11-5-03

DATE

TITLE PM - Cloudy 40° PROJECT NO. 9060
11-5-03 BOOK

Work continued from Page

1530 DISCUSS W/ TERRY R TENUS FOR WE HAVE ACCESS TO T44 + T43
1600 DISCUSS W/ DRILLERS DECIDED TO GO INTO T44/T43 AREA AND NOT TO GO TO T41 W/ 2" CORE BIT IS IN THE HOLE @ ~55' BGS
- DRILLERS LOAD UP TO INSTALL CASING
1700 @ T44
MOVE TO T44 C.
1715 GO BACK TO LAC DOWN TO GET GROUT MIXER AND
1730 LV DRILL SITE:

TO DAYS TOTALS

+ 13MWT 38: INSTALLED 65' PVC WELL
+ 13MWT 27: 10' OB DRILLING W/SPL
2" BORE DRILLING W/SPL
1" BORE DRILLING W/O/SPL
20' PVC WELL
1800 FUR RETURN TO TRUS FIELD OFFICE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Fred M Ramser DATE 11-5-03
WITNESS DATE

TITLE AM: 40° RAIN PROJECT NO. 9060
11-6-03 BOOK

Work continued from Page

0700 FUR TENUS ARR @ FIELD OFFICE
DRILLERS B/M: JON KEIFER
TODD W.
DENNIS S.
NICK P.
- CALIBRATED PID
- DAILY ACT. PAPERWORK
+ CALLED MARVIN KLUESNER
- OK TO GAIN ACCESS THROUGH NORTH GATE TO WELL DRILL SITE 13MWT44.
0815 GOTO 13MWT44, CONTINUES TO RAIN.

0845 RAIN STOPPED BEGIN TO DRILL @ 13MWT44

1115 INSTALLED ISOLATION CASING TO 40' BGS @ 13MWT44
BREAK FOR LUNCH

1300 TRUCK RIG STUCK ON WAY TO WELL 13MWT43
1340 UNSTUCK TRUCK, CONT. TO MOVE OTHER MISC. EQUIP TO 13MWT43 TRAILERS ETC.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Fred M Ramser DATE 11-6-03
WITNESS DATE

11-6-C

BOOK

Work continued from Page

WELL CONSTRUCTION SUMMARY

DATE INSTALLED	WELL ID	SCREEN TOP	SCREEN BOTTOM	INTERVAL TD	BGS ISO. CASING
11-5-03	13MWT27	10'	20'	21'	NA
10-28-03	13MWT32	8'	18'	25'	NA
10-24-03	13MWT37	14.5'	24.5'	25'	NA
11-4-03	13MWT38	55	65'	80'	39'
11-4-03	13MWT39	14	24'	25	NA
10-23-03	13MWT40	15'	25'	25.5	NA
10-22-03	13MWT42	11'	21'	25	NA
11-6-03	13MWT43	10'	20'	21	NA
	13MWT28				38.5
	13MWT35				39'
11-10-03	13MWT41	55	65	66	38'
	13MWT44				40'
11-10-03	13MWT45	70	80	84	39'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred Romer

WITNESS

DATE 11-6-03

DATE

TITLE

11-6-03

40'

BOOK

Work continued from Page

1400 TRUCK RIG ON 13MWT43
- ADVANCE 6" TEMP DRILL PIPE/CASING TO 10'

1520 COMPLETED 13MWT43 WELL
- SCREEN 10-20
- SAND 7-21
- BENTONITE 2-7

TOTALS 13MWT43
- 10' OB DRILL W/SPL
- 11' BORE DRILL W/SPL
- 21' 2" WELL INSTLD

1540 DECON EQUIP
- MATT COCHRAN HAS INFORMED US THAT SWMU 16 IS CLEARED.
- DRILLERS TO LOAD ALL EQUIP TO MOVE TO THAT SWMU 16

1700 DRILLERS MOVE EQUIPMENT TO TENS FIELD OFFICE AREA READY TO MOVE INTO SWMU 16.

TOTALS 13MWT44:
- 10' OB DRL W/SPL
- 30' BORE DRL W/SPL
- 40' ISO CASING INSTALL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred Romer

WITNESS

DATE 11-6-03

DATE

TITLE AM: CLEAR 30 PROJECT NO. 9060
11-7-03 BOOK

Work continued from Page

0700 FUR MOB ON SITE
— START @ 16MWT15

0750 GOTO 16MWT15
— TAG OUT IS NOT IDENTIFIED
MOVE TO 16MWT08

0900 BEGIN TO ADVANCE 4" DRILL PIPE
@ 16MWT08

1100 FINISH SPL TO 38', BEGIN TO
INSTALL 6" CASING USING 11" (8" ID)
DRILL PIPE @ 16MWT08.
BREAK FOR LUNCH

1130 DECON RIG + EQUIP
— WELD HARD CORE

1330 SET UP RIG ON 16MWT15

1600 COMPLETED DRILLING TO 38 4" CORE W/SPL
BEGIN TO REAM W/ 8" ID PIPE =
11" HOLE TO INSTALL 6" ISOLATION
CASING.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Fred M Romer DATE 11-7-03
WITNESS DATE

TITLE PM: CLOUDY 30's PROJECT NO. 9060
11-7-03 BOOK

Work continued from Page

1700 INSTALLED 6" CASING TO 38.5
GROUTED ING IS COMPLETED.

TOTALS:

16MWT15: 7.5' OB W/SPL
31' BDRK W/SPL
38.5 ISO. CASING

16MWT08: 7' OB W/SPL
31.5 BDRK W/SPL
38.5 ISO. CASING

1800 LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Fred M Romer DATE 11-7-03
WITNESS DATE

11-8-C SAT. BOOK 2555

Work continued from Page

0700 FUR ARR AT FIELD OFFICE
- CALIBRATED PID
- DO DAILY DRILL SUMMARY

DRILLERS ON SITE:
DON KEIFER
DENNIS SINKS } BOWSER MORNER
TODD W.
NICK P.
- LOAD SUPPLIES, FILL WATER TANKS

0830 SET UP ON 16MWT11

0900 4" CORE BIT AS BECOME WORN, DRILLER GO TO LAY DOWN TO GET NEWER BIT.

0930 CONTINUE TO DRILL 16MWT11

1045 COMPLETE SPL TO 385' BGS @ 16MWT11.
BEGIN TO ADVANCE 8" ID DRILL PIPE.

1350 COMPLETED INSTALLING 6" ISO CASING BLACK STEEL USING 8" ID (11" OD)
GO TO DECON.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Romer
WITNESS

DATE 11-8-03
DATE

11-8-03 SAT 405 BOOK 2555

Work continued from Page

1500 DRILLERS SET UP ON 16MWT08
- CLEAN OUT GROUT

1525 BEGIN TO DRILL w/ 4" ID DRILL PIPE TO CORE (5" OD)

1700 REACHED 79' BGS HIT SOME HARD SAND STONE @ 79', IN SHALE FROM 39' TO 79'. DRILLERS LV SITE

TOTALS: 16MWT11
- ~~39'~~ 9' OB DRILL w/SPL
30' BORK w/SPL
39' ISO CASING

16MWT08
BORK DRILL w/ SPL = 40'
w/o SPL = 1'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Romer
WITNESS

DATE 11-8-03
DATE

TITLE 11-9-03 AM: CLEAR 30s -40s PROJECT NO. 1060 BOOK

Work continued from Page

0700 FUEL ARR AT FIELD OFFICE
- CALIBRATE PID
- PAPER WORK
DRILLERS ARR
- LOAD MOD. SUPPLIES
- FILL WATER TANK

0730 GO TO SWMU 16, DRILLERS WARM UP RIG.

0815 BEGIN TO DRILL W/ 4" ID

0945 DRILLED TO 99' @ 16MWT08
MOSTLY SHALE TO TD SAND STONE BEDS @ 85-89, SANDY SILTSTONE 89-93 GRADING TO SILTSTONE THEN TO CLAYEY SILT STONE TO 97, 98-99 SANDY SILTSTONE

DRILLER GO TO DECON
- GET H_2O
- BOXES

1040 SET UP ON 16MWT15

1055 BEGIN TO DRILL OUT GROUT FROM 150. CASING.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE [signature] DATE 11-9-03

WITNESS DATE

TITLE 11-9-03 PM: CLEAR 40s PROJECT NO. 1060 BOOK

Work continued from Page

1200 BREAK FOR LUNCH DRILLED FROM 39 THRU 87. PLAN TO DRILL TO THE SAND STONE

1300

1380 DRILLED TO 92 DISTINCT SAND STONE INSTALL SCREEN
SCREEN • 81-91 } 16MWT15
SAND • 78-92 }
BENTONITE TO TOP OF WELL (5# BGS)

1500 COMPLETED INSTALLATION OF 16MWT15. MOVE TO 16MWT08 TO INSTALL WELL ON A SIMILAR SAND STONE @ 85' SCREEN 85-95' SAND 82-99 BENT. TO GROUND SURF.

1630 DRILLER LV SITE

1700 - CLEAN UP SWMU 16
• COLLECT CORE BOXES

17

TOTALS	BORE W/SPL	BORE/MW/SPL	WELL
16MWT08	20		95
16MWT15	53	1	91
	73	1	186

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE [signature] DATE 11-9-03

WITNESS DATE

TITLE [illegible] AM: 30's CLOUDY PROJECT NO. 9060
11-10-03 MONDAY BOOK

Work continued from Page

0700 FUR ARR AT TENS FIELD TRAIL OFFICE
- CALIBRATED
- DRILLERS ONSITE, DECON RIG + TOOLS

0800 DRILLERS SET UP ON 13MWT41
IN ATTEMPT TO RECOVER A
2" CORE BIT LOST IN HOLE
BY THE ATV RIG

0930 RETRIEVED THE LOST BIT, WILL
PROCEED TO 66' BGS TO INSTALL
WELL TO ~~50-60~~' BGS 55-65

1015 TD @ 66' (13MWT41) BEGIN TO
INSTALL WELL @ 55'-65' SCREEN
SAND 66'-52'
BENT 52'-5'
SUBTOTAL: 13MWT41: DRILLED 6'
BORE w/SPL
WELL INSTAL 65'

1050 COMPLETED WELL (13MWT41) INSTALLATION
+ DRILLERS HAVE MANY CHORES BEFORE
THEY CAN MOVE ON TO 13MWT45
• UNLOADING NEW SHIPMENT OF SAND + BENT
• DECON • LOAD MORE WATER
• BREAK FOR LUNCH

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE [signature] DATE 11-10-03
WITNESS DATE

TITLE PM: PARTLY SUNNY 50's PROJECT 9060
11-10-03 MONDAY BOOK

Work continued from Page

1300 MOVE RIG INTO SUMO COMPOUND (SIGNED
IN AT THE NORTH GATE.

1325 SET UP RIG ONTO 13MWT45
• DECIDED TO DRILL DOWN 20'
BELOW ISO CASING BEFORE
CORING WILL LOG CUTTING

1345 BEGIN TO DRILL USING 4½" ID
~~DRILLER~~ DRILLPIPE
DECIDED TO DRILL DOWN
20' BEYOND THE CASING W/O SPL
WILL LOG THE CUTTINGS.

1400 LOGGED 39' TO 57' CUTTING
NO SPL.

1430 BEGAN SPL ~~START @ 57'~~ BGS CORE

1615 FINISH DRILLING CORED TO 84'
BASE ON DISCUSSIONS W/MATT C.
FINDINGS @ WELL 13MWT44 CORES,
RECOMMEND INSTALLING WELL IN
V. BR SILT STONE ABOVE A BLOCKY
GREY SANDSTONE WHICH IS DRY @
T44. THE VBr SHALE HAS SOME H_2O.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE [signature] DATE 11-10-03
WITNESS DATE

TITLE PM: CLOUDY 40s-50s PROJECT NO. 9060
11-10-03 MONDAY BOOK 2555

Work continued from Page

1615 DECIDED TO INSTALL SCREEN @ T45 AT 70' TO 80' BGS ACROSS THE SECTION THE DRILLERS COULD NOT RETRIEVE FROM HOLE AFTER MANY ATTEMPS.

630 DRILLER BEGIN TO INSTALL WELL 13MW T45

SUB TOTAL:

- DRILL (BDRK) w/o SPL: 39' TO 57' = 18'
- DRILL BDRK w/SPL: 57 TO 84 = 27'
- 80' WELL INSTALLATION @ T45

705 COMPLETED WELL INSTALLATION

- SCREEN 70'-80'
- SAND 67'-84'
- BENTONITE 5'-67'

715 DRILLER GO TO DECON CLEAN RIG + TOOL PREP TO GO TO SWMU 16.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Fred Monroe DATE 11-10-03
WITNESS DATE

TITLE CRANE NSWC AM RAINY PROJECT NO. 9060
11-11-03 TUESDAY BOOK 2555

Work continued from Page

0700 FLK ARR AT FIELD OFFICE
- CALIBRATE PID
- DO DAILY ACTIVITES SHEETS
DRILLERS ARR ON SITE
- LOAD SUPPLIES
- FILL WATER TANKS

0750 MOVE TO SWMU 16 MW T11

1130 LOG FOR 16MW T11

38-48: 38-40: SANDY SILT STONE
REC = 70%
RQD = 20%
LAM. DK GREY ALT TO LT GREY FOSSILS PL OCC.
40-42: MUD STONE
42-48: LT. GREY f-g SAND
BLOCK X BEDDED OCC PLAN
FOSSILS LAM TO F. BRED
LO ∆ FRAC OCC VUGS

48-58: MED DK CLAYEY SILT STONE
RQD = 0%
REC = 100%
FISSIL V. BR.

58-68
RQD = 0% MED DK CLAYEY SILT STONE
REC = 100%
FISSIL V. BR.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Fred Monroe DATE 11-11-03
WITNESS DATE

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68-78 DK GRY TO BLK
SOFT CLAYEY SILT STONE 68-72
REC = 75% -FISSIL
RQD = 20% -VBR
68-72 SANDSTONE LT GRY
MED 72-75 BLK BLOCK
HARD POOR BEDDING
SMALL BED.
75-78 LOTS OF FRAG.
BIOTURB?

78-88 SILT STONE
REC = 75% CLAYEY (SHALE)
RQD = 0% SOFT LAM.
V. BR. V. F BRDS

85-88 SILTY
SAND STONE
MED LAM. LTH THIN BEDDED
SOFT ALT GREY + DK GRY
LAM BR

88-98 REC = 100%
RQD = 30%

Work continued to Page

SIGNATURE Fred M Ramser
WITNESS
DATE 11-11-03
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88-96 SANDSTONE
LAM. TO THIN BEDS
ALT. GREY + BLK LAM.
OCC. IRREGULAR LAM
LOW Δ FRAG BECOMING SILTY @ 95'
96-98 COAL BED.

1200 DRILLERS INSTALLED 16MWT11
SCREEN 86-96
SAND 83-98
BENT 5'-83'

1215 BREAK FOR LUNCH

1400 DECIDED TO LET THE ATV RIG DO THE SHALLOW WELL 16MWT07. JON K AND CREW WILL GO TO SWMU16

SUBTOTALS 16MWT11

BORE DRILL W/SPL 40 TO 98
58'
96' WELL INSTALLATION

Work continued to Page

SIGNATURE Fred M Ramser
WITNESS
DATE 11-11-03
DATE

11-11-03 BOOK 2555

Work continued from Page

1700 JON K. CREW
- CLEAN UP AT SWMU 16 + SWMU 13
- TOP OFF BENTONITE AT DRILL WELLS @ SWMU 16
- MOVE CORE BOXES TO STORAGE NEAR FIELD OFFICE

FWR CLEAN UP PREP TO DEPART AM TO-MORROW.

1830 FWR LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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WITNESS

DATE 11-11-03

DATE

11/17/03 BOOK

Work continued from Page

1400 S. GRIER (TETRA TECH) ARRIVES ON SITE.

1530 S. GRIER + MAT COCHRAN (TETRA TECH) GO TO SWMU 13 ~~28~~ + DRIVE TO SET A ROTOSONIC ON 13MW28 + TO CONTINUE FROM 40'

JOHN KEIFER + NICK POST SET UP ON (BOWSER MORNER)

1630 13MW28 + clean it out.

TODD WOLLENHAUPT + DENNIS SINK (BOWSER MORNER) SUPPORT JOHN KEIFER.

1700 JON KEIFER SETS RIG TO 40' + WE FINISH FOR THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE [signature]

WITNESS

DATE 11/17/03

DATE

NSWC CRANE

N9060

GD 0279

SWMU: 13 + 16

2555

DRILLING

START: 3/24/03

END:

TITLE SWMU 16 CLEANUP SWMU PM: RAIN 50's PROJECT NO. 9060

11-11-03 BOOK 2555

Work continued from Page

1700 JON K. CREW
- CLEAN UP AT SWMU 16 + SWMU 13
- TOP OFF BENTONITE AT DRILL WELLS @ SWMU 16
- MOVE CORE BOXES TO STORAGE NEAR FIELD OFFICE

FINAL CLEAN UP PREP TO DEPART AM TO-MORROW.

1830 FINAL LV SITE

SIGNATURE [illegible] DATE 11-11-03

WITNESS DATE

TITLE CLEANUP SWMU PM: SUNNY ≈ 60°F PROJECT NO. 9060

11/17/03 BOOK

Work continued from Page

1400 S. GRIER (TNUS) ARRIVES ON SITE.

1530 S. GRIER + MAT COCHRAN (TNUS) GO TO SWMU 13 + DECIDE TO SET A PETROSONIC ON BMW 28 TO CONTINUE FROM 40'

JOHN KEIFER + NICK POST SET UP ON (BOWSER MORNER) BMW 28 + clean it out.

1630 TODD WOLLENHAUPT + DENNIS SINK (BOWSER MORNER) SUPPORT JOHN KEIFER.

1700 JON KEIFER SETS RIG TO 40' + WE FINISH FOR THE DAY.

SIGNATURE [illegible] DATE 11/17/03

WITNESS DATE

NSWC CRANE 7060

TITLE **PROJECT NO.**

TUE. 11/18/03 RAINY, ≈65°F **BOOK**

Work continued from Page

Scott Grier (FTNB) 13

0700 ON SITE @ 0700

S. GRIER CALIBRATES PID.

BOWSER MORNER CREW ARRIVES

0815 S. GRIER, (JTNB) J. KEIFER,

~~set up~~ RAIN WASHES OUT THE DRILLING.

1345 S. GRIER SETS UP ON 13 MWT 25.

USING THE PARASTOLTIC PUMP

initial H_2O level = 16.68' produced total = 24

H_2O was slightly turbid ≈ 25-40 ntu

1355 S. GRIER FINISHES draying H_2O.

1530 S. GRIER SETS UP ON 13 MWT 34.

~~FOR~~

1730 S. GRIER + TERRI ROTHAN FINISH

~~DEVELOPMENT~~ ING 13 MWT 34.

1830 All personel leave site for the day.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 11/18/03

WITNESS DATE

NSWC CRANE 70

TITLE **PROJECT NO.**

WED. 11/19/03 Cloudy, 50°F **BOOK**

Work continued from Page

0655 Scott GRIER (S.G.), Terri ROTHAN (TR)

MATT COCHRAN (MC), JIM Goeret (JG)

arrive onsite.

Personel calibrate eq. + prepare for

the days drilling activities.

0800 S. GRIER (SG FTNB), J. KEIFER, D. SINK,

N. POST (BOWSER MORNER) SET UP ON 13 MTW ~~28~~

0830 1st Coring - 10

30' of coringing completed

blew out well checking recovery for H_2O

1000 Water Level 77.0" @ 40' cored

1100 WATER LEVEL 76.95' S. GRIER (SG FTNB)

+ J. KEIFER DECIDE TO TAKE 1 MORE 10'

CORING RUN + REMEASURE H_2O level

1130 H_2O level = 86' waiting for recovery

1230 H_2O level = 85.5' S. GRIER + M. COCHRAN

DECIDE TO INSTALL THE WELL AT TOTAL DEPTH 88'

SCREENED INTERVAL 88'-78' with 3' of sand pack.

38/88' (50) BR

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 11/19/03

WITNESS DATE

TITLE 11/19/03 PROJECT NO. BOOK

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8 1300 S. GRIER (TENS) J. KEIFER + D. SINK (BOWSER MORNER)
INSTALL WELL 13 MWT 28.

1400 J. KEIFER, D. SINK + TODD NOLLENHORT
COMPLETE WELL 13 MWT 28.

1430 RIG IS STUCK -

1530 RIG IS OUT.
J. GRIER BOXES CORING
13 MWT 27.

1800 S. GRIER + MAT COCHRAN
LEAVE THE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Scott Grier DATE 11/19/03

WITNESS DATE

TITLE 11/20/03 PROJECT NO. BOOK

Work continued from Page

0700 SCOTT GRIER (SG), Terri Rojahn (TR), MAT COCHRAN (MC) and JIM GORET (JG) ARRIVE ONSITE.

0900 S. GRIER sets up on 13 MWT 45 for development.

0920 SG. BEGINS PURGING 13 MWT 45 with the

Loose valve in well.

1020 Get other valve + dry well

1209 S. GRIER FINISHES DEVELOPING 13 MWT 45.

TOTAL VOL. PURGED = 7.25 g
RECHARGE RATE = 0.08' per 10 min OR
" Δ = 0.48' per 60 min
See well devop. sheet for parameters + other details

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE DATE

WITNESS DATE

TITLE NSWC CRANE 11/20/03 PROJECT NO. BOOK

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1330 S. GRIER SETS UP ON 13 MWT 30.
The well dries in 3 minutes.
aprox. 5.25 gal.
The well is allowed to recharge
recharge is aprox 0.5 - 1.0 foot/10 min
see monitoring well develop. sheet for details

1430 S. GRIER SURGES THE WELL WITH THE BLOCK

1455 S. GRIER PUMPS DRY again
13 MWT 31

1500 S. GRIER FINISHES DEVELOPMENT.

1544 S. GRIER SETS UP ON
13 MWT 30.

1550 SG BEGINS PUMPING
13 MWT 30.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 11/20/03

TITLE NSWC CRANE 11/20/03 PROJECT NO. BOOK

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S.G. surges the well 2x (1606 + 1642)
total vol. purged = 7.5 g
See M.W. dev. sheet for details.
1655 S. GRIER ENDS
PURGING 13 MWT 30.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 11/20/03

TITLE 11/21/03 Clear, 58F PROJECT NO. BOOK 9060

Work continued from Page *WELL DRILLING*

→ 0700 S. GRIER, MATT COCHRAN, TERRI ROJANN + JIM GOERDT ARRIVE ONSITE.

→ 0900 13 MWT 46 = casing set.

S. GRIER (THUS) J. KEIFER, DSINK + TODD WILLENHOPT set up on 13 MWT 46. (BOWER MORNER)

→ 0930 S.G + BOWER MORNER PERSONEL BEGIN DRILLING. 13 MWT 46.

* SEE BORING LOG FOR DETAILS *

INSERTING CASING TO 39' BGS.

DRILLED TO 38' ≈ 40'

1110 DRILLERS WENT TO LUNCH.

1230 DRILLERS RETURNED.

DRILLING ENDS TO GROUT CASING.

1400 GROUTING COMPLETE 13 MWT 46.

1530 S. GRIER HELPS T. ROJANN + M. COCHRAN develop 16 MWT 13 + 16 MWT 15.

1830 All personel leave the site for the night.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier DATE 11/21/03

WITNESS DATE

TITLE 11/22/03 SUNNY, 68F PROJECT NO. BOOK

Work continued from Page

0700 S. GRIER, T. ROJHAN, M. COCHRAN, + J. GOERDT ARRIVE ONSITE.

Personel calibrate eq. make activities report w/ drillers and plan the day activities.

1000 S. GRIER SETS UP ON 13 MWT 28 FOR DEVELOPMENT.

1000 S. GRIER DRIES THE WELL.

*See well development sheet for 13 MWT 28 for details.

1130 S. GRIER COMPLETES DEVELOPING 13 MWT 28. TOTAL PURGED = 3.25 g

1500 S. GRIER (THUS), J. KEIFER + TODD WOLLENHOPT

set on 13 MWT 46 for drilling.

screen = 65 → 55'

sand = 52'

bentonite chip = surface

1730 FINISHED INSTALLATION OF MWT 46

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 11/22/03

WITNESS DATE

TITLE Cloudy, Windy PROJECT NO. BOOK

Work continued from Page

0650 S. GRIER ARRIVES ONSITE.
T. ROJAHN, J. GOERDT + M. COCHRAN ARRIVE.
ALL PERSONEL PREPAIR FOR THE DAY
ACTIVITIES (CAL. EQ, GO OVER LOGS, ETC)

0910 S. GRIER + T. ROJAHN SET UP ON
16 MWT 16. development

1000 S. GRIER + T. ROJAHN set up on
13 MWT 34.

1330 S. GRIER SETS UP ON 13 MWT 08
FOR SAMPLING.

PID = 102
Sample 13GWT08 taken @ 1515
* See sampling log for details *

1900 S. GRIER leaves the site
to pick up 2 *(100' x 3/4") Rolls
OF POLY TUBING.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Scott Grier DATE 11/23/03

WITNESS DATE

TITLE 11/24/03 COLD, WINDY, 30°F PROJECT NO. BOOK

Work continued from Page

0700 S. GRIER, T. ROJAHN, M. COCHRAN,
+ J. GOERDT ARRIVE ON SITE.

ALL Personel prepair for the days
activities.

0900 S. GRIER SETS UP ON 13MWT14.
→ 1115 S. GRIER SAMPLES 13 GWT 14.

* See low flow data + g.w. sample sheets
for details *

1400 S. GRIER SETS UP ON 13 MWT 30.

1615 S. GRIER SAMPLES 13 GWT 30.

1800 S. GRIER GOES TO FIND J. GOERDT
AND HELPS HIM FINISH 13 MWT.

1900 S. GRIER + J. GOERDT leave the
site for the day.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Scott Grier DATE 11/24/03

WITNESS DATE

TITLE 11/25/03

PROJECT NO.

BOOK

Work continued from Page

0700 S. GRIER, T. ROJAHN, M. COCHRAN + J. GOERDT ARRIVE ONSITE.

ALL PERSONEL MAKE PREPARATIONS FOR THE DAYS ACTIVITIES.

0930 S. GRIER SETS UP ON 13 MWT 27.

1005 S. GRIER BEGINS PURGING 13 MWT 27.

1425 S. GRIER SAMPLES 13 MWT 27.

1600 Personel clean up office + decon pad.

2100 S. GRIER leaves the site for the day.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 11/25/03

WITNESS DATE

TITLE 12/03/03

PROJECT NO.

BOOK

Work continued from Page

1400 S. GRIER ARRIVES AT THE MAIN GATE AND GETS HIS PASS.

S. GRIER SAMPLES RINSATE BLANKS.

1815 S. GRIER LEAVES THE SITE FOR THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier DATE 12/03/03

WITNESS DATE

TITLE 12/04/03 Rainy, Cold 38°F PROJECT NO. BOOK

Work continued from Page

0650 S. GRIER (SG) T. ROTHAN (TR) + J. GOERTO (JG) ARRIVE ONSITE.

Personel prepair for the day's activities.

0900 S. GRIER SETS UP ON 13 MWT 43.

1050 S. GRIER SAMPLES 13 MWT 43.

1200 S. GRIER SETS UP ON 13 MWT 44.
PROBLEM WITH LIFT - HAVE TO INTUBING.

1430 S. GRIER BEGINS PURGING 13 MWT 44.

1700 S. GRIER SAMPLES 13 MWT 44.

1745 S. GRIER LEAVES THE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 12/4/03

WITNESS DATE

TITLE 12/05/03 Rain, 36°F PROJECT N BOOK 9060

Work continued from Page

0650 S. GRIER ARRIVES ONSITE.

0915 S. GRIER + T. ROTAHN BEGIN HAND AUGERING 16 SB 47

0940 S.G + T.R SAMPLE (SOIL) 16 SB 47

1000 SG + TR AUGER 16 SB 48.

1015 SG + TR SAMPLE 16 SB 48 0203.

1030 S.G + T.R. AUGER 16 SB 49.

1050 SG + TR SAMPLE 16 SB 49 0405.

1130 SG + TR AUGER 16 SS 42

1155 SG + TR SAMPLE 16 SS 42 0002.

1205 SG + TR AUGER 16 SS 43

1210 SG + TR SAMPLE 16 SS 43 0002.

1215 SG + TR AUGER 16 SS 44.

1225 SG + TR SAMPLE 16 SS 44 0002

1237 SG + TR SAMPLE 16 SS 45 0002.

1255 SG + TR SAMPLE 16 SS 46 0002.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO

Work continued to Page

SIGNATURE Scott Grier DATE 12/5/03

WITNESS DATE

TITLE 9060 PROJECT NO. SNOW BOOK

Work continued from Page

1450 S-GRIER SETS UP ON 16 MWT 11.

1540 WATER LEVEL IN 16MWT 11 drops below pump intake.

1630 S-GRIER BANS 16 MWT 11 dry.

1700 S-GRIER CHECKS H_2O level in 16 MWT 15.
H_2O level = 53.36'

1800 S-GRIER LEAVES THE SITE FOR THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 12/5/03

WITNESS DATE

TITLE 12/6/03 PROJECT NO. Clear, ~~Lt Breeze~~ 40°F BOOK

Work continued from Page

0655 S.GRIER ARRIVES ONSITE.

S.G + TR SAMPLE THE SUMPS AND 16 GWT 08.

1200 S-GRIER SETS UP ON 13 MWT 02.
S.G pumps the well @ 80-100 mL/min.
S.G calculates the H_2O level drop to be risky for enough water to purge + sample

1345 S.G. pumps the well dry. (13 MWT 02)

1500 S.G set up on 13 MWT 06.

1628 S.G purges 13 MWT 06 dry.
Total volume purged = 2.0 g.

1715 S.G. LEAVES THE SITE FOR THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 12/6/03

WITNESS DATE

NENC CRANE

TITLE 12/7/03

PROJECT NO. Clear, Cold, BREEZE, 25°F

Work continued from Page

0655 S. GRIER ARRIVES ONSITE.

0900 S. GRIER SETS UP ON 13 MW 28.

1500 WATER LEVEL DROPS BELOW PUMP INTAKE.

1510 SG FTR SET UP ON 13 MW 45.

WELL 13 MW 45 WATER LEVEL 1755 DROPS BELOW INTAKE ON PUMP.

1830 SG LEAVES THE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier

DATE 12/7/03

WITNESS

DATE

NENC CRANE

TITLE 12/8/03

PROJECT NO. Clear, Cold, 25°F

Work continued from Page

0700 S. GRIER ARRIVES ONSITE.

S.G., T. ROTANN + J. GOERTD MAKE PREPARATIONS FOR THE DAYS ACTIVITIES. (SOIL + GW SAMPLING).

0830 SG + TR BEGIN HAND AUGERING @ SWMU 13.

13 SB 16 H2O in hole @ 2'

0002 INTERVAL SAMPLED @ 0848

.8' loam (DK-BR)

1.5' Silty Clay BR/LT BR/GR

4.0' WET + COHESIVE

0204 INT. SAMPLED @ 0900

13 SB 17

0002 sampled @ 0900

0'-1.5 DK BR LOAM

0204 sampled @ 0930

1.5-4.0 LT BR/GR SILTY CLAY

10-1.5 INC. CLAY + GR COLOR ORANGE brn/3.0-4.0'

3.0-4.0 INC FINE SAND WHITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier

DATE 12/8/03

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

H2O @ 3.0'

13 SB 18 → 0002 sampled @

0-.5' DK BR LOAM 0912

.5'-2.0'-3.0' BR SILTY CLAY 0204 sampled @ 0930

3.0'-4.0' OR/YELLOW FINE SANDY CLAYEY SANDY 30%

13 SB 19 → 0002 sampled @ 0920

0'-.5' DK BR LOAM 0203 sampled @

.5'-1.0' LT BR SILTY CLAY 0930

1.0'-2.0' BR LOAM W/ FINE GRAVEL

2.0'-3.0' DK BR SILTY CLAY

3.0- FINE CLAY DK BR

REFUSAL @ 3.0'

0002

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

DATE 12/8/03

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

13 SB 20 0001 sampled @ 1005

0'-.5' DK BR LOAM/W ORGANICS

.5'-1.0' LT BR/OR CLAYEY FINE SAND ~~SILTY CLAY~~ W/ ROCKS + GRAVEL

REFUSAL @ 1.0

13 SB 21 0002 sampled @ 1004

0204 " " " 1019

0'-.5' DK BR LOAM

.5'-2.0' LT BR/OR SILTY CLAY, SOME W SAND FINE

2.0'-3.0' FINE SAND + OR COLOR

3.0'-4.0' SANDY, SILTY CLAY 30%, 30%, 40%

13 SB 22 0002 sampled @ 1030

0204 " " " 1045

0'-.5' DK BR/BLK LOAM W/ GRAVEL FILL

.5'-1.0' DK BR SILTY CLAY

1.0'-3.0' LT BR/OR CLAYEY SAND (FINE)

GRAVEL @ 2.0'

3.0'-~~4.0~~ 3.5 SANDY CLAY/(FINE) OR/OR/WHITE W GRAVEL

REFUSAL @ 3.5'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE 12/8/03

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

13SB23 0-.5' DR GR. SILTY LOAM w/ GRAVEL

0002 sampled @ 1036 1'-2' OR/BLK SANDY CLAY w/ BLK PATCHES OF ORGANIC MATTER

0204 sampled @ 1045 2'-4' CLAYEY SAND (FINE) OR SEMI COHESIVE

13 SB 24 0-.5' ~~GRY~~/BLK SANDY LOAM w/GRAVEL

0002-1110 .5-1.0' OR. CLAYEY SAND (FINE) 70% SAND

0203-1120 1.0-2.0' OR/GR SANDY CLAY 70% clay

2.0-3.0' OR. SILTY SAND w/GRAVEL 70% SAND

REFUSAL @ 3.0'

13 SB 25

0002-1104 0-.5' GR/BL SANDY ~~LOAM~~ w/GRAVEL

0204-1115 .5-4.0' OR. ~~CLAYEY~~ SILTY SAND (FINE) 70% w/clay

3.0-4.0 INCREASING CLAY 25-30% ~~30%~~

Scott Grier 11/8/03

NSWC CRANE 9060

TITLE 11/8/03

PROJECT NO.

BOOK

Work continued from Page

1500 ~~0650~~ S. GRIER ~~ARRIVE~~ SETS UP ON 13 MWT 28.

1530 S. GRIER GETS THE REMAINDER OF THE SAMPLES FOR 13GWT2901.

1540 S. GRIER SETS UP ON 13 MWT 45.

1558 S. GRIER SAMPLES 1½ AMBER BOTTLES BEFORE WATER LEVEL DROPS BELOW INTAKE OF PUMP.

1700 S. GRIER DOES BORING LOGS FOR ALL HAND AUGERING.

1820 S. GRIER LEAVES THE SITE.

SIGN

Scott Grier 11/8/03

TITLE 12/9/03 PROJECT NO. Cloudy, Light Breeze, 51°F BOOK

Work continued from Page

0650 S. GRIER ARRIVES ONSITE.

0930 S. GRIER SETS UP ON 13 MWT 47.

1110 S. GRIER SAMPLES 13 MWT 47

* see GW sample sheet for details.

1400 S. GRIER CONSTRUCTS ~~WELL~~ SOIL BORING LOGS 13 SB 16 → 13 SB 25.

1500 S. GRIER LEAVES TO CLEAN RENTAL.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier DATE 12/9/03

WITNESS DATE

TITLE PROJECT NO. BOOK

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE DATE

WITNESS DATE

TITLE 12, 7/03

PROJECT NO. Cloudy, Light Breeze, 51°F

Work continued from Page

0650 S. GRIER ARRIVES ONSITE.

0930 S. GRIER SETS UP ON 13 MWT 47.

1110 S. GRIER SAMPLES 13 MWT 47

* see GW sample sheet for details.

1400 S. GRIER CONSTRUCTS ~~WELL~~ SOIL BORING LOGS 13 SB16 → 13 SB25.

1500 S. GRIER LEAVES TO CLEAN RENTAL.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier

DATE 12/9/03

WITNESS

DATE

TITLE 16 OVERCAST 1-15-04 FRIDAY

PROJECT I BOOK 9060

Work continued from Page

1200 DRILLERS LOAD SUPPLIES TO SUMM 16 SET RIG ON HOLE WELL 16MWT18

- BREAK FOR LUNCH

1300 FWR SHOWS DRILLERS WHERE TO DISCHARGE DRILLING FLUIDS INTO IWD LINE.

1330 DRILLERS CONTINUE TO SET UP ON 16MWT18.

+ PREP TO DO SLUG TESTS AT DEEP WELLS ON SUMM 16

- WELLS THAT NEED TO BE TESTED

16MWT08 DTW = 97.05 TD=

16MWT11 DTW ~ 99 BAILER IN WELL CAN NOT MEASURE WL. THE BAILER SEEMS TO BE ON THE BOTTOM SUGGESTING THAT THE WATER LEVEL IS ~ 3' OFF BOTTOM INSUFFICIENT AMOUNT OF H_2O TO DO SLUG TEST.

NOTE: ~4' OF WATER IN 16MWT08

1400 BEGIN DRILLING w/ 1" DRILL PIPE

- SET MUD PAN.

1700 LOWERED 6" CASING

1715 BEGIN TO GROUT IN CASING CEMENT/BEN

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605

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SIGNATURE Greg M Ramser

DATE 1-15-04

WITNESS

DATE

TITLE FUR 16
1-15-04

PROJECT NO. 9060

BOOK

Work continued from Page

1730 COMPLETED INSTALLATION OF 6" CASING 0-40' @ 16 MWT 18 USING CEMENT/BENTONITE GROUT

1800 CLEAN UP W SITE
- LEFT RIG ON HOLE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer

WITNESS

DATE 1-15-04

DATE

TITLE 17
1-16-04 SAT.

PROJECT NO. 9060

BOOK

Work continued from Page

0700 FUR AT FIELD OFFICE
DRILLER AT FIELD OFFICE
- PAPER WORK (DAILYS
- DISCUSS PROJECT +

FUR CALIBRATE EQ.

- PLAN TO MOVE OUT TO MGBG TO INSTALL 01T07 WELL SEE NOTE BOOK 1347 FOR THESE ACT. AT MGBG.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer

WITNESS

DATE 1-16-04

DATE

TITLE PM: RAIN PROJECT NO. 9060
1-17-04 + SAT BOOK

Work continued from Page

1430 SET UP TO DO RECON FOR LOC OF ADD. WELLS AT SWMU 13 TO DEFINE DOWNGRADIENT EXTENT OF CONTAMINANT.
- GET WATER LEVELS @ DEEP WELLS TO DO SLUG TEST:

T46 SWL=57.63, TD=67.65
T41 SWL=66.02 TD=67.81
T44: 64.36 SWL, TD=85.9

1ST SWL=57.63, TD=67.65

+ LOCATE WELLS/PROPOSED WELL ALONG ROAD IN AREAS TO AVOID OVERHEAD UTILITIES + UNDERGROUND LOC. ALONG ROAD ARE TRUCK ACCESSIBLE

1730 PUR RETURNS TO FIELD ~~OFF~~ OFFICE

1800 CLV SITE w/ TR.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 Work continued to Page

SIGNATURE Fred W Rosser DATE 1-17-04
WITNESS DATE

TITLE AM: CLOUDY 20's PROJECT 9060
1-18-04 SUNDAY BOOK

Work continued from Page

0700 PUR ARR AT FIELD OFFICE,
- CALIBRATE PIDS
- MISC HOUSEKEEPING

0730 DRILLERS ARR
- DO PAPERWORK
- LOAD WATER + OTHER SUPPLIES FOR

0820 MOVE TO 16MWT18 LOC
- MAY CONSIDER USING 15' SCREEN

NOTE SWL = 96.4 @ 16MWT11
TD = 98.7

0830 BEGIN TO ADVANCE 4.5" DRILL PIPE ~5" HOLE AT 16MWT18
40'-50'

1115 HAVING TROUBLE EXTRACTING CORES
60'-70' SHALE/MUDSTONE

1330 AGAIN HAVING TROUBLE EXTRACTING CORE
70-80 SHALE

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 Work continued to Page

SIGNATURE DATE
WITNESS DATE

TITLE 20's PROJECT NO. 9060
1-18-04 SUNDAY BOOK

Work continued from Page

1430 CLOCKED DRILLING BIT SHORT RUN 80-88.

1700 TD AT 105' BGS @ 16MW18
ENCOUNTERED COAL SEAM @ ~

BEGIN TO INSTALL WELL 16MW18
SCREEN 94-104
SAND 91-105
BENTONITE 3' - 91' CHIPS HYDRATED

1800 DRILLERS CLEAN UP SITE

TOTALS:

16MW18

40 - 105 BORE w/SPL 65'

104' 2" WELL INSTALL.

850 DRILLER + FMR LV SITE 16 + FMR GO TO FIELD OFFICE
1900 - CLEAN OUT BLUE POLY TANK LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred Wanner DATE 1-18-04
WITNESS DATE

TITLE PROJECT NO. 9060
1-19-04 MONDAY BOOK

Work continued from Page

0700 FMR ARR AT TERRS FIELD OFFICE
- UNLOAD SUPPLIES USED FOR WELL INSTALL
- PAPER WORK
0730 DRILLERS ARR.
- LOAD WATER, MAIN WATERLINE FROZEN USE GARDEN HOSE FROM INSIDE SPIGOT.
-
0815 SURVEYORS ON SITE DISCUSS PROJECT W/T.R.
- JOE McCLOUD GOES TO SWMU 1 TO DECON DOZER + TO PULL CATOR UP HILL
+ SCOTT + DON (DRILLERS) GO TO SWMU 16 TO INSTALL FLUSH MT.
+ CUT 6" ISOLATION CASING
HAVING PROBLEMS + DELAY

0900 FMR ESCORTS SURVEYORS TO SWMU 16

0915 FMR GO TO FIELD OFFICE, SCOTT + DON WENT TO MGB6 TO DISCUSS PLAN C" TO CUT 6" CASING USING GENERATOR + SAWS ALL?
- CATCH UP ON PAPER WORK

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred Wanner DATE 1-19-04
WITNESS DATE

TITLE 1-19-04 MONDAY, TEENS PROJECT NO. 4060 BOOK

Work continued from Page

1200 DRILLER CONTINUE TO CUT THE 6"
SURVEYOR CONTINUE TO DO SITE 1

1530 FINNISH FLUSH MT @ 16MWT 18
GOTO FIELD OFFICE, DO PAPER WORK W/ DRILL
1630 — PREP TO DEVELOPE 16MW18
1825 BAILED 16MWT18 DOWN
TO 104.1 TD = 104.5

PURGED 22 GAL (DRY)

→ TOOD DRILL DEMOB, LV SITE.

1900 FUR LV. SITE.

— NOTE: WATER LEVELS IN
WELLS TO BE SLUG TESTED:

13MWT35 : SWL = 63.96 TD ~ 69.5 70

13MWT45 = SWL = 72.75 TD ~ 82

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 Work continued to Page

SIGNATURE [signature] DATE 1-19-04

WITNESS DATE

TITLE 1-20-04 TUESDAY 15°F SUNNY PROJECT 4060 BOOK

Work continued from Page

0700 FUR ARR AT FIELD OFFICE.
→ DISCUSS W/ TR FIELD ACTIVITIES
— ESCORT SURVEYORS AT SWMU 13
— COMPLETE SYNOPTIC WL AT
SWMU 13 (OUTSIDE WELLS)
— PREFORM SLUG TESTS @
TWO WELLS INSIDE SWMU 13
ALONG RAILROAD.

0815 SURVEYORS ON SITE

0830 FUR + SURVEYORS GO TO SWMU
SURVEYORS GOTO SWMU 1 TO
COMPLETE. WILL MT @ SWMU 16 @ NOON.
0900 FUR BEGIN SYNOPTIC WLS @
SWMU 13.

1130 COMPLETED WL's,

1200 MTG WILL SURVEYORS,
— WILL CONTINUE WORK @ SWMU 1
THEN MOVE TO "OUTSIDE GATE"
@ SWMU 13. EXPECT WORK TILL END
— OF DAY WILL MEET UP W/
THEM TO-MORROW @ 0800 HRS.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 Work continued to Page

SIGNATURE DATE

WITNESS DATE

TITLE 1-20-04 PM: SUNNY + CLOUDS 16°F PROJECT NO. 9060 BOOK

Work continued from Page

1240 SET UP EQUIPMENT FOR SLUG TESTS.

EQUIPMENT:
- MINITROLLS:
  US ENV. RENTAL { S/N 008670 100 PSI
  S/N 012487 100 PSI }
  BOTH MODEL "PROFESSIONAL"
- COMPUTER
  DELL S/N 222 FROM US ENV. RENTAL W/ SOFTWARE

PROGRAM TROLLS

+ SET UP 8670 FOR T35
- RUN TEST ON X-DUCER USING GRADUATED CYLINDER OF "THIS IS NOT CALIBRATION JUST CHECK"

+ SET UP 12487 FOR T45
- RUN CHECK OK
- TOC, Ref 00.00, LOG 10 min.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Manser DATE 1-20-04

WITNESS DATE

TITLE 1-20-04 PROJECT NO. 9060 BOOK

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1400 SET UP AT T45.

1445 - READING WATER COL. ABOVE XD @ 9.554 PRIOR TO INSTALLING BAILERS (TWO) Δ TO 9.553

1450 INSERT BAILERS

1457 XD = 9.892

1500 XD = 9.886

1510 MOVE TO T35, BEGIN TO SET UP TEST

1520 INSERT XD TO BOTTOM (JUST OFF) OF WELL T35 (XD 8670)

~~1521~~ XD WL @ 6.166 (PRIOR TO BAILER INSERTION)

1535 INSERTED BAILER H_2O XD = 6.251

1540

1550 XD_{H_2O} WL = 9.844

1637 XD_{H_2O} WL = 9.824

1655 STARTED SLUG TESTS @ ~~16~~ 13 WELL T35

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Manser DATE 1-20-04

WITNESS DATE

TITLE 1-20-04 PM: CLEAR 10°-20° PROJECT NO. 7060 BOOK

Work continued from Page

1700 STARTED TEST @ T45

1800 LV SUMM 13

1830 LV FIELD OFFICE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramos DATE 1-20-04

WITNESS DATE

TITLE 1-21-04 AM: 20's PROJECT 9060 BOOK

Work continued from Page

0700 FLUR ON SITE AT FIELD OFFICE
- PREP TO SLUG TEST
- PREP TO T46 SLUG TEST T46

0830 GO TO SUMM 16, CHECK IN WITH SECURITY.

0850 ARR @ T35

SET UP TEST FOR T46 ON 8670 XD/TROLL

0925 @ T35 H_2O @ XD = 5.871
NOTE SWL H_2O @ XD = 6.166
5.871
.295

h_o = 1.3 · $\frac{.295}{1.3}$ = 0.22 × 100% = 22%

DECIDED TO STOP TEST

0930 STOPPING TEST
SET UP TEST FOR T46 TROLL
8670

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred M Ramos DATE 1-21-04

WITNESS DATE

TITLE 1-21-04 PROJECT NO. 7060 BOOK

Work continued from Page

0945 PWL LV FOR T 46

0955 MEET SURVEYORS, TAKE TO NORTH GATE TO CHECK IN.

1000 PWL GOES TO T46
- SURVEYORS INSIDE GATE AREA.

1010 PWL @ T46 SET UP FOR SLUG TEST.

1015 INSERTED TROLL 8620
H_2O @ X_0 = 9.475 PRIOR TO BAILER INSERTION.

1030 CAN NOT INSERT BAILER, MIGHT BE DUE TO BEND IN RISER WILL GO GET LONG + SMALL DIA SOLID SLUG.

1130 MET SURVEYORS AT GATE, LET THEM OUT OF GATE

1145 ARR @ T46 SET UP SOLID SLUG.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Greg M Ramsey DATE 1-21-04

WITNESS DATE

TITLE 1-21-04 CLOUDY 30's PROJECT NO. 7060 BOOK

Work continued from Page

1156 XD_{H_2O} = 9.512 BEFORE SLUG INSERTION
WILL DO FALLING HEAD TEST
NOTE: SWL = 57.93 TD = 67.66

67.66
57.93
9.73

DECIDED TO DO FALLING HEAD DUE TO TIME CONSTRAINTS.

1 XD_{H_2O} = 9.544 AT END OF FALLING HEAD TEST

1245 COMPLETE SLUG TEST & CLEAN UP
LV. T46 AREA FOR INSIDE T45

1300 AT 13MWT45. CHECK DRAWDOWN DISTA
Δh @ 0.992 WILL ALLOW TO RUN LONGER

1400 AT FIELD OFFICE LOAD EQUIPMENT FOR MGBG SEE NOTE BOOK 134 FOR MINUTES.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Greg M Ramsey DATE 1-21-04

WITNESS DATE

APPENDIX D.2.3
SWMU 16
FIELD NOTEBOOK
ROUND 3

2377

TABLE OF CONTENTS

Subject	Page

TITLE NSWC CRANE
MON JULY 26 2004

PROJECT NO. N7448
BOOK 2577

Work continued from Page

AT SITE: SJC JW, CM, JD } B/M

AM: CLOUDY, RAIN, COOL
PM: " " "

0700 - AT SITE CALIB PID - DRILLERS GET WATER - GO OVER QUANTITIES.

0800 - STILL RAINING - B/M WILL WAIT TO SEE IF IT SUBSIDES.

0930 STILL RAINING - DRILLERS GO GET SUPPLIES, GAS ETC.

1100 - DRILLERS - BACK ON SITE - B/M DECIDES (DUE TO RAIN) NOT TO WORK TODAY.

1230 B/M OFF SITE - SJC WORKS W/ TR - GETS SUPPLIES ETC.

NO ITEMS FOR B/M TODAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conte DATE 7/26/04

WITNESS DATE

TITLE SWC CRANE **PROJECT NO.** N7448

TUES JULY 27 2004 **BOOK** 2577

Work continued from Page

AT SITE: SJC JW, CM, JD } B/M

AM: SUNNY, WARM

PM: " "

0640 AT SITE - CALIB PID - UNLOAD SUPPLIES, THAT I PICKED UP ON MON.

0730 MOVE TO DECON PAD THEN TO 13MWT51

0800 SET UP AT 13MWT51.

0812 START TO SAMPLE T51 (T51)

0845 @ 15.5 REF (SHALE) WILL AUGER TO 16. SET WELL @ 15-5, SAND 16-4 THEN PELLETS

0920 TALKED TO JEFF SCHUBERT - HE AGREED WITH THE ABOVE WELL - FOR NEXT 3 WELLS - WILL TARGET THE O.B. UNLESS THERE IS NOT ENOUGH SATURATION. HE WOULD LIKE TO CORE 5 TO 8' OF NEXT HOLE TO SEE HOW THICK IS THE SHALE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conti DATE 7-27-04

WITNESS DATE

TITLE SWC CRANE

CONT. (TUES) 2004 **BOC** 2577

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SAND USED: GLOBAL FILTER PACK
50lb Bags
GLOBAL DRILLING SUPPLIERS INC.
1-800-356-6400
#5 QUARTZ SAND PACK

BENTONITE USED: Pure Gold Medium Chips by CETCO
50 lb. Bags
Colloid Environmental Technologies Co.
1-800-527-9948

SWMU 12
QUANT. (TUES)

	OB W/SAMPLES	2" WELL	CORE REAM	TEMP CASIN	
13MWT51	16'	15	—	—	← OB WELL
13MWT50	9.5	25	16.5	9.5	
13MWT49	10	9	—	—	← OB WELL
13MWT48	10				
	45.5	49	16.5	9.5	

Core
T50 25.0
9.5
Ream 15.5
To 26

16.5
9.5
26.0

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conti DATE 7-27-2004

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448
TUES (CONT) 2004 BOOK 2577

Work continued from Page

1000 START @ 13MW T50.

1015 HIT SHALE ≈ 8' - 9.5 - HOLE DRY

1020 WAIT TO SEE IF HOLE MAKES WATER

1045 NO WATER - DECIDE TO CORE SET 6" TEMP CASING TO 9.5'±

1105 SET UP FOR CORING W/ AIR.

1110 START TO CORE @ 13MW T51

1125 RUN (1) 9.5 → 15

1130 START RUN (2)

1155 RUN (2) 15 → 20 - POOR REC VERY "CRUMBLY" SILTSTONE.

1205 DECIDE TO LET SIT (LUNCH)

1245 AT FIELD OFF - TR SAYS THAT MEETING AT 1300 WAS POSTPONED TO THURS.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conte DATE 7/27/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N 744
(TUES) 2004 BOOK 2577

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1330 SJC AT 13MW T50 - CHIP SAYS THAT HOLE HAS ≈ 3' WATER IN HOLE IC FROM 20-17 - DECIDE TO CORE 5 MORE FEET - PLAN TO SET WELL AT ≈ 25' → 15 SCREEN (T50)
12 → 26 SAND
1430 4 → 12 CHIPS

1500 GO DECON TOOLS ETC. MOVED TO 13MW T49.

1545 BACK FROM DECON. START @ T49 (T49)

1605 AT 10' - SHALE ≈ 8.5 - WATER AT 4' BGS AT 1625 - CALL J SCHUBERT SAYS OK TO SET WELL IF WE HAVE ≈ 3' OF WATER FROM 8.5' - WHICH WE DO. WILL SET WELL 9 - 4 (5' SCREEN) SAND FROM 3 TO 9.5 - CHIPS TO 1'

1635 START TO SET WELL. CHIPS TAKES WL OF T50 WAS ≈ DRY BGS.

1700 WELL SET @ T49 TO 9'.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 7/27/04

WITNESS DATE

TITLE WC CRANE PROJECT NO. N7448
(TUES) 2004 BOOK 2577

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1710 MOVE TO/START 13 MW T 48 - HSA RIG (ATV).

1723 DOWN TO 10 w/ SPOONS - LAST 1.5 WAS WET, BUT DOESNT SEEM TO BE RISING.

1750 JIM WILL AUGER TO 10' CLEAN OUT AND LIFT AUGERS - WILL CHECK HOLE IN THE MORNING.

1830 LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conte DATE 7-27-04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448
WED JULY 28 2004 BOOK 2577

Work continued from Page

AT SITE SJC JW CM JD } BM

AM SUNNY COOL - WARM
PM " " V WARM.

0650 AT SITE - CALIB PID - GO OVER QUANT

0750 WL @ T48 (SWMW 13) WAS ≈ 5 BGS DECIDE TO SET WELL AT 10'±

JD

WL T49 - ≈ 4' BGS
WL T50 - 24.8 BGS 25.5 BGS

0800 SETTING WELL AT 13MWT48 - SCREEN FROM 5 - 10, SAND 3.5 TO 10.5, CHIPS FROM 1.5 TO 3.5.

T48

0830 13MWT48 IS INSTALLED AS ABOVE

0900 MOVE TO DECON

1000 GET SUPPLIES AT FIELD OFFICE
GO TO 16MW T20

1010 SET UP AT T20

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conte DATE 7-28-04

WITNESS DATE

TITLE NSWC CRANE WED (CONT) 2004 **PROJECT NO.** N7448 **BOOK** 2577

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1055 DOWN TO 16' - HIT SOME H_2O AT 10-12' ± - WILL CLEAN OUT HOLE AND WAIT TO SEE IF IT MAKES WATER.

1200 WL ≈ 12' BGS AT TD 16' ± AUGERS ARE AT ≈ 12' ± BASED ON 2' OF H_2O ABOVE ROCK IN HOLE NOW AND WATER HIT AT 10-12 DECIDE TO PUT IN WELL FROM 5-15 SAND 4 TO 15.5, CHIPS TO 2'.

1238 PLACING SAND PACK (15.5 TO 4) WL AT 11' ±

1310 MOVE TO 16MWT19 - SET UP ATV.

1348 ~~DONE~~ DOWN TO 16' AT T19 @ 16' WILL WAIT TO SEE IF IT MAKES WATER

1430 HOLE HAS ≈ 2.5' WATER AND STILL RISING - DECIDE TO SET WELL AT 15' - 5' SAND 5.5 → 4, CHIPS TO 2'.

1500 - SETTING WELL - SAND PACK AND PELLETS AT 16MWT ~~AT~~ 19 SJC.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conte DATE 7/28/04

WITNESS DATE

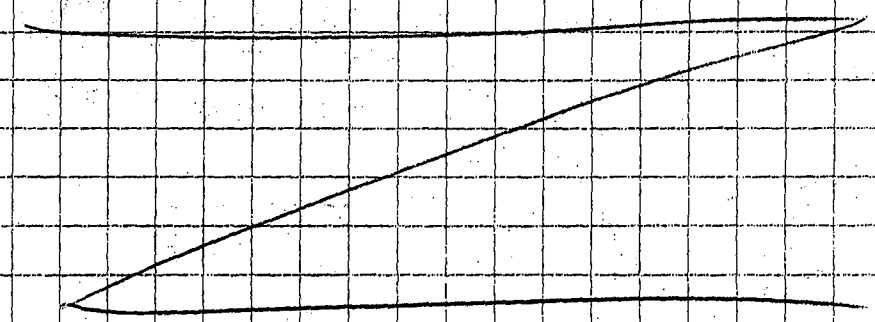
TITLE NSWC CRANE WED (CONT) 2004 **PROJECT NO.** N7440 **BOOK** 2577

Work continued from Page

1600 CLEAN UP - GO TO DECON PAD

1700 FINISH DECON - CLEAN UP AROUND DECON PAD

1830 LV SITE



QUANT WED

	2' well	08 CONT	CORE Ream	Temp Casing
13MWT48	10		NA	NA
16MWT20	15	16	NA	NA
16MWT19	15	16		
	40	32		

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 7/28/04

WITNESS DATE

TITLE N C CRANE PROJECT NO. N7448
THURS JULY 29 2004 BOOK 2577

Work continued from Page

AT SITE SJC JW, CM, JD } BM

AM PARTLY CLOUDY WARM, BREEZY
PM

0645 AT SITE - CALIB PID - LOAD VAN - GO OVER DAR W/ JIM W.

0740 PREPARE TO GO TO 600 RR MTG @ 0800

0800 AT MTG FOR RR 600 CORRIDOR WELLS.

6' OFF RAIL TO DRILL
MAY NOT NEED COMM ON SUNDAY
DONT RUN ON SUN, BUT NEED COMM

≈ 3 TIMES A DAY - TRAIN PASSES

TES
812-225-7013 Mike Lashford RR Insp.
854-1613 Dispatcher RR
854-3300 Security

Inchworm Alpha - Call Sign.

BLDG 7

Call Sec on Sunday

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE S Conte DATE 7/29/04
WITNESS DATE

TITLE NSWC CRANE PROJECT Nº N7448
THURS (CONT) 2004 BOOK 2577

Work continued from Page

0900 MTG OVER - THUS WILL DRAFT UP A WORK PLAN - WORK TO START ON RR AT LEAST 4 WKS AWAY.

0930 OK TO GO TO MFA - WE CAN WORK ON WELLS NEAR THE BLDG 151 ARC. JIM W WENT TO CHECK ON PADS AT SWMU 16

1000 PREPARE TO GO TO SWMU 12 - PLEASE REFER TO NB 2576 FOR DETAILS.

QUANT THURS

PADS

600 RR MTG CORRIDOR

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE S Conte DATE 7/29/04
WITNESS DATE

TITLE NSWC CRANE **PROJECT NO.** N7448
TUE AUG 17 2004 **BOOK** 2577

Work continued from Page

AT SITE SJC JWJ B/ JDF M CMA

AM: SUNNY, WARM 68° → 80°F
PM: " V WARM. LO TO MID 80°F

0630 AT SITE - CALIB PID - SWEEP OUT OUR AREA OF BLDG 3245 - COMPLETE DAR

0715 DRILLERS ARRIVE - GET WATER - TAILGATE MEETING.

0745 LOAD UP EQUIP - HOOK UP COMPRESSOR MOVE TO SWMU 16

0800 CHECK IN AT SWMU 16 OFFICE - SET UP ON 16MWT 21

0830 6¼" HSA TO ≈ 9.5 - TO MAKE HOLE FOR 8" (TEMP) CASING SET

0850 SETTING 8" Φ TEMP CASING

0900 BEGIN AIR ROT (8" BIT)

1045 DOWN TO ≈ 49' - BEGIN PULLING RODS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conti DATE 8/17/04
WITNESS DATE

TITLE NSWC CRANE **PROJECT NO.** N7448
TUES (CONT) 2004 **BOOK** 2577

Work continued from Page

1050 RODS OUT (8" BIT) PROCEED TO SET 6" ID STEEL CASING (PERM) FLUSH JOINT THREADED AT 10' LONG SECTIONS.

1130 6" CASING SET - HAD A LITTLE TROUBLE SETTING THE LAST 10' - HAD TO BLOW OUT SOME CUTTINGS TO SET AT ≈ 49'

1140 BEGIN TO MIX CEMENT / BENT GROUT

1200 HOLE GROUTED - CLEAN UP PULL EQUIP OUT OF SWMU 16 - WILL CONTINUE THIS HOLE NEXT SHIFT.

QUANT TUES

	PERM CAS	OB DRILL NO SAMPLES (?)	TEMP CAS	BR DRILL NO SAMPLES OR CORING (?)
16MWT21	SET @ 49 (50)	9.5	9.5	39.5

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conti DATE 8/17/04
WITNESS DATE

TITLE SWC CRANE PROJECT NO. N7448

~~WED~~ URS SEPT 9 2004 BOOK 2577

Work continued from Page

AT SITE SJC JW, JD, TW } B/M

AM CLOUDY, COOL
PM PARTLY CLDY WARMER

0630 AT SITE - CALIB PID, LOAD VAN, TAILGATE MTG.

0730 GO TO SWMU 16 TO COMPLETE WELL 16MWT21

0810 SET UP OVER T21 - WILL REAM W/ ROLLER BIT FIRST TO CLEAN OUT CASING

0840 CORE RUN (1) 50-57

0950 DONE RUN (2) 57-67

1030 " " (3) 67-77

1120 " " (4) 77-87

1315 " " (5) 87-97 HOLE IS MAKING "SUBSTANTIAL" AMOUNT OF WATER FROM ≈ 78 TO 95 - DECIDE TO REAM TO 96 AND SET A

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 9/9/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

THURS (CONT) 2004 BOOK : 77

Work continued from Page

WELL FROM ≈ 80-95, SAND 77 TO 96, CHIPS TO

1500 PULLING RODS (REAMING) NOW

1515 START SETTING WELL SCREEN & RISER AT DEPTHS MENTIONED ABOVE. WILL LET PELLETS SET UP AND GROUT LATER.

QUANTITIES THURS.

	CORE ~~REAM~~	2" WELL
16MWT21	47' ✓	95' ✓

50 → 97
47

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 9/9/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

WED OCT 6 2004 BOOK 2577

Work continued from Page AT SITE SJC / JG.

AM: SUNNY, COOL
PM: " WARM

0630 AT SITE - NOTE 10/5/04 - TRAVEL AND PREP DAY. TODAY GET VANS LOADED AND CALIB YSI & LAMOTTE START PAPER WORK.

0830 GO TO SWMU 13 - START SW/SD SAMPLING AT LOCATION 33

0900 SAMPLE TIME FOR [redacted] 13SD3301 NO SW

0930 " " " [redacted] 13SD3002 NO SW

1010 " " " [redacted] 13SD2802 NO SW

1045 " " " [redacted] 13SW3401
1100 " " " [redacted] 13SD3401

1245 13SW/SD 16 WAS DRY - NO SED REQ HERE

1305 13SW/SD 15 WAS DRY NO SED REQ

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJ Conte DATE 10/6/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

WED (CONT) 2004 BOOK 2577

Work continued from Page

1315 13SW/SD14 WAS DRY NO SED REQ

1345 Sample Time [redacted] 13 SW3501 ← (MS/MSD) + DUP
1410 " " [redacted] 13 SD3501

1445 CANT FIND 13 SW/SD 31 - CANNOT FIND STAKE OR RIBBON - PACED OFF FROM 13SW/SD 29 AND FOUND POOL OF WATER TO SAMPLE.

1515 Sample Time [redacted] 13SW3102
1520 " " [redacted] 13SD3102 ← MS/MSD + DUP

Summary - Went to 9 Location / 11

Sampled 6 of 8 Sediments
" 3 of 9 Surface Waters

[redacted] Sed @ 28, 30, 31, 33, 34, 35 = 6
SW @ 31, 34, 35 = 3

1730 PROCEED TO LABS, PREPARE SAMPLES

1900 LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJ Conte DATE 10/6/04

WITNESS DATE

TITLE WC CRANE PROJECT NO. N7448

THUR OCT 7 2004 BOOK 2577

Work continued from Page AT SITE SJC / JG

AM: SUNNY COOL
PM: " WARM

0630 AT SITE - GET SUPPLIES READY FOR SW/SD - CALIB YSI AND LAMOTTE
LEFT MSSG FOR R.B.

0830 AT SWMU 13 - 13SW/SD 01

0855 Sample [redacted] 13SW01 02
0900 " [redacted] 13SD01 02

0930 Sample [redacted] 13SD22 02 (NO SW)

THIS COMPLETES SWMU 13 SW/SD.

1050 Sample [redacted] 16SD13 02 (NO SW)

1100 " [redacted] 16SD27 01 (NO SW) ENCORES (6)

1115 " " [redacted] 16SD09 02 (NO SW)

1145 PACK UP SAMPLES FROM YESTERDAY AND TODAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJ Conte DATE 10/7/04
WITNESS DATE

TITLE NSWC CRANE PROJECT N N7448

THURS (CONT) 2004 BOOK 2577

Work continued from Page

1300 CALL FED EX FOR PICKUP (PU# 42)

1330 3 COOLERS READY FOR PICKUP

1400 Sample [redacted] 16SD19 02 (NO SW)

1440 " [redacted] 16SD26 01 (NO SW)

1500 TRY TO FIND 16SD16 CANT FIND TO HEAVILY VEGETATED

1600 LAYOUT 13SW/SD24, 25 & 30
BOTH 24 & 25 HAVE POOLED WATER
30 IS DRY, BUT REQUIRES ENCORES

1730 RETURN TO FIELD OFFICE - PREPARE FOR FRIDAY

1830 LU SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJ Conte DATE 10/7/04
WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

FRI OCT 8 2004 BOOK 2577

Work continued from Page

AT SITE: STC/JG

AM: SUNNY COOL → WARM TO CLOUDY WINDY &

PM: CLOUDY, BREEZY WARM -

0630 AT SITE - PREPARE FOR SW/SD SAMPLING. FAX COPIES OF COC TO LAUCKS AND TO SEDLMYER.

0800 PREPARE TRIP BLANK FOR TODAY.

0840 Sample [redacted] 16 SW 25 01 MS/MSD (Metals) + DUP 01

0845 " [redacted] 16 SD 25 01

0900 Sample [redacted] 16 SW 24 01 MS/MSD (VOAS) + DUP 02 (VOAS)

0910 " [redacted] 16 SD 24 01

1035 Sample [redacted] 16 SD 30 01 MS/MSD + DUP 03

1100 TOOK SAMPLES TO FIELD OFFICE WRITE OUT LABELS.

1230 RETURN TO SWMU 16 - WILL GO TO LOCATIONS 28, 29 TO PICK UP THE LAST 2 SED THAT REQ VOAS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 10/8/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

FRI OCT 8 2004 BOOK 2577

Work continued from Page

1300 Sample [redacted] 16 SD 29 01 (NO SW)

1315 Sample [redacted] 16 SD 28 01 (NO SW)

1430 Finish Labeling - return to field office

1500 PREPARE SAMPLES FOR SHIPPING. LABELS, COC, ETC WILL SHIP FOR SATURDAY PICKUP

1700 SHIP SAMPLES

1800 PREPARE FOR GW SAMPLING ON SAT

1830 LV SITE

Fri Summary:

Sampled 2 SW
" 5 SD

WILL GO TO SWMU 12 FOR GW SAMPLES ON SATURDAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 10/8/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

SUN OCT 10 2004 BOOK 2577

Work continued from Page

AM: CLEAR, COOL
PM: SUNNY, WARMER

AT SITE: SJC / JG (TT NUS)

RESUMED SW/SD @ 1030 HRS - SAMPLED AT SWMU (GW) EARLIER - SEE NB 2576 FOR DETAILS.

1030 UNLOAD GW SAMPLING EQUIP FROM VANS - PREPARE FOR SW/SD SAMPLES.

1115 Sample [redacted] 16SD0802 (NO SW)

1130 " [redacted] ~~16SD 08~~ sjc 10/10 16SD1202 (NO SW)

1255 " [redacted] 16SD0502 (NO SW)

1305 " [redacted] 16SD0402 (NO SW)

1310 " [redacted] 16SD1002 (NO SW)

1330 " [redacted] 16SD2302 (NO SW)

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConte DATE 10/10/04

WITNESS DATE

TITLE NSWC CRANE PROJECT N7448

SUN (CONT) 2004 BOOK 2577

Work continued from Page

1340 Sample [redacted] 16SD1102 (NO SW)

1425 " [redacted] 16SD0602 (NO SW)

1445 " [redacted] 16SD0302 (NO SW)

1530 BACK AT FIELD OFFICE - WORK ON SAMPLE PREP PAPER WORK ETC.

1700 GO TO SWMU 12 - TRY TO LOCATE A FEW SW/SD LOCATIONS

1830 LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConte DATE 10/10/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. ~~N6878~~

MON ~~OCT 11~~ DEC 15 2004 BOOK 2577

Work continued from Page AT SITE: SJC, JG

AM: CLOUDY COLD
PM: " "

0830 16MWT19 3.24
0832 16MWT20 3.63

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJCorda DATE 12/15/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

FRI JAN 7 2005 BOOK 2577

Work continued from Page AT SITE SJC

AM: CLOUDY COLD
PM: " "

0630 AT SITE - CHECK OUT RENTAL COMPUTER - LOAD VAN.

0730 FINISH UP NOTES

0800 GO TO SWMU 16 - HAD TROUBLE W/ LOCKS FROZEN.

0855 START SLUG TESTS:

HAD TO BAIL H_2O @ T16 → 16MWT03 - R, F
16MWT05 - R, F
16MWT16 - NOT ENOUGH H_2O

VERY SLOW REC 16MWT18 - WILL START W/ PDA AND RUN ALL NITE
16MWT19 - R, F

1600 DUMP DATA ONTO HYD COND SHEETS

1800 LV SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJCorda DATE 1/7/05

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

SAT JAN 8 2005 BOOK 2577

Work continued from Page AT SITE: SJC, CD FtNUS

AM: CLOUDY COLD

PM:

0630 AT SITE - PREPARE FOR SLUG TESTS

0700 TR - SAYS THAT COLIN WILL WORK W/ ME TODAY ON SLUG TESTS. WILL HEAD OVER TO SWMU 16 AND SHUT DOWN TEST @ 16MWT18. THEN GO DOWN TO 16MWT20.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conn DATE 1/8/05

WITNESS DATE

TITLE NSWC CRANE PROJECT N7448

BOOK 2577

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE DATE

WITNESS DATE

2565

2565

2565

TITLE

PROJECT NO.

BOOK

8/11/04 Partly Cloudy, 65°F

Work continued from Page

0700 Arrive @ Office Bldg on site. Calibrate PID & Load supplies for the day. Plan is to mob back to site 13 & then, if we get digging permit, to go to site 16.

0815 Mob to Site 13 w/ DPT Rig.

0830 Set up on 13 SB30.

0840 Collect Sample 13SS30 0002 along w/ MS/MSD (2 Jars TOTAL)

0846 Collect Sample 13SB30 0204 along w/ Duplicate: 13FD0811 04-01.

0900 Set up on 13 SB47.

0904 Collect sample 13 SB47 0406. Only able to get 4' sample here.

0910 Set up on 13SB45 again & attempt to get rods out that were stuck there yesterday. Success in getting the rods out

0928 Collect sample 13 SB45 0406.

0940 Mobilize back to Office Building. Await Terry R. with digging permits for SWMU 16

1020 Terry R. returns and says that we still cannot drill @ SWMU 16 because they have not signed off on the Digging Permits yet. They are concerned w/ Fiber Optic & the Fire Alarm System on-base.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Charles C. Ly III

DATE 8/11/04

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

1318 Terry returns w/ dig permit for Site 16. We all mob over to start DPT Work.

1348 Collect 16SS65 0102

1356 Collect 16SB65 0206 from middle.

1405 Collect 16SB65 0608 from middle.

} 16SB65

1423 Collect 16SS64 0102

1435 Collect 16SB64 0206 from middle.

1441 Collect 16SB64 0608 from middle.

} 16SB64

1456 Collect 16SS63 0102

1508 Collect 16SB63 0206 from middle

1517 Collect 16SB63 0608 from middle

} 16SB63

1537 Collect 16SS61 0102

1545 Collect 16SB61 0206 from middle

1550 Collect 16SB61 0607 from middle

} 16SB61

1605 Collect 16SS60 0102

1616 Collect 16SB60 0206 from middle

1622 Collect 16SB60 0609 from middle

} 16SB60

1645 Return to Office & pack samples for shipment.

1730 All leave site for day.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Charles C. Ly III

DATE 8/11/04

WITNESS

DATE

TITLE 8/12/04 Sunny, 60°F

PROJECT NO.

BOOK

Work continued from Page

0700	Arrive @ Office Bldg. on-site. Calibrate PID & Load supplies for the day		
0745	Mob over to site 16 for DPT Work.		
0815	Collect	16SS66010 2	16SB66
0823	Collect	16SB66020 6	
0828	Collect	16SB66060 8	
0842	Collect	16SS68010 2	16SB68
0854	Collect	16SB68020 6 Along with Duplicate Sample 16FD0812040-01	
0859	Collect	16SB68060 9	
0912	Collect	16SS67010 2	16SB67
0917	Collect	16SB67020 6 *	* MS/MSD
0936	Collect	16SB67060 9	
0946	Collect	16SS69010 2	16SB69
0954	Collect	16SB69020 6	
1002	Collect	16SB69060 7	
1022	Collect	16SS72010 2	16SB72
1033	Collect	16SB72020 6	
1037	Collect	16SB72060 7	
1046	Collect	16SS73010 2	16SB73
1050	Collect	16SB73020 4	
1102	Collect	16SS75010 2	16SB75
1106	Collect	16SB75020 3	

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Charles C. Ly III

DATE 8/12/04

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

1240	Collect	16SS77010 2	16SB77 & Dup: 16FD0812040-02
1249	Collect	16SB77020 6	
1304	Collect	16SB77060 10	
1317	Collect	16SS78010 2	16SB78
1323	Collect	16SB78020 6 *	* MS/MSD
1338	Collect	16SB78060 9	
1348	Collect	16SS76010 2	16SB76
1357	Collect	16SB76020 6	
1402	Collect	16SB76060 7	
1413	Collect	16SS71010 2	16SB71
1418	Collect	16SB71020 6	
1515	Collect	16SS52010 2	16SB52
1520	Collect	16SB52020 5	
1528	Collect	16SS53010 2	16SB53
1531	Collect	16SB53020 5	
1427	Collect	16SS70010 2	16SB70
1435	Collect	16SB70020 6	
1440	Collect	16SB70060 7	
1545	Collect	16SS55010 2	16SB55
1548	Collect	16SB55020 6	
1555	Collect	16SB55060 7	

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Charles C. Ly III

DATE 8/12/04

WITNESS

DATE

TITLI

PROJECT NO.

BOOK

Work continued from Page

16ØØ	Collect	16SS56Ø1Ø2	16SB56
16Ø3	Collect	16SB56Ø2Ø6	
1615	Collect	16SB56Ø6Ø8	
163Ø	Return to Main Office. Pack samples for Fed Ex.		
173Ø	All leave site for day.		

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Chuck C. Fry III

DATE 8/12/Ø4

WITNESS

DATE

TITLE

PROJECT I

8/13/Ø4 Partly Cloudy +60°F

BOOK

Work continued from Page

Ø7ØØ	Arrive @ Office Bldg. on-site. Calibrate PID. Load supplies for the day. Help Terry & Jim take a Rinse Blank on the DPT Liner & on the DPT Metal Shoe. Driller is making repairs to the DPT which was cutting off a lot while it was idling yesterday.		
Ø83Ø	Mob over to Site 16.		
Ø846	Collect	16SB59Ø1Ø2	16SB59
Ø851	Collect	16SB59Ø2Ø6	
Ø9ØØ	Collect	16SB59Ø6Ø8	
Ø912	Collect	16SS62Ø1Ø2	16SB62
Ø917	Collect	16SB62Ø2Ø6	
Ø923	Collect	16SB62Ø6Ø7	
Ø938	Collect	16SS58Ø1Ø2	16SB58
Ø941	Collect	16SB58Ø2Ø6 along w/ Duplicate: 16FDØ813Ø4-Ø1	
1ØØ1	Collect	16SB58Ø6Ø7	
1Ø1Ø	Collect	16SS57Ø1Ø2	16SB57
1Ø13	Collect	16SB57Ø2Ø6	
1Ø3Ø	Collect	16SS51Ø1Ø2	16SB51
1Ø33	Collect	16SB51Ø2Ø4	
1Ø5Ø	Collect	16SS54Ø1Ø2	16SB54
1Ø59	Collect	16SB54Ø2Ø5 + MS/MSD	

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Chuck C. Fry III

DATE 8/13/Ø4

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

1130 Return to office. Prepare to MOB to Site 12.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE 8/13/04

WITNESS

DATE

TITLE

PROJECT NO.

8/14/04 Partly Cloudy, 70°F

BOOK

Work continued from Page

0745 Arrive @ Office Bldg on-site. Prepare for today activities: Hand Auger @ Site 16.

0850

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE

WITNESS

DATE

TITLE 8/16/04

PROJECT NO.

BOOK

Work continued from Page

0700 Arrive @ Office, Load up supplies for Today. Going to Core inside Bldg @ SWMU 16 & then use the DPT Rig.

0830 Corey contractor arrives, Jim and I and the driller arrive @ the site to determine how to get the geoprobe up & inside the Bldg.

0915 Corey contractor & Terry R. arrive @ the site. DPT Rig is on load dock. Concrete Cover Subcontractor is:

CAPITOL DRILLING & SAWING
(317)-875-7601
(800)-648-0702

1000 Corey begins on Boring 12SB98
Concrete w/Rebar @ 0-8"
Large Granules & SAND from 8"-12"

1034 Collect 16SS980102
1042 Collect 16SB980206
1050 Collect 16SB980607 } 16SB98
Refusal in hole @ ≈ 6'6".

1059 Collect 16SB990102
1113 Collect 16SB990608 } 16SB99
1116 Collect 16SB990206
Refusal in hole @ ≈ 7'6"

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Chris C. Fry III

DATE 8/16/04

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

1137 Collect 16SB920406
1158 Collect 16SB920608 } 16SB92

1211 Collect 16SB900406
1219 Collect 16SB900608 Refusal @ 8' } 16SB90

1335 Collect 16SB910406 along w/ DXP
16FD0816040 1 } 16SB91
1342 Collect 16SB910609
Refusal in hole @ 9'

1410 Collect 16SB940708 } 16SB94
Refusal in hole @ 7'6"

No SS collected in SB's 92, 90, 91 & 94 due to lack of recovery in sleeves.

1435 Collect 16SB950406 along w/MS/MSD
1445 Collect 16SB950607 } 16SB95
Refusal in hole @ 7'
No SS collected due to No Recovery
Only 1-4oz Jar collected on % Moisture
(NOT 3 as usually Done on MS/MSD

1458 Collect 16SB930406
1505 Collect 16SB930608 } 16SB93
No SS collected due to No Recovery
Refusal in hole @ 7'6"

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Chris C. Fry III

DATE 8/16/04

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

1520 Collect 16SB96Ø4Ø6 } 16SB96
1525 Collect 16SB96Ø6Ø8
1545 Collect 16SB97Ø4Ø6 along w/MS/MSD } 16SB97
1555 Collect 16SB97Ø6Ø7 along w/DUP
16FDØ816Ø4Ø2
17ØØ Return to Office & begin to pack supplies
183Ø Leave all for the day.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Charles C. Fry III

DATE 8/16/Ø4

WITNESS

DATE

TITLE

8/17/Ø4 Sunny +60°F

PROJECT NO.

BOOK

Work continued from Page

Ø7ØØ Arrive @ Office. Load up supplies for today.
Going to Hand Auger 16SB74 w/ Tom Dickson.
Ø816 Collect 16SS74Ø1Ø2 along w/DUP } 16SB74
16FDØ817Ø4Ø1
Ø842 Collect 16SB74Ø2Ø6 along w/MS/MSD
Refusal @ 6'.
Ø93Ø Return to Office & begin finishing paperwork.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE

WITNESS

DATE

APPENDIX D.3.1
SWMU 16
LAND SURVEY DATA
ROUNDS 1, 2, and 3

SURVEY DATA
SWMU 16
NSWC CRANE
CRANE, INDIANA

LOCATION	NORTHING	EASTING	HORIZ DATUM	GROUND SURFACE ELEVATION	VERT DATUM	TOP OF CASING ELEVATION	TOP OF PVC RISER ELEVATION
Monitoring Wells							
16MW01 (WES-14-01-83)	1320638.353	3032713.383	NAD 83	763.87	NAVD 88	No Casing	766.67
16MW02 (WES-14-01-83)	1321319.899	3032647.270	NAD 83	763.69	NAVD 88	766.69	766.54
16MW03 (WES-14-01-83)	1320816.004	3033018.495	NAD 83	761.51	NAVD 88	764.16	763.93
16MW04 (WES-14-01-83)	1320572.345	3032960.959	NAD 83	760.42	NAVD 88	No Casing	762.99
16MW05 (WES-14-01-83)	1320584.051	3032850.321	NAD 83	766.60	NAVD 88	No Casing	769.40
16MWT01	1321193.488	3032881.285	NAD 83	762.02	NAVD 88	765.00	764.50
16MWT02	1321146.420	3032559.160	NAD 83	757.60	NAVD 88	760.98	760.36
16MWT03	1320946.968	3032644.291	NAD 83	761.95	NAVD 88	764.96	764.41
16MWT04	1321003.281	3032946.466	NAD 83	763.88	NAVD 88	766.71	766.14
16MWT05	1320741.793	3032812.773	NAD 83	764.50	NAVD 88	767.45	766.88
16MWT06	1321199.519	3032883.373	NAD 83	761.77	NAVD 88	764.85	764.44
16MWT07	1321176.931	3033001.574	NAD 83	760.54	NAVD 88	762.91	762.87
16MWT08	1321179.449	3033009.240	NAD 83	759.57	NAVD 88	761.62	761.56
16MWT09	1321068.489	3033041.444	NAD 83	762.43	NAVD 88	764.47	764.28
16MWT10	1320936.048	3033074.741	NAD 83	761.93	NAVD 88	764.48	764.43
16MWT11	1320934.642	3033062.786	NAD 83	763.23	NAVD 88	765.47	765.24
16MWT12	1320729.139	3033074.921	NAD 83	753.23	NAVD 88	755.54	755.45
MWT13	1321125.775	3032562.406	NAD 83	757.62	NAVD 88	759.66	759.57
MWT14	Well Abandoned						
16MWT15	1321120.809	3032563.525	NAD 83	757.73	NAVD 88	759.77	759.69
16MWT16	1321059.414	3032814.519	NAD 83	764.98	NAVD 88	764.98	764.74
16MWT17	1321235.876	3032675.070	NAD 83	764.79	NAVD 88	766.52	766.53
16MWT18	1321068.957	3032807.837	NAD 83	764.99	NAVD 88	764.99	764.44
16MWT19	1320172.276	3033846.620	NAD 83	606.73	NAVD 88	609.51	609.31
16MWT20	1320532.681	3034030.681	NAD 83	607.43	NAVD 88	609.93	609.93
16MWT21	1320581.349	3032960.081	NAD 83	760.78	NAVD 88	763.08	763.05
Soil Borings							
16SB001	1321163.914	3032795.687	NAD 83	764.79	NAVD 88	NA	NA
16SB002	1321116.914	3032812.733	NAD 83	764.81	NAVD 88	NA	NA
16SB003	1321065.095	3032831.294	NAD 83	764.72	NAVD 88	NA	NA
16SB004	1321018.358	3032847.437	NAD 83	765.06	NAVD 88	NA	NA
16SB005	1320908.385	3032879.638	NAD 83	764.89	NAVD 88	NA	NA
16SB006	1320866.198	3032889.402	NAD 83	764.52	NAVD 88	NA	NA
16SB007	1320814.001	3032921.489	NAD 83	763.92	NAVD 88	NA	NA
16SB008	1320768.894	3032925.671	NAD 83	763.92	NAVD 88	NA	NA
16SB009	1320726.025	3032956.134	NAD 83	764.14	NAVD 88	NA	NA
16SB010	1320679.087	3032969.696	NAD 83	764.79	NAVD 88	NA	NA
16SB011	1320644.060	3033017.510	NAD 83	763.23	NAVD 88	NA	NA
16SB012	1320602.656	3033049.256	NAD 83	760.21	NAVD 88	NA	NA
16SB013	1320568.142	3033081.181	NAD 83	752.84	NAVD 88	NA	NA
16SB014	1320750.201	3032877.191	NAD 83	764.67	NAVD 88	NA	NA
SB015	1320704.932	3032895.803	NAD 83	765.76	NAVD 88	NA	NA
B016	1320655.738	3032920.131	NAD 83	765.94	NAVD 88	NA	NA

SURVEY DATA
SWMU 16
NSWC CRANE
CRANE, INDIANA

LOCATION	NORTHING	EASTING	HORIZ DATUM	GROUND SURFACE ELEVATION	VERT DATUM	TOP OF CASING ELEVATION	TOP OF PVC RISER ELEVATION
16SB017	1320608.253	3032937.304	NAD 83	761.99	NAVD 88	NA	NA
16SB018	1320564.234	3032957.583	NAD 83	759.64	NAVD 88	NA	NA
16SB019	1320523.093	3032976.124	NAD 83	757.77	NAVD 88	NA	NA
16SB020	1320734.808	3032840.190	NAD 83	764.86	NAVD 88	NA	NA
16SB021	1320681.285	3032828.764	NAD 83	765.01	NAVD 88	NA	NA
16SB022	1320638.996	3032816.413	NAD 83	768.33	NAVD 88	NA	NA
16SB023	1320590.112	3032804.475	NAD 83	768.16	NAVD 88	NA	NA
16SB024	1320542.723	3032790.247	NAD 83	762.01	NAVD 88	NA	NA
16SB025	1320490.078	3032775.728	NAD 83	757.25	NAVD 88	NA	NA
16SB026	1320743.896	3032816.044	NAD 83	764.29	NAVD 88	NA	NA
16SB027	1320705.823	3032777.330	NAD 83	763.71	NAVD 88	NA	NA
16SB028	1320663.722	3032750.586	NAD 83	764.02	NAVD 88	NA	NA
16SB029	1320621.567	3032723.594	NAD 83	766.34	NAVD 88	NA	NA
16SB030	1320580.033	3032696.821	NAD 83	765.18	NAVD 88	NA	NA
16SB031	1320535.645	3032664.459	NAD 83	761.78	NAVD 88	NA	NA
16SB032	1320758.781	3032725.042	NAD 83	762.56	NAVD 88	NA	NA
16SB033	1320811.664	3032707.648	NAD 83	762.34	NAVD 88	NA	NA
16SB034	1320859.397	3032693.211	NAD 83	762.33	NAVD 88	NA	NA
16SB035	1320906.935	3032674.546	NAD 83	762.21	NAVD 88	NA	NA
16SB036	1320947.133	3032643.725	NAD 83	761.50	NAVD 88	NA	NA
16SB037	1321000.817	3032642.063	NAD 83	762.09	NAVD 88	NA	NA
16SB038	1321048.346	3032627.068	NAD 83	761.57	NAVD 88	NA	NA
16SB039	1321093.703	3032609.583	NAD 83	760.55	NAVD 88	NA	NA
16SB040	1321135.432	3032553.138	NAD 83	756.60	NAVD 88	NA	NA
16SB041	1321200.320	3032884.755	NAD 83	761.39	NAVD 88	NA	NA
16SB042	1320695.925	3033088.621	NAD 83	752.50	NAVD 88	NA	NA
16SB043	1320625.178	3033128.417	NAD 83	751.92	NAVD 88	NA	NA
16SB044	1320573.490	3033158.248	NAD 83	744.26	NAVD 88	NA	NA
16SB045	1320496.424	3033084.997	NAD 83	742.47	NAVD 88	NA	NA
16SB046	1320451.825	3033020.166	NAD 83	749.06	NAVD 88	NA	NA
16SB047	1321100.871	3032594.912	NAD 83	759.83	NAVD 88	NA	NA
16SB048	1321081.685	3032601.853	NAD 83	760.26	NAVD 88	NA	NA
16SB049	1321117.411	3032618.950	NAD 83	761.32	NAVD 88	NA	NA
16SB050	1321088.187	3032626.335	NAD 83	761.50	NAVD 88	NA	NA
16SB051	1321027.519	3032592.324	NAD 83	758.93	NAVD 88	NA	NA
16SB052	1321033.422	3032634.104	NAD 83	762.10	NAVD 88	NA	NA
16SB053	1321058.749	3032666.771	NAD 83	763.05	NAVD 88	NA	NA
16SB054	1321100.525	3032638.118	NAD 83	761.91	NAVD 88	NA	NA
16SB055	1321109.559	3032671.144	NAD 83	763.40	NAVD 88	NA	NA
16SB056	1321140.777	3032644.280	NAD 83	762.53	NAVD 88	NA	NA
16SB057	1321142.182	3032594.961	NAD 83	759.35	NAVD 88	NA	NA
16SB058	1321182.117	3032606.254	NAD 83	759.93	NAVD 88	NA	NA
16SB059	1321190.147	3032651.585	NAD 83	762.89	NAVD 88	NA	NA
16SB060	1321170.898	3032691.921	NAD 83	764.95	NAVD 88	NA	NA

SURVEY DATA
SWMU 16
NSWC CRANE
CRANE, INDIANA

LOCATION	NORTHING	EASTING	HORIZ DATUM	GROUND SURFACE ELEVATION	VERT DATUM	TOP OF CASING ELEVATION	TOP OF PVC RISER ELEVATION
16SB061	1321217.153	3032673.532	NAD 83	764.80	NAVD 88	NA	NA
16SB062	1321236.162	3032630.139	NAD 83	762.56	NAVD 88	NA	NA
16SB063	1321271.533	3032659.219	NAD 83	763.70	NAVD 88	NA	NA
16SB064	1321255.060	3032687.896	NAD 83	763.60	NAVD 88	NA	NA
16SB065	1321263.087	3032730.096	NAD 83	764.13	NAVD 88	NA	NA
16SB066	1321212.242	3032722.313	NAD 83	764.57	NAVD 88	NA	NA
16SB067	1321228.360	3032773.035	NAD 83	764.56	NAVD 88	NA	NA
16SB068	1321192.891	3032753.855	NAD 83	764.80	NAVD 88	NA	NA
16SB069	1321179.338	3032792.730	NAD 83	764.78	NAVD 88	NA	NA
16SB070	1321202.500	3032839.433	NAD 83	762.82	NAVD 88	NA	NA
16SB071	1321221.110	3032875.343	NAD 83	761.55	NAVD 88	NA	NA
16SB072	1321152.668	3032776.953	NAD 83	764.89	NAVD 88	NA	NA
16SB073	1321108.890	3032793.195	NAD 83	765.04	NAVD 88	NA	NA
16SB074	1321175.602	3032838.286	NAD 83	763.77	NAVD 88	NA	NA
16SB075	1321138.680	3032847.428	NAD 83	764.08	NAVD 88	NA	NA
16SB076	1321175.175	3032880.624	NAD 83	761.90	NAVD 88	NA	NA
16SB077	1321128.799	3032909.062	NAD 83	763.19	NAVD 88	NA	NA
16SB078	1321176.797	3032924.699	NAD 83	762.22	NAVD 88	NA	NA
16SB079	**Discretionary Sample: Not Collected**						
16SB080	**Discretionary Sample: Not Collected**						
16SB081	**Discretionary Sample: Not Collected**						
16SB082	**Discretionary Sample: Not Collected**						
16SB083	**Discretionary Sample: Not Collected**						
16SB084	**Discretionary Sample: Not Collected**						
16SB085	1320750.920	3033180.590	NAD 83	735.32	NAVD 88	NA	NA
16SB086	1320582.480	3033204.740	NAD 83	738.34	NAVD 88	NA	NA
16SB087	1320499.130	3033135.650	NAD 83	733.33	NAVD 88	NA	NA
16SB088	1320442.180	3033095.670	NAD 83	734.05	NAVD 88	NA	NA
16SB089	1320390.220	3033032.570	NAD 83	741.26	NAVD 88	NA	NA
16SB090	1321129.442	3032700.882	NAD 83	**Inside Building 146**		NA	NA
16SB091	1321129.713	3032707.382	NAD 83	**Inside Building 146**		NA	NA
16SB092	1321152.192	3032760.737	NAD 83	**Inside Building 146**		NA	NA
16SB093	1321141.900	3032750.716	NAD 83	**Inside Building 146**		NA	NA
16SB094	1321118.338	3032701.424	NAD 83	**Inside Building 146**		NA	NA
16SB095	1321118.338	3032714.153	NAD 83	**Inside Building 146**		NA	NA
16SB096	1321139.463	3032761.820	NAD 83	**Inside Building 146**		NA	NA
16SB097	1321133.505	3032756.674	NAD 83	**Inside Building 146**		NA	NA
16SB098	1321112.380	3032767.778	NAD 83	**Inside Building 146**		NA	NA
16SB099	1321095.588	3032719.841	NAD 83	**Inside Building 146**		NA	NA
Staff Gauges							
16SG01	1321342.911	3032498.825	NAD 83	750.58	NAVD 88	NA	NA
16SG02	1321121.912	3032465.012	NAD 83	734.32	NAVD 88	NA	NA
16SG03	1320712.519	3032705.117	NAD 83	761.79	NAVD 88	NA	NA
16SG04	1320748.568	3033005.162	NAD 83	762.44	NAVD 88	NA	NA

SURVEY DATA
SWMU 16
NSWC CRANE
CRANE, INDIANA

LOCATION	NORTHING	EASTING	HORIZ DATUM	GROUND SURFACE ELEVATION	VERT DATUM	TOP OF CASING ELEVATION	TOP OF PVC RISER ELEVATION
16SG05	1320889.156	3032979.281	NAD 83	763.21	NAVD 88	NA	NA
16SG06	1320930.798	3034364.522	NAD 83	603.53	NAVD 88	NA	NA
16SG07	1320765.760	3034582.607	NAD 83	601.53	NAVD 88	NA	NA
16SG08	1318992.375	3033277.471	NAD 83	590.00	NAVD 88	NA	NA
16SG09	1318679.543	3033368.610	NAD 83	583.26	NAVD 88	NA	NA
Sturface Waters/Sediments							
16SW/SD01	1321249.751	3032666.281	NAD 83	**SUMP**		NA	NA
16SW/SD02	1321204.168	3032876.628	NAD 83	757.44	NAVD 88	NA	NA
16SW/SD03	1320992.781	3032938.809	NAD 83	762.37	NAVD 88	NA	NA
16SW/SD04	1320813.677	3033036.219	NAD 83	757.63	NAVD 88	NA	NA
16SW/SD05	1320750.849	3033011.499	NAD 83	760.02	NAVD 88	NA	NA
16SW/SD06	1320731.262	3032753.809	NAD 83	760.75	NAVD 88	NA	NA
16SW/SD07	1321133.207	3032561.910	NAD 83	**SUMP**		NA	NA
16SW/SD08	1321123.311	3032475.944	NAD 83	730.79	NAVD 88	NA	NA
16SW/SD09	1320708.947	3032652.967	NAD 83	752.10	NAVD 88	NA	NA
16SW/SD10	1320805.494	3033255.261	NAD 83	722.84	NAVD 88	NA	NA
16SW/SD11	1321396.802	3032814.354	NAD 83	747.54	NAVD 88	NA	NA
16SW/SD12	1320984.270	3032193.487	NAD 83	681.09	NAVD 88	NA	NA
16SW/SD13	1320296.856	3032110.650	NAD 83	639.33	NAVD 88	NA	NA
16SW/SD14	1321752.048	3034042.952	NAD 83	625.32	NAVD 88	NA	NA
16SW/SD15	1320773.459	3034509.166	NAD 83	595.51	NAVD 88	NA	NA
16SW/SD16	1320361.125	3034191.408	NAD 83	597.61	NAVD 88	NA	NA
16SW/SD17	1319010.148	3033272.074	NAD 83	585.01	NAVD 88	NA	NA
16SW/SD18	1320758.356	3034589.827	NAD 83	595.44	NAVD 88	NA	NA
16SW/SD19	1318678.179	3033398.538	NAD 83	578.89	NAVD 88	NA	NA
16SW/SD20	1320338.899	3032013.807	NAD 83	642.09	NAVD 88	NA	NA
16SW/SD21	1321738.157	3034075.169	NAD 83	623.94	NAVD 88	NA	NA
16SW/SD22	1321416.932	3032998.481	NAD 83	713.03	NAVD 88	NA	NA
16SW/SD23	1321226.160	3032906.057	NAD 83	**NOT AVAILABLE**		NA	NA
16SW/SD24	1320516.610	3034415.110	NAD 83	592.27	NAVD 88	NA	NA
16SW/SD25	1320200.560	3034314.290	NAD 83	591.12	NAVD 88	NA	NA
16SW/SD26	1320958.090	3034338.920	NAD 83	600.23	NAVD 88	NA	NA
16SW/SD27	1320640.390	3032137.210	NAD 83	656.68	NAVD 88	NA	NA
16SW/SD28	1321222.970	3032354.400	NAD 83	710.25	NAVD 88	NA	NA
16SW/SD29	1321143.780	3032360.280	NAD 83	712.41	NAVD 88	NA	NA
16SW/SD30	1321467.540	3034068.880	NAD 83	618.36	NAVD 88	NA	NA

APPENDIX E
SWMU 16
AQUIFER CHARACTERISTICS, CALCULATIONS, AND RECORDS
ROUND 1, ROUND 2, ROUND 3

APPENDIX E.1.1
SWMU 16
SLUG TEST RESULTS AND CALCULATIONS ROUND 1

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	16MWT02
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling Head	**Test Date:**	11-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	0.47 = To

Hydraulic Conductivity (K) :

3.54E-03	ft./min.
5.89E-05	ft./sec.
5.09E+00	ft./day
1.80E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRADE WELL/BORING NO.: 16MW102

PROJECT NO.: 9060 CTO 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 21.13' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 6.35' DATE: 5/11/03

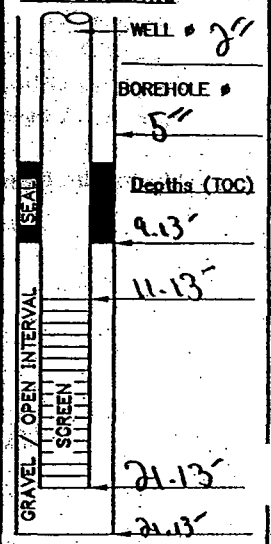
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 42" SOLID SLUG PAGE ___ OF ___

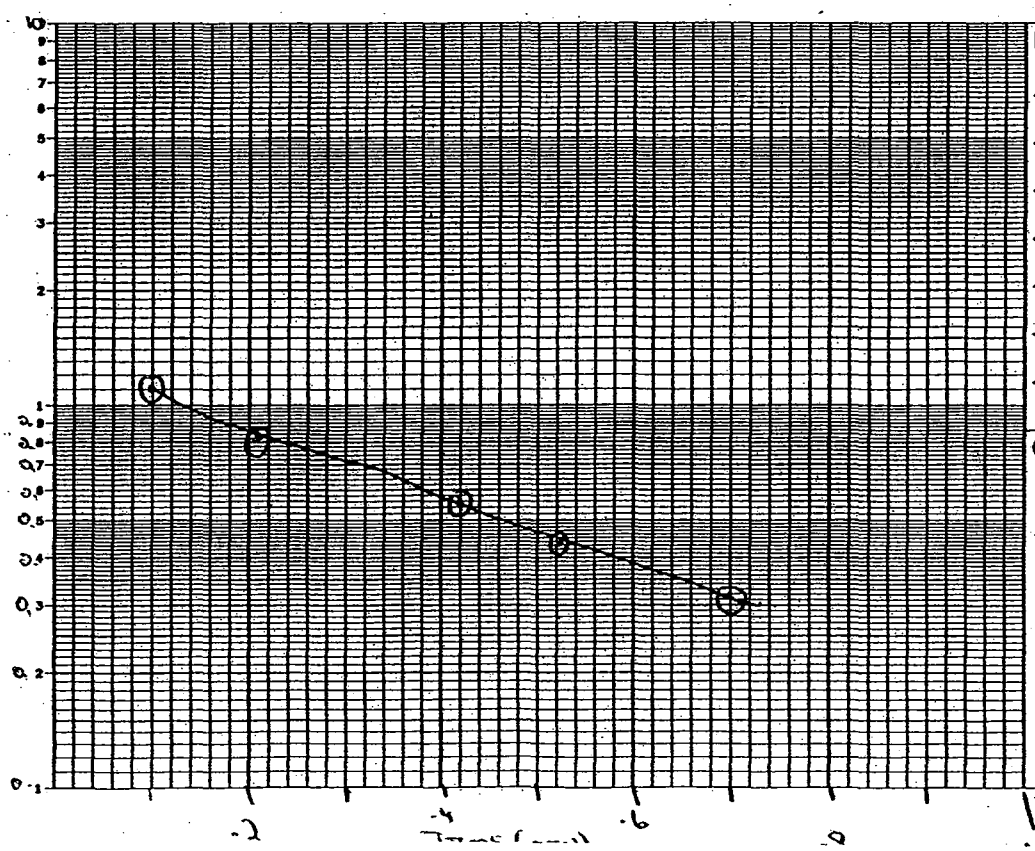
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	14.042	0	0.69	14.36	+0.318
0.01	14.042	0	0.93	14.255	+0.213
~~0.02~~	—	—	1.47	14.143	+0.101
0.03	15.392	+1.35			
0.04	16.01	+1.972			
0.05	15.39	+1.348			
0.06	15.726	+1.684			
0.07	15.182	+1.14			
0.1	15.158	+1.116			
0.21	14.904	+0.862			
0.42	14.585	+0.543			
0.575	14.487	+0.445			

WELL SCHEMATIC



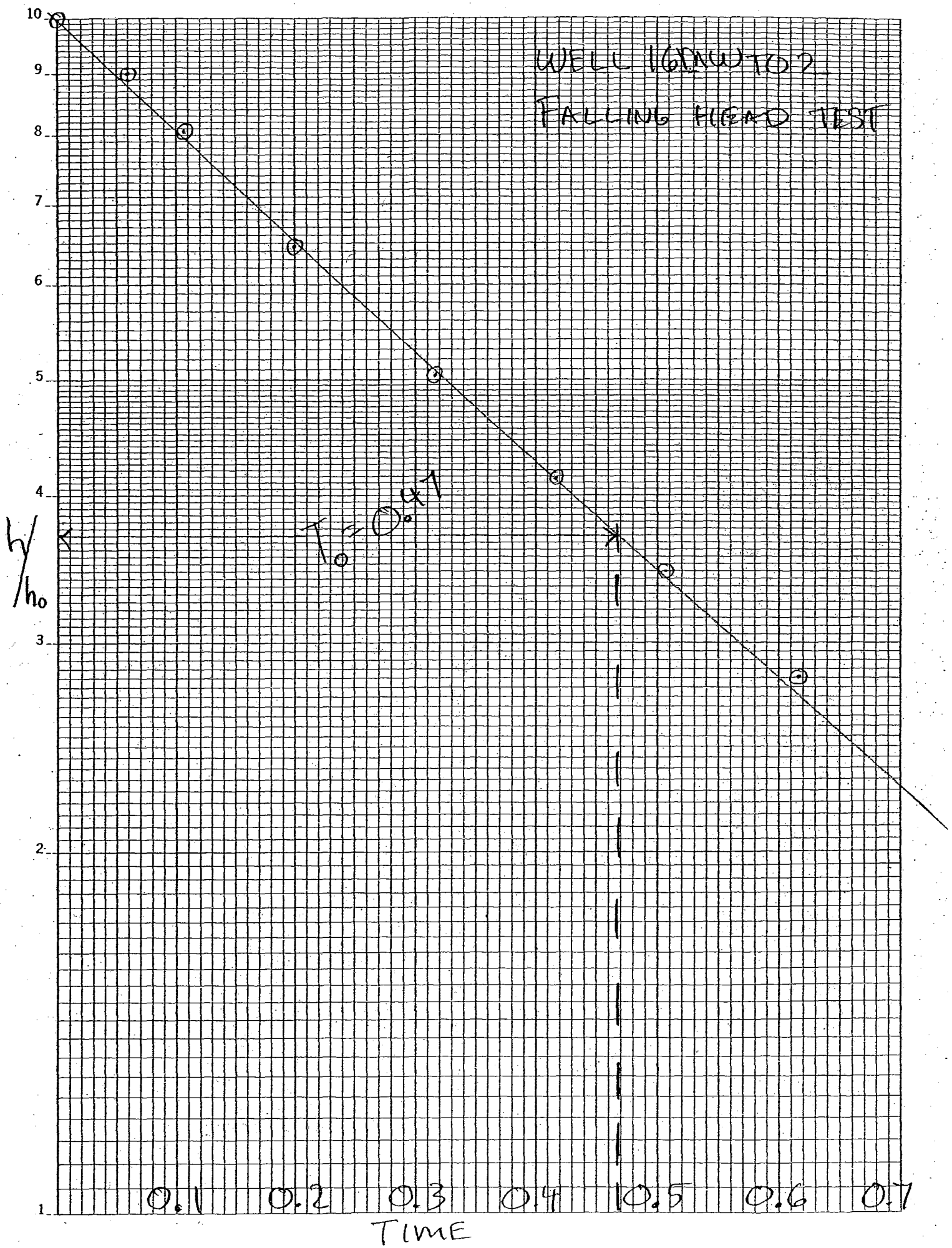
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


WELL 16(NW)TO 2
FALLING HEAD TEST
h/h_0
$T_0 = 0.4 \times 1$
10
9
8
7
6
5
4
3
2
1
0.1
0.2
0.3
0.4
0.5
0.6
0.7
TIME
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generate 5/11/2003 13:20:14
Report from file: ...\SN00824 2003-05-11 091057 16MWT02 Falling.bin
Win-Situ Versior 4.41

Serial number: 824
Firmware Versio 3.06
Unit name:

Test name: 16MWT02 Falling

Test defined on: 5/11/2003 9:10:41
Test started on: 5/11/2003 9:10:57
Test stopped on N/A N/A
Test extracted o N/A N/A

Data gathered using Logarithmic testing
Maximum time Seconds.
Number of dat 87

TOTAL DATA S. 87

Channel number [1]
Measurement t Temperature
Channel name: Temperature

Channel number [2]
Measurement t Pressure
Channel name: Depth
Sensor Range: 30 PSIG.
Specific gravity 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho= -1.135
5/11/2003	9:10:57	0	0	52.29	14.042	0			
5/11/2003	9:10:58	0.3	0.005	52.34	14.042	0			
5/11/2003	9:10:58	0.6	0.01	52.34	14.042	0			
5/11/2003	9:10:58	0.9	0.015	52.34	14.042	0			
5/11/2003	9:10:58	1.2	0.02	52.36	14.042	0			
5/11/2003	9:10:59	1.5	0.025	52.36	14.947	-0.905			
5/11/2003	9:10:59	1.8	0.03	52.36	15.392	-1.35			
5/11/2003	9:10:59	2.1	0.035	52.36	15.158	-1.116			
5/11/2003	9:11:00	2.4	0.04	52.36	16.014	-1.972			
5/11/2003	9:11:00	2.7	0.045	52.39	15.601	-1.559			
5/11/2003	9:11:00	3	0.05	52.39	15.39	-1.348			
5/11/2003	9:11:01	3.3	0.055	52.39	15.935	-1.893			
5/11/2003	9:11:01	3.6	0.06	52.39	15.726	-1.684			
5/11/2003	9:11:01	3.9	0.065	52.39	15.201	-1.159	Plotted shaded values.		
5/11/2003	9:11:01	4.2	0.07	52.39	15.182	-1.14			
5/11/2003	9:11:02	4.5	0.075	52.39	15.296	-1.254	adjusted time	h/ho	
5/11/2003	9:11:02	4.8	0.08	52.39	15.177	-1.135	0.000	1.000	
5/11/2003	9:11:02	5.1	0.085	52.39	15.216	-1.174	0.005	1.034	
5/11/2003	9:11:03	5.4	0.09	52.39	15.181	-1.139	0.010	1.004	
5/11/2003	9:11:03	5.7	0.095	52.39	15.171	-1.129	0.015	0.995	
5/11/2003	9:11:03	6	0.1	52.39	15.158	-1.116	0.020	0.983	
5/11/2003	9:11:04	6.4	0.106667	52.39	15.143	-1.101	0.027	0.970	
5/11/2003	9:11:04	6.7	0.111667	52.39	15.128	-1.086	0.032	0.957	
5/11/2003	9:11:04	7.1	0.118333	52.39	15.111	-1.069	0.038	0.942	
5/11/2003	9:11:05	7.5	0.125	52.39	15.095	-1.053	0.045	0.928	
5/11/2003	9:11:05	8	0.133333	52.39	15.08	-1.038	0.053	0.915	
5/11/2003	9:11:06	8.4	0.14	52.39	15.063	-1.021	0.060	0.900	

5/11/2003	9:11:06	8.9	0.148333	52.39	15.042	-1	0.068	0.881
5/11/2003	9:11:07	9.5	0.158333	52.41	15.023	-0.981	0.078	0.864
5/11/2003	9:11:07	10	0.166667	52.36	14.996	-0.954	0.087	0.841
5/11/2003	9:11:08	10.6	0.176667	52.36	14.975	-0.933	0.097	0.822
5/11/2003	9:11:09	11.3	0.188333	52.36	14.951	-0.909	0.108	0.801
5/11/2003	9:11:09	11.9	0.198333	52.36	14.927	-0.885	0.118	0.780
5/11/2003	9:11:10	12.6	0.21	52.36	14.904	-0.862	0.130	0.759
5/11/2003	9:11:11	13.4	0.223333	52.34	14.879	-0.837	0.143	0.737
5/11/2003	9:11:11	14.2	0.236667	52.34	14.854	-0.812	0.157	0.715
5/11/2003	9:11:12	15	0.25	52.34	14.828	-0.786	0.170	0.693
5/11/2003	9:11:13	15.9	0.265	52.34	14.802	-0.76	0.185	0.670
5/11/2003	9:11:14	16.8	0.28	52.34	14.774	-0.732	0.200	0.645
5/11/2003	9:11:15	17.8	0.296667	52.34	14.746	-0.704	0.217	0.620
5/11/2003	9:11:16	18.9	0.315	52.34	14.722	-0.68	0.235	0.599
5/11/2003	9:11:17	20	0.333333	52.34	14.694	-0.652	0.253	0.574
5/11/2003	9:11:18	21.2	0.353333	52.34	14.666	-0.624	0.273	0.550
5/11/2003	9:11:20	22.4	0.373333	52.34	14.64	-0.598	0.293	0.527
5/11/2003	9:11:21	23.8	0.396667	52.34	14.612	-0.57	0.317	0.502
5/11/2003	9:11:22	25.2	0.42	52.34	14.585	-0.543	0.340	0.478
5/11/2003	9:11:24	26.7	0.445	52.34	14.559	-0.517	0.365	0.456
5/11/2003	9:11:25	28.2	0.47	52.34	14.535	-0.493	0.390	0.434
5/11/2003	9:11:27	29.8	0.496667	52.34	14.511	-0.469	0.417	0.413
5/11/2003	9:11:29	31.5	0.525	52.32	14.487	-0.445	0.445	0.392
5/11/2003	9:11:31	33.3	0.555	52.34	14.46	-0.418	0.475	0.368
5/11/2003	9:11:32	35.2	0.586667	52.34	14.434	-0.392	0.507	0.345
5/11/2003	9:11:35	37.3	0.621667	52.32	14.408	-0.366	0.542	0.322
5/11/2003	9:11:37	39.5	0.658333	52.32	14.384	-0.342	0.578	0.301
5/11/2003	9:11:39	41.8	0.696667	52.32	14.36	-0.318	0.612	0.280
5/11/2003	9:11:42	44.3	0.738333	52.32	14.335	-0.293	0.658	0.258
5/11/2003	9:11:44	46.9	0.781667	52.32	14.315	-0.273	0.702	0.241
5/11/2003	9:11:47	49.7	0.828333	52.32	14.293	-0.251	0.748	0.221
5/11/2003	9:11:50	52.6	0.876667	52.32	14.272	-0.23	0.797	0.203
5/11/2003	9:11:53	55.7	0.928333	52.32	14.255	-0.213	0.848	0.188
5/11/2003	9:11:56	59	0.983333	52.32	14.236	-0.194	0.903	0.171
5/11/2003	9:12:00	62.5	1.041667	52.32	14.218	-0.176	0.962	0.155
5/11/2003	9:12:03	66.2	1.103333	52.32	14.201	-0.159	1.023	0.140
5/11/2003	9:12:07	70.1	1.168333	52.32	14.19	-0.148	1.088	0.130
5/11/2003	9:12:12	74.3	1.238333	52.29	14.177	-0.135	1.158	0.119
5/11/2003	9:12:16	78.7	1.311667	52.29	14.164	-0.122	1.232	0.107
5/11/2003	9:12:21	83.4	1.39	52.29	14.153	-0.111	1.310	0.098
5/11/2003	9:12:26	88.4	1.473333	52.29	14.143	-0.101	1.393	0.089
5/11/2003	9:12:31	93.7	1.561667	52.29	14.134	-0.092	1.482	0.081
5/11/2003	9:12:37	99.3	1.655	52.29	14.125	-0.083	1.575	0.073
5/11/2003	9:12:42	105.2	1.753333	52.29	14.117	-0.075	1.673	0.066
5/11/2003	9:12:49	111.5	1.858333	52.29	14.114	-0.072	1.778	0.063
5/11/2003	9:12:55	118.1	1.968333	52.29	14.104	-0.062	1.888	0.055
5/11/2003	9:13:02	125.1	2.085	52.27	14.099	-0.057	2.005	0.050
5/11/2003	9:13:10	132.6	2.21	52.27	14.095	-0.053	2.130	0.047
5/11/2003	9:13:18	140.5	2.341667	52.27	14.09	-0.048	2.262	0.042
5/11/2003	9:13:26	148.9	2.481667	52.27	14.088	-0.046	2.402	0.041
5/11/2003	9:13:35	157.8	2.63	52.27	14.082	-0.04	2.550	0.035
5/11/2003	9:13:44	167.2	2.786667	52.27	14.078	-0.036	2.707	0.032
5/11/2003	9:13:54	177.2	2.953333	52.27	14.08	-0.038	2.873	0.033
5/11/2003	9:14:05	187.8	3.13	52.27	14.071	-0.029	3.050	0.026
5/11/2003	9:14:16	199	3.316667	52.25	14.069	-0.027	3.237	0.024
5/11/2003	9:14:28	210.9	3.515	52.25	14.066	-0.024	3.435	0.021
5/11/2003	9:14:41	223.5	3.725	52.25	14.064	-0.022	3.645	0.019
5/11/2003	9:14:54	236.8	3.946667	52.25	14.06	-0.018	3.867	0.016
5/11/2003	9:15:08	250.9	4.181667	52.25	14.058	-0.016	4.102	0.014
5/11/2003	9:15:23	265.8	4.43	52.25	14.056	-0.014	4.350	0.012

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	16MWT02
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising Head	**Test Date:**	11-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	0.71 = To

Hydraulic Conductivity (K) :

2.34E-03	ft./min.
3.90E-05	ft./sec.
3.37E+00	ft./day
1.19E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: 16MW102

PROJECT NO.: 9060 CO 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 21.13' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 6.35 DATE: 5/11/03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

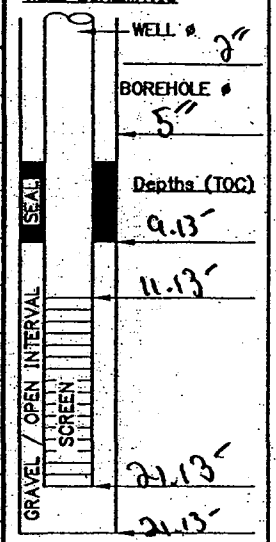
METHOD OF INDUCING WATER LEVEL CHANGE: 1.25' x 42" SOLID SLUG PAGE ___ OF ___

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

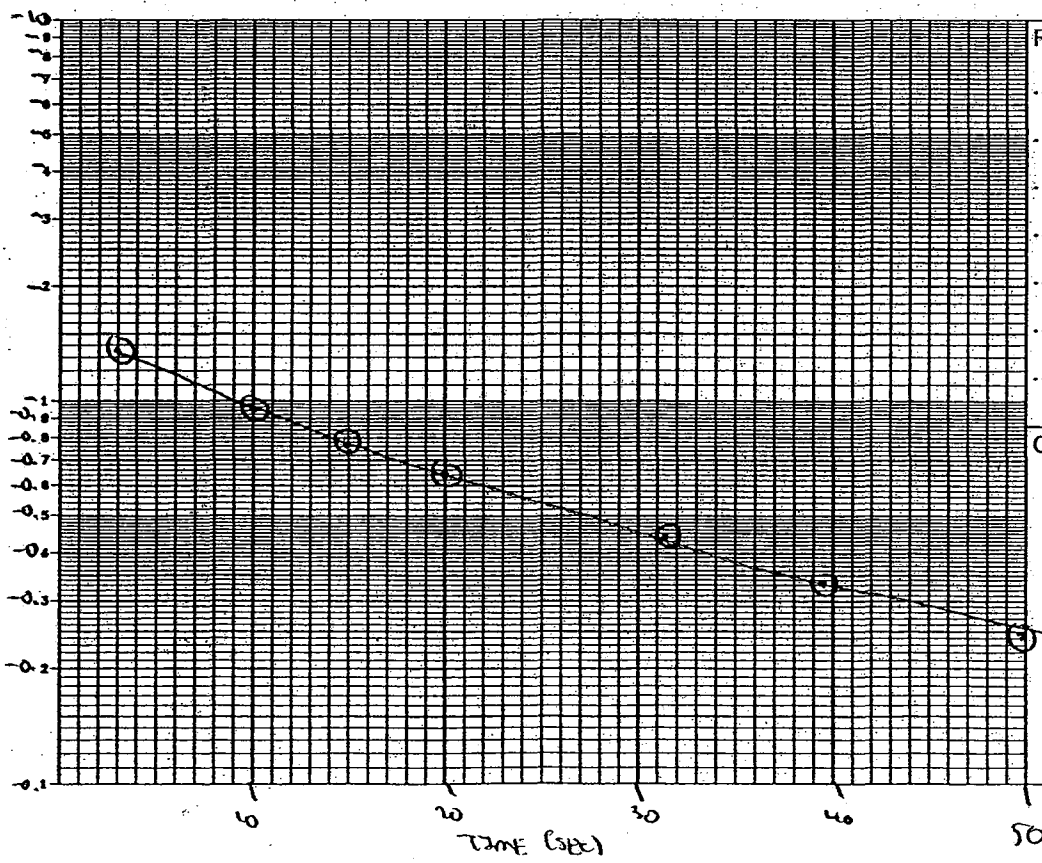
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	14.042	0			
1.5	14.947	+0.905			
3	15.39	+1.348			
6	15.158	+1.116			
8	15.08	+1.038			
10	14.996	+0.954			
15	14.828	+0.786			
20	14.694	+0.652			
31.5	14.487	+0.445			
39.5	14.384	+0.342			
49.7	14.293	+0.251			
66.2	14.201	+0.159			

WELL SCHEMATIC

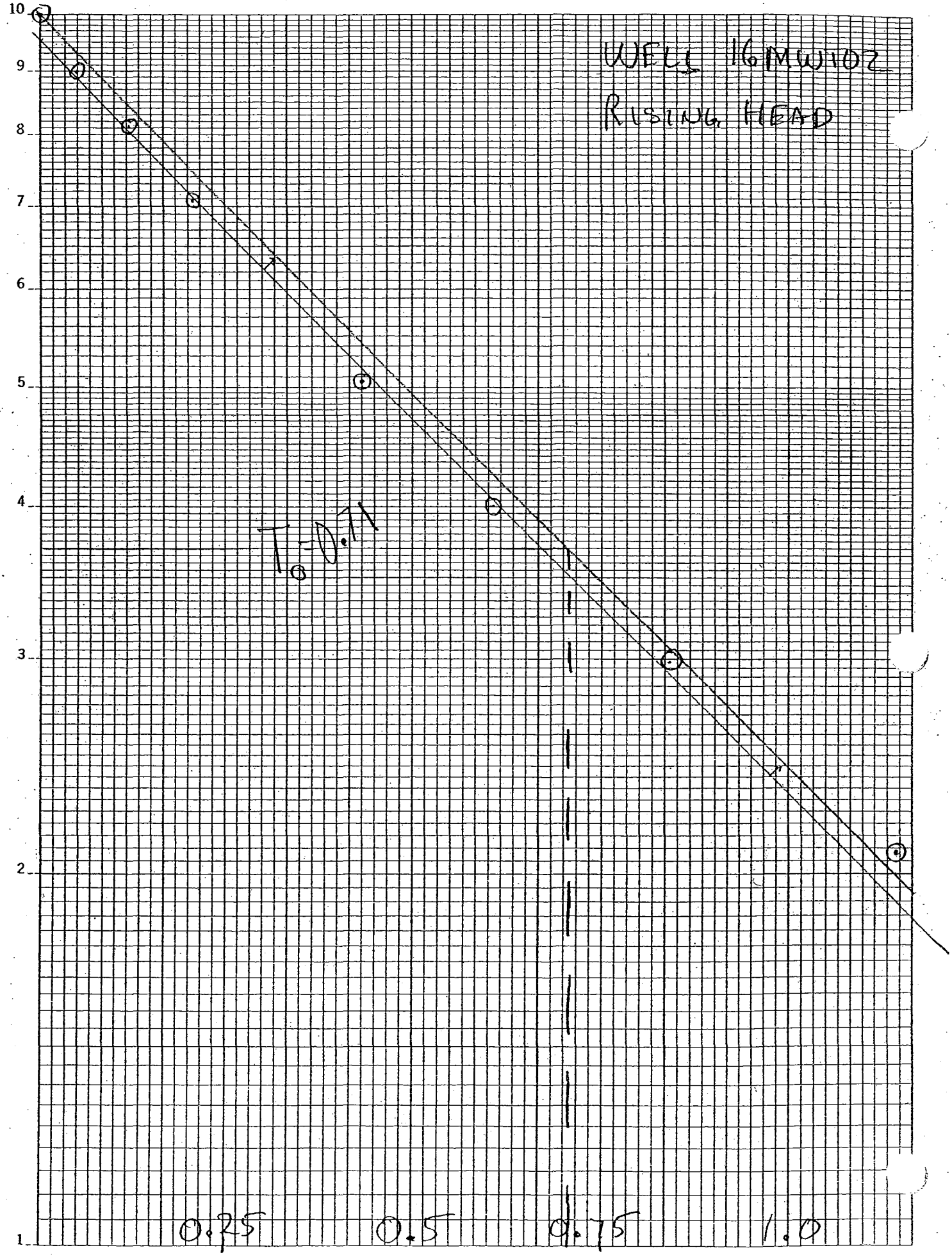


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:



K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO., MADE IN U.S.A.
46 4650

In-Situ Inc. MiniTroll Pro

Report generated: 5/11/2003 13:21:39
Report from file: ...\SN00824 2003-05-11 091704 16MWT02 Rising.bin
Win-Situ Version 4.41

Serial number: 824
Firmware Version 3.06
Unit name:

Test name: 16MWT02 Rising

Test defined on: 5/11/2003 9:16:47
Test started on: 5/11/2003 9:17:04
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time b Seconds.
Number of data s 116

TOTAL DATA SAM 116

Channel number [1]
Measurement typ Temperature
Channel name: Temperature

Channel number [2]
Measurement typ Pressure
Channel name: Depth
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho= -1.11
5/11/2003	9:17:04	0	0	52.23	14.045	0			
5/11/2003	9:17:05	0.3	0.005	52.27	14.058	0.013			
5/11/2003	9:17:05	0.6	0.01	52.29	14.065	0.02			
5/11/2003	9:17:05	0.9	0.015	52.29	12.005	-2.04			
5/11/2003	9:17:06	1.2	0.02	52.29	14.575	0.53			
5/11/2003	9:17:06	1.5	0.025	52.32	12.293	-1.752			
5/11/2003	9:17:06	1.8	0.03	52.32	12.97	-1.075			
5/11/2003	9:17:07	2.1	0.035	52.32	12.464	-1.581			
5/11/2003	9:17:07	2.4	0.04	52.32	12.907	-1.138			
5/11/2003	9:17:07	2.7	0.045	52.32	12.694	-1.351			
5/11/2003	9:17:07	3	0.05	52.32	12.815	-1.23			
5/11/2003	9:17:08	3.3	0.055	52.32	12.83	-1.215			
5/11/2003	9:17:08	3.6	0.06	52.32	12.786	-1.259			
5/11/2003	9:17:08	3.9	0.065	52.34	12.862	-1.183			
5/11/2003	9:17:09	4.2	0.07	52.34	12.873	-1.172			
5/11/2003	9:17:09	4.5	0.075	52.34	12.886	-1.159	Plotted shaded values.		
5/11/2003	9:17:09	4.8	0.08	52.34	12.899	-1.146			
5/11/2003	9:17:10	5.1	0.085	52.34	12.903	-1.142	adjusted time	h/ho	
5/11/2003	9:17:10	5.4	0.09	52.34	12.935	-1.11	0.000	1.000	
5/11/2003	9:17:10	5.7	0.095	52.34	12.931	-1.114	0.005	1.004	
5/11/2003	9:17:10	6	0.1	52.34	12.951	-1.094	0.010	0.986	
5/11/2003	9:17:11	6.4	0.106667	52.34	12.965	-1.08	0.017	0.973	
5/11/2003	9:17:11	6.7	0.111667	52.34	12.979	-1.066	0.022	0.960	
5/11/2003	9:17:12	7.1	0.118333	52.34	12.994	-1.051	0.028	0.947	
5/11/2003	9:17:12	7.5	0.125	52.34	13.007	-1.038	0.035	0.935	
5/11/2003	9:17:12	8	0.133333	52.34	13.028	-1.017	0.043	0.916	
5/11/2003	9:17:13	8.4	0.14	52.34	13.047	-0.998	0.050	0.899	

5/11/2003	9:17:13	8.9	0.148333	52.34	13.06	-0.985	0.058	0.887
5/11/2003	9:17:14	9.5	0.158333	52.34	13.078	-0.967	0.068	0.871
5/11/2003	9:17:14	10	0.166667	52.32	13.084	-0.961	0.077	0.866
5/11/2003	9:17:15	10.6	0.176667	52.32	13.099	-0.946	0.087	0.852
5/11/2003	9:17:16	11.3	0.188333	52.32	13.116	-0.929	0.098	0.837
5/11/2003	9:17:16	11.9	0.198333	52.29	13.133	-0.912	0.108	0.822
5/11/2003	9:17:17	12.6	0.21	52.29	13.15	-0.895	0.120	0.806
5/11/2003	9:17:18	13.4	0.223333	52.29	13.169	-0.876	0.133	0.789
5/11/2003	9:17:19	14.2	0.236667	52.29	13.185	-0.86	0.147	0.775
5/11/2003	9:17:19	15	0.25	52.29	13.204	-0.841	0.160	0.758
5/11/2003	9:17:20	15.9	0.265	52.29	13.223	-0.822	0.175	0.741
5/11/2003	9:17:21	16.8	0.28	52.29	13.243	-0.802	0.190	0.723
5/11/2003	9:17:22	17.8	0.296667	52.29	13.264	-0.781	0.207	0.704
5/11/2003	9:17:23	18.9	0.315	52.29	13.284	-0.761	0.225	0.686
5/11/2003	9:17:24	20	0.333333	52.29	13.305	-0.74	0.243	0.667
5/11/2003	9:17:26	21.2	0.353333	52.29	13.325	-0.72	0.263	0.649
5/11/2003	9:17:27	22.4	0.373333	52.29	13.348	-0.697	0.283	0.628
5/11/2003	9:17:28	23.8	0.396667	52.29	13.372	-0.673	0.307	0.606
5/11/2003	9:17:30	25.2	0.42	52.29	13.395	-0.65	0.330	0.586
5/11/2003	9:17:31	26.7	0.445	52.29	13.415	-0.63	0.355	0.568
5/11/2003	9:17:33	28.2	0.47	52.29	13.439	-0.606	0.380	0.546
5/11/2003	9:17:34	29.8	0.496667	52.29	13.462	-0.583	0.407	0.525
5/11/2003	9:17:36	31.5	0.525	52.29	13.484	-0.561	0.435	0.505
5/11/2003	9:17:38	33.3	0.555	52.29	13.514	-0.531	0.465	0.478
5/11/2003	9:17:40	35.2	0.586667	52.29	13.531	-0.514	0.497	0.463
5/11/2003	9:17:42	37.3	0.621667	52.29	13.555	-0.49	0.532	0.441
5/11/2003	9:17:44	39.5	0.658333	52.27	13.58	-0.465	0.568	0.419
5/11/2003	9:17:46	41.8	0.696667	52.27	13.6	-0.445	0.607	0.401
5/11/2003	9:17:49	44.3	0.738333	52.27	13.626	-0.419	0.648	0.377
5/11/2003	9:17:51	46.9	0.781667	52.27	13.649	-0.396	0.692	0.357
5/11/2003	9:17:54	49.7	0.828333	52.27	13.671	-0.374	0.738	0.337
5/11/2003	9:17:57	52.6	0.876667	52.27	13.692	-0.353	0.787	0.318
5/11/2003	9:18:00	55.7	0.928333	52.27	13.714	-0.331	0.838	0.298
5/11/2003	9:18:03	59	0.983333	52.27	13.735	-0.31	0.893	0.279
5/11/2003	9:18:07	62.5	1.041667	52.27	13.757	-0.288	0.952	0.259
5/11/2003	9:18:11	66.2	1.103333	52.27	13.776	-0.269	1.013	0.242
5/11/2003	9:18:14	70.1	1.168333	52.27	13.794	-0.251	1.078	0.226
5/11/2003	9:18:19	74.3	1.238333	52.27	13.813	-0.232	1.148	0.209
5/11/2003	9:18:23	78.7	1.311667	52.27	13.83	-0.215	1.222	0.194
5/11/2003	9:18:28	83.4	1.39	52.27	13.845	-0.2	1.300	0.180
5/11/2003	9:18:33	88.4	1.473333	52.27	13.862	-0.183	1.383	0.165
5/11/2003	9:18:38	93.7	1.561667	52.27	13.873	-0.172	1.472	0.155
5/11/2003	9:18:44	99.3	1.655	52.25	13.886	-0.159	1.565	0.143
5/11/2003	9:18:50	105.2	1.753333	52.25	13.899	-0.146	1.663	0.132
5/11/2003	9:18:56	111.5	1.858333	52.25	13.911	-0.134	1.768	0.121
5/11/2003	9:19:02	118.1	1.968333	52.25	13.927	-0.118	1.878	0.106
5/11/2003	9:19:09	125.1	2.085	52.25	13.931	-0.114	1.995	0.103
5/11/2003	9:19:17	132.6	2.21	52.25	13.939	-0.106	2.120	0.095
5/11/2003	9:19:25	140.5	2.341667	52.25	13.944	-0.101	2.252	0.091
5/11/2003	9:19:33	148.9	2.481667	52.25	13.952	-0.093	2.392	0.084
5/11/2003	9:19:42	157.8	2.63	52.25	13.959	-0.086	2.540	0.077
5/11/2003	9:19:52	167.2	2.786667	52.25	13.965	-0.08	2.697	0.072
5/11/2003	9:20:02	177.2	2.953333	52.23	13.967	-0.078	2.863	0.070
5/11/2003	9:20:12	187.8	3.13	52.25	13.972	-0.073	3.040	0.066
5/11/2003	9:20:23	199	3.316667	52.23	13.976	-0.069	3.227	0.062
5/11/2003	9:20:35	210.9	3.515	52.23	13.98	-0.065	3.425	0.059
5/11/2003	9:20:48	223.5	3.725	52.23	13.98	-0.065	3.635	0.059
5/11/2003	9:21:01	236.8	3.946667	52.23	13.982	-0.063	3.857	0.057
5/11/2003	9:21:15	250.9	4.181667	52.23	13.984	-0.061	4.092	0.055
5/11/2003	9:21:30	265.8	4.43	52.23	13.987	-0.058	4.340	0.052
5/11/2003	9:21:46	281.6	4.693333	52.23	13.989	-0.056	4.603	0.050
5/11/2003	9:22:03	298.4	4.973333	52.23	13.989	-0.056	4.883	0.050
5/11/2003	9:22:21	316.2	5.27	52.23	13.985	-0.06	5.180	0.054
5/11/2003	9:22:39	335	5.583333	52.23	13.987	-0.058	5.493	0.052
5/11/2003	9:22:59	354.9	5.915	52.25	13.987	-0.058	5.825	0.052

5/11/2003	9:23:20	376	6.266667	52.25	13.987	-0.058	6.177	0.052
5/11/2003	9:23:43	398.4	6.64	52.23	13.987	-0.058	6.550	0.052
5/11/2003	9:24:06	422.1	7.035	52.23	13.989	-0.056	6.945	0.050
5/11/2003	9:24:32	447.2	7.453333	52.23	13.989	-0.056	7.363	0.050
5/11/2003	9:24:58	473.8	7.896667	52.23	13.985	-0.06	7.807	0.054
5/11/2003	9:25:26	502	8.366667	52.23	13.985	-0.06	8.277	0.054
5/11/2003	9:25:56	531.9	8.865	52.23	13.985	-0.06	8.775	0.054
5/11/2003	9:26:28	563.5	9.391667	52.23	13.985	-0.06	9.302	0.054
5/11/2003	9:27:01	597	9.95	52.2	13.986	-0.059	9.860	0.053
5/11/2003	9:27:37	632.5	10.54167	52.2	13.984	-0.061	10.452	0.055
5/11/2003	9:28:14	670.1	11.16833	52.2	13.984	-0.061	11.078	0.055
5/11/2003	9:28:54	709.9	11.83167	52.2	13.984	-0.061	11.742	0.055
5/11/2003	9:29:36	752.1	12.535	52.2	13.982	-0.063	12.445	0.057
5/11/2003	9:30:21	796.8	13.28	52.2	13.98	-0.065	13.190	0.059
5/11/2003	9:31:09	844.2	14.07	52.2	13.978	-0.067	13.980	0.060
5/11/2003	9:31:59	894.4	14.90667	52.2	13.976	-0.069	14.817	0.062
5/11/2003	9:32:52	947.5	15.79167	52.2	13.975	-0.07	15.702	0.063
5/11/2003	9:33:48	1003.8	16.73	52.2	13.975	-0.07	16.640	0.063
5/11/2003	9:34:48	1063.4	17.72333	52.2	13.975	-0.07	17.633	0.063
5/11/2003	9:35:51	1126.6	18.77667	52.2	13.971	-0.074	18.687	0.067
5/11/2003	9:36:58	1193.5	19.89167	52.2	13.971	-0.074	19.802	0.067
5/11/2003	9:38:09	1264.4	21.07333	52.2	13.967	-0.078	20.983	0.070
5/11/2003	9:39:24	1339.5	22.325	52.2	13.965	-0.08	22.235	0.072
5/11/2003	9:40:43	1419	23.65	52.2	13.965	-0.08	23.560	0.072

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	16MWT04
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling Head	**Test Date:**	11-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	2.20 = To

Hydraulic Conductivity (K) :

7.56E-04	ft./min.
1.26E-05	ft./sec.
1.09E+00	ft./day
3.84E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: 16MW104

PROJECT NO.: 9060 CTO 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 27.60' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 7.80' DATE: 5/4/03

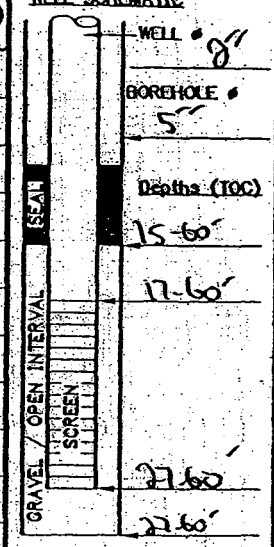
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 42" SOLID SLUG PAGE ___ OF ___

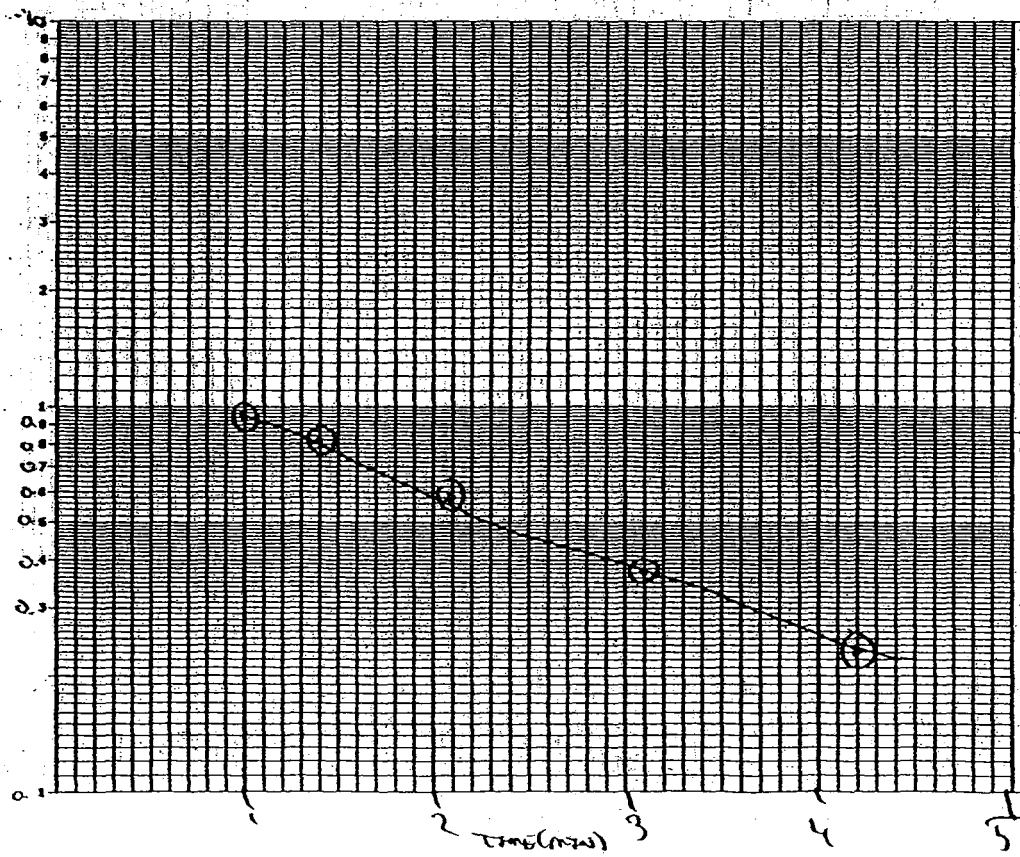
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	18.609	0	4.18	18.839	+0.23
0.14	21.903	+3.294	5.41	18.76	+0.07
0.16	20.375	+1.766			
0.21	19.931	+1.322			
0.42	19.858	+1.249			
0.525	19.796	+1.187			
1.041	19.554	+0.945			
1.39	19.416	+0.807			
1.75	19.294	+0.685			
2.085	19.201	+0.592			
2.48	19.109	+0.497			
3.13	18.977	+0.368			

WELL SCHEMATIC



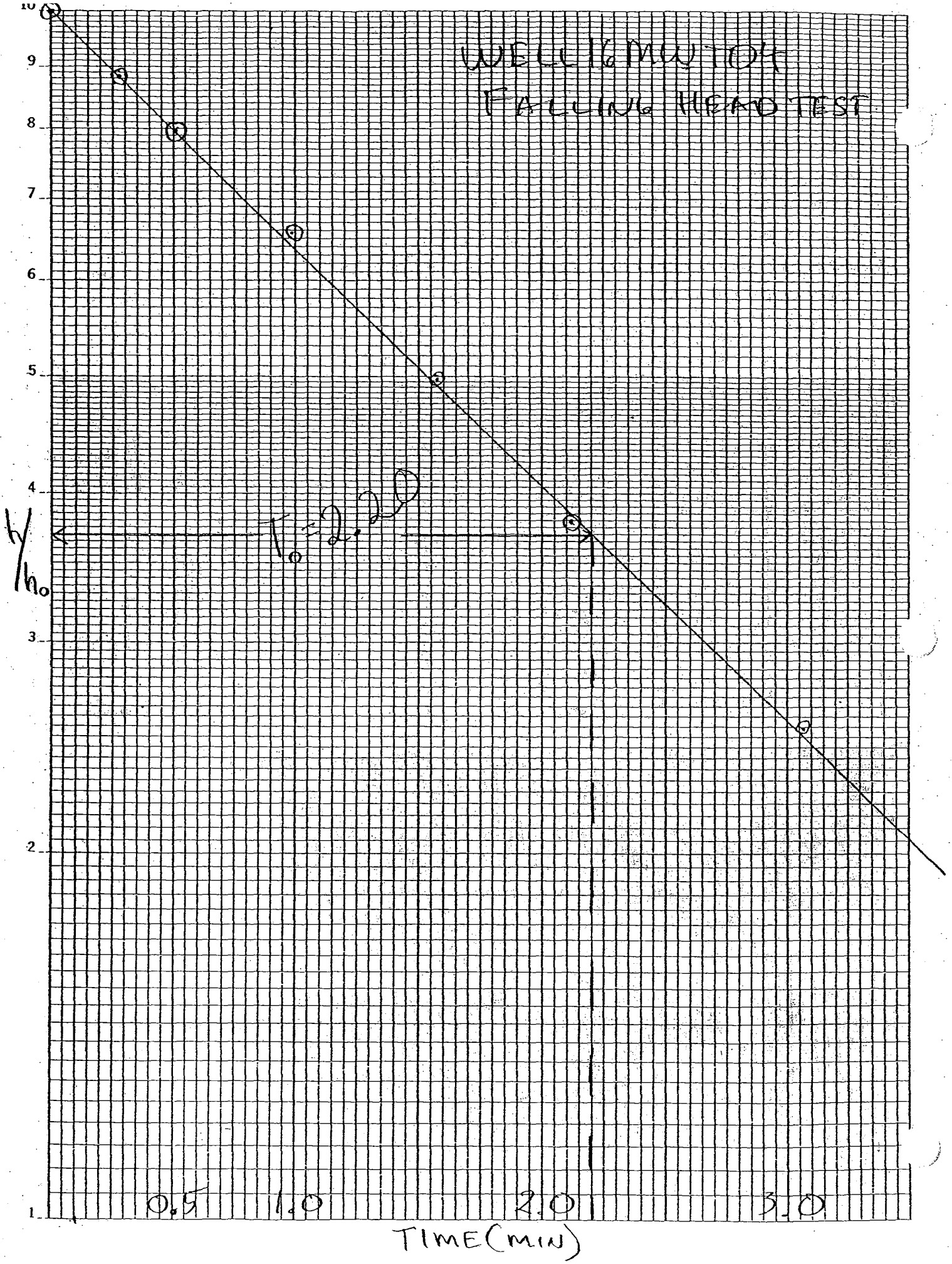
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


WELL 16MW10H
FALLING HEAD TEST
h/h_0
$T_0 = 2.20$
10
9
8
7
6
5
4
3
2
1
0.5
1.0
2.0
5.0
TIME (MIN)

46 4650

In-Situ Inc. MiniTroll Pro

Report gen 5/11/2003 13:22:45
Report fror ...\SN00824 2003-05-11 102438 16MWT04 Falling.bin
Win-Situ V 4.41

Serial num 824
Firmware \ 3.06
Unit name:

Test name: 16MWT04 Falling

Test define 5/11/2003 10:24:28
Test starte 5/11/2003 10:24:38
Test stopp N/A N/A
Test extrac N/A N/A

Data gathered using Logarithmic testing
Maximun Seconds.
Number 124

TOTAL DA 124

Channel number [1]
Measurer Temperature
Channel r Temperature

Channel number [2]
Measurer Pressure
Channel r Depth
Sensor R 30 PSIG.
Specific g 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho=	1.12
5/11/2003	10:24:38	0	0	55.56	18.609	0				
5/11/2003	10:24:38	0.3	0.005	55.61	18.609	0				
5/11/2003	10:24:38	0.6	0.01	55.61	18.609	0				
5/11/2003	10:24:39	0.9	0.015	55.63	18.61	0.001				
5/11/2003	10:24:39	1.2	0.02	55.63	18.609	0				
5/11/2003	10:24:39	1.5	0.025	55.63	18.609	0				
5/11/2003	10:24:40	1.8	0.03	55.63	18.609	0				
5/11/2003	10:24:40	2.1	0.035	55.63	18.609	0				
5/11/2003	10:24:40	2.4	0.04	55.63	18.609	0				
5/11/2003	10:24:40	2.7	0.045	55.65	18.61	0.001				
5/11/2003	10:24:41	3	0.05	55.65	18.609	0				
5/11/2003	10:24:41	3.3	0.055	55.65	18.609	0				
5/11/2003	10:24:41	3.6	0.06	55.65	18.609	0				
5/11/2003	10:24:42	3.9	0.065	55.65	18.609	0				
5/11/2003	10:24:42	4.2	0.07	55.65	18.609	0				
5/11/2003	10:24:42	4.5	0.075	55.65	18.609	0				
5/11/2003	10:24:43	4.8	0.08	55.65	18.609	0				
5/11/2003	10:24:43	5.1	0.085	55.65	18.609	0				
5/11/2003	10:24:43	5.4	0.09	55.65	18.609	0				
5/11/2003	10:24:43	5.7	0.095	55.65	18.609	0				
5/11/2003	10:24:44	6	0.1	55.65	18.609	0				
5/11/2003	10:24:44	6.4	0.106667	55.65	18.609	0				
5/11/2003	10:24:44	6.7	0.111667	55.65	18.609	0				
5/11/2003	10:24:45	7.1	0.118333	55.65	18.609	0				
5/11/2003	10:24:45	7.5	0.125	55.65	18.636	0.027				
5/11/2003	10:24:46	8	0.133333	55.65	18.64	0.031				
5/11/2003	10:24:46	8.4	0.14	55.67	21.903	3.294				

5/11/2003	10:24:47	8.9	0.148333	55.67	20.014	1.405		
5/11/2003	10:24:47	9.5	0.158333	55.67	19.411	0.802		
5/11/2003	10:24:48	10	0.166667	55.63	20.375	1.766		
5/11/2003	10:24:48	10.6	0.176667	55.63	20.449	1.84		
5/11/2003	10:24:49	11.3	0.188333	55.63	20.011	1.402		
5/11/2003	10:24:50	11.9	0.198333	55.61	19.906	1.297		
5/11/2003	10:24:50	12.6	0.21	55.61	19.931	1.322		
5/11/2003	10:24:51	13.4	0.223333	55.61	19.955	1.346		
5/11/2003	10:24:52	14.2	0.236667	55.61	19.961	1.352		
5/11/2003	10:24:53	15	0.25	55.61	19.961	1.352		
5/11/2003	10:24:54	15.9	0.265	55.61	19.953	1.344		
5/11/2003	10:24:55	16.8	0.28	55.61	19.944	1.335		
5/11/2003	10:24:56	17.8	0.296667	55.61	19.933	1.324		
5/11/2003	10:24:57	18.9	0.315	55.61	19.921	1.312		
5/11/2003	10:24:58	20	0.333333	55.61	19.908	1.299		
5/11/2003	10:24:59	21.2	0.353333	55.61	19.897	1.288		
5/11/2003	10:25:00	22.4	0.373333	55.61	19.886	1.277		
5/11/2003	10:25:02	23.8	0.396667	55.61	19.871	1.262		
5/11/2003	10:25:03	25.2	0.42	55.61	19.858	1.249		
5/11/2003	10:25:04	26.7	0.445	55.61	19.841	1.232		
5/11/2003	10:25:06	28.2	0.47	55.61	19.828	1.219		
5/11/2003	10:25:08	29.8	0.496667	55.61	19.813	1.204		
5/11/2003	10:25:09	31.5	0.525	55.61	19.796	1.187		
5/11/2003	10:25:11	33.3	0.555	55.61	19.783	1.174	Plotted shaded values.	
5/11/2003	10:25:13	35.2	0.586667	55.61	19.766	1.157		
5/11/2003	10:25:15	37.3	0.621667	55.61	19.748	1.139	adjusted time	h/ho
5/11/2003	10:25:17	39.5	0.658333	55.61	19.729	1.12	0.000	1.000
5/11/2003	10:25:20	41.8	0.696667	55.61	19.71	1.101	0.038	0.983
5/11/2003	10:25:22	44.3	0.738333	55.61	19.69	1.081	0.080	0.965
5/11/2003	10:25:25	46.9	0.781667	55.61	19.669	1.06	0.123	0.946
5/11/2003	10:25:27	49.7	0.828333	55.61	19.647	1.038	0.170	0.927
5/11/2003	10:25:30	52.6	0.876667	55.61	19.626	1.017	0.218	0.908
5/11/2003	10:25:33	55.7	0.928333	55.61	19.598	0.989	0.270	0.883
5/11/2003	10:25:37	59	0.983333	55.58	19.573	0.964	0.325	0.861
5/11/2003	10:25:40	62.5	1.041667	55.58	19.554	0.945	0.383	0.844
5/11/2003	10:25:44	66.2	1.103333	55.58	19.528	0.919	0.445	0.821
5/11/2003	10:25:48	70.1	1.168333	55.58	19.5	0.891	0.510	0.796
5/11/2003	10:25:52	74.3	1.238333	55.61	19.479	0.87	0.580	0.777
5/11/2003	10:25:56	78.7	1.311667	55.58	19.446	0.837	0.653	0.747
5/11/2003	10:26:01	83.4	1.39	55.58	19.416	0.807	0.732	0.721
5/11/2003	10:26:06	88.4	1.473333	55.58	19.326	0.717	0.815	0.640
5/11/2003	10:26:11	93.7	1.561667	55.63	19.337	0.728	0.903	0.650
5/11/2003	10:26:17	99.3	1.655	55.63	19.341	0.732	0.997	0.654
5/11/2003	10:26:23	105.2	1.753333	55.58	19.294	0.685	1.095	0.612
5/11/2003	10:26:29	111.5	1.858333	55.58	19.266	0.657	1.200	0.587
5/11/2003	10:26:36	118.1	1.968333	55.58	19.233	0.624	1.310	0.557
5/11/2003	10:26:43	125.1	2.085	55.58	19.201	0.592	1.427	0.529
5/11/2003	10:26:50	132.6	2.21	55.58	19.167	0.558	1.552	0.498
5/11/2003	10:26:58	140.5	2.341667	55.58	19.136	0.527	1.683	0.471
5/11/2003	10:27:07	148.9	2.481667	55.58	19.106	0.497	1.823	0.444
5/11/2003	10:27:16	157.8	2.63	55.58	19.074	0.465	1.972	0.415
5/11/2003	10:27:25	167.2	2.786667	55.58	19.035	0.426	2.128	0.380
5/11/2003	10:27:35	177.2	2.953333	55.58	19.007	0.398	2.295	0.355
5/11/2003	10:27:46	187.8	3.13	55.58	18.977	0.368	2.472	0.329
5/11/2003	10:27:57	199	3.316667	55.58	18.947	0.338	2.658	0.302
5/11/2003	10:28:09	210.9	3.515	55.58	18.919	0.31	2.857	0.277
5/11/2003	10:28:21	223.5	3.725	55.58	18.893	0.284	3.067	0.254
5/11/2003	10:28:35	236.8	3.946667	55.58	18.865	0.256	3.288	0.229
5/11/2003	10:28:49	250.9	4.181667	55.58	18.839	0.23	3.523	0.205
5/11/2003	10:29:04	265.8	4.43	55.58	18.815	0.206	3.772	0.184
5/11/2003	10:29:19	281.6	4.693333	55.56	18.793	0.184	4.035	0.164
5/11/2003	10:29:36	298.4	4.973333	55.56	18.778	0.169	4.315	0.151
5/11/2003	10:29:54	316.2	5.27	55.56	18.751	0.142	4.612	0.127
5/11/2003	10:30:13	335	5.583333	55.56	18.733	0.124	4.925	0.111
5/11/2003	10:30:33	354.9	5.915	55.56	18.716	0.107	5.257	0.096

5/11/2003	10:30:54	376	6.266667	55.56	18.703	0.094	5.608	0.084
5/11/2003	10:31:16	398.4	6.64	55.56	18.69	0.081	5.982	0.072
5/11/2003	10:31:40	422.1	7.035	55.56	18.68	0.071	6.377	0.063
5/11/2003	10:32:05	447.2	7.453333	55.56	18.669	0.06	6.795	0.054
5/11/2003	10:32:32	473.8	7.896667	55.56	18.66	0.051	7.238	0.046
5/11/2003	10:33:00	502	8.366667	55.56	18.652	0.043	7.708	0.038
5/11/2003	10:33:30	531.9	8.865	55.56	18.645	0.036	8.207	0.032
5/11/2003	10:34:01	563.5	9.391667	55.56	18.641	0.032	8.733	0.029
5/11/2003	10:34:35	597	9.95	55.56	18.639	0.03	9.292	0.027
5/11/2003	10:35:10	632.5	10.54167	55.56	18.634	0.025	9.883	0.022
5/11/2003	10:35:48	670.1	11.16833	55.56	18.628	0.019	10.510	0.017
5/11/2003	10:36:28	709.9	11.83167	55.56	18.626	0.017	11.173	0.015
5/11/2003	10:37:10	752.1	12.535	55.56	18.624	0.015	11.877	0.013
5/11/2003	10:37:55	796.8	13.28	55.56	18.621	0.012	12.622	0.011
5/11/2003	10:38:42	844.2	14.07	55.58	18.619	0.01	13.412	0.009
5/11/2003	10:39:32	894.4	14.90667	55.56	18.619	0.01	14.248	0.009
5/11/2003	10:40:25	947.5	15.79167	55.58	18.615	0.006	15.133	0.005
5/11/2003	10:41:22	1003.8	16.73	55.56	18.617	0.008	16.072	0.007
5/11/2003	10:42:21	1063.4	17.72333	55.58	18.613	0.004	17.065	0.004
5/11/2003	10:43:24	1126.6	18.77667	55.58	18.606	-0.003	18.118	-0.003
5/11/2003	10:44:31	1193.5	19.89167	55.58	18.609	0	19.233	0.000
5/11/2003	10:45:42	1264.4	21.07333	55.58	18.611	0.002	20.415	0.002
5/11/2003	10:46:57	1339.5	22.325	55.56	18.61	0.001	21.667	0.001
5/11/2003	10:48:17	1419	23.65	55.58	18.607	-0.002	22.992	-0.002
5/11/2003	10:49:41	1503.3	25.055	55.58	18.606	-0.003	24.397	-0.003
5/11/2003	10:51:10	1592.6	26.54333	55.58	18.602	-0.007	25.885	-0.006
5/11/2003	10:52:45	1687.1	28.11833	55.58	18.602	-0.007	27.460	-0.006
5/11/2003	10:54:25	1787.2	29.78667	55.58	18.607	-0.002	29.128	-0.002
5/11/2003	10:56:11	1893.3	31.555	55.58	18.604	-0.005	30.897	-0.004
5/11/2003	10:58:03	2005.7	33.42833	55.58	18.607	-0.002	32.770	-0.002
5/11/2003	11:00:02	2124.7	35.41167	55.58	18.606	-0.003	34.753	-0.003
5/11/2003	11:02:09	2250.8	37.51333	55.58	18.606	-0.003	36.855	-0.003

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: GRANDE WELL/BORING NO.: 16MW104

PROJECT NO.: 9060 CO 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10'/27.60' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 7.80' DATE: 5/14/03

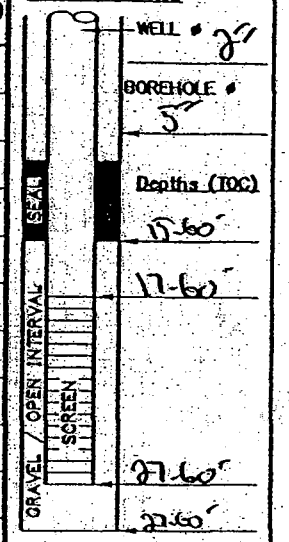
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 4' SOLID SLUG PAGE ___ OF ___

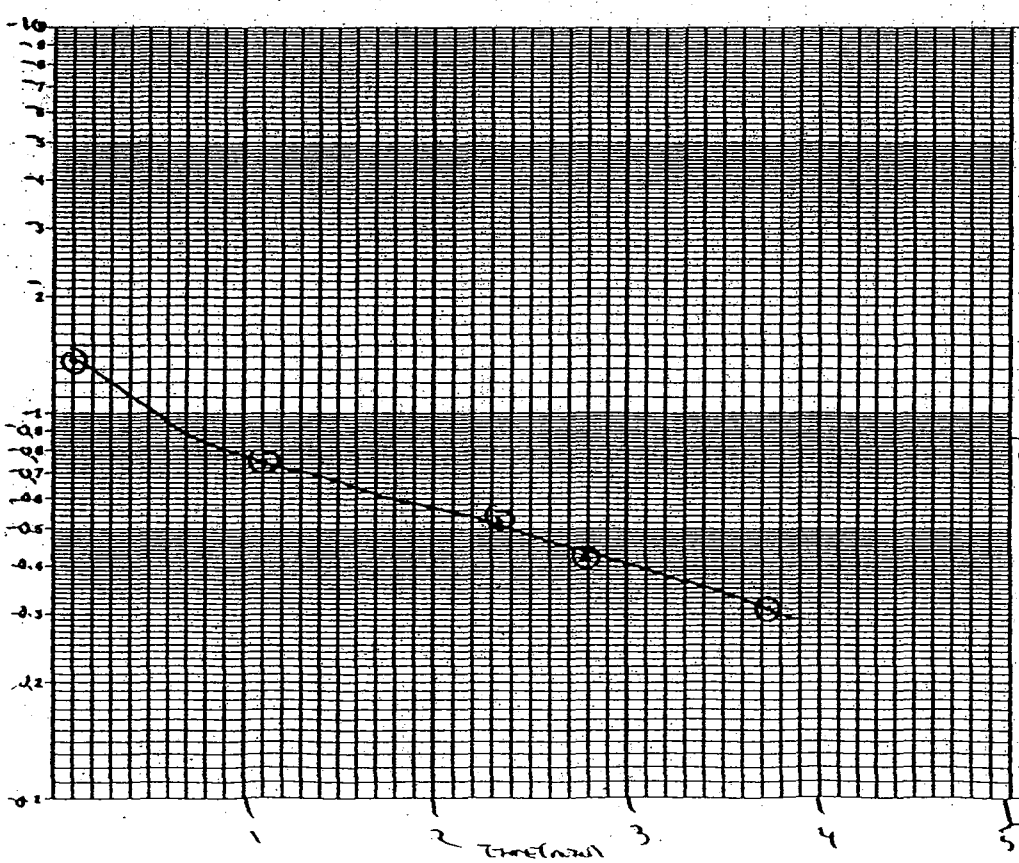
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	18.605	0	2.77	18.183	-0.422
0.045	16.364	-2.241	3.725	18.297	-0.308
0.065	16.935	-1.67	4.43	18.402	-0.203
0.085	17.181	-1.424	6.26	18.50	-0.102
0.1	17.23	-1.375			
0.14	17.26	-1.343			
0.39	17.402	-1.203			
0.62	17.505	-1.1			
0.82	17.608	-0.997			
1.10	17.855	-0.75			
1.98	17.996	-0.609			
2.34	18.089	-0.516			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	16MWT04
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising head	**Test Date:**	11-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	2.27 = To

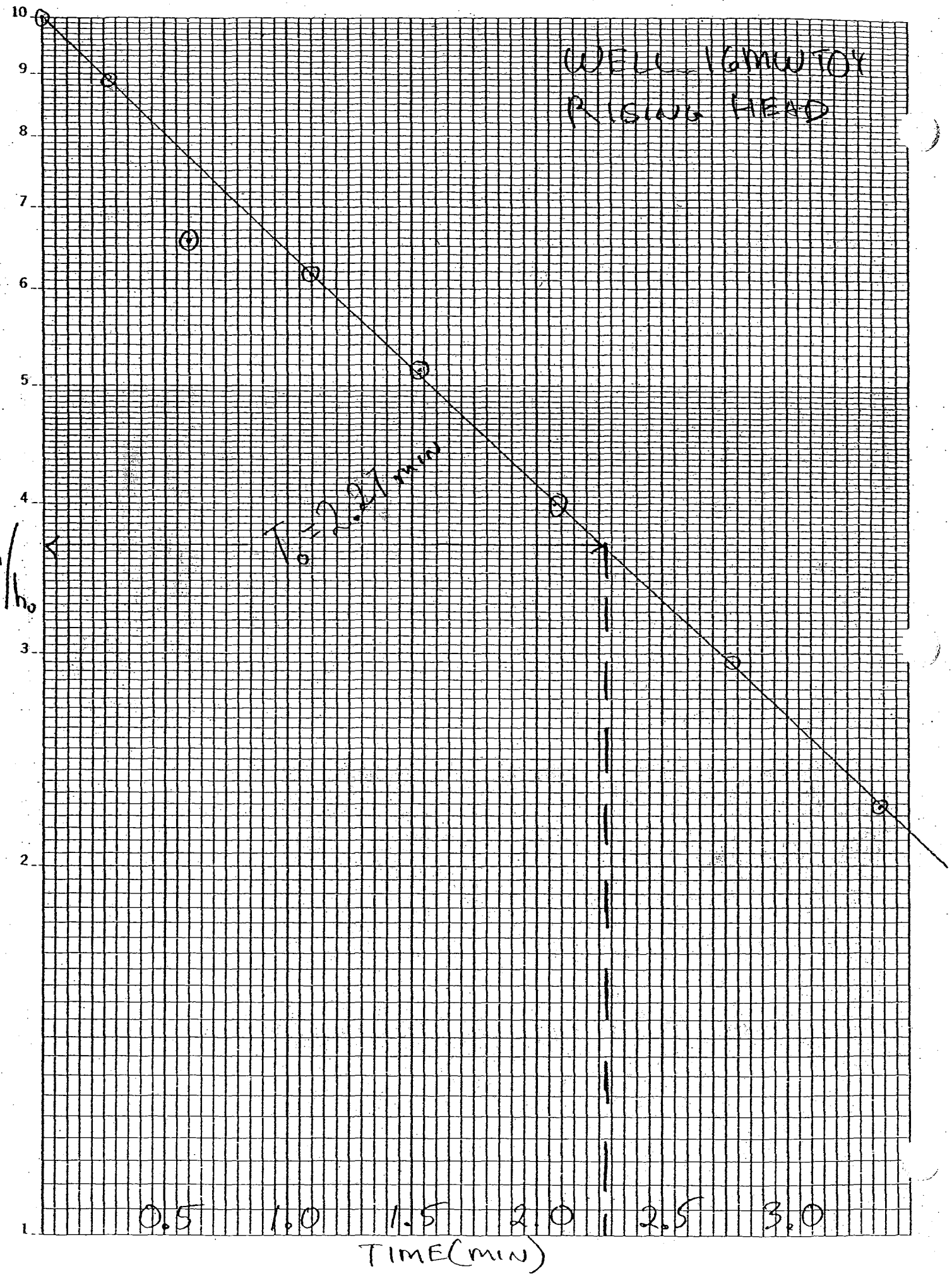
Hydraulic Conductivity (K) :

7.32E-04	ft./min.
1.22E-05	ft./sec.
1.05E+00	ft./day
3.72E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED


WELL 16MW10X
RISING HEAD
$T_{1/2} \approx 2.21$ min
h/h_0
10
9
8
7
6
5
4
3
2
1
0.5
1.0
1.5
2.0
2.5
3.0
TIME (MIN)

46 4650

In-Situ Inc. MiniTroll Pro

Report generated: 5/11/2003 13:24:50
Report from file: ...\SN00824 2003-05-11 110513 16MWT04 Rising .bin
Win-Situ Version 4.41

Serial number: 824
Firmware Version 3.06
Unit name:

Test name: 16MWT04 Rising

Test defined on: 5/11/2003 11:05:04
Test started on: 5/11/2003 11:05:13
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time betw Seconds.
Number of data sam 125

TOTAL DATA SAMPL 125

Channel number [1]
Measurement type: Temperature
Channel name: Temperature

Channel number [2]
Measurement type: Pressure
Channel name: Depth
Sensor Range: 30 PSIG.
Specific gravity: 1

ho= -1.124

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho
5/11/2003	11:05:13	0	0	55.63	18.605	0		
5/11/2003	11:05:14	0.3	0.005	55.67	18.605	0		
5/11/2003	11:05:14	0.6	0.01	55.67	18.606	0.001		
5/11/2003	11:05:14	0.9	0.015	55.7	18.605	0		
5/11/2003	11:05:15	1.2	0.02	55.7	18.605	0		
5/11/2003	11:05:15	1.5	0.025	55.7	18.632	0.027		
5/11/2003	11:05:15	1.8	0.03	55.7	17.777	-0.828		
5/11/2003	11:05:15	2.1	0.035	55.72	17.519	-1.086		
5/11/2003	11:05:16	2.4	0.04	55.7	18.317	-0.288		
5/11/2003	11:05:16	2.7	0.045	55.72	16.364	-2.241		
5/11/2003	11:05:16	3	0.05	55.72	17.805	-0.8		
5/11/2003	11:05:17	3.3	0.055	55.72	16.69	-1.915		
5/11/2003	11:05:17	3.6	0.06	55.7	17.529	-1.076		
5/11/2003	11:05:17	3.9	0.065	55.72	16.935	-1.67		
5/11/2003	11:05:18	4.2	0.07	55.72	17.361	-1.244		
5/11/2003	11:05:18	4.5	0.075	55.72	17.084	-1.521		
5/11/2003	11:05:18	4.8	0.08	55.72	17.271	-1.334		
5/11/2003	11:05:18	5.1	0.085	55.72	17.181	-1.424		
5/11/2003	11:05:19	5.4	0.09	55.72	17.235	-1.37		
5/11/2003	11:05:19	5.7	0.095	55.72	17.219	-1.386		
5/11/2003	11:05:19	6	0.1	55.72	17.23	-1.375		
5/11/2003	11:05:20	6.4	0.106667	55.72	17.228	-1.377		
5/11/2003	11:05:20	6.7	0.111667	55.72	17.249	-1.356		
5/11/2003	11:05:20	7.1	0.118333	55.72	17.237	-1.368		
5/11/2003	11:05:21	7.5	0.125	55.72	17.254	-1.351		
5/11/2003	11:05:21	8	0.133333	55.72	17.258	-1.347		
5/11/2003	11:05:22	8.4	0.14	55.72	17.262	-1.343		

5/11/2003	11:05:22	8.9	0.148333	55.74	17.269	-1.336		
5/11/2003	11:05:23	9.5	0.158333	55.72	17.278	-1.327		
5/11/2003	11:05:23	10	0.166667	55.7	17.275	-1.33		
5/11/2003	11:05:24	10.6	0.176667	55.7	17.286	-1.319		
5/11/2003	11:05:25	11.3	0.188333	55.7	17.29	-1.315		
5/11/2003	11:05:25	11.9	0.198333	55.7	17.292	-1.313		
5/11/2003	11:05:26	12.6	0.21	55.7	17.299	-1.306		
5/11/2003	11:05:27	13.4	0.223333	55.67	17.307	-1.298		
5/11/2003	11:05:28	14.2	0.236667	55.67	17.314	-1.291		
5/11/2003	11:05:28	15	0.25	55.67	17.324	-1.281		
5/11/2003	11:05:29	15.9	0.265	55.67	17.331	-1.274		
5/11/2003	11:05:30	16.8	0.28	55.67	17.341	-1.264		
5/11/2003	11:05:31	17.8	0.296667	55.67	17.348	-1.257		
5/11/2003	11:05:32	18.9	0.315	55.67	17.359	-1.246		
5/11/2003	11:05:33	20	0.333333	55.67	17.37	-1.235		
5/11/2003	11:05:35	21.2	0.353333	55.67	17.382	-1.223		
5/11/2003	11:05:36	22.4	0.373333	55.67	17.391	-1.214		
5/11/2003	11:05:37	23.8	0.396667	55.67	17.402	-1.203		
5/11/2003	11:05:39	25.2	0.42	55.67	17.413	-1.192		
5/11/2003	11:05:40	26.7	0.445	55.67	17.426	-1.179		
5/11/2003	11:05:42	28.2	0.47	55.67	17.44	-1.165	Plotted shaded values.	
5/11/2003	11:05:43	29.8	0.496667	55.67	17.453	-1.152		
5/11/2003	11:05:45	31.5	0.525	55.67	17.469	-1.136	adjusted time	h/ho
5/11/2003	11:05:47	33.3	0.555	55.67	17.481	-1.124	0.000	1.000
5/11/2003	11:05:49	35.2	0.586667	55.67	17.496	-1.109	0.032	0.987
5/11/2003	11:05:51	37.3	0.621667	55.67	17.505	-1.1	0.067	0.979
5/11/2003	11:05:53	39.5	0.658333	55.67	17.529	-1.076	0.103	0.957
5/11/2003	11:05:55	41.8	0.696667	55.67	17.546	-1.059	0.142	0.942
5/11/2003	11:05:58	44.3	0.738333	55.65	17.567	-1.038	0.183	0.923
5/11/2003	11:06:00	46.9	0.781667	55.67	17.594	-1.011	0.227	0.899
5/11/2003	11:06:03	49.7	0.828333	55.65	17.608	-0.997	0.273	0.887
5/11/2003	11:06:06	52.6	0.876667	55.65	17.628	-0.977	0.322	0.869
5/11/2003	11:06:09	55.7	0.928333	55.65	17.651	-0.954	0.373	0.849
5/11/2003	11:06:12	59	0.983333	55.77	17.851	-0.754	0.428	0.671
5/11/2003	11:06:16	62.5	1.041667	55.77	17.851	-0.754	0.487	0.671
5/11/2003	11:06:20	66.2	1.103333	55.77	17.855	-0.75	0.548	0.667
5/11/2003	11:06:23	70.1	1.168333	55.77	17.857	-0.748	0.613	0.665
5/11/2003	11:06:28	74.3	1.238333	55.79	17.858	-0.747	0.683	0.665
5/11/2003	11:06:32	78.7	1.311667	55.77	17.86	-0.745	0.757	0.663
5/11/2003	11:06:37	83.4	1.39	55.77	17.864	-0.741	0.835	0.659
5/11/2003	11:06:42	88.4	1.473333	55.7	17.854	-0.751	0.918	0.668
5/11/2003	11:06:47	93.7	1.561667	55.7	17.876	-0.729	1.007	0.649
5/11/2003	11:06:53	99.3	1.655	55.67	17.91	-0.695	1.100	0.618
5/11/2003	11:06:59	105.2	1.753333	55.67	17.938	-0.667	1.198	0.593
5/11/2003	11:07:05	111.5	1.858333	55.67	17.97	-0.635	1.303	0.565
5/11/2003	11:07:11	118.1	1.968333	55.67	17.996	-0.609	1.413	0.542
5/11/2003	11:07:18	125.1	2.085	55.67	18.028	-0.577	1.530	0.513
5/11/2003	11:07:26	132.6	2.21	55.67	18.059	-0.546	1.655	0.486
5/11/2003	11:07:34	140.5	2.341667	55.65	18.089	-0.516	1.787	0.459
5/11/2003	11:07:42	148.9	2.481667	55.65	18.121	-0.484	1.927	0.431
5/11/2003	11:07:51	157.8	2.63	55.65	18.155	-0.45	2.075	0.400
5/11/2003	11:08:01	167.2	2.786667	55.65	18.183	-0.422	2.232	0.375
5/11/2003	11:08:11	177.2	2.953333	55.65	18.211	-0.394	2.398	0.351
5/11/2003	11:08:21	187.8	3.13	55.63	18.243	-0.362	2.575	0.322
5/11/2003	11:08:32	199	3.316667	55.63	18.273	-0.332	2.762	0.295
5/11/2003	11:08:44	210.9	3.515	55.63	18.299	-0.306	2.960	0.272
5/11/2003	11:08:57	223.5	3.725	55.63	18.297	-0.308	3.170	0.274
5/11/2003	11:09:10	236.8	3.946667	55.63	18.353	-0.252	3.392	0.224
5/11/2003	11:09:24	250.9	4.181667	55.61	18.379	-0.226	3.627	0.201
5/11/2003	11:09:39	265.8	4.43	55.61	18.402	-0.203	3.875	0.181
5/11/2003	11:09:55	281.6	4.693333	55.61	18.42	-0.185	4.138	0.165
5/11/2003	11:10:12	298.4	4.973333	55.61	18.441	-0.164	4.418	0.146
5/11/2003	11:10:30	316.2	5.27	55.61	18.46	-0.145	4.715	0.129
5/11/2003	11:10:48	335	5.583333	55.61	18.476	-0.129	5.028	0.115
5/11/2003	11:11:08	354.9	5.915	55.58	18.484	-0.121	5.360	0.108

5/11/2003	11:11:29	376	6.266667	55.58	18.503	-0.102	5.712	0.091
5/11/2003	11:11:52	398.4	6.64	55.58	18.516	-0.089	6.085	0.079
5/11/2003	11:12:15	422.1	7.035	55.58	18.525	-0.08	6.480	0.071
5/11/2003	11:12:41	447.2	7.453333	55.58	18.535	-0.07	6.898	0.062
5/11/2003	11:13:07	473.8	7.896667	55.58	18.546	-0.059	7.342	0.052
5/11/2003	11:13:35	502	8.366667	55.56	18.55	-0.055	7.812	0.049
5/11/2003	11:14:05	531.9	8.865	55.56	18.557	-0.048	8.310	0.043
5/11/2003	11:14:37	563.5	9.391667	55.58	18.559	-0.046	8.837	0.041
5/11/2003	11:15:10	597	9.95	55.56	18.565	-0.04	9.395	0.036
5/11/2003	11:15:46	632.5	10.54167	55.56	18.567	-0.038	9.987	0.034
5/11/2003	11:16:23	670.1	11.16833	55.56	18.572	-0.033	10.613	0.029
5/11/2003	11:17:03	709.9	11.83167	55.56	18.572	-0.033	11.277	0.029
5/11/2003	11:17:45	752.1	12.535	55.56	18.574	-0.031	11.980	0.028
5/11/2003	11:18:30	796.8	13.28	55.58	18.572	-0.033	12.725	0.029
5/11/2003	11:19:18	844.2	14.07	55.58	18.576	-0.029	13.515	0.026
5/11/2003	11:20:08	894.4	14.90667	55.58	18.578	-0.027	14.352	0.024
5/11/2003	11:21:01	947.5	15.79167	55.58	18.579	-0.026	15.237	0.023
5/11/2003	11:21:57	1003.8	16.73	55.58	18.581	-0.024	16.175	0.021
5/11/2003	11:22:57	1063.4	17.72333	55.58	18.576	-0.029	17.168	0.026
5/11/2003	11:24:00	1126.6	18.77667	55.58	18.581	-0.024	18.222	0.021
5/11/2003	11:25:07	1193.5	19.89167	55.58	18.581	-0.024	19.337	0.021
5/11/2003	11:26:18	1264.4	21.07333	55.61	18.583	-0.022	20.518	0.020
5/11/2003	11:27:33	1339.5	22.325	55.61	18.583	-0.022	21.770	0.020
5/11/2003	11:28:52	1419	23.65	55.61	18.581	-0.024	23.095	0.021
5/11/2003	11:30:17	1503.3	25.055	55.61	18.579	-0.026	24.500	0.023
5/11/2003	11:31:46	1592.6	26.54333	55.61	18.581	-0.024	25.988	0.021
5/11/2003	11:33:20	1687.1	28.11833	55.61	18.575	-0.03	27.563	0.027
5/11/2003	11:35:01	1787.2	29.78667	55.61	18.579	-0.026	29.232	0.023
5/11/2003	11:36:47	1893.3	31.555	55.61	18.575	-0.03	31.000	0.027
5/11/2003	11:38:39	2005.7	33.42833	55.61	18.579	-0.026	32.873	0.023
5/11/2003	11:40:38	2124.7	35.41167	55.61	18.581	-0.024	34.857	0.021
5/11/2003	11:42:44	2250.8	37.51333	55.61	18.581	-0.024	36.958	0.021
5/11/2003	11:44:58	2384.4	39.74	55.63	18.577	-0.028	39.185	0.025

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	16MWT05
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/27/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	3.75 = To

Hydraulic Conductivity (K) :

4.43E-04	ft./min.
7.39E-06	ft./sec.
6.38E-01	ft./day
2.25E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: 16MW105

PROJECT NO.: 9060 CTO 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 41.85' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 29.30' DATE: 5/11/03

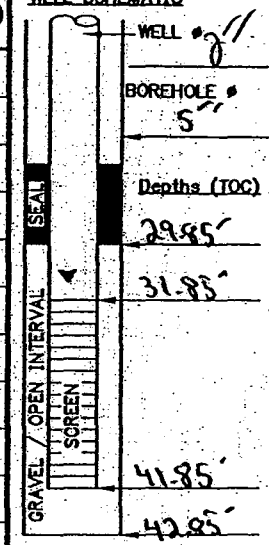
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" x 39" SOLID SLUG PAGE ___ OF ___

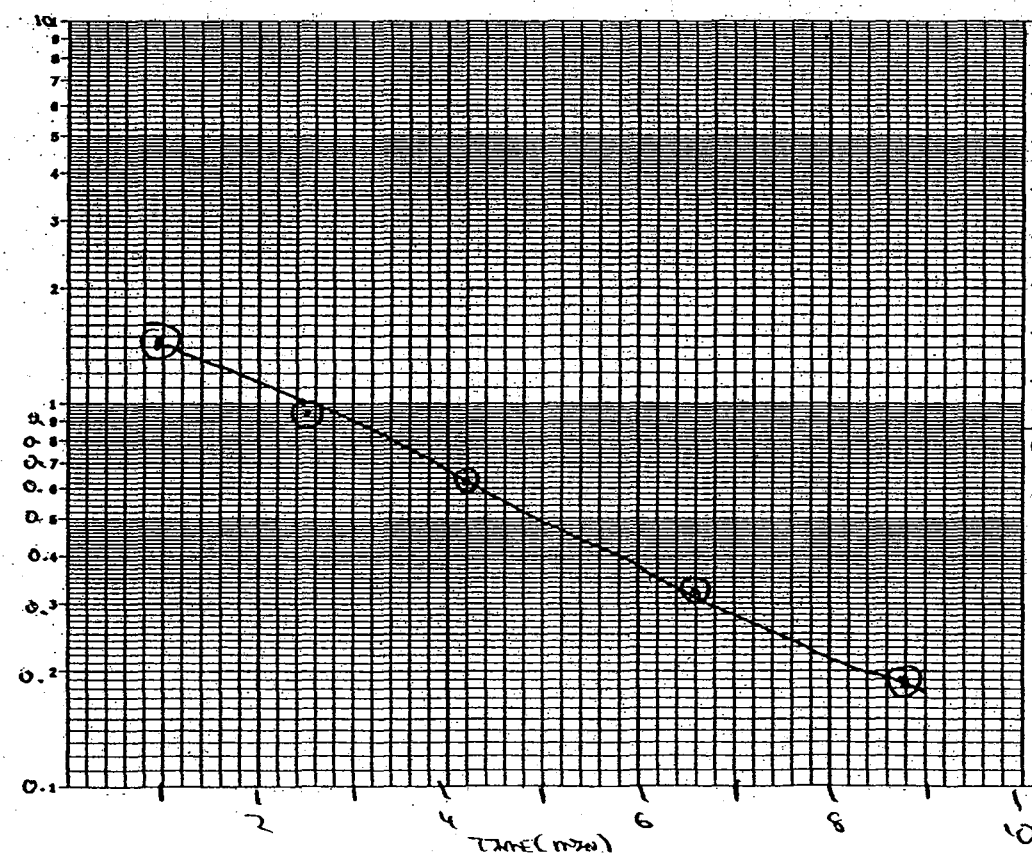
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI.

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	11.855	0	5.27	12.323	0.468
0.085	14.338	2.483	6.64	12.185	0.33
0.1	14.779	2.924	8.865	12.048	0.193
0.21	13.7	1.845	11.83	11.956	0.101
0.315	13.638	1.783	18.77	11.886	0.031
0.42	13.579	1.724			
0.585	13.523	1.668			
1.04	13.291	1.436			
1.75	13.035	1.18			
2.48	12.824	0.969			
3.13	12.672	0.817			
4.18	12.475	0.62			

WELL SCHEMATIC



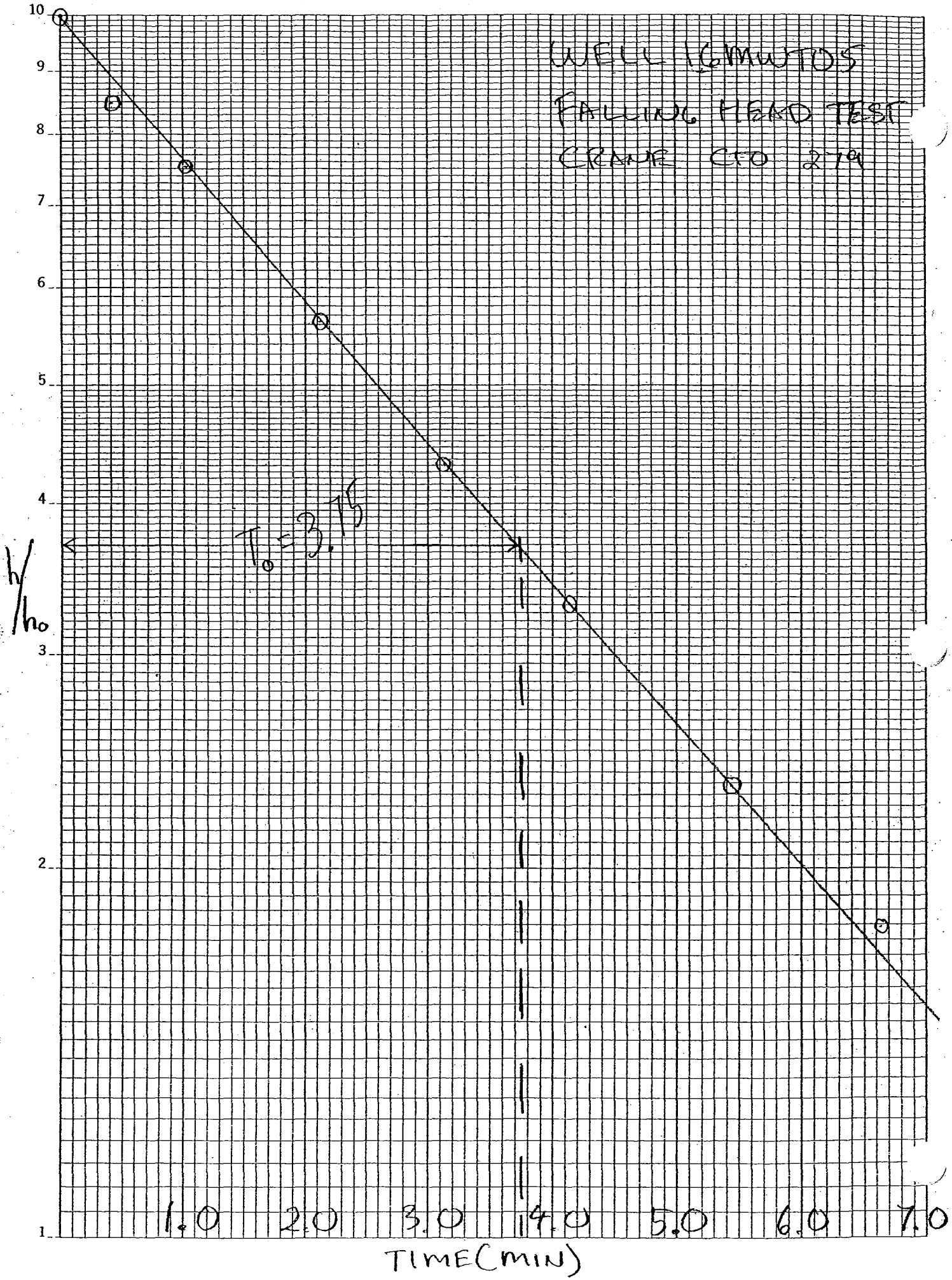
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


WELL 16MW105
FALLING HEAD TEST
CRANE CFO 279
$T_0 = 3.75$
h/ho
10
9
8
7
6
5
4
3
2
1
1.0
2.0
3.0
4.0
5.0
6.0
7.0
TIME(MIN)
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 4650

In-Situ Inc. MiniTroll Pro

Report generate 5/11/2003 13:25:59
Report from file: ...\SN09015 2003-05-11 093526 16MWT05 Falling.bin
Win-Situ Versio 4.41

Serial number: 9015
Firmware Versic 3.04
Unit name: MW-14FW

Test name: 16MWT05 Falling

Test defined on: 5/11/2003 9:35:15
Test started on: 5/11/2003 9:35:26
Test stopped on N/A N/A
Test extracted o N/A N/A

Data gathered using Logarithmic testing
Maximum time Seconds.
Number of dat 130

TOTAL DATA S 130

Channel number [1]
Measurement t Temperature
Channel name OnBoard Temp

Channel number [2]
Measurement t Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho= 1.525
5/11/2003	9:35:26	0	0	58.54	11.855	0			
5/11/2003	9:35:27	0.3	0.005	58.56	11.855	0			
5/11/2003	9:35:27	0.6	0.01	58.59	11.855	0			
5/11/2003	9:35:27	0.9	0.015	58.59	11.855	0			
5/11/2003	9:35:28	1.2	0.02	58.59	11.855	0			
5/11/2003	9:35:28	1.5	0.025	58.61	11.855	0			
5/11/2003	9:35:28	1.8	0.03	58.61	11.855	0			
5/11/2003	9:35:29	2.1	0.035	58.61	11.855	0			
5/11/2003	9:35:29	2.4	0.04	58.61	11.855	0			
5/11/2003	9:35:29	2.7	0.045	58.61	11.855	0			
5/11/2003	9:35:29	3	0.05	58.61	11.855	0			
5/11/2003	9:35:30	3.3	0.055	58.61	11.855	0			
5/11/2003	9:35:30	3.6	0.06	58.61	11.855	0			
5/11/2003	9:35:30	3.9	0.065	58.63	11.855	0			
5/11/2003	9:35:31	4.2	0.07	58.63	11.855	0			
5/11/2003	9:35:31	4.5	0.075	58.63	11.905	0.05			
5/11/2003	9:35:31	4.8	0.08	58.63	11.913	0.058			
5/11/2003	9:35:32	5.1	0.085	58.63	14.338	2.483			
5/11/2003	9:35:32	5.4	0.09	58.63	13.417	1.562			
5/11/2003	9:35:32	5.7	0.095	58.63	13.85	1.995			
5/11/2003	9:35:32	6	0.1	58.63	14.779	2.924			
5/11/2003	9:35:33	6.4	0.106667	58.63	14.049	2.194			
5/11/2003	9:35:33	6.7	0.111667	58.63	14.375	2.52			
5/11/2003	9:35:34	7.1	0.118333	58.63	14.418	2.563			
5/11/2003	9:35:34	7.5	0.125	58.63	13.567	1.712			
5/11/2003	9:35:34	8	0.133333	58.63	14.205	2.35			
5/11/2003	9:35:35	8.4	0.14	58.63	13.928	2.073			

5/11/2003	9:35:35	8.9	0.148333	58.63	13.296	1.441		
5/11/2003	9:35:36	9.5	0.158333	58.63	13.973	2.118		
5/11/2003	9:35:37	10	0.166667	58.63	13.626	1.771		
5/11/2003	9:35:37	10.6	0.176667	58.61	13.786	1.931		
5/11/2003	9:35:38	11.3	0.188333	58.61	13.696	1.841		
5/11/2003	9:35:38	11.9	0.198333	58.61	13.727	1.872		
5/11/2003	9:35:39	12.6	0.21	58.61	13.7	1.845		
5/11/2003	9:35:40	13.4	0.223333	58.61	13.692	1.837		
5/11/2003	9:35:41	14.2	0.236667	58.61	13.69	1.835		
5/11/2003	9:35:41	15	0.25	58.61	13.679	1.824		
5/11/2003	9:35:42	15.9	0.265	58.61	13.669	1.814		
5/11/2003	9:35:43	16.8	0.28	58.61	13.659	1.804		
5/11/2003	9:35:44	17.8	0.296667	58.59	13.65	1.795		
5/11/2003	9:35:45	18.9	0.315	58.59	13.638	1.783		
5/11/2003	9:35:46	20	0.333333	58.59	13.626	1.771		
5/11/2003	9:35:48	21.2	0.353333	58.59	13.614	1.759		
5/11/2003	9:35:49	22.4	0.373333	58.59	13.603	1.748		
5/11/2003	9:35:50	23.8	0.396667	58.59	13.589	1.734		
5/11/2003	9:35:52	25.2	0.42	58.59	13.579	1.724		
5/11/2003	9:35:53	26.7	0.445	58.59	13.564	1.709		
5/11/2003	9:35:55	28.2	0.47	58.59	13.552	1.697		
5/11/2003	9:35:56	29.8	0.496667	58.59	13.538	1.683		
5/11/2003	9:35:58	31.5	0.525	58.59	13.523	1.668		
5/11/2003	9:36:00	33.3	0.555	58.59	13.509	1.654		
5/11/2003	9:36:02	35.2	0.586667	58.59	13.484	1.629		
5/11/2003	9:36:04	37.3	0.621667	58.59	13.474	1.619	adjusted time	h/ho
5/11/2003	9:36:06	39.5	0.658333	58.59	13.458	1.603		
5/11/2003	9:36:08	41.8	0.696667	58.59	13.441	1.586	Plotted shaded values.	
5/11/2003	9:36:11	44.3	0.738333	58.59	13.421	1.566		
5/11/2003	9:36:13	46.9	0.781667	58.59	13.402	1.547		
5/11/2003	9:36:16	49.7	0.828333	58.59	13.38	1.525	0.000	1.000
5/11/2003	9:36:19	52.6	0.876667	58.59	13.359	1.504	0.048	0.986
5/11/2003	9:36:22	55.7	0.928333	58.59	13.337	1.482	0.100	0.972
5/11/2003	9:36:25	59	0.983333	58.59	13.316	1.461	0.155	0.958
5/11/2003	9:36:29	62.5	1.041667	58.56	13.291	1.436	0.213	0.942
5/11/2003	9:36:33	66.2	1.103333	58.7	13.151	1.296	0.275	0.850
5/11/2003	9:36:37	70.1	1.168333	58.7	13.149	1.294	0.340	0.849
5/11/2003	9:36:41	74.3	1.238333	58.7	13.147	1.292	0.410	0.847
5/11/2003	9:36:45	78.7	1.311667	58.7	13.143	1.288	0.483	0.845
5/11/2003	9:36:50	83.4	1.39	58.7	13.141	1.286	0.562	0.843
5/11/2003	9:36:55	88.4	1.473333	58.7	13.139	1.284	0.645	0.842
5/11/2003	9:37:00	93.7	1.561667	58.61	13.101	1.246	0.733	0.817
5/11/2003	9:37:06	99.3	1.655	58.61	13.068	1.213	0.827	0.795
5/11/2003	9:37:12	105.2	1.753333	58.59	13.035	1.18	0.925	0.774
5/11/2003	9:37:18	111.5	1.858333	58.59	13.004	1.149	1.030	0.753
5/11/2003	9:37:25	118.1	1.968333	58.59	12.969	1.114	1.140	0.730
5/11/2003	9:37:32	125.1	2.085	58.59	12.933	1.078	1.257	0.707
5/11/2003	9:37:39	132.6	2.21	58.59	12.898	1.043	1.382	0.684
5/11/2003	9:37:47	140.5	2.341667	58.56	12.863	1.008	1.513	0.661
5/11/2003	9:37:55	148.9	2.481667	58.56	12.824	0.969	1.653	0.635
5/11/2003	9:38:04	157.8	2.63	58.56	12.787	0.932	1.802	0.611
5/11/2003	9:38:14	167.2	2.786667	58.56	12.75	0.895	1.958	0.587
5/11/2003	9:38:24	177.2	2.953333	58.56	12.713	0.858	2.125	0.563
5/11/2003	9:38:34	187.8	3.13	58.56	12.672	0.817	2.302	0.536
5/11/2003	9:38:45	199	3.316667	58.56	12.633	0.778	2.488	0.510
5/11/2003	9:38:57	210.9	3.515	58.54	12.594	0.739	2.687	0.485
5/11/2003	9:39:10	223.5	3.725	58.54	12.555	0.7	2.897	0.459
5/11/2003	9:39:23	236.8	3.946667	58.54	12.514	0.659	3.118	0.432
5/11/2003	9:39:37	250.9	4.181667	58.54	12.475	0.62	3.353	0.407
5/11/2003	9:39:52	265.8	4.43	58.54	12.436	0.581	3.602	0.381
5/11/2003	9:40:08	281.6	4.693333	58.54	12.397	0.542	3.865	0.355
5/11/2003	9:40:25	298.4	4.973333	58.54	12.358	0.503	4.145	0.330
5/11/2003	9:40:43	316.2	5.27	58.52	12.323	0.468	4.442	0.307
5/11/2003	9:41:01	335	5.583333	58.52	12.286	0.431	4.755	0.283
5/11/2003	9:41:21	354.9	5.915	58.52	12.251	0.396	5.087	0.260

5/11/2003	9:41:42	376	6.266667	58.52	12.212	0.357	5.438	0.234
5/11/2003	9:42:05	398.4	6.64	58.52	12.185	0.33	5.812	0.216
5/11/2003	9:42:29	422.1	7.035	58.52	12.154	0.299	6.207	0.196
5/11/2003	9:42:54	447.2	7.453333	58.52	12.126	0.271	6.625	0.178
5/11/2003	9:43:20	473.8	7.896667	58.52	12.097	0.242	7.068	0.159
5/11/2003	9:43:48	502	8.366667	58.52	12.072	0.217	7.538	0.142
5/11/2003	9:44:18	531.9	8.865	58.52	12.048	0.193	8.037	0.127
5/11/2003	9:44:50	563.5	9.391667	58.52	12.025	0.17	8.563	0.111
5/11/2003	9:45:23	597	9.95	58.52	12.005	0.15	9.122	0.098
5/11/2003	9:45:59	632.5	10.54167	58.52	11.986	0.131	9.713	0.086
5/11/2003	9:46:37	670.1	11.16833	58.5	11.972	0.117	10.340	0.077
5/11/2003	9:47:16	709.9	11.83167	58.52	11.956	0.101	11.003	0.066
5/11/2003	9:47:59	752.1	12.535	58.5	11.943	0.088	11.707	0.058
5/11/2003	9:48:43	796.8	13.28	58.5	11.929	0.074	12.452	0.049
5/11/2003	9:49:31	844.2	14.07	58.5	11.922	0.067	13.242	0.044
5/11/2003	9:50:21	894.4	14.90667	58.5	11.912	0.057	14.078	0.037
5/11/2003	9:51:14	947.5	15.79167	58.5	11.904	0.049	14.963	0.032
5/11/2003	9:52:10	1003.8	16.73	58.5	11.898	0.043	15.902	0.028
5/11/2003	9:53:10	1063.4	17.72333	58.5	11.892	0.037	16.895	0.024
5/11/2003	9:54:13	1126.6	18.77667	58.5	11.886	0.031	17.948	0.020
5/11/2003	9:55:20	1193.5	19.89167	58.5	11.883	0.028	19.063	0.018
5/11/2003	9:56:31	1264.4	21.07333	58.5	11.879	0.024	20.245	0.016
5/11/2003	9:57:46	1339.5	22.325	58.5	11.877	0.022	21.497	0.014
5/11/2003	9:59:05	1419	23.65	58.5	11.875	0.02	22.822	0.013
5/11/2003	10:00:30	1503.3	25.055	58.5	11.873	0.018	24.227	0.012
5/11/2003	10:01:59	1592.6	26.54333	58.5	11.869	0.014	25.715	0.009
5/11/2003	10:03:34	1687.1	28.11833	58.5	11.869	0.014	27.290	0.009
5/11/2003	10:05:14	1787.2	29.78667	58.5	11.865	0.01	28.958	0.007
5/11/2003	10:07:00	1893.3	31.555	58.5	11.865	0.01	30.727	0.007
5/11/2003	10:08:52	2005.7	33.42833	58.5	11.861	0.006	32.600	0.004
5/11/2003	10:10:51	2124.7	35.41167	58.5	11.859	0.004	34.583	0.003
5/11/2003	10:12:57	2250.8	37.51333	58.5	11.861	0.006	36.685	0.004
5/11/2003	10:15:11	2384.4	39.74	58.5	11.859	0.004	38.912	0.003
5/11/2003	10:17:32	2525.9	42.09833	58.5	11.857	0.002	41.270	0.001
5/11/2003	10:20:02	2675.8	44.59667	58.5	11.854	-0.001	43.768	-0.001
5/11/2003	10:22:41	2834.6	47.24333	58.5	11.855	0	46.415	0.000
5/11/2003	10:25:29	3002.8	50.04667	58.5	11.852	-0.003	49.218	-0.002
5/11/2003	10:28:27	3180.9	53.015	58.5	11.855	0	52.187	0.000

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	16MWT05
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	4.10 = To

Hydraulic Conductivity (K) :

4.05E-04	ft./min.
6.76E-06	ft./sec.
5.84E-01	ft./day
2.06E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: 16MW105

PROJECT NO.: 9060 CTO 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 41.85' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 29.30' DATE: 5/1/03

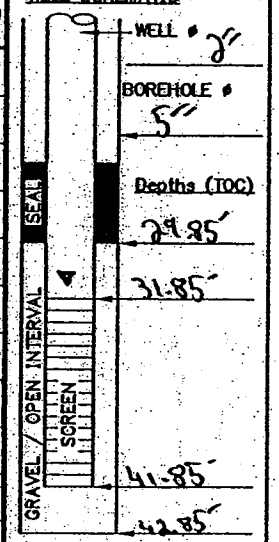
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" x 39" SOLID SLUG PAGE ..... OF .....

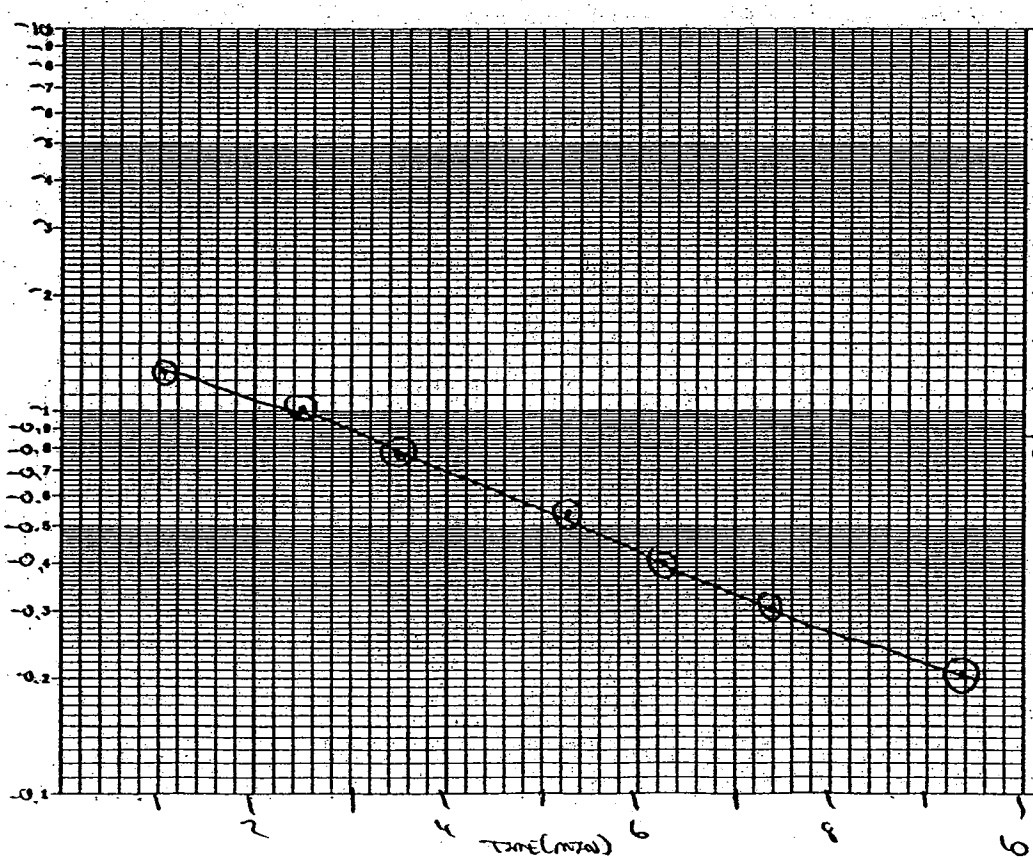
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30 PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	11.863	0	1.16	10.463	-1.4
0.02	8.765	-3.098	1.655	10.623	-1.24
0.03	10.19	-1.673	2.48	10.854	-1.009
0.04	10.12	-1.743	3.515	11.076	-0.787
0.05	10.03	-1.833	5.27	11.344	-0.519
0.06	9.975	-1.888	6.26	11.453	-0.41
0.07	9.958	-1.905	7.45	11.551	-0.312
0.1	9.965	-1.898	9.39	11.658	-0.205
0.21	10.045	-1.818	13.28	11.763	-0.1
0.42	10.157	-1.706			
0.621	10.254	-1.609			
0.876	10.348	-1.515			

WELL SCHEMATIC



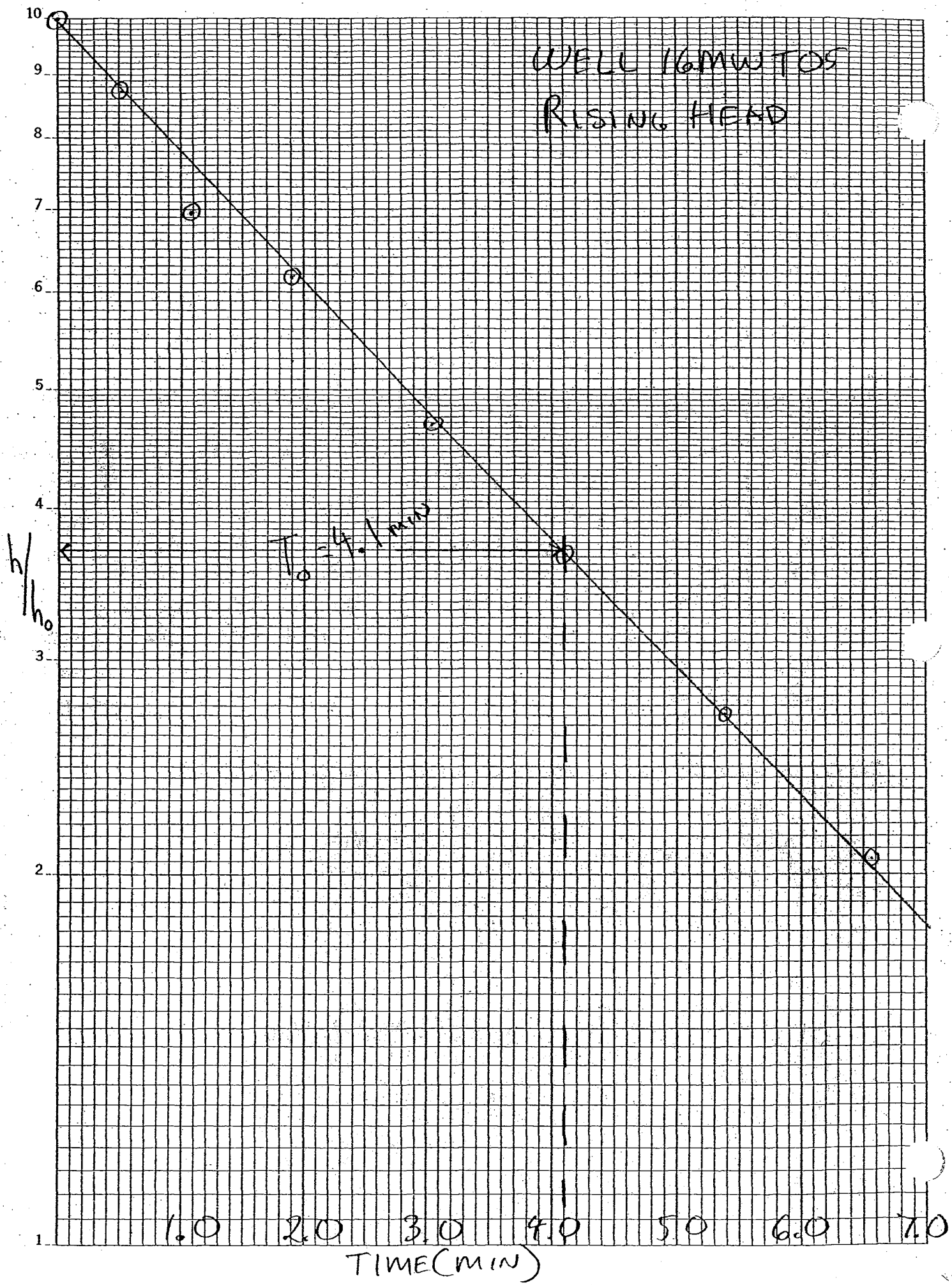
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL



K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.
46 4650

In-Situ Inc. MiniTroll Pro

Report generate 5/11/2003 13:27:01
Report from file: ...\SN09015 2003-05-11 103052 16MWT05 Rising.bin
Win-Situ Versior 4.41

Serial number: 9015
Firmware Versio 3.04
Unit name: MW-14FW

Test name: 16MWT05 Rising

Test defined on: 5/11/2003 10:30:37
Test started on: 5/11/2003 10:30:52
Test stopped on N/A N/A
Test extracted o N/A N/A

Data gathered using Logarithmic testing
Maximum time Seconds.
Number of dat 126

TOTAL DATA S. 126

Channel number [1]
Measurement t Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement t Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho= -1.515
5/11/2003	10:30:52	0	0	58.5	11.863	0			
5/11/2003	10:30:53	0.3	0.005	58.54	11.863	0			
5/11/2003	10:30:53	0.6	0.01	58.54	11.863	0			
5/11/2003	10:30:53	0.9	0.015	58.56	11.728	-0.135			
5/11/2003	10:30:54	1.2	0.02	58.56	8.765	-3.098			
5/11/2003	10:30:54	1.5	0.025	58.56	9.583	-2.28			
5/11/2003	10:30:54	1.8	0.03	58.56	10.19	-1.673			
5/11/2003	10:30:54	2.1	0.035	58.56	9.511	-2.352			
5/11/2003	10:30:55	2.4	0.04	58.59	10.12	-1.743			
5/11/2003	10:30:55	2.7	0.045	58.59	9.716	-2.147			
5/11/2003	10:30:55	3	0.05	58.59	10.03	-1.833			
5/11/2003	10:30:56	3.3	0.055	58.59	9.835	-2.028			
5/11/2003	10:30:56	3.6	0.06	58.59	9.975	-1.888			
5/11/2003	10:30:56	3.9	0.065	58.59	9.895	-1.968			
5/11/2003	10:30:57	4.2	0.07	58.59	9.958	-1.905			
5/11/2003	10:30:57	4.5	0.075	58.59	9.926	-1.937			
5/11/2003	10:30:57	4.8	0.08	58.59	9.956	-1.907			
5/11/2003	10:30:57	5.1	0.085	58.61	9.95	-1.913			
5/11/2003	10:30:58	5.4	0.09	58.61	9.961	-1.902			
5/11/2003	10:30:58	5.7	0.095	58.61	9.965	-1.898			
5/11/2003	10:30:58	6	0.1	58.61	9.965	-1.898			
5/11/2003	10:30:59	6.4	0.106667	58.61	9.973	-1.89			
5/11/2003	10:30:59	6.7	0.111667	58.61	9.979	-1.884			
5/11/2003	10:30:59	7.1	0.118333	58.61	9.981	-1.882			
5/11/2003	10:31:00	7.5	0.125	58.61	9.991	-1.872			
5/11/2003	10:31:00	8	0.133333	58.61	9.995	-1.868			
5/11/2003	10:31:01	8.4	0.14	58.61	10	-1.863			

5/11/2003	10:31:01	8.9	0.148333	58.61	10.004	-1.859		
5/11/2003	10:31:02	9.5	0.158333	58.61	10.014	-1.849		
5/11/2003	10:31:02	10	0.166667	58.59	10.014	-1.849		
5/11/2003	10:31:03	10.6	0.176667	58.59	10.02	-1.843		
5/11/2003	10:31:04	11.3	0.188333	58.59	10.024	-1.839		
5/11/2003	10:31:04	11.9	0.198333	58.59	10.034	-1.829		
5/11/2003	10:31:05	12.6	0.21	58.59	10.045	-1.818		
5/11/2003	10:31:06	13.4	0.223333	58.59	10.049	-1.814		
5/11/2003	10:31:07	14.2	0.236667	58.59	10.059	-1.804		
5/11/2003	10:31:07	15	0.25	58.59	10.065	-1.798		
5/11/2003	10:31:08	15.9	0.265	58.56	10.075	-1.788		
5/11/2003	10:31:09	16.8	0.28	58.56	10.083	-1.78		
5/11/2003	10:31:10	17.8	0.296667	58.56	10.093	-1.77		
5/11/2003	10:31:11	18.9	0.315	58.56	10.102	-1.761		
5/11/2003	10:31:12	20	0.333333	58.56	10.114	-1.749		
5/11/2003	10:31:14	21.2	0.353333	58.56	10.124	-1.739		
5/11/2003	10:31:15	22.4	0.373333	58.56	10.133	-1.73		
5/11/2003	10:31:16	23.8	0.396667	58.56	10.145	-1.718		
5/11/2003	10:31:18	25.2	0.42	58.56	10.157	-1.706		
5/11/2003	10:31:19	26.7	0.445	58.56	10.169	-1.694		
5/11/2003	10:31:21	28.2	0.47	58.56	10.182	-1.681		
5/11/2003	10:31:22	29.8	0.496667	58.56	10.196	-1.667		
5/11/2003	10:31:24	31.5	0.525	58.56	10.21	-1.653		
5/11/2003	10:31:26	33.3	0.555	58.56	10.227	-1.636		
5/11/2003	10:31:28	35.2	0.586667	58.56	10.241	-1.622		
5/11/2003	10:31:30	37.3	0.621667	58.56	10.254	-1.609		
5/11/2003	10:31:32	39.5	0.658333	58.56	10.278	-1.585		
5/11/2003	10:31:34	41.8	0.696667	58.56	10.297	-1.566		
5/11/2003	10:31:37	44.3	0.738333	58.54	10.305	-1.558	Plotted shaded values.	
5/11/2003	10:31:39	46.9	0.781667	58.54	10.309	-1.554		
5/11/2003	10:31:42	49.7	0.828333	58.54	10.329	-1.534	adjusted time	h/ho
5/11/2003	10:31:45	52.6	0.876667	58.54	10.348	-1.515	0.000	1.000
5/11/2003	10:31:48	55.7	0.928333	58.54	10.368	-1.495	0.052	0.987
5/11/2003	10:31:51	59	0.983333	58.54	10.391	-1.472	0.107	0.972
5/11/2003	10:31:55	62.5	1.041667	58.54	10.417	-1.446	0.165	0.954
5/11/2003	10:31:59	66.2	1.103333	58.54	10.438	-1.425	0.227	0.941
5/11/2003	10:32:02	70.1	1.168333	58.54	10.463	-1.4	0.292	0.924
5/11/2003	10:32:07	74.3	1.238333	58.54	10.489	-1.374	0.362	0.907
5/11/2003	10:32:11	78.7	1.311667	58.54	10.512	-1.351	0.435	0.892
5/11/2003	10:32:16	83.4	1.39	58.54	10.54	-1.323	0.519	0.875
5/11/2003	10:32:21	88.4	1.473333	58.54	10.569	-1.294	0.597	0.854
5/11/2003	10:32:26	93.7	1.561667	58.54	10.596	-1.267	0.685	0.836
5/11/2003	10:32:32	99.3	1.655	58.54	10.623	-1.24	0.778	0.818
5/11/2003	10:32:38	105.2	1.753333	58.52	10.655	-1.208	0.877	0.797
5/11/2003	10:32:44	111.5	1.858333	58.52	10.795	-1.068	0.982	0.705
5/11/2003	10:32:50	118.1	1.968333	58.54	10.807	-1.056	1.032	0.697
5/11/2003	10:32:57	125.1	2.085	58.56	10.811	-1.052	1.208	0.694
5/11/2003	10:33:05	132.6	2.21	58.56	10.813	-1.05	1.333	0.693
5/11/2003	10:33:13	140.5	2.341667	58.52	10.819	-1.044	1.465	0.689
5/11/2003	10:33:21	148.9	2.481667	58.52	10.854	-1.009	1.605	0.666
5/11/2003	10:33:30	157.8	2.63	58.52	10.891	-0.972	1.753	0.642
5/11/2003	10:33:40	167.2	2.786667	58.52	10.928	-0.935	1.910	0.617
5/11/2003	10:33:50	177.2	2.953333	58.52	10.963	-0.9	2.077	0.594
5/11/2003	10:34:00	187.8	3.13	58.52	11	-0.863	2.253	0.570
5/11/2003	10:34:11	199	3.316667	58.52	11.039	-0.824	2.440	0.544
5/11/2003	10:34:23	210.9	3.515	58.52	11.076	-0.787	2.638	0.519
5/11/2003	10:34:36	223.5	3.725	58.52	11.115	-0.748	2.848	0.494
5/11/2003	10:34:49	236.8	3.946667	58.52	11.153	-0.71	3.070	0.469
5/11/2003	10:35:03	250.9	4.181667	58.52	11.192	-0.671	3.305	0.443
5/11/2003	10:35:18	265.8	4.43	58.52	11.231	-0.632	3.553	0.417
5/11/2003	10:35:34	281.6	4.693333	58.52	11.27	-0.593	3.817	0.391
5/11/2003	10:35:51	298.4	4.973333	58.52	11.309	-0.554	4.097	0.365
5/11/2003	10:36:09	316.2	5.27	58.52	11.344	-0.519	4.393	0.343
5/11/2003	10:36:27	335	5.583333	58.52	11.381	-0.482	4.707	0.318
5/11/2003	10:36:47	354.9	5.915	58.52	11.418	-0.445	5.038	0.294

5/11/2003	10:37:08	376	6.266667	58.52	11.453	-0.41	5.390	0.271
5/11/2003	10:37:31	398.4	6.64	58.52	11.488	-0.375	5.763	0.248
5/11/2003	10:37:54	422.1	7.035	58.5	11.52	-0.343	6.158	0.226
5/11/2003	10:38:20	447.2	7.453333	58.5	11.551	-0.312	6.577	0.206
5/11/2003	10:38:46	473.8	7.896667	58.5	11.58	-0.283	7.020	0.187
5/11/2003	10:39:14	502	8.366667	58.5	11.607	-0.256	7.490	0.169
5/11/2003	10:39:44	531.9	8.865	58.5	11.635	-0.228	7.988	0.150
5/11/2003	10:40:16	563.5	9.391667	58.5	11.658	-0.205	8.515	0.135
5/11/2003	10:40:49	597	9.95	58.5	11.682	-0.181	9.073	0.119
5/11/2003	10:41:25	632.5	10.54167	58.5	11.701	-0.162	9.665	0.107
5/11/2003	10:42:02	670.1	11.16833	58.5	11.721	-0.142	10.292	0.094
5/11/2003	10:42:42	709.9	11.83167	58.5	11.738	-0.125	10.955	0.083
5/11/2003	10:43:24	752.1	12.535	58.5	11.752	-0.111	11.658	0.073
5/11/2003	10:44:09	796.8	13.28	58.5	11.763	-0.1	12.403	0.066
5/11/2003	10:44:57	844.2	14.07	58.5	11.775	-0.088	13.193	0.058
5/11/2003	10:45:47	894.4	14.90667	58.5	11.785	-0.078	14.030	0.051
5/11/2003	10:46:40	947.5	15.79167	58.5	11.795	-0.068	14.915	0.045
5/11/2003	10:47:36	1003.8	16.73	58.5	11.801	-0.062	15.853	0.041
5/11/2003	10:48:36	1063.4	17.72333	58.5	11.808	-0.055	16.847	0.036
5/11/2003	10:49:39	1126.6	18.77667	58.5	11.812	-0.051	17.900	0.034
5/11/2003	10:50:46	1193.5	19.89167	58.5	11.816	-0.047	19.015	0.031
5/11/2003	10:51:57	1264.4	21.07333	58.5	11.818	-0.045	20.197	0.030
5/11/2003	10:53:12	1339.5	22.325	58.5	11.822	-0.041	21.448	0.027
5/11/2003	10:54:31	1419	23.65	58.5	11.824	-0.039	22.773	0.026
5/11/2003	10:55:56	1503.3	25.055	58.5	11.824	-0.039	24.178	0.026
5/11/2003	10:57:25	1592.6	26.54333	58.5	11.826	-0.037	25.667	0.024
5/11/2003	10:58:59	1687.1	28.11833	58.5	11.824	-0.039	27.242	0.026
5/11/2003	11:00:40	1787.2	29.78667	58.5	11.826	-0.037	28.910	0.024
5/11/2003	11:02:26	1893.3	31.555	58.5	11.828	-0.035	30.678	0.023
5/11/2003	11:04:18	2005.7	33.42833	58.5	11.826	-0.037	32.552	0.024
5/11/2003	11:06:17	2124.7	35.41167	58.5	11.826	-0.037	34.535	0.024
5/11/2003	11:08:23	2250.8	37.51333	58.5	11.826	-0.037	36.637	0.024
5/11/2003	11:10:37	2384.4	39.74	58.5	11.826	-0.037	38.863	0.024
5/11/2003	11:12:58	2525.9	42.09833	58.5	11.826	-0.037	41.222	0.024

APPENDIX E.1.2
SWMU 16
SLUG TEST RESULTS AND CALCULATIONS ROUND 2

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT09
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	4.25 = R
Length of Well Screen (ft.) :	12 = L
Time for 37% head change (min.) :	5.50 = To

Hydraulic Conductivity (K) :

1.85E-04	ft./min.
3.09E-06	ft./sec.
2.67E-01	ft./day
9.42E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 16MWT09

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 13.28' DATE: 11-23-03

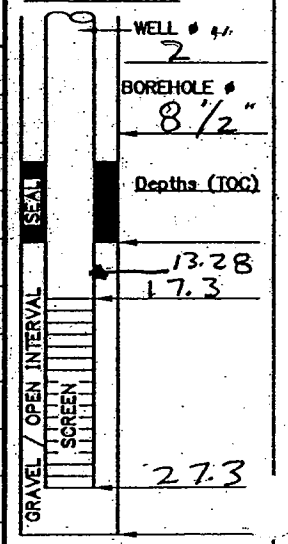
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

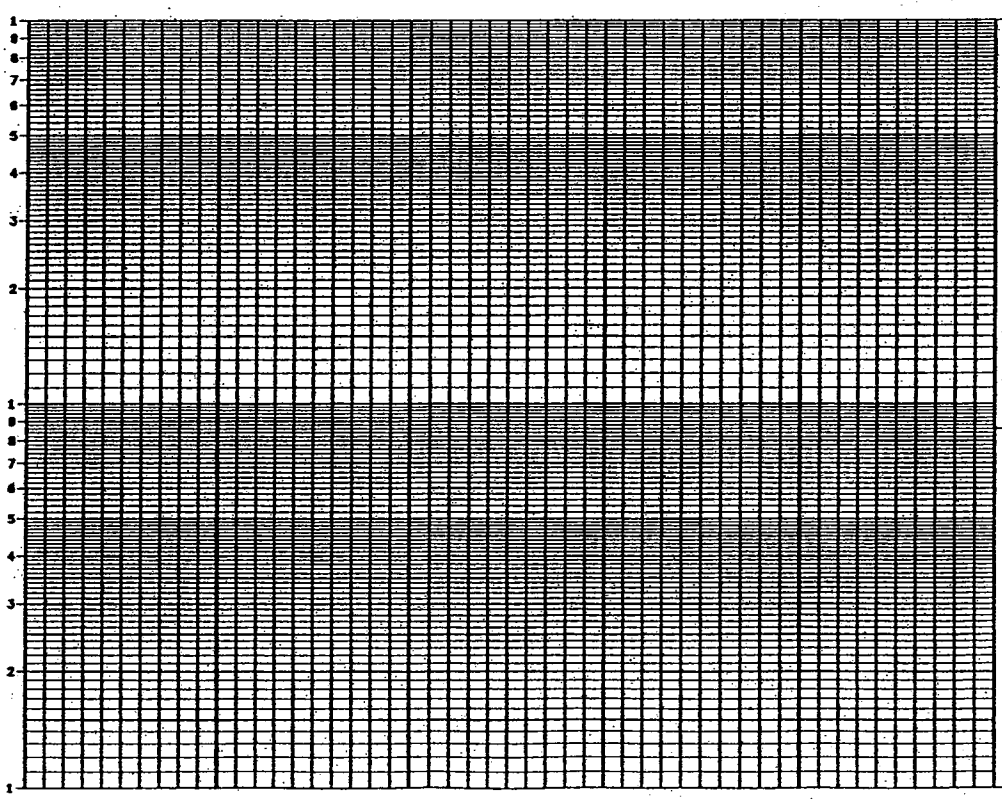
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3.0	1.263	
.1	2.33		4.0	1.060	
.2	2.184		5.0	.894	
.3	2.142		6.0	.762	
.4	2.089		8.0	.558	
.5	2.043		10.0	.419	
.6	1.999		12.0	.322	
.7	1.956		15.0	.223	
.8	1.914		18.0	.159	
.9	1.876		20.	.125	
1.0	1.873				
2.0	1.513				

WELL SCHEMATIC



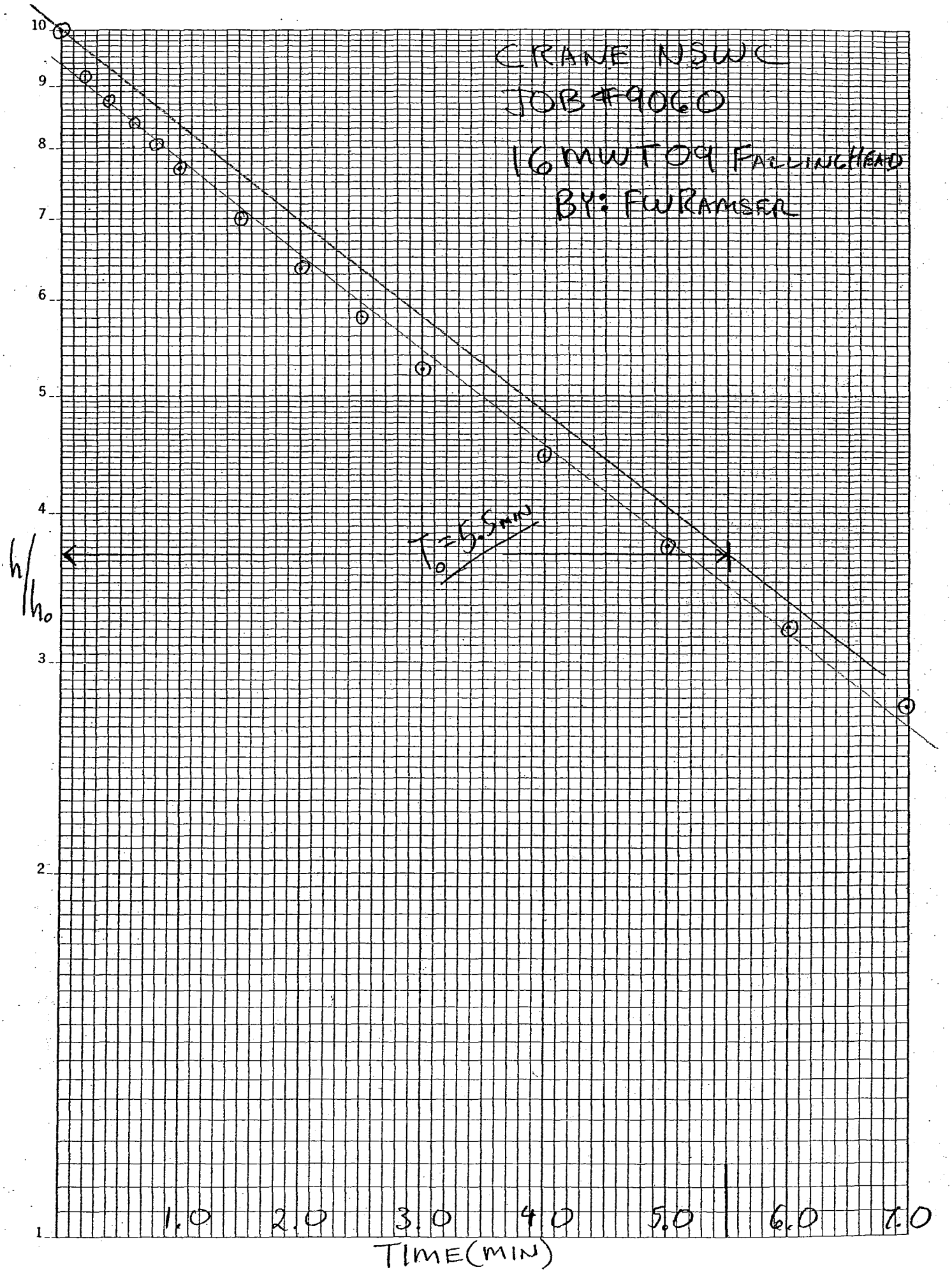
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


CRANE NSWC
JOB #9060
16MWT09 FALLINGHEAD
BY: FWRAMSER
$T_0 = 6.5$ min
h/h_0
10
9
8
7
6
5
4
3
2
1
1.0
2.0
3.0
4.0
5.0
6.0
7.0
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 16:23:20
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 16\SN06899 2003-11-23 094607
DataMgr Version 3.68 16MWT09falling#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 16MWT09falling#1

Test defined on: 11/23/2003 9:45:24
Test started on: 11/23/2003 9:46:07
Test stopped on: 11/23/2003 10:06:55
Test extracted on: N/A

Data gathered using Linear testing
Time between da Minutes.
Number of data s 209

TOTAL DATA SAM 209

Channel number [2]
Measurement type Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined refer 0 Feet H2O
Referenced on: test start
Pressure head at 14.226 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho
11/23/2003	9:46	0	0		
11/23/2003	9:46	0.1	2.333	0	1.000
11/23/2003	9:46	0.2	2.184	0.1	0.936
11/23/2003	9:46	0.3	2.142	0.2	0.918
11/23/2003	9:46	0.4	2.089	0.3	0.895
11/23/2003	9:46	0.5	2.043	0.4	0.876
11/23/2003	9:46	0.6	1.999	0.5	0.857
11/23/2003	9:46	0.7	1.956	0.6	0.838
11/23/2003	9:46	0.8	1.914	0.7	0.820
11/23/2003	9:47	0.9	1.876	0.8	0.804
11/23/2003	9:47	1	1.837	0.9	0.787
11/23/2003	9:47	1.1	1.797	1	0.770
11/23/2003	9:47	1.2	1.765	1.1	0.757
11/23/2003	9:47	1.3	1.731	1.2	0.742
11/23/2003	9:47	1.4	1.696	1.3	0.727
11/23/2003	9:47	1.5	1.66	1.4	0.712
11/23/2003	9:47	1.6	1.634	1.5	0.700
11/23/2003	9:47	1.7	1.602	1.6	0.687
11/23/2003	9:47	1.8	1.572	1.7	0.674
11/23/2003	9:48	1.9	1.543	1.8	0.661
11/23/2003	9:48	2	1.513	1.9	0.649
11/23/2003	9:48	2.1	1.489	2	0.638
11/23/2003	9:48	2.2	1.461	2.1	0.626

ho = 2.333

11/23/2003 9:48	2.3	1.435	2.2	0.615
11/23/2003 9:48	2.4	1.408	2.3	0.604
11/23/2003 9:48	2.5	1.382	2.4	0.592
11/23/2003 9:48	2.6	1.356	2.5	0.581
11/23/2003 9:48	2.7	1.332	2.6	0.571
11/23/2003 9:48	2.8	1.307	2.7	0.560
11/23/2003 9:49	2.9	1.283	2.8	0.550
11/23/2003 9:49	3	1.263	2.9	0.541
11/23/2003 9:49	3.1	1.225	3	0.525
11/23/2003 9:49	3.2	1.223	3.1	0.524
11/23/2003 9:49	3.3	1.199	3.2	0.514
11/23/2003 9:49	3.4	1.176	3.3	0.504
11/23/2003 9:49	3.5	1.156	3.4	0.495
11/23/2003 9:49	3.6	1.136	3.5	0.487
11/23/2003 9:49	3.7	1.116	3.6	0.478
11/23/2003 9:49	3.8	1.098	3.7	0.471
11/23/2003 9:50	3.9	1.08	3.8	0.463
11/23/2003 9:50	4	1.06	3.9	0.454
11/23/2003 9:50	4.1	1.041	4	0.446
11/23/2003 9:50	4.2	1.023	4.1	0.438
11/23/2003 9:50	4.3	1.009	4.2	0.432
11/23/2003 9:50	4.4	0.989	4.3	0.424
11/23/2003 9:50	4.5	0.973	4.4	0.417
11/23/2003 9:50	4.6	0.961	4.5	0.412
11/23/2003 9:50	4.7	0.941	4.6	0.403
11/23/2003 9:50	4.8	0.927	4.7	0.397
11/23/2003 9:51	4.9	0.91	4.8	0.390
11/23/2003 9:51	5	0.894	4.9	0.383
11/23/2003 9:51	5.1	0.876	5	0.375
11/23/2003 9:51	5.2	0.86	5.1	0.369
11/23/2003 9:51	5.3	0.848	5.2	0.363
11/23/2003 9:51	5.4	0.836	5.3	0.358
11/23/2003 9:51	5.5	0.824	5.4	0.353
11/23/2003 9:51	5.6	0.812	5.5	0.348
11/23/2003 9:51	5.7	0.8	5.6	0.343
11/23/2003 9:51	5.8	0.786	5.7	0.337
11/23/2003 9:52	5.9	0.776	5.8	0.333
11/23/2003 9:52	6	0.762	5.9	0.327
11/23/2003 9:52	6.1	0.75	6	0.321
11/23/2003 9:52	6.2	0.737	6.1	0.316
11/23/2003 9:52	6.3	0.725	6.2	0.311
11/23/2003 9:52	6.4	0.715	6.3	0.306
11/23/2003 9:52	6.5	0.703	6.4	0.301
11/23/2003 9:52	6.6	0.693	6.5	0.297
11/23/2003 9:52	6.7	0.683	6.6	0.293
11/23/2003 9:52	6.8	0.673	6.7	0.288
11/23/2003 9:53	6.9	0.663	6.8	0.284
11/23/2003 9:53	7	0.651	6.9	0.279
11/23/2003 9:53	7.1	0.641	7	0.275
11/23/2003 9:53	7.2	0.629	7.1	0.270
11/23/2003 9:53	7.3	0.619	7.2	0.265
11/23/2003 9:53	7.4	0.617	7.3	0.264
11/23/2003 9:53	7.5	0.602	7.4	0.258
11/23/2003 9:53	7.6	0.592	7.5	0.254
11/23/2003 9:53	7.7	0.58	7.6	0.249
11/23/2003 9:53	7.8	0.574	7.7	0.246
11/23/2003 9:54	7.9	0.564	7.8	0.242
11/23/2003 9:54	8	0.558	7.9	0.239
11/23/2003 9:54	8.1	0.552	8	0.237
11/23/2003 9:54	8.2	0.54	8.1	0.231
11/23/2003 9:54	8.3	0.534	8.2	0.229
11/23/2003 9:54	8.4	0.526	8.3	0.225

11/23/2003 9:54	8.5	0.52	8.4	0.223
11/23/2003 9:54	8.6	0.512	8.5	0.219
11/23/2003 9:54	8.7	0.502	8.6	0.215
11/23/2003 9:54	8.8	0.5	8.7	0.214
11/23/2003 9:55	8.9	0.492	8.8	0.211
11/23/2003 9:55	9	0.482	8.9	0.207
11/23/2003 9:55	9.1	0.478	9	0.205
11/23/2003 9:55	9.2	0.459	9.1	0.197
11/23/2003 9:55	9.3	0.459	9.2	0.197
11/23/2003 9:55	9.4	0.453	9.3	0.194
11/23/2003 9:55	9.5	0.453	9.4	0.194
11/23/2003 9:55	9.6	0.445	9.5	0.191
11/23/2003 9:55	9.7	0.437	9.6	0.187
11/23/2003 9:55	9.8	0.431	9.7	0.185
11/23/2003 9:56	9.9	0.427	9.8	0.183
11/23/2003 9:56	10	0.419	9.9	0.180
11/23/2003 9:56	10.1	0.413	10	0.177
11/23/2003 9:57	11.1	0.361	11	0.155
11/23/2003 9:58	12.1	0.316	12	0.135
11/23/2003 9:59	13.1	0.276	13	0.118
11/23/2003 10:00	14.1	0.266	14	0.114
11/23/2003 10:01	15.1	0.219	15	0.094
11/23/2003 10:02	16.1	0.197	16	0.084
11/23/2003 10:03	17.1	0.177	17	0.076
11/23/2003 10:04	18.1	0.159	18	0.068
11/23/2003 10:05	19.1	0.143	19	0.061
11/23/2003 10:06	20.1	0.129	20	0.055

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT09
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.354'	4.25 = R
Length of Well Screen (ft.) :		12 = L
Time for 37% head change (min.) :		5.50 = To

Hydraulic Conductivity (K) :

1.85E-04	ft./min.
3.09E-06	ft./sec.
2.67E-01	ft./day
9.42E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(12/.354)}{2 \times 12 \times 5.50} =$$

1.84×10^{-4} FT/MIN

CHECKED
MJ
2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT09
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1	= r
Effective Radius of Well Screen (in.) :	4.25	= R
Length of Well Screen (ft.) :	12	= L
Time for 37% head change (min.) :	3.55	= To

Hydraulic Conductivity (K) :

2.87E-04	ft./min.
4.79E-06	ft./sec.
4.13E-01	ft./day
1.46E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 16MWT09

PROJECT NO.: 90060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 13.28 DATE: 11-23-03

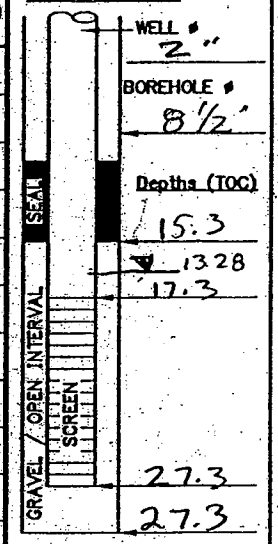
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

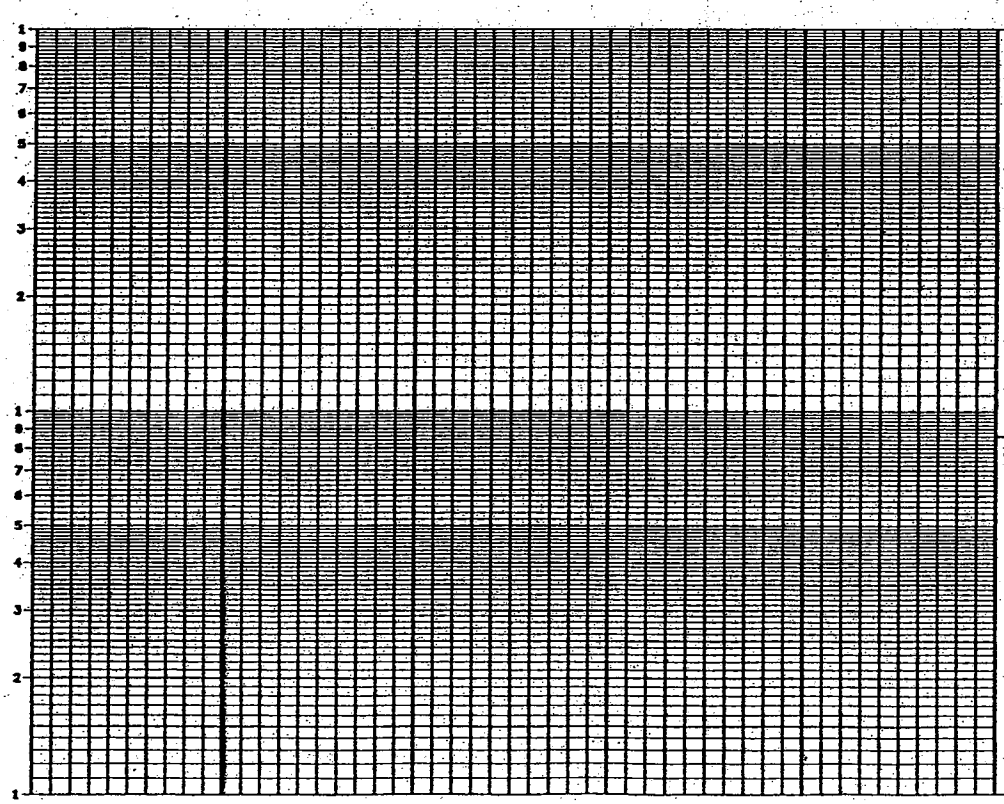
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.0	0		3.0	-.576	
.1	-1.213		4.0	-.383	
.2	-1.485		5.0	-.226	
.3	-1.491		6.0	-.107	
.4	-1.447		8.0	-.069	
.5	-1.397		10.0	.181	
.6	-1.346				
.7	-1.300				
.8	-1.253				
.9	-1.209				
1.0	-1.169				
2.0	-.828				

WELL SCHEMATIC



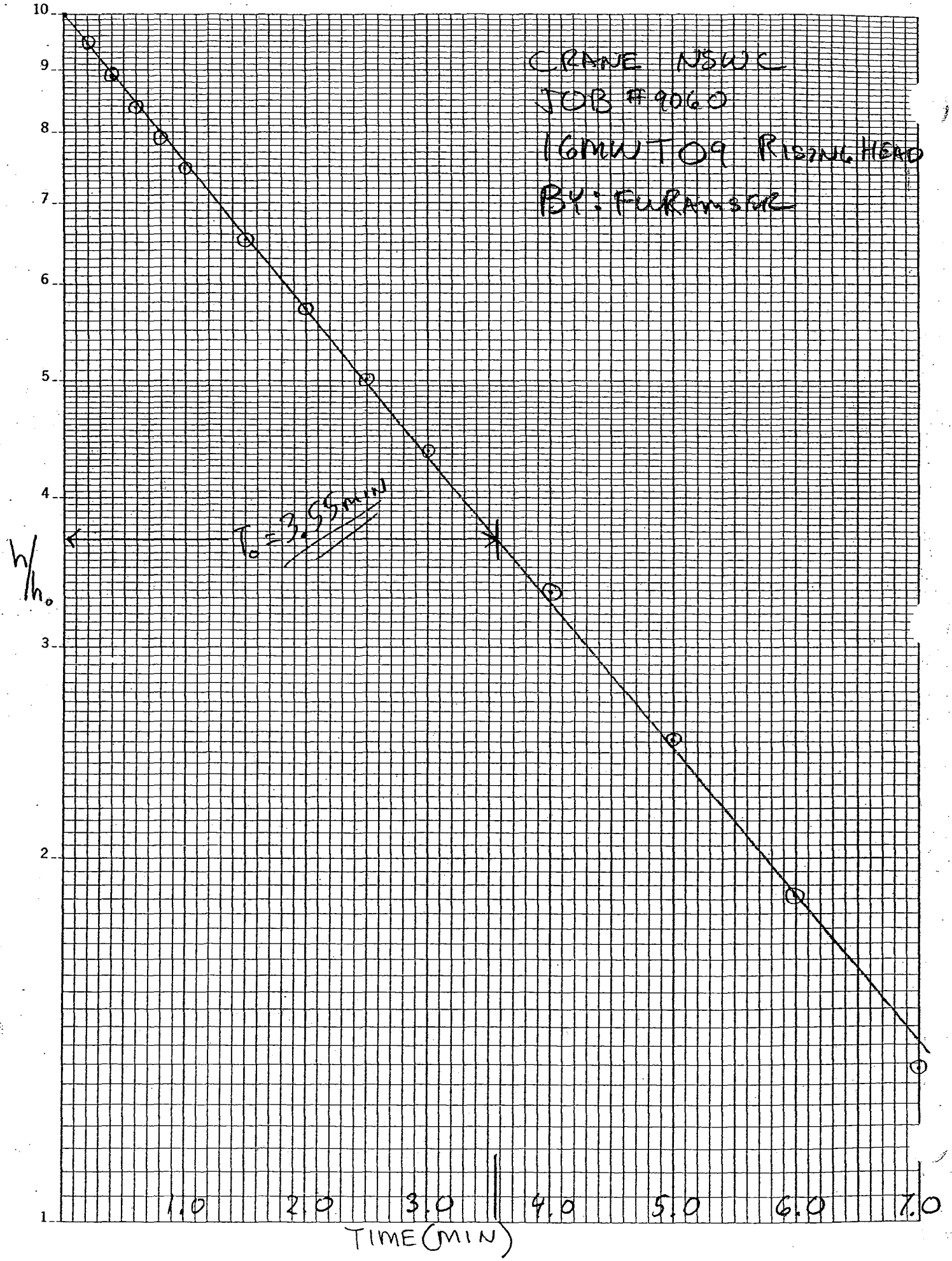
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


CRANE NSWC
JOB # 9060
16MW T09 RISING HEAD
BY: FURRAMSRE
$T_o = 3.65$ min
h/h_o
10
9
8
7
6
5
4
3
2
1
1.0
2.0
3.0
4.0
5.0
6.0
7.0
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/10/2003 8:41:24
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 16\SN06899 2003-11-23 100953_
DataMgr Version 3.68 16MWT09rising#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 16MWT09rising#1

Test defined on: 11/23/2003 10:08:47
Test started on: 11/23/2003 10:09:53
Test stopped on: 11/23/2003 10:21:03
Test extracted on: N/A

Data gathered using Linear testing
Time between data point Minutes.
Number of data samples 112

TOTAL DATA SAMPLES 112

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at referen 13.749 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	Adj Feet H20	Adjusted ET. (min)	h/ho	ho = -1.741
	11/23/2003 10:09	0	0				
	11/23/2003 10:09	0.1	-1.213				
	11/23/2003 10:10	0.2	-1.485				
	11/23/2003 10:10	0.3	-1.491	-1.741	0	1.000	
	11/23/2003 10:10	0.4	-1.447	-1.697	0.1	0.975	
	11/23/2003 10:10	0.5	-1.397	-1.647	0.2	0.946	
	11/23/2003 10:10	0.6	-1.346	-1.596	0.3	0.917	
	11/23/2003 10:10	0.7	-1.3	-1.55	0.4	0.890	
	11/23/2003 10:10	0.8	-1.253	-1.503	0.5	0.863	
	11/23/2003 10:10	0.9	-1.209	-1.459	0.6	0.838	
	11/23/2003 10:10	1	-1.169	-1.419	0.7	0.815	
	11/23/2003 10:10	1.1	-1.131	-1.381	0.8	0.793	
	11/23/2003 10:11	1.2	-1.092	-1.342	0.9	0.771	
	11/23/2003 10:11	1.3	-1.054	-1.304	1	0.749	
	11/23/2003 10:11	1.4	-1.02	-1.27	1.1	0.729	
	11/23/2003 10:11	1.5	-0.983	-1.233	1.2	0.708	
	11/23/2003 10:11	1.6	-0.949	-1.199	1.3	0.689	
	11/23/2003 10:11	1.7	-0.921	-1.171	1.4	0.673	
	11/23/2003 10:11	1.8	-0.887	-1.137	1.5	0.653	
	11/23/2003 10:11	1.9	-0.856	-1.106	1.6	0.635	
	11/23/2003 10:11	2	-0.828	-1.078	1.7	0.619	

11/23/2003 10:11	2.1	-0.8	-1.05	1.8	0.603
11/23/2003 10:12	2.2	-0.774	-1.024	1.9	0.588
11/23/2003 10:12	2.3	-0.746	-0.996	2	0.572
11/23/2003 10:12	2.4	-0.719	-0.969	2.1	0.557
11/23/2003 10:12	2.5	-0.695	-0.945	2.2	0.543
11/23/2003 10:12	2.6	-0.669	-0.919	2.3	0.528
11/23/2003 10:12	2.7	-0.645	-0.895	2.4	0.514
11/23/2003 10:12	2.8	-0.623	-0.873	2.5	0.501
11/23/2003 10:12	2.9	-0.598	-0.848	2.6	0.487
11/23/2003 10:12	3	-0.576	-0.826	2.7	0.474
11/23/2003 10:12	3.1	-0.554	-0.804	2.8	0.462
11/23/2003 10:13	3.2	-0.534	-0.784	2.9	0.450
11/23/2003 10:13	3.3	-0.512	-0.762	3	0.438
11/23/2003 10:13	3.4	-0.492	-0.742	3.1	0.426
11/23/2003 10:13	3.5	-0.472	-0.722	3.2	0.415
11/23/2003 10:13	3.6	-0.456	-0.706	3.3	0.406
11/23/2003 10:13	3.7	-0.437	-0.687	3.4	0.395
11/23/2003 10:13	3.8	-0.417	-0.667	3.5	0.383
11/23/2003 10:13	3.9	-0.397	-0.647	3.6	0.372
11/23/2003 10:13	4	-0.383	-0.633	3.7	0.364
11/23/2003 10:13	4.1	-0.365	-0.615	3.8	0.353
11/23/2003 10:14	4.2	-0.347	-0.597	3.9	0.343
11/23/2003 10:14	4.3	-0.331	-0.581	4	0.334
11/23/2003 10:14	4.4	-0.314	-0.564	4.1	0.324
11/23/2003 10:14	4.5	-0.304	-0.554	4.2	0.318
11/23/2003 10:14	4.6	-0.286	-0.536	4.3	0.308
11/23/2003 10:14	4.7	-0.27	-0.52	4.4	0.299
11/23/2003 10:14	4.8	-0.254	-0.504	4.5	0.289
11/23/2003 10:14	4.9	-0.24	-0.49	4.6	0.281
11/23/2003 10:14	5	-0.226	-0.476	4.7	0.273
11/23/2003 10:14	5.1	-0.214	-0.464	4.8	0.267
11/23/2003 10:15	5.2	-0.199	-0.449	4.9	0.258
11/23/2003 10:15	5.3	-0.187	-0.437	5	0.251
11/23/2003 10:15	5.4	-0.176	-0.426	5.1	0.245
11/23/2003 10:15	5.5	-0.161	-0.411	5.2	0.236
11/23/2003 10:15	5.6	-0.151	-0.401	5.3	0.230
11/23/2003 10:15	5.7	-0.139	-0.389	5.4	0.223
11/23/2003 10:15	5.8	-0.129	-0.379	5.5	0.218
11/23/2003 10:15	5.9	-0.117	-0.367	5.6	0.211
11/23/2003 10:15	6	-0.107	-0.357	5.7	0.205
11/23/2003 10:15	6.1	-0.097	-0.347	5.8	0.199
11/23/2003 10:16	6.2	-0.085	-0.335	5.9	0.192
11/23/2003 10:16	6.3	-0.073	-0.323	6	0.186
11/23/2003 10:16	6.4	-0.066	-0.316	6.1	0.182
11/23/2003 10:16	6.5	-0.054	-0.304	6.2	0.175
11/23/2003 10:16	6.6	-0.046	-0.296	6.3	0.170
11/23/2003 10:16	6.7	-0.036	-0.286	6.4	0.164
11/23/2003 10:16	6.8	-0.028	-0.278	6.5	0.160
11/23/2003 10:16	6.9	-0.018	-0.268	6.6	0.154
11/23/2003 10:16	7	-0.01	-0.26	6.7	0.149
11/23/2003 10:16	7.1	-0.004	-0.254	6.8	0.146
11/23/2003 10:17	7.2	0.01	-0.24	6.9	0.138
11/23/2003 10:17	7.3	0.016	-0.234	7	0.134
11/23/2003 10:17	7.4	0.024	-0.226	7.1	0.130
11/23/2003 10:17	7.5	0.032	-0.218	7.2	0.125
11/23/2003 10:17	7.6	0.038	-0.212	7.3	0.122
11/23/2003 10:17	7.7	0.046	-0.204	7.4	0.117
11/23/2003 10:17	7.8	0.054	-0.196	7.5	0.113
11/23/2003 10:17	7.9	0.06	-0.19	7.6	0.109
11/23/2003 10:17	8	0.069	-0.181	7.7	0.104

11/23/2003 10:17	8.1	0.075	-0.175	7.8	0.101
11/23/2003 10:18	8.2	0.081	-0.169	7.9	0.097
11/23/2003 10:18	8.3	0.087	-0.163	8	0.094
11/23/2003 10:18	8.4	0.095	-0.155	8.1	0.089
11/23/2003 10:18	8.5	0.099	-0.151	8.2	0.087
11/23/2003 10:18	8.6	0.107	-0.143	8.3	0.082
11/23/2003 10:18	8.7	0.113	-0.137	8.4	0.079
11/23/2003 10:18	8.8	0.119	-0.131	8.5	0.075
11/23/2003 10:18	8.9	0.125	-0.125	8.6	0.072
11/23/2003 10:18	9	0.129	-0.121	8.7	0.070
11/23/2003 10:18	9.1	0.135	-0.115	8.8	0.066
11/23/2003 10:19	9.2	0.141	-0.109	8.9	0.063
11/23/2003 10:19	9.3	0.147	-0.103	9	0.059
11/23/2003 10:19	9.4	0.151	-0.099	9.1	0.057
11/23/2003 10:19	9.5	0.155	-0.095	9.2	0.055
11/23/2003 10:19	9.6	0.159	-0.091	9.3	0.052
11/23/2003 10:19	9.7	0.165	-0.085	9.4	0.049
11/23/2003 10:19	9.8	0.173	-0.077	9.5	0.044
11/23/2003 10:19	9.9	0.175	-0.075	9.6	0.043
11/23/2003 10:19	10	0.181	-0.069	9.7	0.040
11/23/2003 10:19	10.1	0.187	-0.063	9.8	0.036
11/23/2003 10:20	10.2	0.189	-0.061	9.9	0.035
11/23/2003 10:20	10.3	0.195	-0.055	10	0.032
11/23/2003 10:20	10.4	0.199	-0.051	10.1	0.029
11/23/2003 10:20	10.5	0.205	-0.045	10.2	0.026
11/23/2003 10:20	10.6	0.207	-0.043	10.3	0.025
11/23/2003 10:20	10.7	0.213	-0.037	10.4	0.021
11/23/2003 10:20	10.8	0.215	-0.035	10.5	0.020
11/23/2003 10:20	10.9	0.221	-0.029	10.6	0.017
11/23/2003 10:20	11	0.223	-0.027	10.7	0.016
11/23/2003 10:20	11.1	0.227	-0.023	10.8	0.013

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT09
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) : .083' = 1 = r
Effective Radius of Well Screen (in.) : .354' = 4.25 = R
Length of Well Screen (ft.) : 12 = L
Time for 37% head change (min.) : 3.55 = To

Hydraulic Conductivity (K) :

2.87E-04	ft./min.
4.79E-06	ft./sec.
4.13E-01	ft./day
1.46E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(12/.354)}{2 \times 12 \times 3.55} =$$

$$= 2.88 \times (10^{-4} \text{ ft})/\text{min}$$

CHECKED

.006 X2 - 18 = 04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT10
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head #2	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	4.25 = R
Length of Well Screen (ft.) :	5.64 = L
Time for 37% head change (min.) :	0.094 = To

Hydraulic Conductivity (K) :

1.81E-02	ft./min.
3.02E-04	ft./sec.
2.61E+01	ft./day
9.21E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 16MWT10

PROJECT NO.: 9060 GEOLOGIST: M G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 2

STATIC WATER LEVEL (Depth/Elevation): 22.16 TOR DATE: 11-22-03

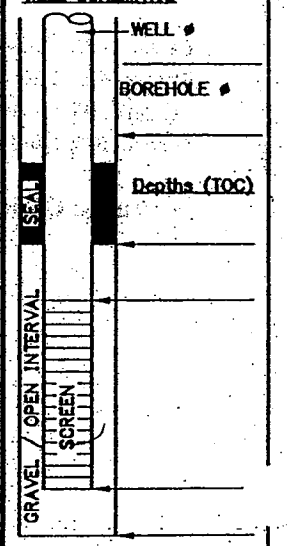
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER PAGE 1 OF 1

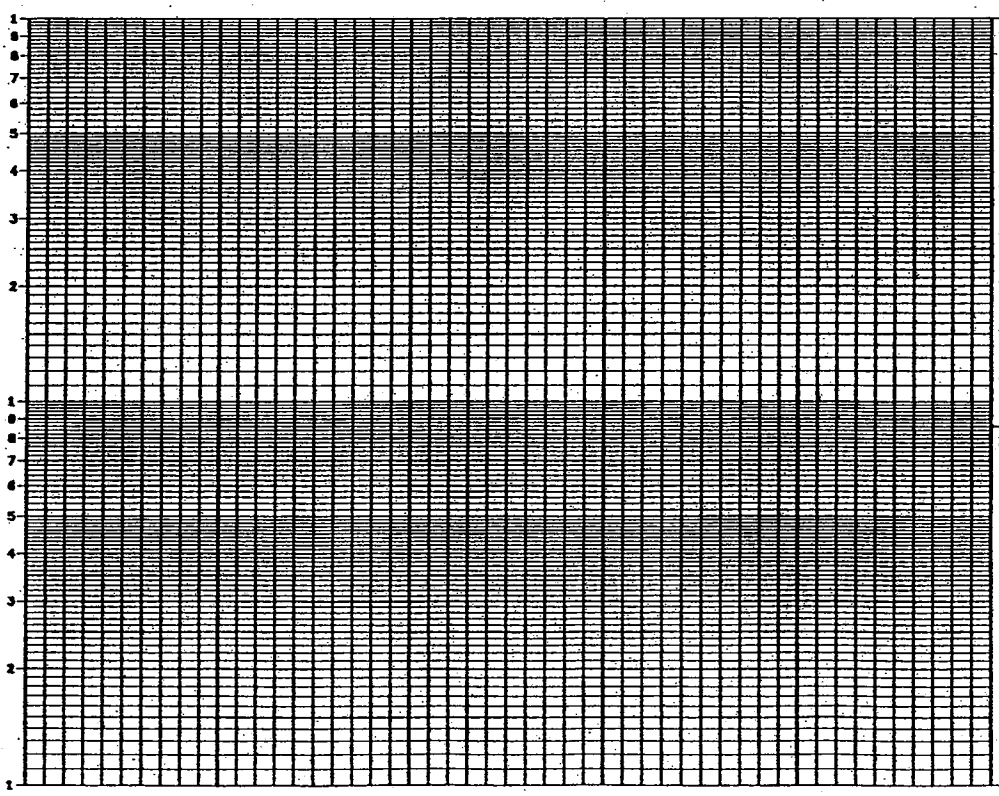
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT STATIC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-.002		3	-.157	
.1	-.798		4	-.128	
.2	-.425		5	-.113	
.3	-.360		6	-.095	
.4	-.330		8	-.075	
.5	-.312		10	-.057	
.6	-.299		12	-.048	
.7	-.285		15	-.036	
.8	-.272		20	-.023	
.9	-.261		23	-.016	
1	-.254				
2	-.195				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

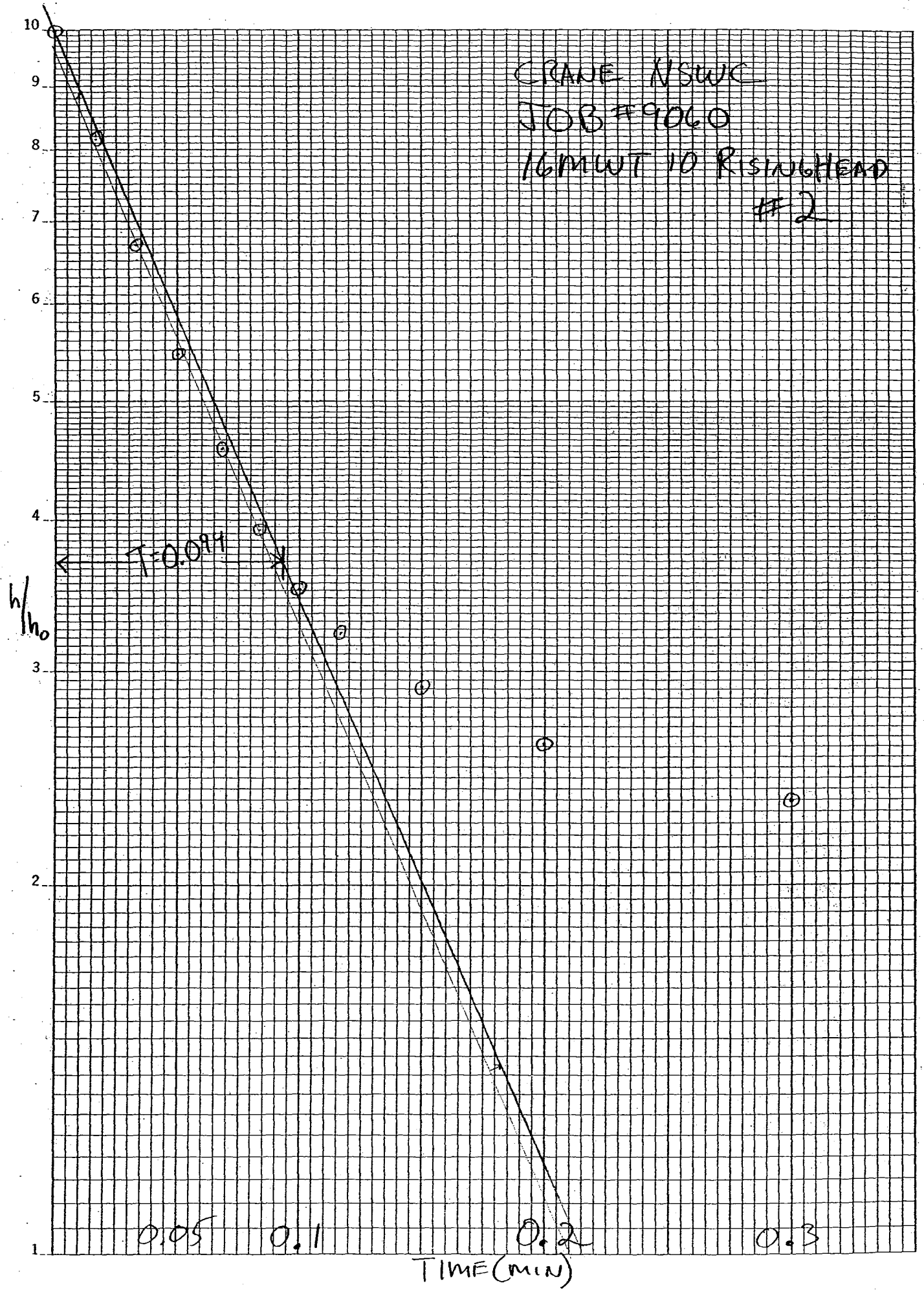


REMARKS:

TEST #5 ON FILE.

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/4/2003 10:26:23
Report from file: C:\Win-Situ\Data\SN00916 2003-11-22 113435 .bin
DataMgr Version 3.68

Serial number: 916
Firmware Version 3.07
Unit name:

Test name:

Test defined on: 11/22/2003 11:34:13
Test started on: 11/22/2003 11:34:35
Test stopped on: 11/22/2003 11:59:02
Test extracted on: N/A

Data gathered using Linear testing
Time between data Minutes.
Number of data san 1467

TOTAL DATA SAMPL 1467

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined referer 0 Feet H2O
Referenced on: channel definition.
Pressure head at rel 4.706 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = -1.461
11/22/2003	11:34	0	-0.002			
11/22/2003	11:34	0.0167	-0.002			
11/22/2003	11:34	0.0333	-1.754			
11/22/2003	11:34	0.05	-1.461	0	1.000	
11/22/2003	11:34	0.0667	-1.19	0.0167	0.815	
11/22/2003	11:34	0.0833	-0.979	0.0333	0.670	
11/22/2003	11:34	0.1	-0.798	0.05	0.546	
11/22/2003	11:34	0.1167	-0.669	0.0667	0.458	
11/22/2003	11:34	0.1333	-0.574	0.0833	0.393	
11/22/2003	11:34	0.15	-0.512	0.1	0.350	
11/22/2003	11:34	0.1667	-0.474	0.1167	0.324	
11/22/2003	11:34	0.1833	-0.445	0.1333	0.305	
11/22/2003	11:34	0.2	-0.425	0.15	0.291	
11/22/2003	11:34	0.2167	-0.405	0.1667	0.277	
11/22/2003	11:34	0.2333	-0.394	0.1833	0.270	
11/22/2003	11:34	0.25	-0.383	0.2	0.262	
11/22/2003	11:34	0.2667	-0.374	0.2167	0.256	
11/22/2003	11:34	0.2833	-0.367	0.2333	0.251	
11/22/2003	11:34	0.3	-0.36	0.25	0.246	

11/22/2003 11:34	0.3167	-0.354	0.2667	0.242
11/22/2003 11:34	0.3333	-0.347	0.2833	0.238
11/22/2003 11:34	0.35	-0.343	0.3	0.235
11/22/2003 11:34	0.3667	-0.338	0.3167	0.231
11/22/2003 11:34	0.3833	-0.334	0.3333	0.229
11/22/2003 11:34	0.4	-0.33	0.35	0.226
11/22/2003 11:35	0.4167	-0.327	0.3667	0.224
11/22/2003 11:35	0.4333	-0.325	0.3833	0.222
11/22/2003 11:35	0.45	-0.321	0.4	0.220
11/22/2003 11:35	0.4667	-0.321	0.4167	0.220
11/22/2003 11:35	0.4833	-0.316	0.4333	0.216
11/22/2003 11:35	0.5	-0.312	0.45	0.214
11/22/2003 11:35	0.5167	-0.31	0.4667	0.212
11/22/2003 11:35	0.5333	-0.307	0.4833	0.210
11/22/2003 11:35	0.55	-0.303	0.5	0.207
11/22/2003 11:35	0.5667	-0.303	0.5167	0.207
11/22/2003 11:35	0.5833	-0.301	0.5333	0.206
11/22/2003 11:35	0.6	-0.299	0.55	0.205
11/22/2003 11:35	0.6167	-0.294	0.5667	0.201
11/22/2003 11:35	0.6333	-0.294	0.5833	0.201
11/22/2003 11:35	0.65	-0.292	0.6	0.200
11/22/2003 11:35	0.6667	-0.29	0.6167	0.198
11/22/2003 11:35	0.6833	-0.287	0.6333	0.196
11/22/2003 11:35	0.7	-0.285	0.65	0.195
11/22/2003 11:35	0.7167	-0.283	0.6667	0.194
11/22/2003 11:35	0.7333	-0.281	0.6833	0.192
11/22/2003 11:35	0.75	-0.277	0.7	0.190
11/22/2003 11:35	0.7667	-0.274	0.7167	0.188
11/22/2003 11:35	0.7833	-0.274	0.7333	0.188
11/22/2003 11:35	0.8	-0.272	0.75	0.186
11/22/2003 11:35	0.8167	-0.27	0.7667	0.185
11/22/2003 11:35	0.8333	-0.27	0.7833	0.185
11/22/2003 11:35	0.85	-0.268	0.8	0.183
11/22/2003 11:35	0.8667	-0.265	0.8167	0.181
11/22/2003 11:35	0.8833	-0.263	0.8333	0.180
11/22/2003 11:35	0.9	-0.261	0.85	0.179
11/22/2003 11:35	0.9167	-0.263	0.8667	0.180
11/22/2003 11:35	0.9333	-0.261	0.8833	0.179
11/22/2003 11:35	0.95	-0.257	0.9	0.176
11/22/2003 11:35	0.9667	-0.257	0.9167	0.176
11/22/2003 11:35	0.9833	-0.257	0.9333	0.176
11/22/2003 11:35	1	-0.254	0.95	0.174
11/22/2003 11:35	1.0167	-0.254	0.9667	0.174
11/22/2003 11:35	1.0333	-0.252	0.9833	0.172
11/22/2003 11:35	1.05	-0.248	1	0.170
11/22/2003 11:36	2.05	-0.195	2	0.133
11/22/2003 11:37	3.05	-0.155	3	0.106
11/22/2003 11:38	4.05	-0.128	4	0.088
11/22/2003 11:39	5.05	-0.11	5	0.075
11/22/2003 11:40	6.05	-0.093	6	0.064
11/22/2003 11:41	7.05	-0.079	7	0.054
11/22/2003 11:42	8.05	-0.072	8	0.049
11/22/2003 11:43	9.05	-0.066	9	0.045
11/22/2003 11:44	10.05	-0.055	10	0.038
11/22/2003 11:45	11.05	-0.05	11	0.034
11/22/2003 11:46	12.05	-0.046	12	0.031
11/22/2003 11:47	13.05	-0.043	13	0.029
11/22/2003 11:48	14.05	-0.039	14	0.027

11/22/2003 11:49	15.05	-0.034	15	0.023
11/22/2003 11:50	16.05	-0.032	16	0.022
11/22/2003 11:51	17.05	-0.028	17	0.019
11/22/2003 11:52	18.05	-0.025	18	0.017
11/22/2003 11:53	19.05	-0.023	19	0.016
11/22/2003 11:54	20.05	-0.021	20	0.014
11/22/2003 11:55	21.05	-0.021	21	0.014
11/22/2003 11:56	22.05	-0.018	22	0.012
11/22/2003 11:57	23.05	-0.016	23	0.011
11/22/2003 11:58	24.05	-0.014	24	0.010

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT10
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head #2	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.354'	4.25 = R
Length of Well Screen (ft.) :		5.64 = L
Time for 37% head change (min.) :		0.094 = To

Hydraulic Conductivity (K) :

1.81E-02	ft./min.
3.02E-04	ft./sec.
2.61E+01	ft./day
9.21E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(5.64/.354)}{2 \times 5.64 \times .094} =$$

1.80×10^{-2} Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT10
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	4.25 = R
Length of Well Screen (ft.) :	5.64 = L
Time for 37% head change (min.) :	0.09 = To

Hydraulic Conductivity (K) :

1.89E-02	ft./min.
3.16E-04	ft./sec.
2.73E+01	ft./day
9.62E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 16MWT10

PROJECT NO.: 9060 GEOLOGIST: M.G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 22.16 TOR DATE: 11-22-03

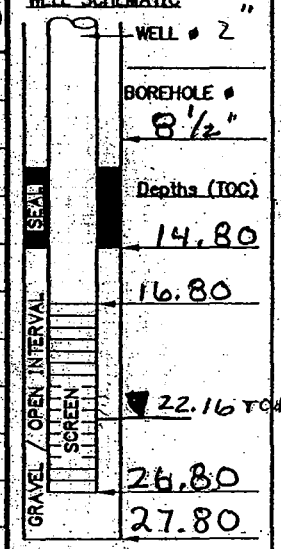
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT STATIC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	.010		6.2663	-.097	
.025	-2.664		7.0347	-.088	
.03	-1.806		8.3663	-.074	
.1	-.756		9.9497	-.058	
.2102	-.392		10.5413	-.054	
.3333	-.334		12.5347	-.043	
.5247	-.300		14.9063	-.034	
1.04	-.249		15.7913	-.031	
2.2097	-.188		19.8913	-.025	
3.1297	-.157		24.78	-.006	
4.1813	-.132				
5.2697	-.110				

WELL SCHEMATIC

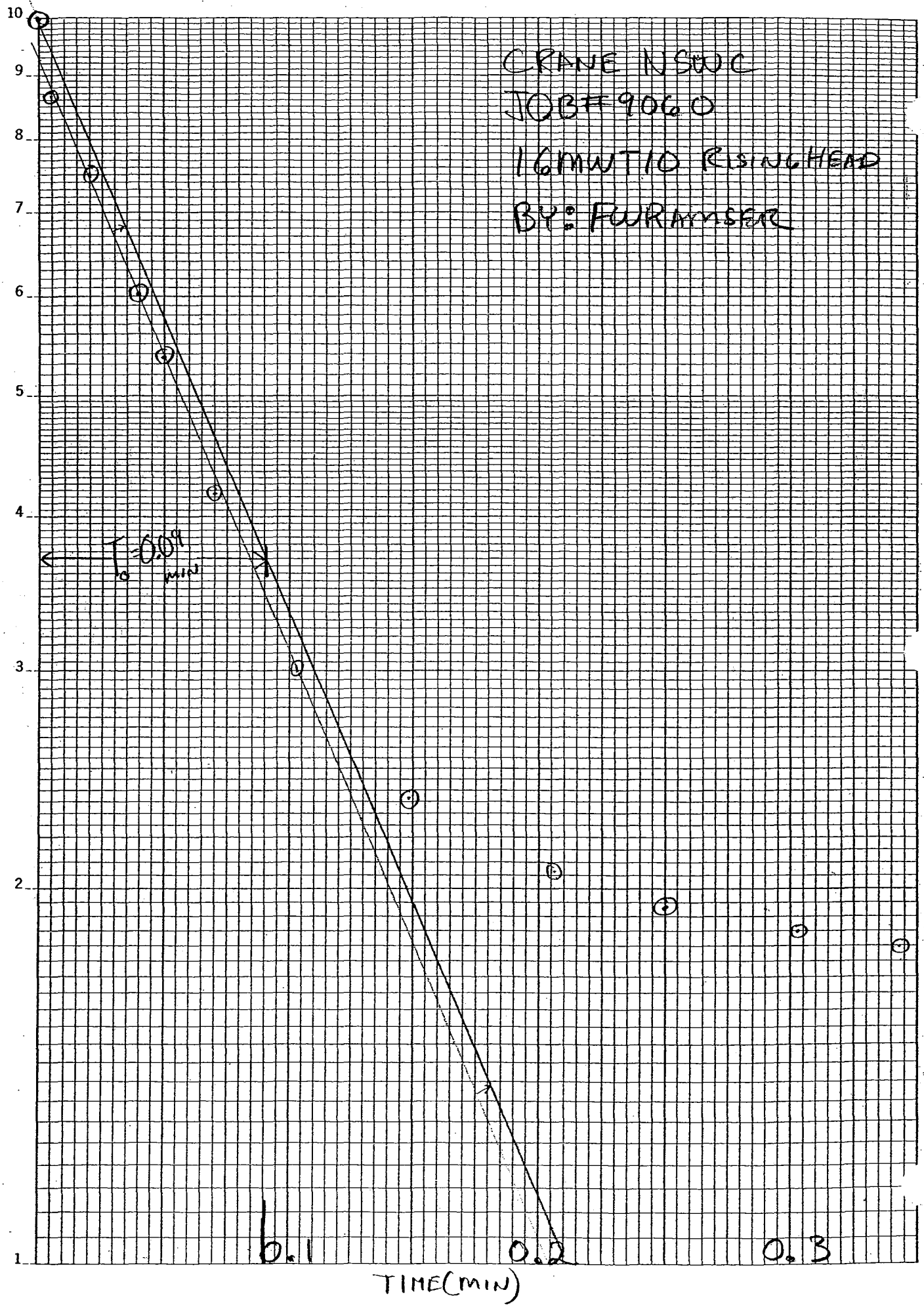


▽ Indicate SWL Depth on Drawing

REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 TNL



K+E SEMI-LOGARITHMIC .1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 4650

In-Situ Inc. MiniTroll Pro

Report generated: 12/4/2003 10:01:35
Report from file: C:\Win-Situ\Data\SN00916 2003-11-22 105857 16MWT10rising#1.bin
DataMgr Version 3.68

Serial number: 916
Firmware Version 3.07
Unit name:

Test name: 16MWT10rising#1

Test defined on: 11/22/2003 10:56:32
Test started on: 11/22/2003 10:58:57
Test stopped on: 11/22/2003 11:30:49
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time betwee Minutes.
Number of data sampl 121

TOTAL DATA SAMPLES 121

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference 0 Feet H2O
Referenced on: channel definition.
Pressure head at refer 4.704 Feet H2O

● = DATA PLOTTED

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET (min)	h/ho	
						ho = -1.806
11/22/2003	10:58	0	0.01			
11/22/2003	10:58	0.0048	0.009			
11/22/2003	10:58	0.0098	0.011			
11/22/2003	10:58	0.015	0.011			
11/22/2003	10:58	0.0198	-0.569			
11/22/2003	10:58	0.025	-2.664			
11/22/2003	10:58	0.03	-1.806	0.000	1.000	●
11/22/2003	10:58	0.035	-1.561	0.005	0.864	●
11/22/2003	10:58	0.0398	-1.525	0.010	0.844	
11/22/2003	10:58	0.045	-1.45	0.015	0.803	
11/22/2003	10:59	0.05	-1.354	0.020	0.750	●
11/22/2003	10:59	0.0548	-1.294	0.025	0.717	
11/22/2003	10:59	0.06	-1.243	0.030	0.688	
11/22/2003	10:59	0.0648	-1.141	0.035	0.632	
11/22/2003	10:59	0.07	-1.085	0.040	0.601	●
11/22/2003	10:59	0.075	-1.03	0.045	0.570	
11/22/2003	10:59	0.0798	-0.972	0.050	0.538	●
11/22/2003	10:59	0.0848	-0.928	0.055	0.514	
11/22/2003	10:59	0.09	-0.843	0.060	0.467	
11/22/2003	10:59	0.095	-0.794	0.065	0.440	
11/22/2003	10:59	0.1	-0.756	0.070	0.419	●

11/22/2003 10:59	0.1057	-0.707	0.076	0.391
11/22/2003 10:59	0.1118	-0.654	0.082	0.362
11/22/2003 10:59	0.1185	-0.614	0.089	0.340
11/22/2003 10:59	0.1255	-0.576	0.096	0.319
11/22/2003 10:59	0.1327	-0.543	0.103	0.301
11/22/2003 10:59	0.1405	-0.512	0.111	0.283
11/22/2003 10:59	0.1488	-0.485	0.119	0.269
11/22/2003 10:59	0.1578	-0.463	0.128	0.256
11/22/2003 10:59	0.167	-0.445	0.137	0.246
11/22/2003 10:59	0.1768	-0.427	0.147	0.236
11/22/2003 10:59	0.1875	-0.414	0.158	0.229
11/22/2003 10:59	0.1985	-0.401	0.169	0.222
11/22/2003 10:59	0.21	-0.392	0.180	0.217
11/22/2003 10:59	0.2225	-0.383	0.193	0.212
11/22/2003 10:59	0.2358	-0.374	0.206	0.207
11/22/2003 10:59	0.2498	-0.365	0.220	0.202
11/22/2003 10:59	0.2647	-0.358	0.235	0.198
11/22/2003 10:59	0.2803	-0.351	0.250	0.194
11/22/2003 10:59	0.297	-0.345	0.267	0.191
11/22/2003 10:59	0.3145	-0.338	0.285	0.187
11/22/2003 10:59	0.3333	-0.334	0.303	0.185
11/22/2003 10:59	0.3532	-0.327	0.323	0.181
11/22/2003 10:59	0.374	-0.325	0.344	0.180
11/22/2003 10:59	0.3963	-0.32	0.366	0.177
11/22/2003 10:59	0.4198	-0.316	0.390	0.175
11/22/2003 10:59	0.4445	-0.314	0.415	0.174
11/22/2003 10:59	0.4695	-0.309	0.440	0.171
11/22/2003 10:59	0.4963	-0.304	0.466	0.168
11/22/2003 10:59	0.5247	-0.3	0.495	0.166
11/22/2003 10:59	0.5547	-0.298	0.525	0.165
11/22/2003 10:59	0.5862	-0.293	0.556	0.162
11/22/2003 10:59	0.6213	-0.289	0.591	0.160
11/22/2003 10:59	0.6578	-0.284	0.628	0.157
11/22/2003 10:59	0.6963	-0.28	0.666	0.155
11/22/2003 10:59	0.738	-0.278	0.708	0.154
11/22/2003 10:59	0.7813	-0.273	0.751	0.151
11/22/2003 10:59	0.8278	-0.267	0.798	0.148
11/22/2003 10:59	0.8762	-0.262	0.846	0.145
11/22/2003 10:59	0.9278	-0.258	0.898	0.143
11/22/2003 10:59	0.9828	-0.253	0.953	0.140
11/22/2003 10:59	1.0412	-0.249	1.011	0.138
11/22/2003 11:00	1.103	-0.244	1.073	0.135
11/22/2003 11:00	1.1678	-0.24	1.138	0.133
11/22/2003 11:00	1.238	-0.233	1.208	0.129
11/22/2003 11:00	1.3113	-0.229	1.281	0.127
11/22/2003 11:00	1.3895	-0.224	1.360	0.124
11/22/2003 11:00	1.4728	-0.222	1.443	0.123
11/22/2003 11:00	1.5613	-0.213	1.531	0.118
11/22/2003 11:00	1.6547	-0.211	1.625	0.117
11/22/2003 11:00	1.753	-0.204	1.723	0.113
11/22/2003 11:00	1.858	-0.2	1.828	0.111
11/22/2003 11:00	1.9678	-0.195	1.938	0.108
11/22/2003 11:01	2.0845	-0.191	2.055	0.106
11/22/2003 11:01	2.2097	-0.188	2.180	0.104
11/22/2003 11:01	2.3412	-0.182	2.311	0.101
11/22/2003 11:01	2.4812	-0.177	2.451	0.098
11/22/2003 11:01	2.6297	-0.17	2.600	0.094
11/22/2003 11:01	2.7863	-0.168	2.756	0.093
11/22/2003 11:01	2.953	-0.162	2.923	0.090
11/22/2003 11:02	3.1297	-0.157	3.100	0.087

11/22/2003 11:02	3.3162	-0.148	3.286	0.082
11/22/2003 11:02	3.5145	-0.146	3.485	0.081
11/22/2003 11:02	3.7245	-0.142	3.695	0.079
11/22/2003 11:02	3.9463	-0.135	3.916	0.075
11/22/2003 11:03	4.1812	-0.132	4.151	0.073
11/22/2003 11:03	4.4295	-0.126	4.400	0.070
11/22/2003 11:03	4.6928	-0.121	4.663	0.067
11/22/2003 11:03	4.9728	-0.115	4.943	0.064
11/22/2003 11:04	5.2697	-0.11	5.240	0.061
11/22/2003 11:04	5.583	-0.105	5.553	0.058
11/22/2003 11:04	5.9145	-0.101	5.885	0.056
11/22/2003 11:05	6.2663	-0.097	6.236	0.054
11/22/2003 11:05	6.6395	-0.092	6.610	0.051
11/22/2003 11:05	7.0345	-0.088	7.005	0.049
11/22/2003 11:06	7.453	-0.085	7.423	0.047
11/22/2003 11:06	7.8962	-0.079	7.866	0.044
11/22/2003 11:07	8.3663	-0.074	8.336	0.041
11/22/2003 11:07	8.8645	-0.07	8.835	0.039
11/22/2003 11:08	9.3913	-0.063	9.361	0.035
11/22/2003 11:08	9.9497	-0.058	9.920	0.032
11/22/2003 11:09	10.5413	-0.054	10.511	0.030
11/22/2003 11:10	11.168	-0.052	11.138	0.029
11/22/2003 11:10	11.8312	-0.05	11.801	0.028
11/22/2003 11:11	12.5347	-0.043	12.505	0.024
11/22/2003 11:12	13.2795	-0.04	13.250	0.022
11/22/2003 11:13	14.0695	-0.036	14.040	0.020
11/22/2003 11:13	14.9062	-0.034	14.876	0.019
11/22/2003 11:14	15.7913	-0.031	15.761	0.017
11/22/2003 11:15	16.7295	-0.031	16.700	0.017
11/22/2003 11:16	17.723	-0.027	17.693	0.015
11/22/2003 11:17	18.7762	-0.025	18.746	0.014
11/22/2003 11:18	19.8913	-0.025	19.861	0.014
11/22/2003 11:20	21.073	-0.02	21.043	0.011
11/22/2003 11:21	22.3247	-0.015	22.295	0.008
11/22/2003 11:22	23.6497	-0.018	23.620	0.010
11/22/2003 11:24	25.0545	-0.015	25.025	0.008
11/22/2003 11:25	26.5428	-0.013	26.513	0.007
11/22/2003 11:27	28.1178	-0.015	28.088	0.008
11/22/2003 11:28	29.7863	-0.006	29.756	0.003
11/22/2003 11:30	31.5545	0.025	31.525	-0.014

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT10
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.354'	4.25 = R
Length of Well Screen (ft.) :		5.64 = L
Time for 37% head change (min.) :		0.09 = To

Hydraulic Conductivity (K) :

1.89E-02	ft./min.
3.16E-04	ft./sec.
2.73E+01	ft./day
9.62E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(5.64/.354)}{2 \times 5.64 \times .09} =$$

1.88×10^{-2} Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT15
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	14 = L
Time for 37% head change (min.) :	385.00 = To

Hydraulic Conductivity (K) :

2.71E-06	ft./min.
4.52E-08	ft./sec.
3.90E-03	ft./day
1.38E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 16MWT15

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 56.66 TOC DATE: 11-23-03

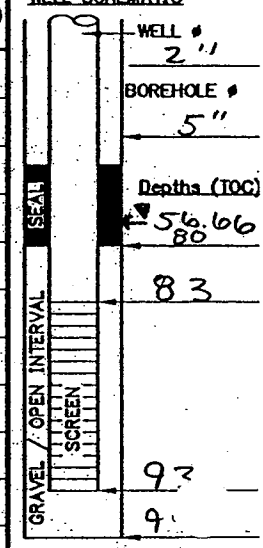
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

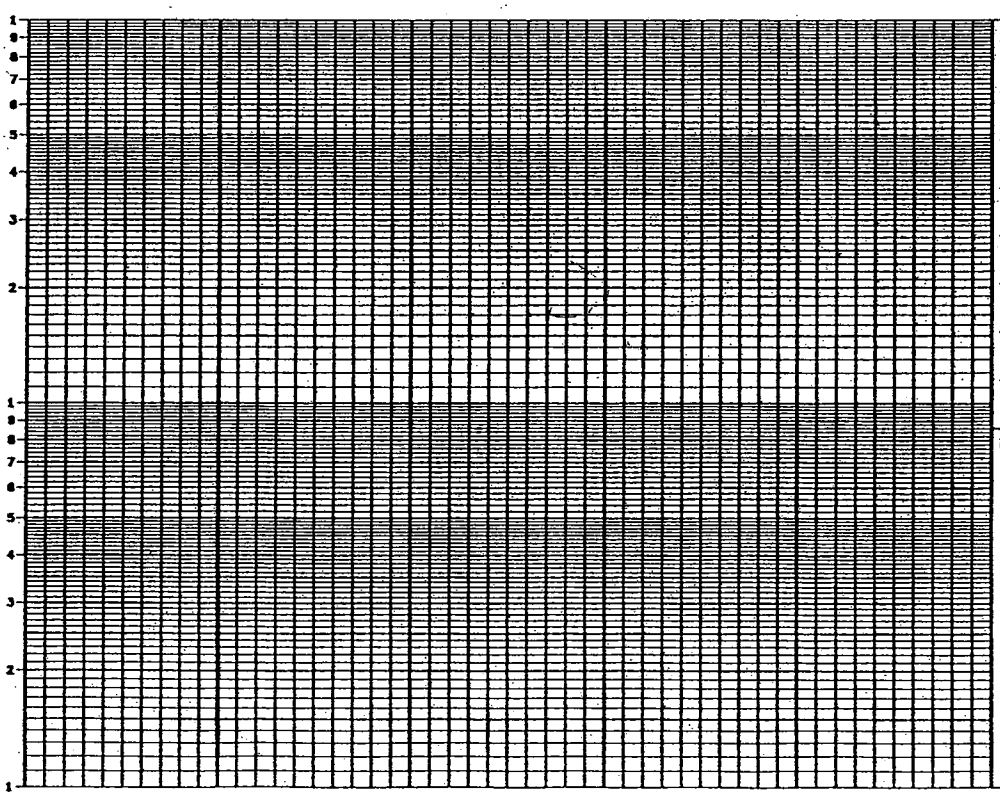
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		150	1.478	
.2	2.748		180	1.389	
1	2.657		210	1.331	
5	2.530		240	1.273	
10	2.433		270	1.229	
20	2.321		300	1.187	
30	2.217				
40	2.122				
60	1.960				
80	1.822				
100	1.709				
120	1.604				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

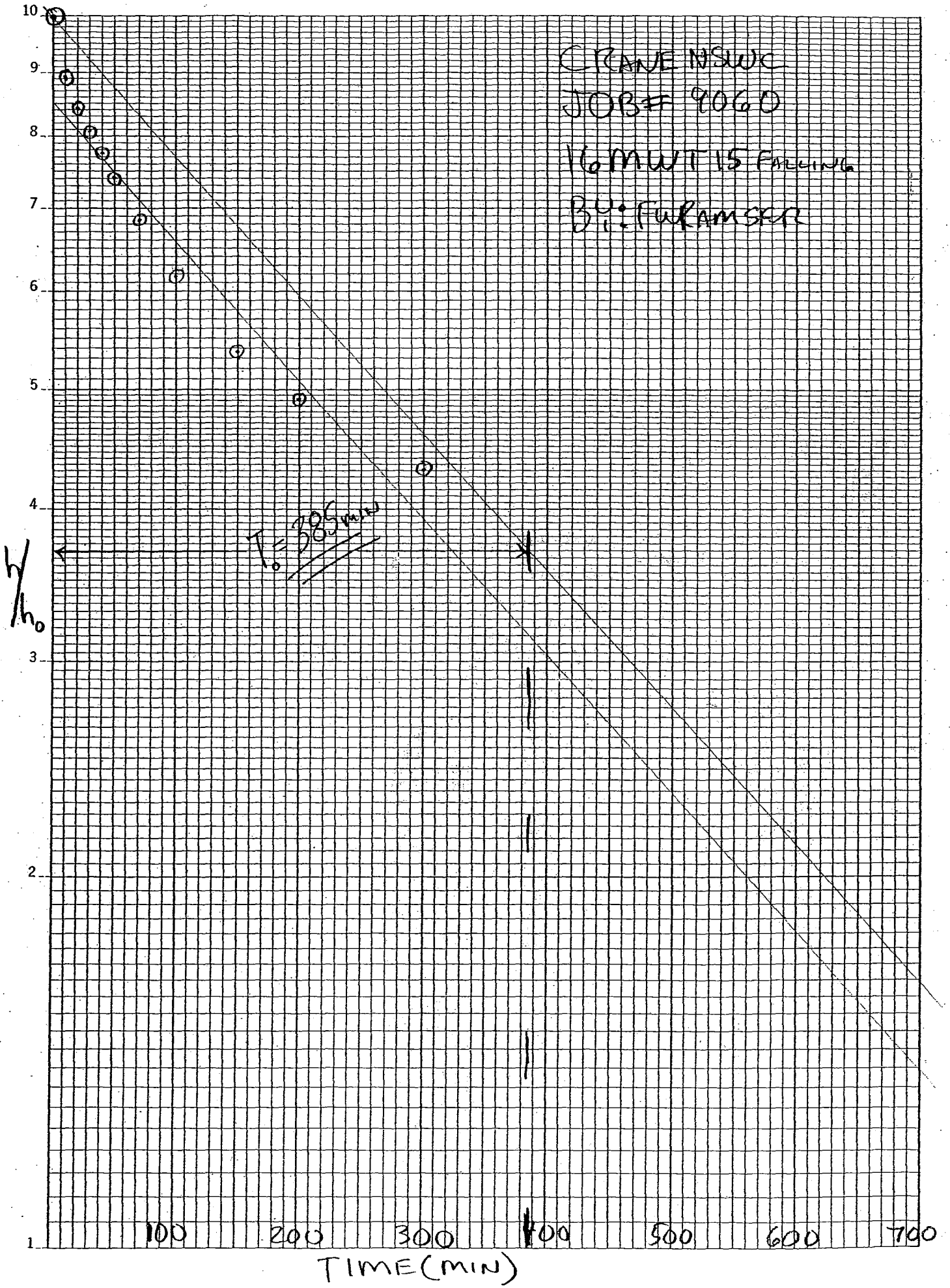


REMARKS:

TEST STOPPED AT 6:00 PM. DARK, REQUIRED TO LEAVE SECURE AREA

CALCS, SKETCH MAPS, ETC.:

ACAD: FORM_HYDCONTST.dwg 07/06/99 INL


CRANE NSWC
JOB# 9060
16MWT15 FALLING
BY: FURAMSER
T0 = 385 min
h/h0
10
9
8
7
6
5
4
3
2
1
100
200
300
400
500
600
700
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/4/2003 9:49:15
Report from file: C:\Win-Situ\Data\SN00916 2003-11-23 124002 16MWT15falling#1.bin
DataMgr Version 3.68

Serial number: 916
Firmware Version 3.07
Unit name:

Test name: 16MWT15falling#1

Test defined on: 11/23/2003 12:38:27
Test started on: 11/23/2003 12:40:02
Test stopped on: 11/23/2003 17:45:39
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: Minutes.
Number of data samples: 3057

TOTAL DATA SAMPLES 3057

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 18.509 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = 2.748
11/23/2003	12:40	0	0			
11/23/2003	12:40	0.1	2.521			
11/23/2003	12:40	0.2	2.748	0	1	
11/23/2003	12:40	0.3	2.726	0.1	0.991994	
11/23/2003	12:40	0.4	2.712	0.2	0.9869	
11/23/2003	12:40	0.5	2.699	0.3	0.982169	
11/23/2003	12:40	0.6	2.69	0.4	0.978894	
11/23/2003	12:40	0.7	2.679	0.5	0.974891	
11/23/2003	12:40	0.8	2.67	0.6	0.971616	
11/23/2003	12:40	0.9	2.666	0.7	0.97016	
11/23/2003	12:41	1	2.657	0.8	0.966885	
11/23/2003	12:41	1.1	2.652	0.9	0.965066	
11/23/2003	12:41	1.2	2.646	1	0.962882	
11/23/2003	12:41	1.3	2.639	1.1	0.960335	
11/23/2003	12:41	1.4	2.632	1.2	0.957787	
11/23/2003	12:41	1.5	2.63	1.3	0.95706	
11/23/2003	12:41	1.6	2.626	1.4	0.955604	
11/23/2003	12:41	1.7	2.619	1.5	0.953057	
11/23/2003	12:41	1.8	2.617	1.6	0.952329	
11/23/2003	12:41	1.9	2.61	1.7	0.949782	
11/23/2003	12:42	2	2.606	1.8	0.948326	
11/23/2003	12:42	2.1	2.604	1.9	0.947598	
11/23/2003	12:42	2.2	2.599	2	0.945779	
11/23/2003	12:42	2.3	2.595	2.1	0.944323	
11/23/2003	12:42	2.4	2.595	2.2	0.944323	
11/23/2003	12:42	2.5	2.59	2.3	0.942504	
11/23/2003	12:42	2.6	2.586	2.4	0.941048	
11/23/2003	12:42	2.7	2.584	2.5	0.94032	
11/23/2003	12:42	2.8	2.581	2.6	0.939229	
11/23/2003	12:42	2.9	2.577	2.7	0.937773	
11/23/2003	12:43	3	2.575	2.8	0.937045	
11/23/2003	12:43	3.1	2.575	2.9	0.937045	
11/23/2003	12:43	3.2	2.57	3	0.935226	

11/23/2003 12:43	3.3	2.568	3.1	0.934498
11/23/2003 12:43	3.4	2.568	3.2	0.934498
11/23/2003 12:43	3.5	2.564	3.3	0.933042
11/23/2003 12:43	3.6	2.561	3.4	0.931951
11/23/2003 12:43	3.7	2.559	3.5	0.931223
11/23/2003 12:43	3.8	2.555	3.6	0.929767
11/23/2003 12:43	3.9	2.555	3.7	0.929767
11/23/2003 12:44	4	2.55	3.8	0.927948
11/23/2003 12:44	4.1	2.55	3.9	0.927948
11/23/2003 12:44	4.2	2.544	4	0.925764
11/23/2003 12:44	4.3	2.55	4.1	0.927948
11/23/2003 12:44	4.4	2.544	4.2	0.925764
11/23/2003 12:44	4.5	2.541	4.3	0.924672
11/23/2003 12:44	4.6	2.539	4.4	0.923945
11/23/2003 12:44	4.7	2.541	4.5	0.924672
11/23/2003 12:44	4.8	2.532	4.6	0.921397
11/23/2003 12:44	4.9	2.53	4.7	0.92067
11/23/2003 12:45	5	2.53	4.8	0.92067
11/23/2003 12:45	5.1	2.528	4.9	0.919942
11/23/2003 12:45	5.2	2.526	5	0.919214
11/23/2003 12:45	5.3	2.526	5.1	0.919214
11/23/2003 12:45	5.4	2.521	5.2	0.917394
11/23/2003 12:45	5.5	2.521	5.3	0.917394
11/23/2003 12:45	5.6	2.517	5.4	0.915939
11/23/2003 12:45	5.7	2.517	5.5	0.915939
11/23/2003 12:45	5.8	2.517	5.6	0.915939
11/23/2003 12:45	5.9	2.515	5.7	0.915211
11/23/2003 12:46	6	2.51	5.8	0.913392
11/23/2003 12:46	6.1	2.508	5.9	0.912664
11/23/2003 12:46	6.2	2.506	6	0.911936
11/23/2003 12:46	6.3	2.506	6.1	0.911936
11/23/2003 12:46	6.4	2.504	6.2	0.911208
11/23/2003 12:46	6.5	2.501	6.3	0.910116
11/23/2003 12:46	6.6	2.499	6.4	0.909389
11/23/2003 12:46	6.7	2.499	6.5	0.909389
11/23/2003 12:46	6.8	2.499	6.6	0.909389
11/23/2003 12:46	6.9	2.495	6.7	0.907933
11/23/2003 12:47	7	2.495	6.8	0.907933
11/23/2003 12:47	7.1	2.493	6.9	0.907205
11/23/2003 12:47	7.2	2.49	7	0.906114
11/23/2003 12:47	7.3	2.488	7.1	0.905386
11/23/2003 12:47	7.4	2.486	7.2	0.904658
11/23/2003 12:47	7.5	2.486	7.3	0.904658
11/23/2003 12:47	7.6	2.484	7.4	0.90393
11/23/2003 12:47	7.7	2.479	7.5	0.902111
11/23/2003 12:47	7.8	2.477	7.6	0.901383
11/23/2003 12:47	7.9	2.477	7.7	0.901383
11/23/2003 12:48	8	2.475	7.8	0.900655
11/23/2003 12:48	8.1	2.473	7.9	0.899927
11/23/2003 12:48	8.2	2.47	8	0.898836
11/23/2003 12:48	8.3	2.47	8.1	0.898836
11/23/2003 12:48	8.4	2.47	8.2	0.898836
11/23/2003 12:48	8.5	2.466	8.3	0.89738
11/23/2003 12:48	8.6	2.466	8.4	0.89738
11/23/2003 12:48	8.7	2.464	8.5	0.896652
11/23/2003 12:48	8.8	2.461	8.6	0.89556
11/23/2003 12:48	8.9	2.459	8.7	0.894833
11/23/2003 12:49	9	2.457	8.8	0.894105
11/23/2003 12:49	9.1	2.457	8.9	0.894105
11/23/2003 12:49	9.2	2.457	9	0.894105
11/23/2003 12:49	9.3	2.455	9.1	0.893377
11/23/2003 12:49	9.4	2.453	9.2	0.892649
11/23/2003 12:49	9.5	2.453	9.3	0.892649
11/23/2003 12:49	9.6	2.45	9.4	0.891557
11/23/2003 12:49	9.7	2.45	9.5	0.891557
11/23/2003 12:49	9.8	2.446	9.6	0.890102
11/23/2003 12:49	9.9	2.444	9.7	0.889374
11/23/2003 12:50	10	2.439	9.8	0.887555
11/23/2003 12:50	10.1	2.444	9.9	0.889374
11/23/2003 12:50	10.2	2.439	10	0.887555
11/23/2003 12:51	11.2	2.417	11	0.879549
11/23/2003 12:52	12.2	2.419	12	0.880277

11/23/2003 12:53	13.2	2.406	13	0.875546
11/23/2003 12:54	14.2	2.392	14	0.870451
11/23/2003 12:55	15.2	2.381	15	0.866448
11/23/2003 12:56	16.2	2.368	16	0.861718
11/23/2003 12:57	17.2	2.355	17	0.856987
11/23/2003 12:58	18.2	2.341	18	0.851892
11/23/2003 12:59	19.2	2.333	19	0.848981
11/23/2003 13:00	20.2	2.319	20	0.843886
11/23/2003 13:01	21.2	2.308	21	0.839884
11/23/2003 13:02	22.2	2.297	22	0.835881
11/23/2003 13:03	23.2	2.286	23	0.831878
11/23/2003 13:04	24.2	2.277	24	0.828603
11/23/2003 13:05	25.2	2.266	25	0.8246
11/23/2003 13:06	26.2	2.255	26	0.820597
11/23/2003 13:07	27.2	2.244	27	0.816594
11/23/2003 13:08	28.2	2.235	28	0.813319
11/23/2003 13:09	29.2	2.224	29	0.809316
11/23/2003 13:10	30.2	2.215	30	0.806041
11/23/2003 13:11	31.2	2.206	31	0.802766
11/23/2003 13:12	32.2	2.195	32	0.798763
11/23/2003 13:13	33.2	2.184	33	0.79476
11/23/2003 13:14	34.2	2.175	34	0.791485
11/23/2003 13:15	35.2	2.166	35	0.78821
11/23/2003 13:16	36.2	2.155	36	0.784207
11/23/2003 13:17	37.2	2.148	37	0.781659
11/23/2003 13:18	38.2	2.137	38	0.777656
11/23/2003 13:19	39.2	2.13	39	0.775109
11/23/2003 13:20	40.2	2.122	40	0.772198
11/23/2003 13:21	41.2	2.108	41	0.767103
11/23/2003 13:22	42.2	2.104	42	0.765648
11/23/2003 13:23	43.2	2.093	43	0.761645
11/23/2003 13:24	44.2	2.084	44	0.75837
11/23/2003 13:25	45.2	2.075	45	0.755095
11/23/2003 13:25	45.3	2.075	45.1	0.755095
11/23/2003 13:26	46.2	2.066	46	0.75182
11/23/2003 13:27	47.2	2.057	47	0.748544
11/23/2003 13:28	48.2	2.048	48	0.745269
11/23/2003 13:29	49.2	2.039	49	0.741994
11/23/2003 13:30	50.2	2.037	50	0.741266
11/23/2003 13:31	51.2	2.026	51	0.737263
11/23/2003 13:32	52.2	2.017	52	0.733988
11/23/2003 13:33	53.2	2.008	53	0.730713
11/23/2003 13:34	54.2	2.004	54	0.729258
11/23/2003 13:35	55.2	1.997	55	0.72671
11/23/2003 13:36	56.2	1.989	56	0.723799
11/23/2003 13:37	57.2	1.979	57	0.72016
11/23/2003 13:38	58.2	1.971	58	0.717249
11/23/2003 13:39	59.2	1.962	59	0.713974
11/23/2003 13:40	60.2	1.957	60	0.712154
11/23/2003 13:50	70.2	1.884	70	0.68559
11/23/2003 14:00	80.2	1.822	80	0.663028
11/23/2003 14:10	90.2	1.76	90	0.640466
11/23/2003 14:20	100.2	1.702	100	0.61936
11/23/2003 14:30	110.2	1.649	110	0.600073
11/23/2003 14:40	120.2	1.602	120	0.582969
11/23/2003 14:50	130.2	1.56	130	0.567686
11/23/2003 15:00	140.2	1.515	140	0.55131
11/23/2003 15:10	150.2	1.478	150	0.537846
11/23/2003 15:20	160.2	1.444	160	0.525473
11/23/2003 15:30	170.2	1.411	170	0.513464
11/23/2003 15:40	180.2	1.391	180	0.506186
11/23/2003 15:50	190.2	1.371	190	0.498908
11/23/2003 16:00	200.2	1.351	200	0.49163
11/23/2003 16:20	220.2	1.309	220	0.476346
11/23/2003 16:40	240.2	1.278	240	0.465066
11/23/2003 17:00	260.2	1.24	260	0.451237
11/23/2003 17:20	280.2	1.213	280	0.441412
11/23/2003 17:40	300.2	1.184	300	0.430859

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT15
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :		14 = L
Time for 37% head change (min.) :		385.00 = To

Hydraulic Conductivity (K) :

2.71E-06	ft./min.
4.52E-08	ft./sec.
3.90E-03	ft./day
1.38E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(14/.2081)}{2 \times 14 \times 385} =$$

2.69×10^{-6} Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT17
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	4.25 = R
Length of Well Screen (ft.) :	10.6 = L
Time for 37% head change (min.) :	3.20 = To

Hydraulic Conductivity (K) :

3.48E-04	ft./min.
5.80E-06	ft./sec.
5.01E-01	ft./day
1.77E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 16MWT17

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 15.40 TOC DATE: 11-23-03

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

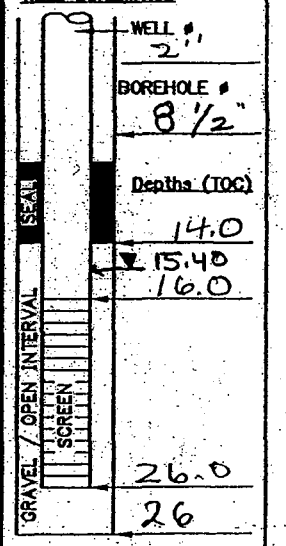
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC. ZERO AT SWL+START

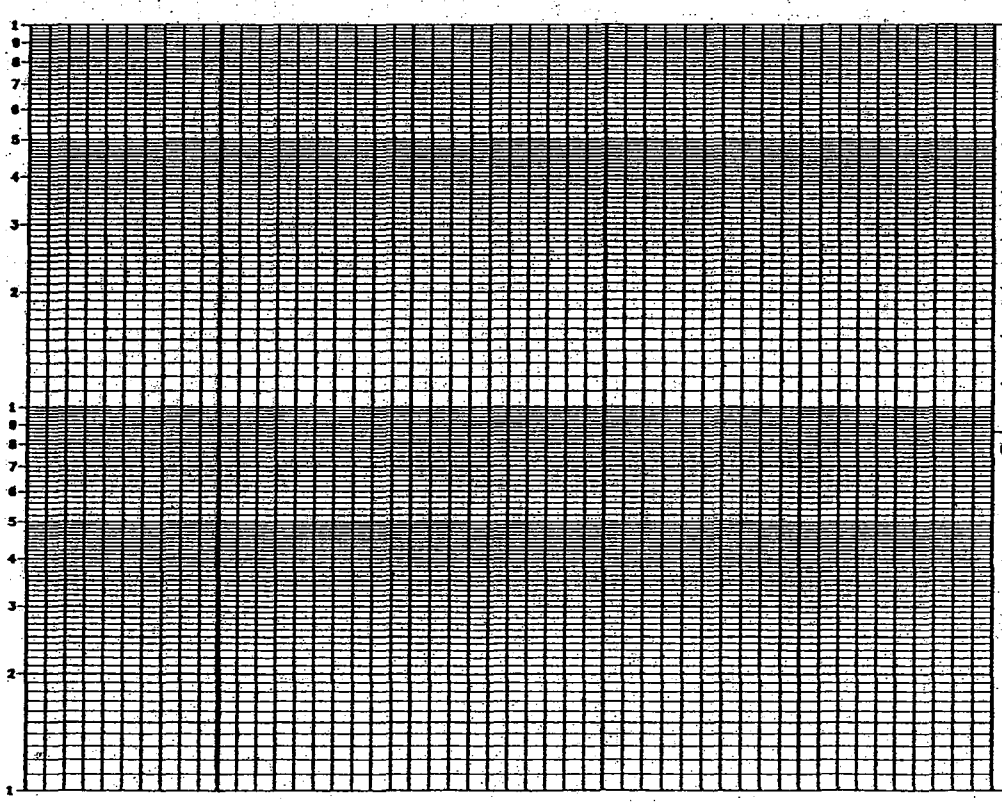
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3	.677	
.1	1.280		4	.514	
.2	1.725		5	.399	
.3	1.651		6	.294	
.4	1.590		7	.259	
.5	1.526		8	.217	
.6	1.469		10	.171	
.7	1.419		12	.139	
.8	1.362		15	.112	
.9	1.324		17	.102	
1.0	1.276				
2.0	.919				

WELL SCHEMATIC

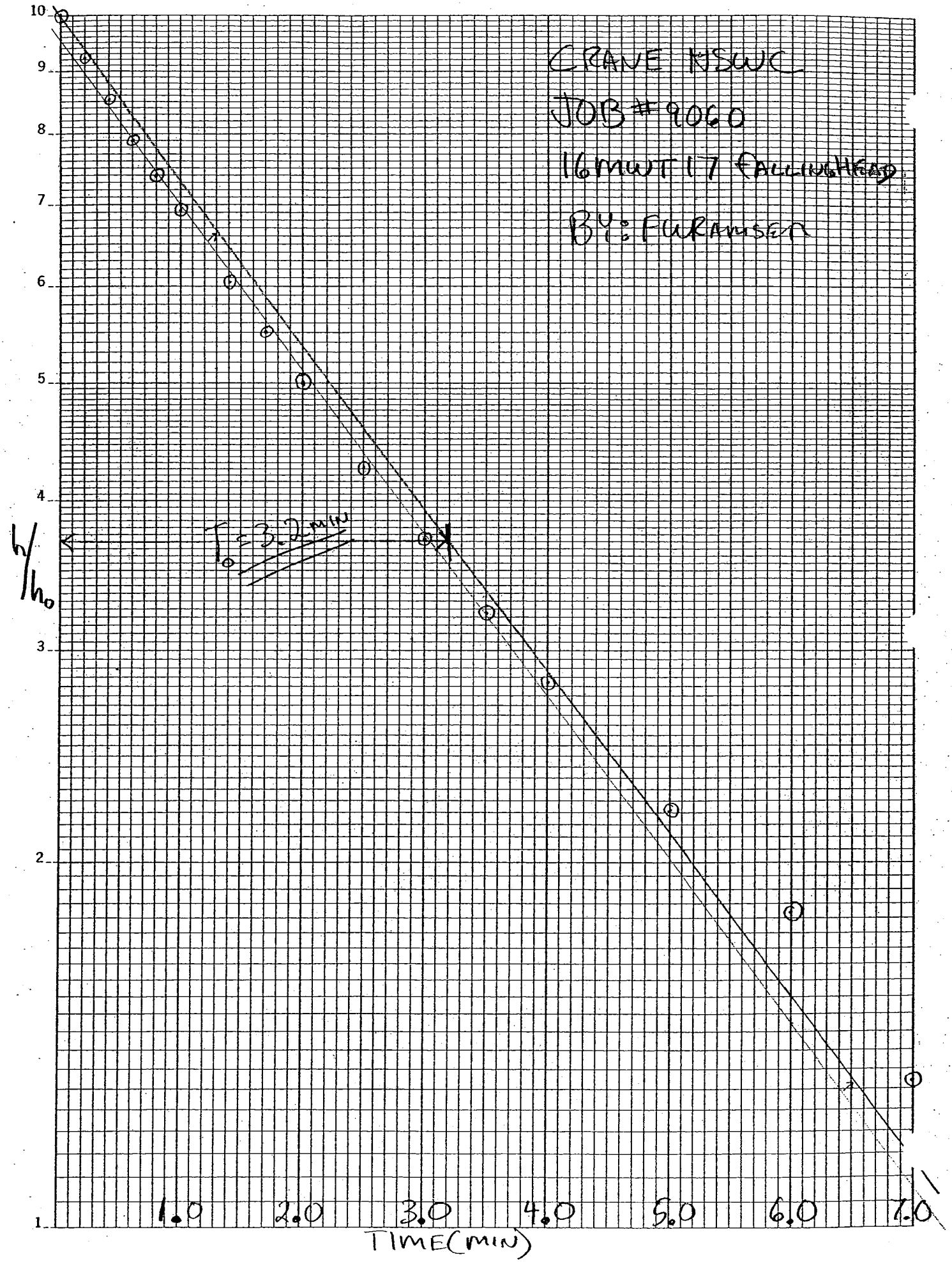


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS,SKETCH MAPS, ETC.:



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/10/2003 8:47:40
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 16\SN06899 2003-11-23 105030 16MWT17falling#1.bin
DataMgr Version 3.68

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 16MWT17falling#1

Test defined on: 11/23/2003 10:50:06
Test started on: 11/23/2003 10:50:30
Test stopped on: 11/23/2003 11:08:30
Test extracted on: N/A

Data gathered using Linear testing
Time between data Minutes.
Number of data san 180

TOTAL DATA SAMPL 180

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined referer 0 Feet H2O
Referenced on: test start
Pressure head at rel 10.617 Feet H2O

• ⇒ PLOTTED DATA

ho = 1.725

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	
11/23/2003	10:50	0	0			
11/23/2003	10:50	0.1	1.28			
11/23/2003	10:50	0.2	1.725	0	1.000	•
11/23/2003	10:50	0.3	1.651	0.1	0.957	
11/23/2003	10:50	0.4	1.59	0.2	0.922	•
11/23/2003	10:51	0.5	1.526	0.3	0.885	
11/23/2003	10:51	0.6	1.469	0.4	0.852	•
11/23/2003	10:51	0.7	1.419	0.5	0.823	
11/23/2003	10:51	0.8	1.362	0.6	0.790	•
11/23/2003	10:51	0.9	1.324	0.7	0.768	
11/23/2003	10:51	1	1.276	0.8	0.740	•
11/23/2003	10:51	1.1	1.233	0.9	0.715	
11/23/2003	10:51	1.2	1.193	1	0.692	•
11/23/2003	10:51	1.3	1.153	1.1	0.668	
11/23/2003	10:51	1.4	1.114	1.2	0.646	
11/23/2003	10:52	1.5	1.08	1.3	0.626	
11/23/2003	10:52	1.6	1.044	1.4	0.605	•
11/23/2003	10:52	1.7	1.012	1.5	0.587	
11/23/2003	10:52	1.8	0.979	1.6	0.568	

11/23/2003 10:52	1.9	0.949	1.7	0.550
11/23/2003 10:52	2	0.919	1.8	0.533
11/23/2003 10:52	2.1	0.891	1.9	0.517
11/23/2003 10:52	2.2	0.862	2	0.500
11/23/2003 10:52	2.3	0.834	2.1	0.483
11/23/2003 10:52	2.4	0.798	2.2	0.463
11/23/2003 10:53	2.5	0.788	2.3	0.457
11/23/2003 10:53	2.6	0.768	2.4	0.445
11/23/2003 10:53	2.7	0.737	2.5	0.427
11/23/2003 10:53	2.8	0.717	2.6	0.416
11/23/2003 10:53	2.9	0.697	2.7	0.404
11/23/2003 10:53	3	0.677	2.8	0.392
11/23/2003 10:53	3.1	0.659	2.9	0.382
11/23/2003 10:53	3.2	0.641	3	0.372
11/23/2003 10:53	3.3	0.622	3.1	0.361
11/23/2003 10:53	3.4	0.604	3.2	0.350
11/23/2003 10:54	3.5	0.59	3.3	0.342
11/23/2003 10:54	3.6	0.574	3.4	0.333
11/23/2003 10:54	3.7	0.558	3.5	0.323
11/23/2003 10:54	3.8	0.544	3.6	0.315
11/23/2003 10:54	3.9	0.528	3.7	0.306
11/23/2003 10:54	4	0.514	3.8	0.298
11/23/2003 10:54	4.1	0.499	3.9	0.289
11/23/2003 10:54	4.2	0.487	4	0.282
11/23/2003 10:54	4.3	0.475	4.1	0.275
11/23/2003 10:54	4.4	0.461	4.2	0.267
11/23/2003 10:55	4.5	0.449	4.3	0.260
11/23/2003 10:55	4.6	0.439	4.4	0.254
11/23/2003 10:55	4.7	0.429	4.5	0.249
11/23/2003 10:55	4.8	0.419	4.6	0.243
11/23/2003 10:55	4.9	0.407	4.7	0.236
11/23/2003 10:55	5	0.399	4.8	0.231
11/23/2003 10:55	5.1	0.389	4.9	0.226
11/23/2003 10:55	5.2	0.381	5	0.221
11/23/2003 10:55	5.3	0.37	5.1	0.214
11/23/2003 10:55	5.4	0.362	5.2	0.210
11/23/2003 10:56	5.5	0.354	5.3	0.205
11/23/2003 10:56	5.6	0.346	5.4	0.201
11/23/2003 10:56	5.7	0.338	5.5	0.196
11/23/2003 10:56	5.8	0.33	5.6	0.191
11/23/2003 10:56	5.9	0.324	5.7	0.188
11/23/2003 10:56	6	0.294	5.8	0.170
11/23/2003 10:56	6.1	0.31	5.9	0.180
11/23/2003 10:56	6.2	0.314	6	0.182
11/23/2003 10:56	6.3	0.315	6.1	0.183
11/23/2003 10:56	6.4	0.294	6.2	0.170
11/23/2003 10:57	6.5	0.288	6.3	0.167
11/23/2003 10:57	6.6	0.282	6.4	0.163
11/23/2003 10:57	6.7	0.276	6.5	0.160
11/23/2003 10:57	6.8	0.272	6.6	0.158
11/23/2003 10:57	6.9	0.265	6.7	0.154
11/23/2003 10:57	7	0.259	6.8	0.150
11/23/2003 10:57	7.1	0.255	6.9	0.148
11/23/2003 10:57	7.2	0.227	7	0.132
11/23/2003 10:57	7.3	0.243	7.1	0.141
11/23/2003 10:57	7.4	0.247	7.2	0.143
11/23/2003 10:58	7.5	0.249	7.3	0.144
11/23/2003 10:58	7.6	0.251	7.4	0.146

11/23/2003 10:58	7.7	0.251	7.5	0.146
11/23/2003 10:58	7.8	0.227	7.6	0.132
11/23/2003 10:58	7.9	0.223	7.7	0.129
11/23/2003 10:58	8	0.217	7.8	0.126
11/23/2003 10:58	8.1	0.217	7.9	0.126
11/23/2003 10:58	8.2	0.211	8	0.122
11/23/2003 10:58	8.3	0.209	8.1	0.121
11/23/2003 10:58	8.4	0.205	8.2	0.119
11/23/2003 10:59	8.5	0.207	8.3	0.120
11/23/2003 10:59	8.6	0.203	8.4	0.118
11/23/2003 10:59	8.7	0.199	8.5	0.115
11/23/2003 10:59	8.8	0.195	8.6	0.113
11/23/2003 10:59	8.9	0.195	8.7	0.113
11/23/2003 10:59	9	0.191	8.8	0.111
11/23/2003 10:59	9.1	0.189	8.9	0.110
11/23/2003 10:59	9.2	0.187	9	0.108
11/23/2003 10:59	9.3	0.185	9.1	0.107
11/23/2003 10:59	9.4	0.181	9.2	0.105
11/23/2003 11:00	9.5	0.181	9.3	0.105
11/23/2003 11:00	9.6	0.177	9.4	0.103
11/23/2003 11:00	9.7	0.173	9.5	0.100
11/23/2003 11:00	9.8	0.173	9.6	0.100
11/23/2003 11:00	9.9	0.171	9.7	0.099
11/23/2003 11:00	10	0.171	9.8	0.099
11/23/2003 11:00	10.1	0.164	9.9	0.095
11/23/2003 11:00	10.2	0.162	10	0.094
11/23/2003 11:01	11.2	0.151	11	0.088
11/23/2003 11:02	12.2	0.137	12	0.079
11/23/2003 11:03	13.2	0.125	13	0.072
11/23/2003 11:04	14.2	0.119	14	0.069
11/23/2003 11:05	15.2	0.11	15	0.064
11/23/2003 11:06	16.2	0.108	16	0.063
11/23/2003 11:07	17.2	0.1	17	0.058

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT17
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083	1 = r
Effective Radius of Well Screen (in.) :	.354	4.25 = R
Length of Well Screen (ft.) :		10.6 = L
Time for 37% head change (min.) :		3.20 = To

Hydraulic Conductivity (K) :

3.48E-04	ft./min.
5.80E-06	ft./sec.
5.01E-01	ft./day
1.77E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(10.6/.354)}{2 \times 10.6 \times 3.20} =$$

3.45×10^{-4} Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT17
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	4.25 = R
Length of Well Screen (ft.) :	10.6 = L
Time for 37% head change (min.) :	3.15 = To

Hydraulic Conductivity (K) :

3.53E-04	ft./min.
5.89E-06	ft./sec.
5.09E-01	ft./day
1.80E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 16MWT17

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 15.40 TOC DATE: 11-23-03

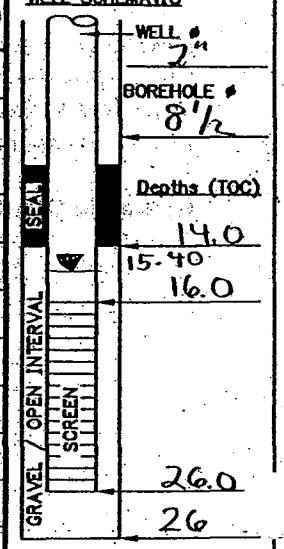
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

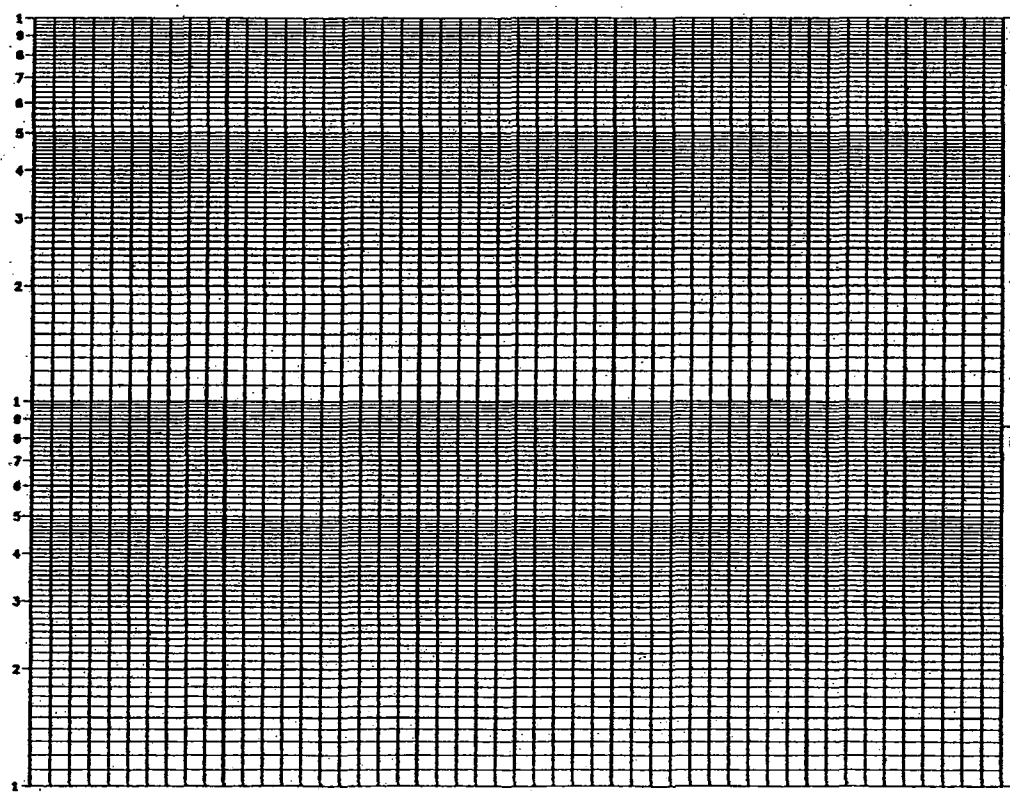
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC 2

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3	-.323	
.1	-1.566		4	-.252	
.2	-.883		5	-.200	
.3	-.790		6	-.170	
.4	-.754		7	-.145	
.5	-.722		8	-.129	
.6	-.691		10	-.109	
.7	-.665		12	-.097	
.8	-.639		15	-.087	
.9	-.619		18	-.083	
1.0	-.597				
2.0	-.434				

WELL SCHEMATIC



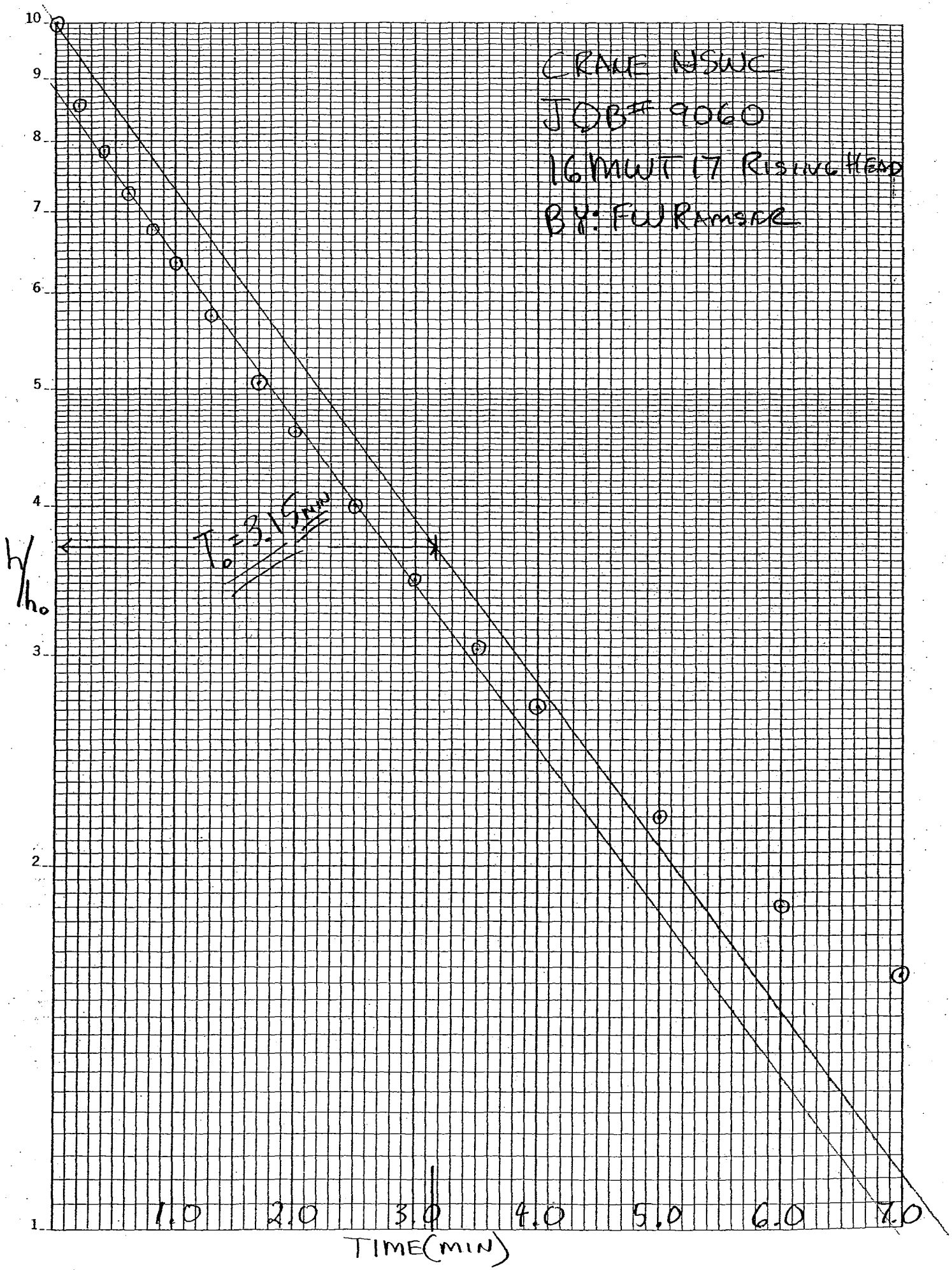
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS,SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/10/2003 8:54:48
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 16\SN06899 2003-11-23 111045
DataMgr Version 3.68 16MWT17rising#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 16MWT17rising#1

Test defined on: 11/23/2003 11:10:06
Test started on: 11/23/2003 11:10:45
Test stopped on: 11/23/2003 11:31:18
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: Minutes.
Number of data samples: 206

TOTAL DATA SAMPLES 206

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 10.706 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = -0.883
	11/23/2003 11:10	0	0			
	11/23/2003 11:10	0.1	-1.566			
	11/23/2003 11:10	0.2	-0.883	0	1.000	•
	11/23/2003 11:11	0.3	-0.79	0.1	0.895	
	11/23/2003 11:11	0.4	-0.754	0.2	0.854	•
	11/23/2003 11:11	0.5	-0.722	0.3	0.818	
	11/23/2003 11:11	0.6	-0.691	0.4	0.783	•
	11/23/2003 11:11	0.7	-0.665	0.5	0.753	
	11/23/2003 11:11	0.8	-0.639	0.6	0.724	•
	11/23/2003 11:11	0.9	-0.619	0.7	0.701	
	11/23/2003 11:11	1	-0.597	0.8	0.676	•
	11/23/2003 11:11	1.1	-0.576	0.9	0.652	
	11/23/2003 11:11	1.2	-0.559	1	0.633	•
	11/23/2003 11:12	1.3	-0.54	1.1	0.612	
	11/23/2003 11:12	1.4	-0.522	1.2	0.591	
	11/23/2003 11:12	1.5	-0.506	1.3	0.573	•
	11/23/2003 11:12	1.6	-0.49	1.4	0.555	
	11/23/2003 11:12	1.7	-0.476	1.5	0.539	
	11/23/2003 11:12	1.8	-0.46	1.6	0.521	

11/23/2003 11:12	1.9	-0.448	1.7	0.507
11/23/2003 11:12	2	-0.434	1.8	0.492
11/23/2003 11:12	2.1	-0.419	1.9	0.475
11/23/2003 11:12	2.2	-0.407	2	0.461
11/23/2003 11:13	2.3	-0.399	2.1	0.452
11/23/2003 11:13	2.4	-0.387	2.2	0.438
11/23/2003 11:13	2.5	-0.373	2.3	0.422
11/23/2003 11:13	2.6	-0.363	2.4	0.411
11/23/2003 11:13	2.7	-0.353	2.5	0.400
11/23/2003 11:13	2.8	-0.343	2.6	0.388
11/23/2003 11:13	2.9	-0.333	2.7	0.377
11/23/2003 11:13	3	-0.323	2.8	0.366
11/23/2003 11:13	3.1	-0.314	2.9	0.356
11/23/2003 11:13	3.2	-0.306	3	0.347
11/23/2003 11:14	3.3	-0.298	3.1	0.337
11/23/2003 11:14	3.4	-0.29	3.2	0.328
11/23/2003 11:14	3.5	-0.282	3.3	0.319
11/23/2003 11:14	3.6	-0.276	3.4	0.313
11/23/2003 11:14	3.7	-0.268	3.5	0.304
11/23/2003 11:14	3.8	-0.262	3.6	0.297
11/23/2003 11:14	3.9	-0.256	3.7	0.290
11/23/2003 11:14	4	-0.252	3.8	0.285
11/23/2003 11:14	4.1	-0.244	3.9	0.276
11/23/2003 11:14	4.2	-0.24	4	0.272
11/23/2003 11:15	4.3	-0.232	4.1	0.263
11/23/2003 11:15	4.4	-0.228	4.2	0.258
11/23/2003 11:15	4.5	-0.222	4.3	0.251
11/23/2003 11:15	4.6	-0.22	4.4	0.249
11/23/2003 11:15	4.7	-0.214	4.5	0.242
11/23/2003 11:15	4.8	-0.206	4.6	0.233
11/23/2003 11:15	4.9	-0.204	4.7	0.231
11/23/2003 11:15	5	-0.2	4.8	0.227
11/23/2003 11:15	5.1	-0.198	4.9	0.224
11/23/2003 11:15	5.2	-0.194	5	0.220
11/23/2003 11:16	5.3	-0.187	5.1	0.212
11/23/2003 11:16	5.4	-0.185	5.2	0.210
11/23/2003 11:16	5.5	-0.183	5.3	0.207
11/23/2003 11:16	5.6	-0.179	5.4	0.203
11/23/2003 11:16	5.7	-0.178	5.5	0.202
11/23/2003 11:16	5.8	-0.174	5.6	0.197
11/23/2003 11:16	5.9	-0.173	5.7	0.196
11/23/2003 11:16	6	-0.17	5.8	0.193
11/23/2003 11:16	6.1	-0.165	5.9	0.187
11/23/2003 11:16	6.2	-0.163	6	0.185
11/23/2003 11:17	6.3	-0.161	6.1	0.182
11/23/2003 11:17	6.4	-0.159	6.2	0.180
11/23/2003 11:17	6.5	-0.155	6.3	0.176
11/23/2003 11:17	6.6	-0.153	6.4	0.173
11/23/2003 11:17	6.7	-0.153	6.5	0.173
11/23/2003 11:17	6.8	-0.149	6.6	0.169
11/23/2003 11:17	6.9	-0.147	6.7	0.166
11/23/2003 11:17	7	-0.145	6.8	0.164
11/23/2003 11:17	7.1	-0.145	6.9	0.164
11/23/2003 11:17	7.2	-0.143	7	0.162
11/23/2003 11:18	7.3	-0.143	7.1	0.162
11/23/2003 11:18	7.4	-0.141	7.2	0.160
11/23/2003 11:18	7.5	-0.143	7.3	0.162
11/23/2003 11:18	7.6	-0.139	7.4	0.157

11/23/2003 11:18	7.7	-0.135	7.5	0.153
11/23/2003 11:18	7.8	-0.131	7.6	0.148
11/23/2003 11:18	7.9	-0.131	7.7	0.148
11/23/2003 11:18	8	-0.129	7.8	0.146
11/23/2003 11:18	8.1	-0.129	7.9	0.146
11/23/2003 11:18	8.2	-0.127	8	0.144
11/23/2003 11:19	8.3	-0.129	8.1	0.146
11/23/2003 11:19	8.4	-0.125	8.2	0.142
11/23/2003 11:19	8.5	-0.127	8.3	0.144
11/23/2003 11:19	8.6	-0.125	8.4	0.142
11/23/2003 11:19	8.7	-0.123	8.5	0.139
11/23/2003 11:19	8.8	-0.121	8.6	0.137
11/23/2003 11:19	8.9	-0.121	8.7	0.137
11/23/2003 11:19	9	-0.117	8.8	0.133
11/23/2003 11:19	9.1	-0.119	8.9	0.135
11/23/2003 11:19	9.2	-0.123	9	0.139
11/23/2003 11:20	9.3	-0.117	9.1	0.133
11/23/2003 11:20	9.4	-0.115	9.2	0.130
11/23/2003 11:20	9.5	-0.113	9.3	0.128
11/23/2003 11:20	9.6	-0.113	9.4	0.128
11/23/2003 11:20	9.7	-0.113	9.5	0.128
11/23/2003 11:20	9.8	-0.111	9.6	0.126
11/23/2003 11:20	9.9	-0.107	9.7	0.121
11/23/2003 11:20	10	-0.109	9.8	0.123
11/23/2003 11:20	10.1	-0.111	9.9	0.126
11/23/2003 11:20	10.2	-0.111	10	0.126
11/23/2003 11:21	11.2	-0.099	11	0.112
11/23/2003 11:22	12.2	-0.097	12	0.110
11/23/2003 11:23	13.2	-0.093	13	0.105
11/23/2003 11:24	14.2	-0.087	14	0.099
11/23/2003 11:25	15.2	-0.089	15	0.101
11/23/2003 11:26	16.2	-0.087	16	0.099
11/23/2003 11:27	17.2	-0.087	17	0.099
11/23/2003 11:28	18.2	-0.083	18	0.094
11/23/2003 11:29	19.2	-0.085	19	0.096
11/23/2003 11:30	20.2	-0.081	20	0.092

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	16MWT17
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.354'	4.25 = R
Length of Well Screen (ft.) :		10.6 = L
Time for 37% head change (min.) :		3.15 = To

Hydraulic Conductivity (K) :

3.53E-04	ft./min.
5.89E-06	ft./sec.
5.09E-01	ft./day
1.80E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(10.6/.354)}{2 \times 10.6 \times 3.15} =$$

3.51×10^{-4} Ft/min

CHECKED

2-18-04

APPENDIX E.1.3
SWMU 16
SLUG TEST RESULTS AND CALCULATIONS ROUND 3

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 16MWT21

PROJECT NO.: N7448 GEOLOGIST: CONTI

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 15' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 67.41 TPVC DATE: 11-15-04

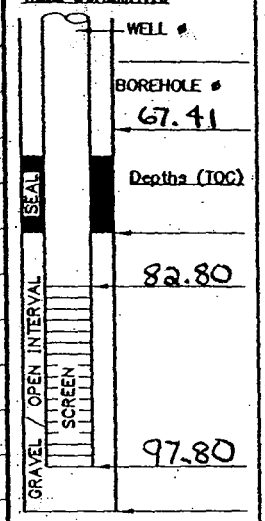
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 2 SEC SLUG 3.2' LONG PAGE 1 OF

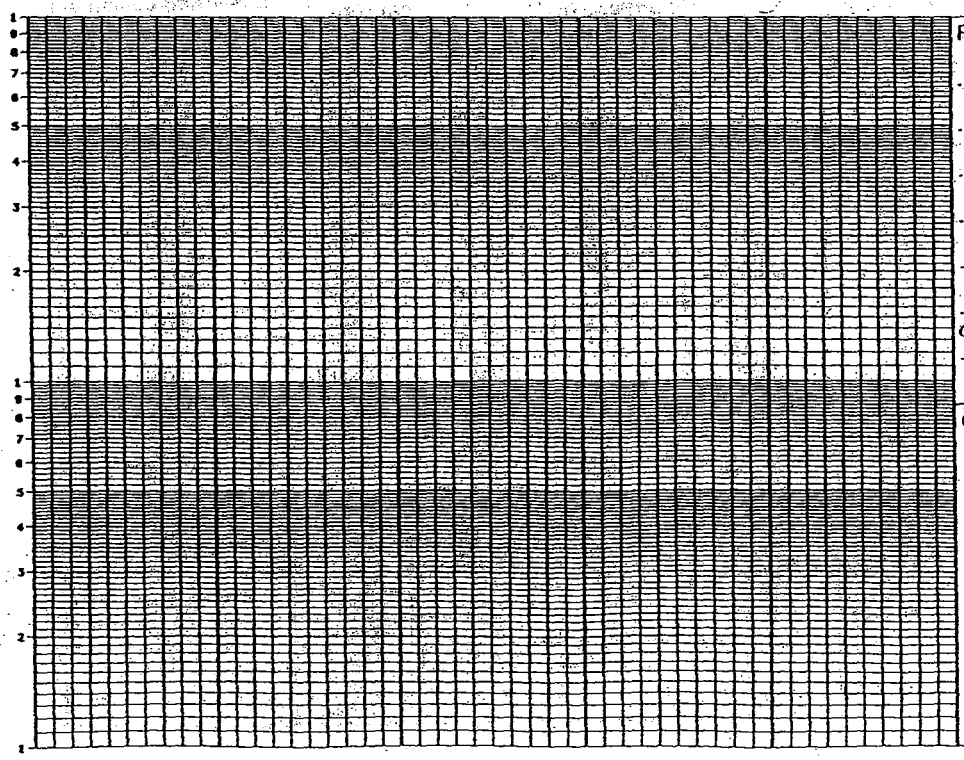
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
.1	2.284		1200	1.532	
.5	2.068		1400	1.46	
1	2.062		1500	1.43	
5	2.052				
15	2.04				
30	2.03				
60	2.00				
70	1.99				
100	1.98				
208	1.92				
500	1.72				
1000	1.28				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

15.795 XD

START @ 1500 HRS 11/15

END @ 1640" 11/16

WILL RUN OVERNITE

65.49 WL ON 11/16/04 @ 0851

30.75 in/Hg 11/16/04

CALCS, SKETCH MAPS, ETC.:

TOOK WL @ 0851 THIS WL MEAS APPEARED TO AFFECT REC BY ± 0.3'

ACAD:FORM_HYDCONTST.dwg 07/08/99 INL

HYDRAULIC CONDUCTIVITY TEST DATA / CALCULATIONS

Note: Yellow cells are input cells, blue cells are automatically calculated

Project Name:	Crane SWMU13/16
Project No.:	N7448
Method of Inducing Water Level Change:	Solid Slug
Reference Pt (Top of Casing, Transducer, etc):	TOC
Test Type (Rising Head / Falling Head):	Falling Head

Well / Boring No.:	16MWT21
Test No.:	1
Date:	12/30/2004
Geologist:	Colin Doolan
Checked by / Date:	SWR / 1-3-05

Well Radius, r (ft.):	0.0833
Radius of Sand/Gravel Pack Interval, R (ft):	0.417
Screened / Monitored Interval Below Water Table, L (ft):	19
Static Water Level (Depth/ Elevation) (ft.):	67.41
Baseline Reading for Test Data (SWL, Transducer Reading, etc):	0.00

TEST DATA

Note: To exclude a data point from the regression, place an "x" in the "exclude" column / data point's row. The first row cannot be excluded.

Exclude	Elapsed Time (min)	Measured Water Level (feet)	Elapsed Time (min)	Drawdown or Head (H) (feet)	H/H_0	$\ln(H/H_0)$	Linear Regression of ln(H/H0) (b=0)
	0.00	2.11	0.00	2.11	1.00	0.0000	0.00
	0.12	2.07	0.12	2.07	0.98	-0.0191	0.00
	0.32	2.07	0.32	2.07	0.98	-0.0211	0.00
	0.65	2.06	0.65	2.06	0.98	-0.0230	0.00
	1.21	2.06	1.21	2.06	0.98	-0.0249	0.00
	2.16	2.06	2.16	2.06	0.97	-0.0259	0.00
	3.77	2.06	3.77	2.06	0.97	-0.0269	0.00
	6.46	2.05	6.46	2.05	0.97	-0.0298	0.00
	10.99	2.04	10.99	2.04	0.97	-0.0327	0.00
	18.60	2.04	18.60	2.04	0.96	-0.0368	0.01
	31.38	2.02	31.38	2.02	0.96	-0.0426	0.01
	52.84	2.01	52.84	2.01	0.95	-0.0495	0.02
	88.87	1.99	88.87	1.99	0.94	-0.0610	0.04
	149.36	1.95	149.36	1.95	0.92	-0.0793	0.07
	237.56	1.90	237.56	1.90	0.90	-0.1047	0.10
	327.56	1.85	327.56	1.85	0.88	-0.1335	0.14
	417.56	1.82	417.56	1.82	0.86	-0.1504	0.18
	507.56	1.71	507.56	1.71	0.81	-0.2135	0.22
	597.56	1.65	597.56	1.65	0.78	-0.2481	0.26
	687.56	1.56	687.56	1.56	0.74	-0.3042	0.30
	777.561	1.49	777.56	1.49	0.71	-0.3489	0.34
	867.561	1.409	867.56	1.41	0.67	-0.4048	0.38
	957.561	1.328	957.56	1.33	0.63	-0.4640	0.42
	1047.561	1.255	1047.56	1.26	0.59	-0.5205	0.46
			0.00			0.0000	
			0.00			0.0000	

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)[1]

Number of data points in the slug test:	24
Slope of the line that linearly approximates ln(h/h0) (m in y=mx+b):	0.000
Y-intercept of the line that linearly approximates ln(h/h0) (b in y=mx+b):	0.016
Actual Y-intercept is set to 0.	0.000
T_0 (min):	2273.806
K (ft/min):	3.07E-07
K (ft/day):	0.000

$$m = \frac{n\left(\sum xy\right) - \left(\sum x\right)\left(\sum y\right)}{n\left(\sum (x^2)\right) - \left(\sum x\right)^2}$$

$$b = \frac{\left(\sum y\right)\left(\sum (x^2)\right) - \left(\sum x\right)\left(\sum xy\right)}{n\left(\sum (x^2)\right) - \left(\sum x\right)^2}$$

n: Number of data points. x: Elapsed time point. y: ln(H/H0) point

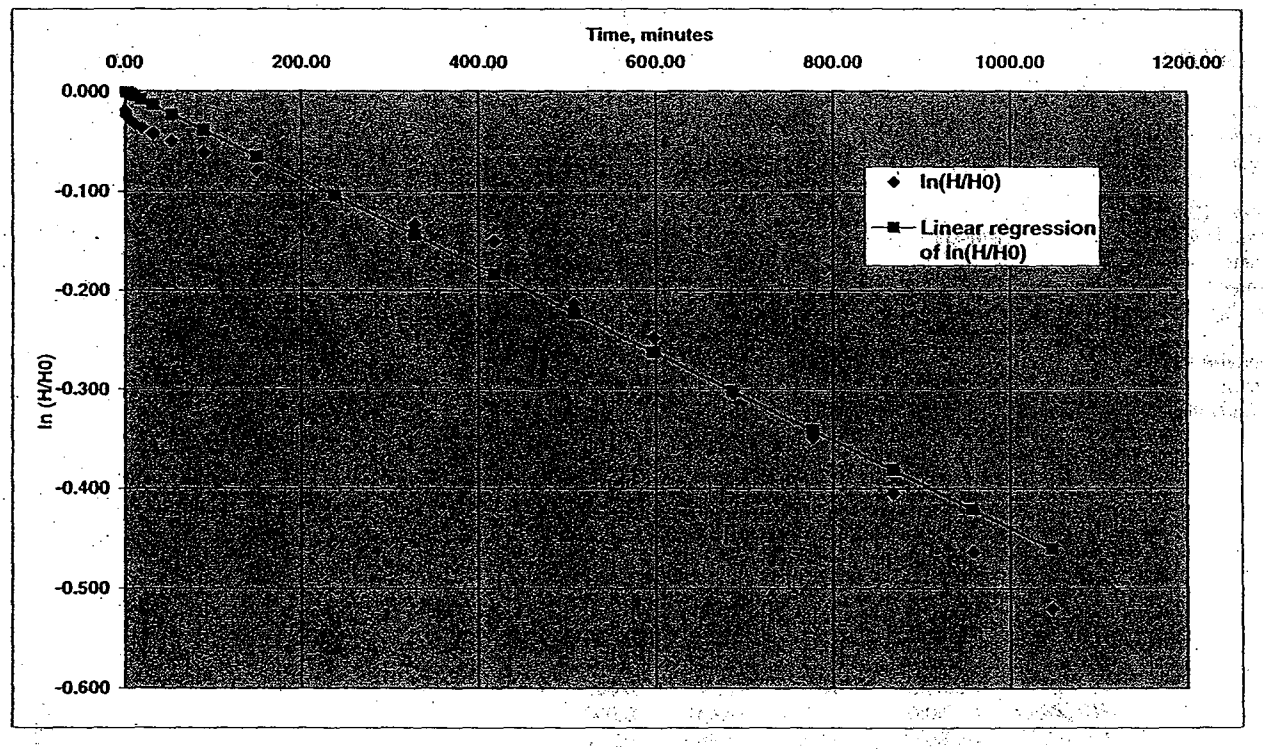
T_0: Time at which ln(H/H0)=-1

$K = r^2 \cdot \ln(L/R)/(2LT_0)$

L: Screened/monitored interval below water table (ft)

r: Well radius (ft)

R: Gravel pack radius (ft)



1. HVORSLEV, M.J. 1951. Time Lag and Soil Permeability in Groundwater Observations. U.S. Army Corps of Engineers. Waterways Experiment Station Bulletin 36, Vicksburg, Mississippi.

$$K = \frac{(0.0833)^2 \ln\left(\frac{19}{0.417}\right)}{2(19)(2273.81)}$$

$$= \frac{\quad}{86{,}404.78}$$

$$= 3.07 \times 10^{-7}\ \text{ft/min}$$

$$\boxed{= 0.00044\ \text{ft/day}}$$

In-Situ Inc. MiniTroll Pro

Report generated: 11/16/2004 16:41:28
Report from file: ...\SN08927 2004-11-15 150000 16MWT21-F.bin
Win-Situ Version 4.47

Serial number: 8927
Firmware Version 3.09
Unit name:

Test name: 16MWT21-F

Test defined on: 11/15/2004 14:51:45
Test scheduled for: 11/15/2004 15:00:00
Test started on: 11/15/2004 15:00:00
Test stopped on: 11/16/2004 16:40:32
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between data points: Minutes.
Number of data samples: 287

TOTAL DATA SAMPLES 287

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 15.793 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adjusted ET (min)	Adjusted Feet H2O
11/15/2004	15:00:00	0	13.4	0		
11/15/2004	15:00:00	0.005	13.41	0.004		
11/15/2004	15:00:00	0.01	13.42	0.006		
11/15/2004	15:00:00	0.015	13.42	0.006		
11/15/2004	15:00:01	0.02	13.42	0.008		
11/15/2004	15:00:01	0.025	13.44	0.007		
11/15/2004	15:00:01	0.03	13.44	0.007		
11/15/2004	15:00:02	0.035	13.44	0.007		
11/15/2004	15:00:02	0.04	13.44	0.014		
11/15/2004	15:00:02	0.045	13.44	0.787		
11/15/2004	15:00:03	0.05	13.44	1.878		
11/15/2004	15:00:03	0.055	13.44	2.145		
11/15/2004	15:00:03	0.06	13.44	2.278		
11/15/2004	15:00:03	0.065	13.44	1.762		
11/15/2004	15:00:04	0.07	13.45	1.618		
11/15/2004	15:00:04	0.075	13.45	2.321		
11/15/2004	15:00:04	0.08	13.45	2.44		
11/15/2004	15:00:05	0.085	13.45	1.885		
11/15/2004	15:00:05	0.09	13.45	1.829		
11/15/2004	15:00:05	0.095	13.45	2.258		
11/15/2004	15:00:06	0.1	13.45	2.284		
11/15/2004	15:00:06	0.1058	13.45	1.912		
11/15/2004	15:00:06	0.112	13.45	2.047		
11/15/2004	15:00:07	0.1185	13.45	2.234		
11/15/2004	15:00:07	0.1255	13.45	1.979		

11/15/2004	15:00:07	0.1328	13.45	2.104			
11/15/2004	15:00:08	0.1407	13.45	2.118			
11/15/2004	15:00:08	0.149	13.45	2.031			
11/15/2004	15:00:09	0.1578	13.45	2.136			
11/15/2004	15:00:10	0.1672	13.44	2.037			
11/15/2004	15:00:10	0.177	13.44	2.112	T=0	0	2.112
11/15/2004	15:00:11	0.1875	13.44	2.056		0.0105	2.056
11/15/2004	15:00:11	0.1985	13.44	2.088		0.0215	2.088
11/15/2004	15:00:12	0.2102	13.44	2.076		0.0332	2.076
11/15/2004	15:00:13	0.2227	13.44	2.066		0.0457	2.066
11/15/2004	15:00:14	0.2358	13.44	2.08		0.0588	2.08
11/15/2004	15:00:15	0.2498	13.42	2.076		0.0728	2.076
11/15/2004	15:00:15	0.2647	13.42	2.07		0.0877	2.07
11/15/2004	15:00:16	0.2803	13.42	2.07		0.1033	2.07
11/15/2004	15:00:17	0.297	13.42	2.072		0.12	2.072
11/15/2004	15:00:18	0.3147	13.44	2.072		0.1377	2.072
11/15/2004	15:00:20	0.3333	13.42	2.072		0.1563	2.072
11/15/2004	15:00:21	0.3532	13.42	2.07		0.1762	2.07
11/15/2004	15:00:22	0.3742	13.42	2.07		0.1972	2.07
11/15/2004	15:00:23	0.3963	13.42	2.068		0.2193	2.068
11/15/2004	15:00:25	0.4198	13.42	2.068		0.2428	2.068
11/15/2004	15:00:26	0.4447	13.42	2.066		0.2677	2.066
11/15/2004	15:00:28	0.4697	13.42	2.068		0.2927	2.068
11/15/2004	15:00:29	0.4963	13.42	2.068		0.3193	2.068
11/15/2004	15:00:31	0.5247	13.42	2.066		0.3477	2.066
11/15/2004	15:00:33	0.5547	13.42	2.066		0.3777	2.066
11/15/2004	15:00:35	0.5863	13.42	2.066		0.4093	2.066
11/15/2004	15:00:37	0.6213	13.42	2.066		0.4443	2.066
11/15/2004	15:00:39	0.658	13.42	2.064		0.481	2.064
11/15/2004	15:00:41	0.6963	13.42	2.064		0.5193	2.064
11/15/2004	15:00:44	0.738	13.42	2.064		0.561	2.064
11/15/2004	15:00:46	0.7813	13.42	2.064		0.6043	2.064
11/15/2004	15:00:49	0.828	13.42	2.064		0.651	2.064
11/15/2004	15:00:52	0.8763	13.42	2.062		0.6993	2.062
11/15/2004	15:00:55	0.928	13.42	2.062		0.751	2.062
11/15/2004	15:00:58	0.983	13.42	2.062		0.806	2.062
11/15/2004	15:01:02	1.0413	13.42	2.062		0.8643	2.062
11/15/2004	15:01:06	1.103	13.41	2.062		0.926	2.062
11/15/2004	15:01:10	1.168	13.41	2.062		0.991	2.062
11/15/2004	15:01:14	1.238	13.41	2.062		1.061	2.062
11/15/2004	15:01:18	1.3113	13.41	2.06		1.1343	2.06
11/15/2004	15:01:23	1.3897	13.41	2.06		1.2127	2.06
11/15/2004	15:01:28	1.473	13.41	2.06		1.296	2.06
11/15/2004	15:01:33	1.5613	13.41	2.06		1.3843	2.06
11/15/2004	15:01:39	1.6547	13.41	2.06		1.4777	2.06
11/15/2004	15:01:45	1.753	13.41	2.058		1.576	2.058
11/15/2004	15:01:51	1.858	13.41	2.06		1.681	2.06
11/15/2004	15:01:58	1.968	13.41	2.058		1.791	2.058
11/15/2004	15:02:05	2.0847	13.41	2.058		1.9077	2.058
11/15/2004	15:02:12	2.2097	13.4	2.058		2.0327	2.058
11/15/2004	15:02:20	2.3413	13.4	2.058		2.1643	2.058
11/15/2004	15:02:28	2.4813	13.4	2.058		2.3043	2.058
11/15/2004	15:02:37	2.6297	13.4	2.056		2.4527	2.056
11/15/2004	15:02:47	2.7863	13.4	2.056		2.6093	2.056
11/15/2004	15:02:57	2.953	13.4	2.056		2.776	2.056
11/15/2004	15:03:07	3.1297	13.4	2.056		2.9527	2.056
11/15/2004	15:03:18	3.3163	13.4	2.056		3.1393	2.056
11/15/2004	15:03:30	3.5147	13.4	2.056		3.3377	2.056
11/15/2004	15:03:43	3.7247	13.4	2.056		3.5477	2.056
11/15/2004	15:03:56	3.9463	13.4	2.056		3.7693	2.056
11/15/2004	15:04:10	4.1813	13.4	2.054		4.0043	2.054
11/15/2004	15:04:25	4.4297	13.4	2.054		4.2527	2.054
11/15/2004	15:04:41	4.693	13.4	2.054		4.516	2.054
11/15/2004	15:04:58	4.973	13.4	2.052		4.796	2.052
11/15/2004	15:05:16	5.2697	13.4	2.052		5.0927	2.052
11/15/2004	15:05:34	5.583	13.4	2.052		5.406	2.052
11/15/2004	15:05:54	5.9147	13.4	2.05		5.7377	2.05
11/15/2004	15:06:15	6.2663	13.4	2.05		6.0893	2.05

11/15/2004	15:06:38	6.6397	13.4	2.05	6.4627	2.05
11/15/2004	15:07:02	7.0347	13.4	2.05	6.8577	2.05
11/15/2004	15:07:27	7.453	13.4	2.05	7.276	2.05
11/15/2004	15:07:53	7.8963	13.4	2.048	7.7193	2.048
11/15/2004	15:08:21	8.3663	13.4	2.048	8.1893	2.048
11/15/2004	15:08:51	8.8647	13.4	2.048	8.6877	2.048
11/15/2004	15:09:23	9.3913	13.39	2.046	9.2143	2.046
11/15/2004	15:09:56	9.9497	13.4	2.046	9.7727	2.046
11/15/2004	15:10:32	10.5413	13.4	2.046	10.3643	2.046
11/15/2004	15:11:10	11.168	13.4	2.044	10.991	2.044
11/15/2004	15:11:49	11.8313	13.4	2.044	11.6543	2.044
11/15/2004	15:12:32	12.5347	13.4	2.042	12.3577	2.042
11/15/2004	15:13:16	13.2797	13.4	2.042	13.1027	2.042
11/15/2004	15:14:04	14.0697	13.4	2.042	13.8927	2.042
11/15/2004	15:14:54	14.9063	13.4	2.04	14.7293	2.04
11/15/2004	15:15:47	15.7913	13.39	2.04	15.6143	2.04
11/15/2004	15:16:43	16.7297	13.4	2.038	16.5527	2.038
11/15/2004	15:17:43	17.723	13.4	2.038	17.546	2.038
11/15/2004	15:18:46	18.7763	13.4	2.036	18.5993	2.036
11/15/2004	15:19:53	19.8913	13.4	2.036	19.7143	2.036
11/15/2004	15:21:04	21.073	13.39	2.034	20.896	2.034
11/15/2004	15:22:19	22.3247	13.4	2.032	22.1477	2.032
11/15/2004	15:23:38	23.6497	13.4	2.032	23.4727	2.032
11/15/2004	15:25:03	25.0547	13.39	2.03	24.8777	2.03
11/15/2004	15:26:32	26.543	13.4	2.028	26.366	2.028
11/15/2004	15:28:07	28.118	13.4	2.028	27.941	2.028
11/15/2004	15:29:47	29.7863	13.4	2.026	29.6093	2.026
11/15/2004	15:31:33	31.5547	13.4	2.024	31.3777	2.024
11/15/2004	15:33:25	33.428	13.4	2.024	33.251	2.024
11/15/2004	15:35:24	35.4113	13.39	2.022	35.2343	2.022
11/15/2004	15:37:30	37.513	13.4	2.02	37.336	2.02
11/15/2004	15:39:44	39.7397	13.4	2.02	39.5627	2.02
11/15/2004	15:42:05	42.098	13.39	2.018	41.921	2.018
11/15/2004	15:44:35	44.5963	13.4	2.016	44.4193	2.016
11/15/2004	15:47:14	47.243	13.4	2.014	47.066	2.014
11/15/2004	15:50:02	50.0463	13.4	2.012	49.8693	2.012
11/15/2004	15:53:00	53.0147	13.4	2.01	52.8377	2.01
11/15/2004	15:56:09	56.1597	13.4	2.008	55.9827	2.008
11/15/2004	15:59:29	59.4913	13.4	2.006	59.3143	2.006
11/15/2004	16:03:01	63.0197	13.39	2.002	62.8427	2.002
11/15/2004	16:06:45	66.758	13.39	2.002	66.581	2.002
11/15/2004	16:10:43	70.718	13.39	1.998	70.541	1.998
11/15/2004	16:14:54	74.9113	13.39	1.996	74.7343	1.996
11/15/2004	16:19:21	79.3547	13.39	1.992	79.1777	1.992
11/15/2004	16:24:03	84.0613	13.39	1.99	83.8843	1.99
11/15/2004	16:29:02	89.0463	13.4	1.987	88.8693	1.987
11/15/2004	16:34:19	94.3263	13.4	1.983	94.1493	1.983
11/15/2004	16:39:55	99.9197	13.39	1.98	99.7427	1.98
11/15/2004	16:45:50	105.8447	13.39	1.976	105.6677	1.976
11/15/2004	16:52:07	112.1197	13.4	1.971	111.9427	1.971
11/15/2004	16:58:46	118.768	13.4	1.969	118.591	1.969
11/15/2004	17:05:48	125.8097	13.39	1.965	125.6327	1.965
11/15/2004	17:13:16	133.268	13.4	1.961	133.091	1.961
11/15/2004	17:21:10	141.168	13.39	1.957	140.991	1.957
11/15/2004	17:29:32	149.5363	13.39	1.951	149.3593	1.951
11/15/2004	17:38:24	158.4013	13.39	1.947	158.2243	1.947
11/15/2004	17:47:47	167.7913	13.4	1.941	167.6143	1.941
11/15/2004	17:57:44	177.738	13.4	1.935	177.561	1.935
11/15/2004	18:07:44	187.738	13.4	1.929	187.561	1.929
11/15/2004	18:17:44	197.738	13.39	1.923	197.561	1.923
11/15/2004	18:27:44	207.738	13.4	1.919	207.561	1.919
11/15/2004	18:37:44	217.738	13.4	1.913	217.561	1.913
11/15/2004	18:47:44	227.738	13.4	1.907	227.561	1.907
11/15/2004	18:57:44	237.738	13.4	1.902	237.561	1.902
11/15/2004	19:07:44	247.738	13.39	1.899	247.561	1.899
11/15/2004	19:17:44	257.738	13.4	1.892	257.561	1.892
11/15/2004	19:27:44	267.738	13.4	1.888	267.561	1.888
11/15/2004	19:37:44	277.738	13.4	1.882	277.561	1.882

11/15/2004	19:47:44	287.738	13.39	1.878	287.561	1.878
11/15/2004	19:57:44	297.738	13.39	1.872	297.561	1.872
11/15/2004	20:07:44	307.738	13.39	1.866	307.561	1.866
11/15/2004	20:17:44	317.738	13.39	1.862	317.561	1.862
11/15/2004	20:27:44	327.738	13.39	1.848	327.561	1.848
11/15/2004	20:37:44	337.738	13.4	1.836	337.561	1.836
11/15/2004	20:47:44	347.738	13.39	1.822	347.561	1.822
11/15/2004	20:57:44	357.738	13.39	1.808	357.561	1.808
11/15/2004	21:07:44	367.738	13.39	1.797	367.561	1.797
11/15/2004	21:17:44	377.738	13.39	1.783	377.561	1.783
11/15/2004	21:27:44	387.738	13.4	1.773	387.561	1.773
11/15/2004	21:37:44	397.738	13.4	1.759	397.561	1.759
11/15/2004	21:47:44	407.738	13.4	1.747	407.561	1.747
11/15/2004	21:57:44	417.738	13.4	1.817	417.561	1.817
11/15/2004	22:07:44	427.738	13.4	1.805	427.561	1.805
11/15/2004	22:17:44	437.738	13.4	1.793	437.561	1.793
11/15/2004	22:27:44	447.738	13.39	1.779	447.561	1.779
11/15/2004	22:37:44	457.738	13.4	1.767	457.561	1.767
11/15/2004	22:47:44	467.738	13.4	1.755	467.561	1.755
11/15/2004	22:57:44	477.738	13.4	1.743	477.561	1.743
11/15/2004	23:07:44	487.738	13.39	1.731	487.561	1.731
11/15/2004	23:17:44	497.738	13.4	1.718	497.561	1.718
11/15/2004	23:27:44	507.738	13.4	1.706	507.561	1.706
11/15/2004	23:37:44	517.738	13.4	1.694	517.561	1.694
11/15/2004	23:47:44	527.738	13.39	1.682	527.561	1.682
11/15/2004	23:57:44	537.738	13.39	1.672	537.561	1.672
11/16/2004	0:07:44	547.738	13.39	1.66	547.561	1.66
11/16/2004	0:17:44	557.738	13.39	1.648	557.561	1.648
11/16/2004	0:27:44	567.738	13.4	1.637	567.561	1.637
11/16/2004	0:37:44	577.738	13.4	1.672	577.561	1.672
11/16/2004	0:47:44	587.738	13.39	1.66	587.561	1.66
11/16/2004	0:57:44	597.738	13.39	1.648	597.561	1.648
11/16/2004	1:07:44	607.738	13.39	1.636	607.561	1.636
11/16/2004	1:17:44	617.738	13.4	1.623	617.561	1.623
11/16/2004	1:27:44	627.738	13.39	1.613	627.561	1.613
11/16/2004	1:37:44	637.738	13.4	1.603	637.561	1.603
11/16/2004	1:47:44	647.738	13.4	1.591	647.561	1.591
11/16/2004	1:57:44	657.738	13.39	1.581	657.561	1.581
11/16/2004	2:07:44	667.738	13.39	1.581	667.561	1.581
11/16/2004	2:17:44	677.738	13.39	1.571	677.561	1.571
11/16/2004	2:27:44	687.738	13.4	1.558	687.561	1.558
11/16/2004	2:37:44	697.738	13.4	1.548	697.561	1.548
11/16/2004	2:47:44	707.738	13.39	1.536	707.561	1.536
11/16/2004	2:57:44	717.738	13.39	1.526	717.561	1.526
11/16/2004	3:07:44	727.738	13.39	1.516	727.561	1.516
11/16/2004	3:17:44	737.738	13.39	1.506	737.561	1.506
11/16/2004	3:27:44	747.738	13.4	1.522	747.561	1.522
11/16/2004	3:37:44	757.738	13.4	1.51	757.561	1.51
11/16/2004	3:47:44	767.738	13.4	1.5	767.561	1.5
11/16/2004	3:57:44	777.738	13.39	1.49	777.561	1.49
11/16/2004	4:07:44	787.738	13.39	1.482	787.561	1.482
11/16/2004	4:17:44	797.738	13.4	1.473	797.561	1.473
11/16/2004	4:27:44	807.738	13.4	1.463	807.561	1.463
11/16/2004	4:37:44	817.738	13.4	1.453	817.561	1.453
11/16/2004	4:47:44	827.738	13.4	1.445	827.561	1.445
11/16/2004	4:57:44	837.738	13.39	1.435	837.561	1.435
11/16/2004	5:07:44	847.738	13.4	1.425	847.561	1.425
11/16/2004	5:17:44	857.738	13.39	1.419	857.561	1.419
11/16/2004	5:27:44	867.738	13.4	1.409	867.561	1.409
11/16/2004	5:37:44	877.738	13.39	1.399	877.561	1.399
11/16/2004	5:47:44	887.738	13.39	1.389	887.561	1.389
11/16/2004	5:57:44	897.738	13.4	1.38	897.561	1.38
11/16/2004	6:07:44	907.738	13.4	1.37	907.561	1.37
11/16/2004	6:17:44	917.738	13.4	1.36	917.561	1.36
11/16/2004	6:27:44	927.738	13.4	1.352	927.561	1.352
11/16/2004	6:37:44	937.738	13.4	1.346	937.561	1.346
11/16/2004	6:47:44	947.738	13.39	1.338	947.561	1.338
11/16/2004	6:57:44	957.738	13.4	1.328	957.561	1.328

11/16/2004	7:07:44	967.738	13.39	1.318	967.561	1.318
11/16/2004	7:17:44	977.738	13.4	1.308	977.561	1.308
11/16/2004	7:27:44	987.738	13.4	1.299	987.561	1.299
11/16/2004	7:37:44	997.738	13.4	1.291	997.561	1.291
11/16/2004	7:47:44	1007.738	13.4	1.281	1007.561	1.281
11/16/2004	7:57:44	1017.738	13.39	1.279	1017.561	1.279
11/16/2004	8:07:44	1027.738	13.39	1.271	1027.561	1.271
11/16/2004	8:17:44	1037.738	13.4	1.263	1037.561	1.263
11/16/2004	8:27:44	1047.738	13.4	1.255	1047.561	1.255
11/16/2004	8:37:44	1057.738	13.39	1.251	1057.561	1.251
11/16/2004	8:47:44	1067.738	13.4	1.589	1067.561	1.589
11/16/2004	8:57:44	1077.738	13.4	1.581	1077.561	1.581
11/16/2004	9:07:44	1087.738	13.4	1.577	1087.561	1.577
11/16/2004	9:17:44	1097.738	13.4	1.573	1097.561	1.573
11/16/2004	9:27:44	1107.738	13.4	1.569	1107.561	1.569
11/16/2004	9:37:44	1117.738	13.4	1.565	1117.561	1.565
11/16/2004	9:47:44	1127.738	13.39	1.561	1127.561	1.561
11/16/2004	9:57:44	1137.738	13.4	1.556	1137.561	1.556
11/16/2004	10:07:44	1147.738	13.4	1.554	1147.561	1.554
11/16/2004	10:17:44	1157.738	13.4	1.55	1157.561	1.55
11/16/2004	10:27:44	1167.738	13.4	1.546	1167.561	1.546
11/16/2004	10:37:44	1177.738	13.4	1.542	1177.561	1.542
11/16/2004	10:47:44	1187.738	13.4	1.538	1187.561	1.538
11/16/2004	10:57:44	1197.738	13.4	1.534	1197.561	1.534
11/16/2004	11:07:44	1207.738	13.4	1.532	1207.561	1.532
11/16/2004	11:17:44	1217.738	13.4	1.528	1217.561	1.528
11/16/2004	11:27:44	1227.738	13.4	1.524	1227.561	1.524
11/16/2004	11:37:44	1237.738	13.39	1.52	1237.561	1.52
11/16/2004	11:47:44	1247.738	13.4	1.516	1247.561	1.516
11/16/2004	11:57:44	1257.738	13.4	1.514	1257.561	1.514
11/16/2004	12:07:44	1267.738	13.4	1.51	1267.561	1.51
11/16/2004	12:17:44	1277.738	13.39	1.506	1277.561	1.506
11/16/2004	12:27:44	1287.738	13.4	1.502	1287.561	1.502
11/16/2004	12:37:44	1297.738	13.4	1.5	1297.561	1.5
11/16/2004	12:47:44	1307.738	13.4	1.496	1307.561	1.496
11/16/2004	12:57:44	1317.738	13.39	1.492	1317.561	1.492
11/16/2004	13:07:44	1327.738	13.39	1.49	1327.561	1.49
11/16/2004	13:17:44	1337.738	13.4	1.486	1337.561	1.486
11/16/2004	13:27:44	1347.738	13.4	1.484	1347.561	1.484
11/16/2004	13:37:44	1357.738	13.4	1.48	1357.561	1.48
11/16/2004	13:47:44	1367.738	13.4	1.475	1367.561	1.475
11/16/2004	13:57:44	1377.738	13.39	1.472	1377.561	1.472
11/16/2004	14:07:44	1387.738	13.4	1.469	1387.561	1.469
11/16/2004	14:17:44	1397.738	13.39	1.466	1397.561	1.466
11/16/2004	14:27:44	1407.738	13.4	1.461	1407.561	1.461
11/16/2004	14:37:44	1417.738	13.4	1.459	1417.561	1.459
11/16/2004	14:47:44	1427.738	13.4	1.455	1427.561	1.455
11/16/2004	14:57:44	1437.738	13.39	1.451	1437.561	1.451
11/16/2004	15:07:44	1447.738	13.4	1.449	1447.561	1.449
11/16/2004	15:17:44	1457.738	13.4	1.445	1457.561	1.445
11/16/2004	15:27:44	1467.738	13.4	1.441	1467.561	1.441
11/16/2004	15:37:44	1477.738	13.39	1.437	1477.561	1.437
11/16/2004	15:47:44	1487.738	13.39	1.435	1487.561	1.435
11/16/2004	15:57:44	1497.738	13.4	1.431	1497.561	1.431
11/16/2004	16:07:44	1507.738	13.4	1.429	1507.561	1.429
11/16/2004	16:17:44	1517.738	13.4	1.423	1517.561	1.423
11/16/2004	16:27:44	1527.738	13.4	1.421	1527.561	1.421
11/16/2004	16:37:44	1537.738	13.4	1.415	1537.561	1.415

APPENDIX E.2.
SWMU 16
HYDRAULIC GRADIENT AND GROUND WATER VELOCITY CALCULATIONS

CLIENT	JOB NUMBER
NSWC CRANE	9060

SUBJECT: G.W FLOW GRADIENT/VELOCITIES - SWMU 16 (SHALLOW)

BASED ON: | DRAWING NUMBER:

BY	CHECKED BY	APPROVED BY	DATE
FWR	FCW		

VELOCITY + Shallow GROUND WATER:

NORTH AREA: $i = dh/dl$, $dh = 751.18 - 747.03 = 4.15$, $dl = 210$

$i = \frac{4.15}{210} =$

$i = 0.0198$ ✓

K = 1.83 ft/day (FROM TABLE 1-4, AVG K SWMU 16)

n = 0.005 (ASSUMED FRACTURE VOL. PER UNIT VOL OF BDRK MASS)

$V = Ki/n$

$= (1.83 ft/day)(0.0198)/0.005$

$= 7.3$ ft/day ✓

EAST-CENTRAL:

$i = \frac{dh}{dl} = \frac{8'}{110} = 0.0727$ ✓

K = 1.83 ft/day (FROM TABLE 1-4 AVG. K SWMU 16)

n = 0.005 (ASSUMED FRACTURE VOL. PER UNIT VOL OF BDRK MASS)

$V = Ki/n$

$= (1.83 ft/day)(0.0727)/.005)$

$= 26.62$ ft/day ✓

CLIENT	JOB NUMBER
NSWC CRANE	9060

SUBJECT: GW FLOW GRADIENT + SEEPAGE VELOCITY. - SWMU 16 (INTERMEDIATE)

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
	FCW		

VELOCITY:

*INTERMEDIATE GROUND WATER

$$i = \frac{dh}{dl} = \left(\frac{0.5}{70} + \frac{0.5}{200}\right)\frac{1}{2}$$

$$= 0.0048$$

K = 0.611 ft/day (FROM TABLE 1-4, AVE K SWMU 16)

n = 0.005

$$V = Ki/n$$

$$= (0.611 \text{ ft/day})(0.0048)/(0.005)$$

$$V = 0.59 \text{ ft/day}$$

CLIENT NSWC CRANE	JOB NUMBER 9060
SUBJECT GW FLOW GRADIENT + SEEPAGE VELOCITY - SWMU 16 (DEEP GW)	
BASED ON	DRAWING NUMBER
BY FWR / CHECKED BY FCW	APPROVED BY / DATE

VELOCITY: * DEEP GROUNDWATER

$i = \frac{dh}{dl} = \frac{3}{150}$ ✓
$= 0.02$

K = 0.004 ft/day (FROM TABLE 1-4, AVE K SWMU 16)

n = 0.005

$V = Ki/n$

$= (0.004 \text{ ft/day})(0.02)/0.005$

$= \underline{\underline{0.016 \text{ ft/day}}}$ ✓

APPENDIX F
SWMU 16
HEALTH AND SAFETY DOCUMENTATION
ROUND 1, ROUND 2, ROUND 3

APPENDIX F.1
SWMU 16
HEALTH AND SAFETY DOCUMENTATION
ROUND 1

Project-Level H&S Recordkeeping

On-site H&S training (topics, participants, dates)...See Section F

Air monitoring instrument calibration...See Section C (C.10.1, C.10.2 & C.10.3)

Monitoring instrument results including background levels, breathing zone readings, personnel exposure records, etc. (air monitoring, noise monitoring, other H&S quantitative measurements)...See Section B (B.1.1, B.1.2 & B.1.3)

H&S training and medical certificates/documents for site personnel... See Section F

Site specific written program documentation (e.g., Hazard communication)...NA

H&S Site clearance letters... See Section F

TETRA TECH NUS, INC.
661 Andersen Drive ▪ Pittsburgh, Pennsylvania 15220-2745
(412) 921-7090 ▪ FAX (412) 921-4040 ▪ www.tetratech.com

PITT-03-3-038

March 21, 2003

Project Number 9060

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Number [redacted]

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888 The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include DPT; drilling; and surface and subsurface soils, sediments, ground water, and surface water sampling at the NSWC Crane site in Indiana. This is scheduled to be conducted from March 24-May 31, 2003. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Mine Fill A, Mine Fill B, Cast High Explosive Fill/Incinerator, Pyrotechnic Test Area dated October 2002 prepared under CTO 0166. These individuals are as follows:

Bob Balkovec
Matt Cochran
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Wroblewski
M. Perry
K. Henn
R. Basinski
T. Johnston

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
ROBERT BALKOVEC Robert Balkovec	3/24/03	11/1998	5/24/02	~~5/24/02~~	11/2001
MATT COCHRAN [illegible]	3/24/03	5/1983	10/02	10/02	8/02
Chad Mahaffy Chad Mahaffy	3/24/03	10/02	12/02	12/02	8/29/02
Son Kotz [illegible]	3/24/03	6/1992	1/03	—	11/23/02
TONY MAYBER [illegible]	3-24-03	6/2000	12/02 ~~1/03~~	12/02	3/28/02
Dave Schreangost Dave Schreangost	3-24-03	8/90	1/03	12/02	11/23/02
Tim Bittenger [illegible]	3-24-03	9/87	12/02	12/02	11/20/02
TERRY ROSAHL [illegible]	3-24-03	10/85	1/03	1/03	11/15/02
Jeff S. Akers Jeff S. Akers	3-25-03	9-87	12-02	12-02	11-23-02
DENNIS A. SINK Dennis Sink	4-23-03	1-90	12-02	—	

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
MATT COOPER Matt Cooper	4/8/03	NA	SURVEYOR	→	→
Corey Allen Corey S. Allen	4/8/03	NA	SURVEYOR	→	→

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech NUS.

Employee Name: TERRY ROJAHN

Office Location: PITTSBURGH

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134/

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: Anna Jones M.D.

Date: 11/10/02

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040.

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

TERRY ROJAHN

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

prepared and conducted by the
NUS Corporation, Pittsburgh, Pennsylvania

SEPT. 30 - OCT. 4, 1985
Date of Award

Gary F. Smith, C.S.P.
Director; Health, Safety Training

E. Dennis Escher, P.E.
Vice President

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Terry R. Rojahn

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

January 30, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Bob Balkovec

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER
REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

May 24, 2002

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Balkovec, Robert	**COMPANY:**	TT/NUS
SSN:	181-66-7235	**POSITION:**	Geologist
DATE OF EXAM:	07/15/2002	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	07/15/2003	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.
2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:
3. ☐ **NOT QUALIFIED**
4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 07/22/02

Signature: _____

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Cochran, Matt	**COMPANY:**	TT/NUS
SSN:	174-54-3686	**POSITION:**	Project Manager
DATE OF EXAM:	03/17/00	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	03/17/02	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.
2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:
3. ☐ **NOT QUALIFIED**
4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 03/21/00

Signature: [illegible]

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Matt Cochran

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 18, 2002

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

Michael G. Cochran

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

presented and conducted by the

NUS Corporation, Pittsburgh, Pennsylvania

May 9 thru 13, 1983

Date of Award

Gary [illegible]
Manager, Health & Safety

E. Dennis Escher, P.E.
General Manager

MedWork
Occupational Health Care
725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/13/02

To: _____

From: _____

Re: David Schrecengost

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON _____ I HAVE REVIEWED THEIR MEDICAL HISTORY, THEIR CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\25orms\BOWSERRECER703-00.doc

Certificate of Training

This Document Certifies That

DAVID SCHRECENGOST

Has Successfully Completed The OSHA Required 40 Hour

HEALTH AND SAFETY TRAINING

Complying with OSHA STANDARD 29CFR 1910.120

INITIAL TRAINING

B. F. Stuart CSP

Course Director

EPT inc.

Environmental Protection Training, inc.

AUGUST 30, 1990

Date of Completion

001150

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

DAVE SCHRECENGOST

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 003

23 Dec 02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14655 DR. 205
FINDLAY, OHIO 45840
419-427-0358

MedWork

Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/23/02

To:

From:

Re: Jon Reiter

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON _____ I HAVE REVIEWED THEIR MEDICAL HISTORY, THERE CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\Forms\BOWSERRECER203-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

JON KEIFER

HAS SUCCESSFULLY COMPLETED

HAZWOPER

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

16TH DAY OF JANUARY 2003

TRAINING CERTIFICATE NO.

16JAN03 013

SCOTT BERNDT, CHMM

DATE

OCCUPATIONAL HAZARD MANAGEMENT
14855 CR. 205
FINDLAY, OHIO 45840

Medchem Safety Corporation, Inc.
of Cincinnati, Ohio

certifies that

Jon Keifer

Has Completed

the OSHA 1910.120 Hazardous Waste Operations and
Emergency Response Forty (40) Hour Course
This 8th Day of June, 1992.

Carl T. Jones, President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

S M C INC

Stephen C. Wilson, Vice President
Medchem Safety Corporation, Inc.
5082 Worley Road
Troy, Ohio 45373

LITHO IN U.S.A.

12-27-2001

LAST NAME KEIFER
FIRST NAME JON

FIT TEST REPORT

Fit test information

ID NUMBER 269-52-6158
LAST NAME KEIFER
FIRST NAME JON
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/27/2001
TEST TIME 10:05
DUE DATE 12/27/2002

PORTACOUNT S/N 16361
N95 COMPANION N

RESPIRATOR
MANUFACTURER [illegible]
MODEL 4000 SERIES
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. [illegible]

PROTOCOL DEFAULT 29CFR1910.134
PASS LEVEL 100

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	12400	Y
DEEP BREATHING	60	[illegible]	Y
TURN HEAD TO SIDE	60	48500	Y
[illegible]	30	34500	Y
TALKING	60	[illegible]	Y
GRIMACE	30	[illegible]	Y
BEND AND TOUCH TOES	60	[illegible]	Y
NORMAL BREATHING	60	12000	Y

OVERALL FF 24000 Y

FIT TEST OPERATOR [signature] DATE 12-27-01
DIANE SNYDER

NAME [signature] DATE 12-27-01
JON KEIFER

MedWork
Occupational Health Care
725 S. Ludlow Street. Dayton. Ohio 45402

Date: 11-23-02

To: _____

From: _____

Re: Jeff Okiro

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON _____. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kenneth Thurne
PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

1203

3
1
0

Certificate of Completion

This Certifies That

JEFF AKERS

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Bolek
Training Director

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES
THAT

JEFF S. AKERS

HAS SUCCESSFULLY COMPLETED

HAZWOPER
SUPERVISOR
&
ANNUAL REFRESHER TRAINING
TRAINING

IN ACCORDANCE WITH
29 CFR 1910.120
ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.
23DEC02 005

Bal S Bernt — 23 Dec 02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14855 CR. 203
FINDLAY, OHIO 45840
419-427-0356

[illegible] LAST NAME [illegible]
FIRST NAME [illegible]

[illegible]
Fit Test Information

ID NUMBER [illegible]
LAST NAME AKERS CUSTOM1
FIRST NAME JEFF CUSTOM2
COMPANY BOWSER MORNER CUSTOM3
LOCATION DAYTON CUSTOM4
NOTE

TEST DATE [illegible] PORTACOUNT S/N [illegible]
TEST TIME 08:35 No SHOP ENROLL N
DUE DATE [illegible]

RESPIRATOR PROTOCOL OSHA ISO FIT TEST
MANUFACTURER [illegible] SENSITIVITY [illegible]
MODEL [illegible]
MASK STYLE FULL FACE
MASK SIZE MEDIUM FACE
APPROVAL
SER. # [illegible]

EXERCISE	PENETRATION	FIT FACTOR	PASS
NORMAL BREATHING	[illegible]	[illegible]	[illegible]
DEEP BREATHING	[illegible]	[illegible]	[illegible]
HEAD LEFT TO RIGHT	[illegible]	[illegible]	[illegible]
HEAD UP AND DOWN	[illegible]	[illegible]	[illegible]
TALKING	[illegible]	[illegible]	
GRIMACE	[illegible]	[illegible]	
BEND AND TOUCH TOES	[illegible]	[illegible]	[illegible]
NORMAL BREATHING	[illegible]	[illegible]	

OVERALL [illegible] [illegible]

[illegible]

MedWork

Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 8/20/02

To:

From:

Re: Chad McCuff

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 8-20-02 I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kenn Hum MD

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

CHAD MAHAFFY

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 021

Scott Berndt 23 Dec 02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14695 CR. 205
FINDLAY, OHIO 45840
419-427-0326

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14633 COUNTY ROAD 205
FINDLAY, OHIO 45840

CERTIFIES
THAT

CHAD R. MAHAFFY

HAS
SUCCESSFULLY
COMPLETED

40 HOUR SITE WORKER & OPERATIONS TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE NO: 020CT02 02

ON THE

2ND DAY OF OCTOBER 2002

SCOTT BERNDT, CHMM — DATE

12/20/2002

LAST NAME [illegible]
FIRST NAME [illegible]

[illegible]

[illegible]

ID NUMBER [illegible]
LAST NAME [illegible]
FIRST NAME [illegible]
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

[illegible]
[illegible]
[illegible]
[illegible]

TEST DATE [illegible]
TEST TIME [illegible]
DUE DATE [illegible]

PORTACOUNT S/N [illegible]
PAS COMPANION N

RESPIRATOR
MANUFACTURER SURVIVAIR
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE MEDIUM/LARGE
APPROVAL
EFF. = 99% M

PROTOCOL OSHA [illegible]
PASS LEVEL 100

EXERCISE	[illegible]	[illegible]	PASS
NORMAL BREATHING	[illegible]	[illegible]	[illegible]
DEEP BREATHING	[illegible]	[illegible]	Y
HEAD SIDE TO SIDE	[illegible]	[illegible]	[illegible]
HEAD UP AND DOWN	[illegible]	[illegible]	[illegible]
TALKING	[illegible]	[illegible]	[illegible]
GRIMACE	[illegible]	[illegible]	[illegible]
BEND AND TOUCH TOES	[illegible]	[illegible]	Y
NORMAL BREATHING	[illegible]	[illegible]	[illegible]

OVERALL FIT [illegible] [illegible]

FIT TEST OPERATOR [illegible] DATE [illegible]
PRINT NAME

NAME [illegible]
[illegible]

MedWork
Occupational Health Care

725 S. Ludlow Street. Dayton, Ohio 45402

Date: _____

To: _____

From: _____

Re: Anthony Mayer

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 3-28-02. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF ~~CHEST X RAY~~, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

TONY MAYRER

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 001

SCOTT BERNOT, CHMM — DATE 22 Dec 02

OCCUPATIONAL HAZARD MANAGEMENT
14655 CR. 205
FINDLAY, OHIO 45840
419-427-0358

Certificate of Completion

presented to

Anthony G. Mayrer

has completed

Hazardous Waste Operations and Emergency Response

40 Hour OSHA 29CFR 1910.120

Sinclair Community College

Presented by Franklin E. Clay
Chair, Safety Risk Management

Given this 16th day of June 2000

Instructor R. David Hylton

Certificate No.: SCC-HAZ-250

[illegible] LAST NAME [illegible]
FIRST NAME [illegible]

[illegible]
[illegible]

SS NUMBER [illegible]
LAST NAME [illegible]
FIRST NAME [illegible]
COMPANY [illegible]
LOCATION [illegible]
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE [illegible]
TEST TIME [illegible]
DOB DATE [illegible]

PORTACOUNT S/N [illegible]
456 COMPANION N

RESPIRATOR
MANUFACTURER [illegible]
MODEL [illegible]
MASK STYLE FULL FACE
MASK SIZE [illegible]
APPROVAL
[illegible]

PROTOCOL USPA 29CFR[illegible]
PASS LEVEL [illegible]

EXERCISE	[illegible]	[illegible]	PASS
NORMAL BREATHING	[illegible]	[illegible]	[illegible]
DEEP BREATHING	[illegible]	[illegible]	[illegible]
HEAD SIDE TO SIDE	[illegible]	[illegible]	
HEAD UP AND DOWN	[illegible]	[illegible]	[illegible]
TALKING	[illegible]	[illegible]	[illegible]
BENDING	[illegible]	[illegible]	[illegible]
BEND AND TOUCH TOES	[illegible]	[illegible]	[illegible]
NORMAL BREATHING	[illegible]	[illegible]	

[illegible] [illegible]

[illegible] [illegible]
[illegible]

NAME [illegible]
[illegible]

MedWork
Occupational Health Care
725 S. Ludlow Street, Dayton, Ohio 45402

Date: _____

To: _____

From: _____

Re: Tim Boehmer

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 11/22/02. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH. EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kevin Thune
PHYSICIAN SIGNATURE

F:\Forms\BOWSERRECERT03-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

TIM BOEHMER

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 006

Bret Bernot 23 Dec 02

SCOTT BERNOT, CHMM DATE

OCCUPATIONAL HAZARD MANAGEMENT
14858 CR. 206
FINDLAY, OHIO 45840
419-427-0288

Medchem Safety Corporation, Inc.
of Cincinnati, Ohio

certifies that

Tim Boehmer

Has Completed
the OSHA 1910.120 Hazardous Waste Operations and
Emergency Response Eight (8) Hour Supervisors Course
This 5th Day of April, 1991.

S
M C
INC

Carl T. Jones, President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

Stephen C. Wilson, Vice President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

1203

Certificate of Completion

3 1 0

This Certifies That

TIM BOEHMER

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120
Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Bolds
Training Director

Certificate of Completion

This is to certify that

TIM BOEHMER

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000002
Certificate Identification Number

Henry M. Butcher, REM, CEA

The State of Ohio
Ohio Bureau of Workers' Compensation
Division of Safety and Hygiene

TIM BOEHMER

has satisfactorily completed 6 hours

Teaching the Safe Operations of Powered Industrial Trucks

of

Sponsored By
BWC - Southwest Regional Office

Superintendent

April 11, 1995
Date

Bob Heater & Mona Weiss
Instructor

BWC-1580 (3/90)
CERT-6

DUPONT

Certificate of Completion

this is to certify that

Tim Boehmer

has successfully completed the

DuPont Corporate Remediation Group

Training Program on

Safety Audit Skills

on this 30th day of November 1998

Lisa S. Edwin

Lisa S. Edwin, CSP

12/23/2002

LAST NAME BOEHMER
FIRST NAME [illegible]

FIT TEST REPORT

FIT TEST INSTRUCTOR

ID NUMBER [illegible]
LAST NAME BOEHMER
FIRST NAME [illegible]
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE [illegible]/2002
TEST TIME [illegible]
DUE DATE 12/23/2003

PORTACOUNT S/N [illegible]
ABS COMPANION N

RESPIRATOR
MANUFACTURER SUPERVAR
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE MEDIUM/LARGE
APPROVAL
[illegible] N

PROTOCOL OSHA [illegible]
PASS LEVEL 500

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	[illegible]	[illegible]	[illegible]
DEEP BREATHING	[illegible]	[illegible]	[illegible]
HEAD SIDE TO SIDE	[illegible]	[illegible]	[illegible]
HEAD UP AND DOWN	[illegible]	[illegible]	[illegible]
TALKING	[illegible]	[illegible]	[illegible]
GRIMACE	[illegible]	[illegible]	[illegible]
BEND AND TOUCH TOES	[illegible]	[illegible]	[illegible]
NORMAL BREATHING	[illegible]	[illegible]	[illegible]

OVERALL FF [illegible]

FIT TEST OPERATOR _____ DATE _____
ERIC HORSTMAN

PASS [illegible] DATE 12/23/02
TESTER SUPERVISOR

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

DENNIS A. SINK

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 002

Bd S Bernt 23 Dec 02

SCOTT BERNDT, CHMM DATE

OCCUPATIONAL HAZARD MANAGEMENT
14855 CR. 209
FINDLAY, OHIO 45840
419-427-0356

Certificate of Completion

This Certifies That

DENNIS SINK

has completed the course

"FORTY HOUR PERSONNEL PROTECTION & SAFETY COURSE"

(In compliance with Federal Regulation 29 CFR 1910.120)

Presented by

SPRINGFIELD SAFETY COUNCIL 50 years

Providing you a . . . to cost containment

January 29, 1990
Date

J.C. Schaffner
Director Marketing Training

APPENDIX F.2
SWMU 16
HEALTH AND SAFETY DOCUMENTATION
ROUND 2

Project-Level H&S Recordkeeping

On-site H&S training (topics, participants, dates)...See Section F

Air monitoring instrument calibration...See Section C (C.10.1, C.10.2 & C.10.3)

Monitoring instrument results including background levels, breathing zone readings, personnel exposure records, etc. (air monitoring, noise monitoring, other H&S quantitative measurements)...See Section B (B.1.1, B.1.2 & B.1.3)

H&S training and medical certificates/documents for site personnel... See Section F

Site specific written program documentation (e.g., Hazard communication)...NA

H&S Site clearance letters... See Section F

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-11-3-029

November 14, 2003

Project Numbers 9060 and 0845

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0315

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to add personnel conducting the field activities at the NSWC Crane site from November 17 through December 19, 2003. Mr. Jim Goerdt and Mr. Scott Grier have been added to the field crew performing this work. All other information in our letter dated October 17, 2003 remains the same.

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld

c: B. Gorman (Code ES 34)
D. Wroblewski
M. Perry
K. Henn
R. Basinski
T. Johnston

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-10-3-045

October 17, 2003

Project Numbers 9060 and 0845

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0315

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include DPT; drilling; and surface and subsurface soils, sediments, ground water, and surface water sampling at the NSWC Crane site in Indiana. This is scheduled to be conducted from October 20 through December 19, 2003. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Mine Fill A, Mine Fill B, Cast High Explosive Fill/Incinerator, Pyrotechnic Test Area, Revision 1, dated October 2003, prepared under CTO 0166; and the Health and Safety Plan for Corrective Measures Study Field Work at Mustard Gas Burial Ground (SWMU 01) dated October 2003 prepared under CTO 0315. These individuals are as follows:

Bob Balkovec	Terry Rojahn
Matt Cochran	Frank Wudkwych
Fred Ramser	

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Wroblewski
M. Perry
K. Henn
R. Basinski
T. Johnston

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
DENNIS A. SINK	10-21-03	1-90?	12-02		3-03
TIM BOEHMER	10-21-03	1-90	12-02	?	11-02
Todd Wollenhaupt	10-21-03	1-90	12-02		12-02
Jon Keifer	10-21-03	3-92	12-02		12-02
FRED CURAMSER	10-21-03	7-91	5-03	5-03	12-03
FRANK WOORWYCH	10-21-03	5-97	5-03	2-98	5-03
MATT COCHRAN	10-21-03	5-03	10-03		
TERRY ROSAHN	10-21-03	10-95	1-03	1-03	11-02
NICK POST	10-24-03	4-15-94	12-23-02	12-23-02	10-10-03
Josh Deer	11-3-03	4-02	9-03		8-03

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
JAMES R WALSH	11-3-03	5/87	12/23/02		2/17/03
MAYNARD LAHTI	11-4-03	10/90	12/23/02		10/6/03
SCOTT GEIER	11/17/03	3/8/02	3/21/03		3/7/02
JIM GOERDT	11/17/03	8/96	10/10/03		11/11/03

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech NUS.

Employee Name: TERRY ROJAHN

Office Location: PITTSBURGH

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134/

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: Anna Yung M.D.

Date: 11/10/02

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040.

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

TERRY ROJAHN

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

prepared and conducted by the
NUS Corporation, Pittsburgh, Pennsylvania

SEPT. 30 - OCT. 4, 1985
Date of Award

Gary F. Smith, C.S.P.
Director; Health, Safety Training

E. Dennis Escher, P.E.
Vice President

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Terry R. Rojahn

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

January 30, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Wudkwych, Frank	**COMPANY:**	TT/NUS
SSN:	181-64-7566	**POSITION:**	Geologist
DATE OF EXAM:	05/01/2003	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	05/01/2005	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.
2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:
3. ☐ **NOT QUALIFIED**
4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 05/06/03

Signature: Peter P Greaney MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

CERTIFICATE OF TRAINING

CHMR

THIS CERTIFIES THAT

FRANK C. WUDKWYCH

has successfully completed a course of instruction in

OCCUPATIONAL HEALTH AND SAFETY

40-Hour Basic Health and Safety Training
Complying with 29 CFR 1910.120(e)(3)(i)

CELEBRATING 10 YEARS

prepared and conducted by the

Center for Hazardous Materials Research

Pittsburgh, Pennsylvania

May 16, 1997

Date of Award

Edgar Berkey, Ph.D.
President

University of Pittsburgh Applied Research Center

320 William Pitt Way ◆ Pittsburgh, PA 15238

(412) 826-3915 ◆ (412) 826-5320 ◆ (800) 246-8659

http://www.chmr.org

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Frank C. Wudkwych

has successfully completed a course of instruction in

HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE MANAGEMENT/SUPERVISOR TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

February 27, 1998

Date of Award

Clyde Snyder
Senior Instructor
Hazardous Materials Training

Matthew M. Soltis, CIH, CSP
Corporate Health and Safety
Manager

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Frank Wudkwych

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

May 23, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Cochran, Matthew	**COMPANY:**	TT/NUS
SSN:	174-54-3686	**POSITION:**	Geologist
DATE OF EXAM:	03/01/2002	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	03/01/2004	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 03/07/02

Signature: Peter Greaney MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Matt Cochran

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 10, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

Michael G. Cochran

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

presented and conducted by the

NUS Corporation, Pittsburgh, Pennsylvania

May 9 thru 13, 1983

Date of Award

Gary F. Sachs
Manager, Health & Safety

E. Dennis Escher, P.E.
General Manager

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech.

Employee Name: Fred Ramser

Office Location: Tetra Tech

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134.

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: [illegible] M.D.

Date: 12-12-12

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Fred W. Ramser

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

May 23, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HALLIBURTON NUS
Environmental Corporation

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

FRED W. RAMSER

has successfully completed a 40 hour course of instruction in
OSHA 29 CFR 1910.120

HAZARDOUS WASTE HEALTH AND SAFETY TRAINING

prepared and conducted by the
HALLIBURTON NUS Environmental Corporation,
Pittsburgh, Pennsylvania

JULY 15 - 19, 1991
Date of Award

Dana R. Irvin
Principal Instructor, Project Manager
Environmental Management Group

James K. Laffey
Director, Hazardous Materials Training
Environmental Management Group

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Goerdt, James	**COMPANY:**	TT/NUS
SSN:	481-86-2691	**POSITION:**	Environmental Scientist
DATE OF EXAM:	11/07/2003	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	11/07/2005	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Scott Hardy, M.D. Date: 11/11/03

Signature: Scott Hardy MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

APPLIED EDUCATIONAL SERIES

James D. Goerdt

APPLIED ASSOCIATES INTERNATIONAL INC.

CERTIFICATE

OSHA, 1910.120
Hazardous Waste Operations and Emergency Response 40 Hour Course

ISSUE DATE: December 13, 1991

EXPIRATION: December 13, 1992

CERTIFICATE: HAZ9112001058

STEVEN L. WILLIAMS
President

THOMAS O. MURRAY
Certified Industrial Hygenist

P. O. Box 300068
Fern Park, Florida 32730-0068

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Jim Goerdt

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER
REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 10, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: Baseline Examination

EMPLOYEE:	Grier, Scott	**COMPANY:**	TT/NUS
SSN:	209-56-9743	**POSITION:**	Earth Scientist
DATE OF EXAM:	02/28/2002	**LOCATION:**	TT/NUS-King Of Prussia
EXPIRATION DATE:	02/28/2004	**SITE:**	King Of Prussia

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 03/07/02

Signature: Peter Greaney MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

Compliance Solutions

"Today's Training...Tomorrow's Solution"

10515 E 40th Ave, Suite 118, Denver Colorado 80239 800-711-2706

Student Affiliation:
Tetra Tech NUS, Inc.
14818

Certificate of Completion

This is to certify that

Scott Grier

has successfully completed the classroom requirements for

40 Hour HAZWOPER

29 CFR 1910.120(e)

Presented

Friday, March 08, 2002

Compliance Solutions Occupational Trainers, Inc.

Certificate Number: 40409

Neval Gupta
Vice President

Paul Hewes
Instructor

Compliance Solutions

"Today's Training... Tomorrow's Solution"

10515 E 40th Ave, Suite 116, Denver Colorado 80239 800-711-2706

Student Affiliation:
Tetra Tech NUS, Inc.
14818

Certificate of Completion

This is to certify that

Scott Grier

has successfully completed the classroom requirements for

8 Hour HAZWOPER Refresher

29 CFR 1910.120(e)

Presented

Friday, March 21, 2003

Compliance Solutions Occupational Trainers, Inc.

Certificate Number: 47837

Neval Gupta
Vice President

Jeffrey Kline
President/CEO

MedWork
Occupational Health Care
725 S. Ludlow Street, Dayton, Ohio 45402

Date: _____

To: _____

From: _____

Re: Tim Boehner

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 11/23/02. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIR CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kevin Hurd
PHYSICIAN SIGNATURE

F:\Forms\BOWSERRECERT03-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

TIM BOEHMER

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 006

SCOTT BERNDT, CHMM — DATE 23 Dec 02

OCCUPATIONAL HAZARD MANAGEMENT
14655 CR. 205
FINDLAY, OHIO 45840
419-427-0356

Medchem Safety Corporation, Inc.
of Cincinnati, Ohio

certifies that

Tim Boehmer

Has Completed
the OSHA 1910.120 Hazardous Waste Operations and
Emergency Response Eight (8) Hour Supervisors Course
This 5th Day of April, 1991.

Carl T. Jones

Carl T. Jones, President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

S
M C
INC

Stephen C. Wilson

Stephen C. Wilson, Vice President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

1203

3

1

0

Certificate of Completion

This Certifies That

TIM BOEHMER

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Bolds
Training Director

Certificate of Completion

This is to certify that

TIM BOEHMER

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000002
Certificate Identification Number

Henry M. Butcher, REM, CEA

The State of Ohio
Ohio Bureau of Workers' Compensation
Division of Safety and Hygiene

TIM BOEHMER

has satisfactorily completed 6 hours

Teaching the Safe Operations of Powered Industrial Trucks

of

Sponsored By
BWC - Southwest Regional Office

Superintendent

April 11, 1995

Date

Bob Heater & Mona Weiss

Instructor

BWC-1580 (3/90)
CERT-6

DUPONT

Certificate of Completion

this is to certify that

Tim Boehmer

has successfully completed the

DuPont Corporate Remediation Group

Training Program on

Safety Audit Skills

on this 30th day of November 1998

Lisa S. Edwin

Lisa S. Edwin, CSP

CERTIFICATE OF ACHIEVEMENT

This certificate has been awarded by the Ohio Chamber of Commerce and the Manufacturers' Education Council to

TIM BOEHMER

For a demonstrated commitment to sound safety management practices.

Certified for the successful completion of all requirements in the OSHA Recordkeeping course conducted April 29, 1998 in Columbus, Ohio.

Andrew E. Boehrel, President
Ohio Chamber of Commerce, Columbus

Mark W. Uher, President
Manufacturers' Education Council, Columbus

12/03/2002

LAST NAME SOEHNER
FIRST NAME TIMOTHY

FIT TEST REPORT

Fit test information

ID NUMBER 077-52-1652
LAST NAME SOEHNER
FIRST NAME TIMOTHY
COMPANY SOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/03/2002
TEST TIME 08:54
DUE DATE 12/03/2003

PORTACOUNT S/N 1284
X86 COMPANION N

RESPIRATOR
MANUFACTURER SURVIVAIR
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE MEDIUM/LARGE
APPROVAL
EFF. - 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 100

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	9100	Y
DEEP BREATHING	60	10200	Y
HEAD SIDE TO SIDE	30	2170	Y
HEAD UP AND DOWN	30	2100	Y
TALKING	60	917	Y
GRIMACE	15	2401	Y
BEND AND TOUCH TOES	60	2510	Y
NORMAL BREATHING	60	1230	Y

OVERALL FF 2170

FIT TEST OPERATOR _____ DATE _____
ERIC HORSTMAN

NAME _____ DATE 12/3/02
TIMOTHY SOEHNER

MedWork

Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 10-06-03

To: Bowser Morner

From: MedWork

Re: Maynard Lahti

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON OCT. 6, 2003. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

ALL WRITTEN OR PRINTED INFORMATION MUST BE LEGIBLE

Published by J. J. KELLER & ASSOCIATES, INC., Neenah, WI • USA
(800) 327-6868 • www.jjkeller.com • Printed in the United States 651-FS-L2

MEDICAL EXAMINER'S CERTIFICATE

I certify that I have examined SUG MAYWARD LAHTI in accordance with the Federal Motor Carrier Safety Regulations (49 CFR 391.41-391.49) and with knowledge of the driving duties, I find this person is qualified; and, if applicable, only when:

- ☑ wearing corrective lenses
- ☐ wearing hearing aid
- ☐ accompanied by a _____ waiver/exemption
- ☐ driving within an exempt intracity zone (49 CFR 391.62)
- ☐ accompanied by a Skill Performance Evaluation Certificate (SPE)
- ☐ qualified by operation of 49 CFR 391.64

The information I have provided regarding this physical examination is true and complete. A complete examination form with any attachment embodies my findings completely and correctly, and is on file in my office.

SIGNATURE OF MEDICAL EXAMINER	TELEPHONE	DATE
		10-6-05

MEDICAL EXAMINER'S NAME (PRINT)	☑ MD ☐ DO ☐ Chiropractor ☐ Physician Assistant ☐ Advanced Practice Nurse
A ALMAZAN MD	

MEDICAL EXAMINER'S LICENSE OR CERTIFICATE NO. / ISSUING STATE	
35076247A	OH

SIGNATURE OF DRIVER	DRIVER'S LICENSE NO.	STATE
Sugo Maynard Lahti	RL367640	OH

ADDRESS OF DRIVER
PO 36 STAN-HELL RD KINSMAN, OH. 44428

MEDICAL CERTIFICATE EXPIRATION DATE
10-6-05

DISTRIBUTION: 1 COPY TO THE DRIVER, 1 COPY TO THE MOTOR CARRIER

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

MAYNARD S. LAHTI

HAS SUCCESSFULLY COMPLETED

HAZWOPER

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

16TH DAY OF JANUARY 2003

TRAINING CERTIFICATE NO.

16JAN03 006

Bud Berndt 16 Jan. 03

SCOTT BERNDT, CHMM DATE

OCCUPATIONAL HAZARD MANAGEMENT
14555 CR. 205
FINDLAY, OHIO 45840

HAZMAT TRAINING ▲ INFORMATION ▲ SERVICES INC.

CERTIFICATE OF COMPLETION

This is to certify that

MAYNARD LAHTI

has successfully completed

THE 40-HOUR HAZARDOUS MATERIALS SITE WORKER COURSE

at

HAZMAT T.I.S.I., COLUMBIA, MARYLAND

Manager, Training Services Department

OCTOBER, 1990
Date

President

12/29/2003

LAST NAME LAHTI
FIRST NAME MAYNARD

FIT TEST REPORT

Fit test Information

ID NUMBER 273-52-2403
LAST NAME LAHTI
FIRST NAME MAYNARD
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 09:30
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	1310	Y
DEEP BREATHING	60	843	N
HEAD SIDE TO SIDE	60	1490	Y
HEAD UP AND DOWN	60	1230	Y
TALKING	60	1170	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	2080	Y
NORMAL BREATHING	60	1330	Y
OVERALL FF		1270	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Maynard Lahti DATE 12-29-03
MAYNARD LAHTI

OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

RESPIRATOR QUESTIONNAIRE

NAME: Joshua Dean **COMPANY:** Bowser Morner

A new questionnaire should be completed annually or sooner if a medical condition intervenes. OCC recommends that a pre-placement medical evaluation be done on all employees using a respirator.

PHYSICAL EXAMINATION REQUIRED: (YES) **NO**

(If examination is required, it must be completed within 30 days of questionnaire.)

Questionnaire Reviewed by: C. Van Kouwenhoven Date: 8/14/03
Nurse Signature

A. ____ No limitations regarding respirator use.

B. ____ Restrictions are placed on this employee for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

_____

_____

C. ____ Follow-up medical evaluation is recommended as per NIOSH guidelines.
Every 5 years for persons under age 35
Every 2 years for persons aged 35 to 45
Every year for persons over the age of 45

Evaluations for persons performing strenuous work with SCBA:
Every 3 years for those under age 35
Every 18 months for those aged 35 to 45
Annually for those over the age of 45

D. ____ Your employee has been provided a copy of this Licensed Health Care Professional's written recommendation.

T.E. Lieser, MD; P.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES
THAT

JOSH DEAN

HAS SUCCESSFULLY COMPLETED

HAZWOPER

ANNUAL REFRESHER TRAINING
TRAINING
IN ACCORDANCE WITH
29 CFR 1910.120
ON THE

2ND OF SEPTEMBER 2003

TRAINING CERTIFICATE NO.
02SEP03 001

SCOTT BERNDT, CHMM

2 Sept 03
DATE

OCCUPATIONAL HAZARD MANAGEMENT
2001 COTTONWOOD STREET
FINDLAY, OHIO 45840

FINDLAY

THE UNIVERSITY OF FINDLAY

Certificate of Achievement

awarded by

THE NATIONAL CENTER OF EXCELLENCE FOR ENVIRONMENTAL MANAGEMENT

ENVIRONMENTAL RESOURCE TRAINING CENTER

to

JOSHUA DEAN

for Successful Completion of

OSHA 40-HOUR SAFETY TRAINING WORKSHOP

(FULFILLS THE REQUIREMENTS OF 29 CFR 1910.120 COVERING HAZARDOUS WASTE OPERATIONS)

4.0 CEU'S

APRIL 27, 2002

EXECUTIVE DIRECTOR

INSTRUCTOR

OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

RESPIRATOR QUESTIONNAIRE

NAME: James Walsh **COMPANY:** Bowser-Morner

A new questionnaire should be completed annually or sooner if a medical condition intervenes. OCC recommends that a pre-placement medical evaluation be done on all employees using a respirator.

PHYSICAL EXAMINATION REQUIRED: **YES** **NO**

(If examination is required, it must be completed within 30 days of questionnaire.)

Questionnaire Reviewed by: C. Van Kirghnuten Date: 2/17/2005
Nurse Signature

A. ✓ No limitations regarding respirator use.

B. ____ Restrictions are placed on this employee for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

C. ✓ Follow-up medical evaluation is recommended as per NIOSH guidelines.
Every 5 years for persons under age 35
Every 2 years for persons aged 35 to 45
Every year for persons over the age of 45

Evaluations for persons performing strenuous work with SCBA:
Every 3 years for those under age 35
Every 18 months for those aged 35 to 45
Annually for those over the age of 45

D. ✓ Your employee has been provided a copy of this Licensed Health Care Professional's written recommendation.

B.C. Russell PAC

T.E. Lieser, MD; P.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

JAMES R. WALSH

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 014

Bret S Bernt 23 Dec 02

SCOTT BERNDT, CHMM DATE

OCCUPATIONAL HAZARD MANAGEMENT
14655 CR. 203
FINDLAY, OHIO 45840
419-427-0355

1203

0

Certificate of Completion

This Certifies That

James R. Walsh

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

May 8-11, 1987
Date

Training Director

[illegible]

LAST NAME WALSH
FIRST NAME JAMES

[illegible]

[illegible]

ID NUMBER [illegible]
LAST NAME WALSH
FIRST NAME JAMES
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE [illegible]
TEST TIME [illegible]
DUE DATE [illegible]

PORTACOUNT S/N [illegible]
USE COMPANSATION N

RESPIRATOR
MANUFACTURER SURGIVAIR
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE [illegible]
APPROVAL
[illegible]

PROTOCOL OSHA [illegible]
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FITFACTOR	[illegible]
NORMAL BREATHING	[illegible]	[illegible]	[illegible]
DEEP BREATHING	[illegible]	[illegible]	[illegible]
TURN HEAD SIDE TO SIDE	[illegible]	[illegible]	[illegible]
NOD HEAD UP AND DOWN	[illegible]	[illegible]	[illegible]
TALKING	[illegible]	[illegible]	[illegible]
GRIMACE	[illegible]	[illegible]	[illegible]
BEND AND TOUCH TOES	[illegible]	[illegible]	[illegible]
NORMAL BREATHING	[illegible]	[illegible]	[illegible]

[illegible] [illegible]

[illegible] DATE [illegible]
RESPIRATOR

NAME [illegible] DATE [illegible]
[illegible]

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/23/02

To: _____

From: _____

Re: Jon Keifer

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON _____. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\Forms\BOWSERRECERT03-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

JON KEIFER

HAS SUCCESSFULLY COMPLETED

HAZWOPER

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

16TH DAY OF JANUARY 2003

TRAINING CERTIFICATE NO.

16JAN03 013

SCOTT BERNDT, CHMM

16 Jan 03

DATE

OCCUPATIONAL HAZARD MANAGEMENT
14655 CR. 205
FINDLAY, OHIO 45840

Medchem Safety Corporation, Inc.
of Cincinnati, Ohio

certifies that

Jon Keifer

Has Completed

the OSHA 1910.120 Hazardous Waste Operations and
Emergency Response Forty (40) Hour Course
This 8th Day of June, 1992.

S M C INC.

Carl T. Jones, President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

Stephen C. Wilson, Vice President
Medchem Safety Corporation, Inc.
5082 Worley Road
Troy, Ohio 45373

© GOES 460-1/2

LITHO IN U.S.A.

MedWork

Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 5/23/05

To: _____

From: _____

Re: DENNIS SINK

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 5/23/05. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

DENNIS A. SINK

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 002

SCOTT BERNDT, CHMM — DATE: 23 Dec. 02

OCCUPATIONAL HAZARD MANAGEMENT
14655 CR. 205
FINDLAY, OHIO 45840
419-427-0356

Certificate of Completion

This Certifies That

DENNIS SINK

has completed the course

"FORTY HOUR PERSONNEL PROTECTION & SAFETY COURSE"

(In compliance with Federal Regulation 29 CFR 1910.120)

Presented by

SPRINGFIELD SAFETY COUNCIL 50 years

Providing you a . . .

to cost containment

January 29, 1990
Date

J.C. Schaffner
Director Marketing - Training

Certificate of Completion

This is to certify that

DENNIS SINK

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000013
Certificate Identification Number

Henry M. Butcher, REM, CEA

12/23/2002

LAST NAME SINK
FIRST NAME DENNIS

FIT TEST REPORT

Fit test information

ID NUMBER [illegible]
LAST NAME SINK
FIRST NAME DENNIS
COMPANY SCHASER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/23/2002
TEST TIME 09:35
DUE DATE 12/23/2003

PONTACOUNT OR PERS
1ST COMPANION #

RESPIRATOR
MANUFACTURER SUPERVAIR
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE MEDIUM/LARGE
APPROVAL
SFR. & SFL #

PROTOCOL OSHA 1910.134
PASS LEVEL (100)

EXERCISE	DURATION (SEC)	BLS SCORE	PASS
NORMAL BREATHING	60	[illegible]	Y
DEEP BREATHING	60	[illegible]	Y
HEAD SIDE TO SIDE	60	[illegible]	Y
HEAD UP AND DOWN	60	[illegible]	Y
TALKING	60	[illegible]	Y
GRIMACE	60	[illegible]	Y
BEND AND TOUCH TOES	60	[illegible]	Y
NORMAL BREATHING	60	[illegible]	Y

OVERALL FF [illegible] Y

FIT TEST OPERATOR ERIC HORSTMAN DATE [illegible]

NAME DENNIS SINK DATE 12-23-02

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11-6-02

To: _____

From: _____

Re: Todd Wollenhaupt

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 11-6-02. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14655 COUNTY ROAD 205
FINDLAY, OHIO 45840

CERTIFIES
THAT

TODD WOLLENHAUPT

HAS
SUCCESSFULLY
COMPLETED

40 HOUR SITE WORKER & OPERATIONS TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE NO: 27NOV.02 001

ON THE

27TH OF NOVEMBER 2002

Scott Berndt — 27 NOV 02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

TODD WOLLENHAUPT

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 007

SCOTT BERNDT, CHMM — DATE: 23 Dec 02

OCCUPATIONAL HAZARD MANAGEMENT
14655 CR. 205
FINDLAY, OHIO 45840
419-427-0356

OCCUPATIONAL HAZARD MANAGEMENT

14655 CR 205
FINDLAY, OHIO 45840
419-427-0356

Qualitative
Respirator Fit Test Log

Date: 27 Nov. 02
Time: 0900

Personal Information

Name: Todd Wollenhaupt
SS#: 283-64-6069
Company: Bowser-Morner, inc

Respirator Information

Type: Full Face [X] Half Face [ ] PAPR [ ]

Manufacturer: ~~MSA~~ Sonvinair Model: ~~3200~~ SRL 9000

Fit Test Media: Irritant Smoke: [ ] Banana Oil: [X]

Positive - Negative Self Test:	Pass	BW	Fail	
Looking Forward:	Pass		Fail	
Head Right:	Pass		Fail	
Head Left:	Pass		Fail	
Head Up:	Pass		Fail	
Head Down:	Pass		Fail	
After Jumping Jacks:	Pass		Fail	
After Bending Down:	Pass		Fail	
After Walking:	Pass		Fail	
Rainbow Passage:	Pass	BW	Fail	

Student Signature: Todd Wollenhaupt Date: 11-27-02

Instructor Signature: [illegible] Date: 27 Nov. 02

12/23/2002

LAST NAME WOLLENHAUPT
FIRST NAME TODD

FIT TEST REPORT

Fit test information

ID NUMBER	2024-0102		
LAST NAME	WOLLENHAUPT	CUSTOM1	
FIRST NAME	TODD	CUSTOM2	
COMPANY	BOWSER MORNER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			

TEST DATE	12/23/2002	PORTACOUNT S/N	4240
TEST TIME	14:03	N95 COMPANION	N
DOB DATE	12/23/2002		

RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	3M/MMM	PASS LEVEL	100
MODEL	SIGMA		
MASK STYLE	FULL FACE		
MASK SIZE	MEDIUM		
APPROVAL			
EPA # 95%			

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS?
NORMAL BREATHING	60	9080	Y
DEEP BREATHING	60	3458	Y
HEAD SIDE TO SIDE	60	7570	Y
HEAD UP AND DOWN	60	10700	Y
TALKING	60	6280	Y
GRIMACE	15	5400	Y
BEND AND TOUCH TOES	60	5010	Y
NORMAL BREATHING	60	6750	Y
OVERALL FF		9120	Y

FIT TEST OPERATOR _____ DATE _____
ERIC MORSTMAN

NAME _____ DATE _____
TODD WOLLENHAUPT

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 10/10/03

To: _____

From: MEDWORK

Re: NICHOLAS POST

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON OCT. 10, 2003. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

94041540E-01

CERTIFICATE

ENVIROGENICS

HEALTH AND SAFETY TRAINING INSTITUTE
65 South Main Street, Building C, Pennington, NJ 08534

THIS IS TO CERTIFY THAT

NICHOLAS C. POST

HAS SUCCESSFULLY COMPLETED THE TRAINING REQUIREMENTS
FOR

OSHA 1910.120(e)(9) 40-HOUR EQUIVALENT HAZARDOUS WASTE OPERATIONS HEALTH AND SAFETY TRAINING

INSTRUCTOR

April 15, 1994
DATE

© 1992 ... 1/2

PRINTED IN U.S.A.

Occupational Hazard Management

Certifies

that

NICK POST

Has successfully completed

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

In Accordance with

29 CFR 1910.120

on the

23RD DAY OF DECEMBER 2002

Training Certificate No.

23DEC02 025

Scott Berndt, CHMM — Date: 23 Dec 02

Occupational Hazard Management
14655 CR. 205
Findlay, Ohio 45840
419-427-0356

APPENDIX F.3
SWMU 16
HEALTH AND SAFETY DOCUMENTATION
ROUND 3

Project-Level H&S Recordkeeping

On-site H&S training (topics, participants, dates)...See Section F

Air monitoring instrument calibration...See Section C (C.10.1, C.10.2 & C.10.3)

Monitoring instrument results including background levels, breathing zone readings, personnel exposure records, etc. (air monitoring, noise monitoring, other H&S quantitative measurements)...See Section B (B.1.1, B.1.2 & B.1.3)

H&S training and medical certificates/documents for site personnel... See Section F

Site specific written program documentation (e.g., Hazard communication)...NA

H&S Site clearance letters... See Section F

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-06-4-023

June 8, 2004

Project Number 7448

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 324)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0343

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by a Tetra Tech NUS, Inc. employee under the CLEAN contract, and to attest that the individual identified herein is in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include locating and staking locations for proposed groundwater monitoring and soil boring locations in and around the following SWMUs at NSWC Crane site in Indiana:

- SWMU 12, Mine Fill A
- SWMU 13, Mine Fill B
- SWMU 16, Cast High Explosive Fill/ Building 146

This is scheduled to be conducted from June 10 through June 15, 2004. These activities will be performed by Mr. Stan Conti, a Tetra Tech NUS, Inc. employee. After an evaluation of available historical information, it has been determined that Mr. Conti's planned activities will not involve a reasonable potential for any exposures to hazardous waste site safety or health hazards, and as such, the requirements of OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations are not considered to be applicable for the purposes of this visit. Nonetheless, Mr. Conti is current in both HAZWOPER training and medical surveillance program requirements.

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld

c: Mr. B. Gorman (Code ES34)
Mrs. D. Humbert
Mr. M. Perry
Mr. K. Henn
Mr. R. Basinski
Dr. T. Johnston

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-07-4-017

July 7, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT at the NSWC Crane site in Indiana. This is scheduled to be conducted from July 8 through August 6, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator dated June 2004, prepared under CTO 0343 and the Health and Safety Plan for Mine Fill A (SWMU 12) prepared under CTO 0357. These individuals are as follows:

Stan Conti	Chip Laney
Jim Goerdt	Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Humbert
M. Perry
K. Henn
R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-07-4-052

July 27, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 324)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0343 and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by a Tetra Tech NUS, Inc. employee under the CLEAN contract, and to attest that the individual identified herein is in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include oversite of field activities being conducted at NSWC Crane site in Indiana. This is scheduled to be conducted from July 28-29, 2004. These activities will be performed by Mr. Mark Peterson, a Tetra Tech NUS, Inc. employee.

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: Mr. B. Gorman (Code ES34)
Mrs. D. Humbert
Mr. M. Perry
Mr. K. Henn
Mr. R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-08-4-019

August 6, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Number[redacted]d 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT at the NSWC Crane site in Indiana. This is scheduled to be conducted from August 9 through September 6, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator dated June 2004, prepared under CTO 0343 and the Health and Safety Plan for Mine Fill A (SWMU 12) prepared under CTO 0357. These individuals are as follows:

Stan Conti	Chip Laney
Jim Goerdt	Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Humbert
M. Perry
K. Henn
R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-08-4-031

August 13, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to add personnel conducting the field activities at the NSWC Crane site from August 15-18, 2004. Mr. Tom Dickson has been added to the field crew performing this work. All other information in our letter dated August 6, 2004 remains the same.

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld

c: B. Gorman (Code ES 42)
D. Humbert
M. Perry
K. Henn
R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-09-4-006

September 3, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; and surface water, seep and sediment sampling at the NSWC Crane site in Indiana. This is scheduled to be conducted from September 7 -30, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator dated June 2004, prepared under CTO 0343 and the Health and Safety Plan for Mine Fill A (SWMU 12) Revision 1, dated August 2004, prepared under CTO 0357. These individuals are as follows:

Stan Conti
Jim Goerdt
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Humbert
M. Perry
K. Henn
R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-10-4-057

October 25, 2004

Project Number 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 324)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0343 and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by a Tetra Tech NUS, Inc. employee under the CLEAN contract, and to attest that the individual identified herein is in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT at the NSWC Crane site in Indiana. This is scheduled to be conducted from October 25 through November 22, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator dated August 2004, prepared under CTO 0343 and the Health and Safety Plan for Mine Fill A (SWMU 12) dated August 2004, prepared under CTO 0357. These individuals are as follows:

Stan Conti
Jim Goerdt
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS/mlg

c: Mr. B. Gorman (Code ES34)
Mrs. D. Humbert
Mr. M. Perry
Mr. K. Henn
Mr. R. Basinski
File copy CTO 0343 and CTO 0357

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-11-4-003

November 3, 2004

Project Numbers N0039, N0989, and N8925

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Mark Davidson (Code ES33)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Number 0078, 0328, and 0359

Subject: Personnel Clearance for Site Visit

Dear Mr. Davidson:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include collecting groundwater samples at Site 8, Sites 36 and 37, and Site 59; and collecting a soil sample at Site 37 at the NAS Cecil Field site in Jacksonville, Florida. This is scheduled to be conducted November 4 and November 30, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for National Attenuation Groundwater Monitoring Sites, Revision 4 dated May 2004, and the Health and Safety Plan for Operable Unit 9, Site 59 - Buildings 324/1845 Area Remedial Investigation dated September 2004. These individuals are as follows:

Scott McGuire	Dave Siefken
Chris Gleaton	Shina Ballard
Gus Nelson	Mervin Dale

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld

c: B. Gorman (Code ES34)
D. Humbert
M. Perry
K. Henn
M. Speranza
File

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-12-4-003

December 3, 2004

Project Number N6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: William Gates (Code ES31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0160, 0331, 0343, and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. employees under the CLEAN contract, and to attest that the individuals identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT and hand augering techniques at the NSWC Crane site in Indiana. This is scheduled to be conducted from December 6, 2004 through December 17, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow these listed health and safety plans.

- Health and Safety Plan for Solid Waste Management Unit 7, dated December 2004, prepared under CTO 0160.
- Health and Safety Plan for RCRA Facility Investigation at Building 106 Pond (SWMU 8) and Roads and Grounds Area (SWMU 15), dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Environmental Indicator Investigation for SWMUs 18, 19, 20, and the Old Gun Tub Storage Lot, dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator, dated August 2004, prepared under CTO 0343.
- Health and Safety Plan for Mine Fill A (SWMU 12), Revision 1, dated August 2004, prepared under CTO 0357.

These individuals are as follows:

Stan Conti
Jim Goerdt
Terry Rojahn
Donald Westerhoff

TETRA TECH NUS, INC.

PITT-12-4-003

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS/mlg

cc: Mr. B. Gorman (Code ES34)
Ms. Debra Humbert, TtNUS, Inc.
Mr. Mark Perry, TtNUS, Inc.
Mr. Keith Henn, TtNUS, Inc.
Roger Clark, Ph.D., TtNUS, Inc.
Mr. Ralph Basinski, TtNUS, Inc.
File copy CTO 0160, 0331, 0343, and 0357

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-12-4-053

December 30, 2004

Project Numbers 3961, 1245, 7448, and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: William Gates (Code ES31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0160, 0331, 0343, and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. employees under the CLEAN contract, and to attest that the individuals identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT and hand augering techniques at the NSWC Crane site in Indiana. This is scheduled to be conducted from January 4-28, 2005. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow these listed health and safety plans.

- Health and Safety Plan for Solid Waste Management Unit 7, dated December 2004, prepared under CTO 0160.
- Health and Safety Plan for RCRA Facility Investigation at Building 106 Pond (SWMU 8) and Roads and Grounds Area (SWMU 15), dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Environmental Indicator Investigation for SWMUs 18, 19, 20, and the Old Gun Tub Storage Lot, dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator, dated August 2004, prepared under CTO 0343.
- Health and Safety Plan for Mine Fill A (SWMU 12), Revision 1, dated August 2004, prepared under CTO 0357.

These individuals are as follows:

Stan Conti
Colin Doolan
Jim Goerdt
Terry Rojahn

TETRA TECH NUS, INC.

PITT-12-4-053

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS/lld

cc: Mr. B. Gorman (Code ES34)
Ms. Debra Humbert, TtNUS, Inc.
Mr. Mark Perry, TtNUS, Inc.
Mr. Keith Henn, TtNUS, Inc.
Roger Clark, Ph.D., TtNUS, Inc.
Mr. Ralph Basinski, TtNUS, Inc.
File copy CTO 0160, 0331, 0343, and 0357

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-2-5-050

February 25, 2005

Project Numbers N1245, N6878, and 00042

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: William Gates (Code ES31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0331, 0357, and 0376

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. employees under the CLEAN contract, and to attest that the individuals identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT and hand augering techniques at the NSWC Crane site in Indiana. This is scheduled to be conducted from February 28 through March 16, 2005. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow these listed health and safety plans.

- Health and Safety Plan for RCRA Facility Investigation at Building 106 Pond (SWMU 8) and Roads and Grounds Area (SWMU 15), dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Environmental Indicator Investigation for SWMUs 18, 19, 20, and the Old Gun Tub Storage Lot, dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator, dated August 2004, prepared under CTO 0343.
- Health and Safety Plan for Mine Fill A (SWMU 12), Revision 1, dated August 2004, prepared under CTO 0357.
- Health and Safety Plan for Risk Assessment and CMS at Solid Waste Management Unit (SWMU) 9, dated February 2005, prepared under CTO 0376.

These individuals are as follows:

Jim Goerdt
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS/lld

cc: Mr. B. Gorman (Code ES34)
Ms. Debra Humbert, TtNUS, Inc.
Mr. Mark Perry, TtNUS, Inc.
Mr. Keith Henn, TtNUS, Inc.
Roger Clark, Ph.D., TtNUS, Inc.
Mr. Ralph Basinski, TtNUS, Inc.
File copy CTO 0331, 0357, and 0376

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing remedial investigation activities at CRANE and that I have received site-specific training which included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present at the sites
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Initial response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

I have been given the opportunity to ask questions and all of my questions have been answered to my satisfaction. I further state, that the dates of my training (introductory, refresher, and supervisory, as applicable) and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
Josh Dean	7-8-04	8-'02	12-'03	NA	8-'03
Jim WAISH	7-8-04	may 87	12-2003	2001	2-1-04
BRUCE KIRKPATRICK	7-8-04	1986	1-2004	NA	11-03
DONALD NULL	7-8-04	1998	12-03	NA	11-03
Charles C. Lancy III	7-8-04	4/30/92	~~7/10~~ 9/5/02	1998	3-04
Jim Goerdt	7-8-04	12/91	10/03	NA	11/03
SJ CONTI	7-8-04	8/83	5/14/04	"84"	12/02
TERRY ROSAHN	7-8-04	9/85	1/04	1/04	11/02
Chad Mahaffy	7-23-04	2002	12-2003	12-2003	12/03
JOSH DUTTON	8/9/04	12/01	10/17/03	NA	1/16/04

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
KEN BOEHMER	8/26/04	9/87	12-27-03		FEB MARCH 04
JOHN DAVIS	8/26/04	11/02	12-27-03		12/03
Todd Wolfenbarger	8/26/04	11/02	12-27-03		11/03

Railway Access Plan Pre-Task Briefing
Attestment

By my signature below, I attest that I have participated in a pre-task briefing which included a review of the TtNUS Railway Access Plan for NSWC Crane Hill 600 activities. This briefing addressed supervision and communication of on-track safety methods prior to commencing work in this area, in accordance with Federal Railroad Administration regulation 49 CFR 214.315.

My signature also indicates that I was provided an opportunity to ask questions during this briefing, and that any questions raised were addressed to my satisfaction.

Name (Printed)	Signature	Date	FOL Initials*
JAMES L. WALSH		10-25-04	TR
Stan Conti		10-25-04	TR
TERRY ROJAHN		10-25-04	TR
Todd Wilkenhauf		10-25-04	TR
Josh Dean		10-25-04	TR

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

TERRY ROJAHN

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

prepared and conducted by the
NUS Corporation, Pittsburgh, Pennsylvania

SEPT. 30 - OCT. 4, 1985
Date of Award

Gary F. Smith, C.S.P.
Director; Health, Safety Training

E. Dennis Escher, P.E.
Vice President

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Terry Rojahn

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

January 30, 2004

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech NUS.

Employee Name: TERRY ROJAHN

Office Location: PITTSBURGH

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134/

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: Anna Young M.D.

Date: 11/10/02

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040.

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

WorkCare™

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech.

Employee Name: Terry Rojhan

Office Location: Bluesoft

Yes	No	
☒	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☒	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134/

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: [illegible] M.D.

Date: 11-5-04

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

TETRA TECH NUS, INC.
661 Andersen Drive ▪ Pittsburgh, Pennsylvania 15220-2745
(412) 921-7090 ▪ FAX (412) 921-4040 ▪ www.tetratech.com

March 11, 2003

Mr. Stanley Conti
Tetra Tech NUS, Inc.
Foster Plaza 7
661 Andersen Drive
Pittsburgh, PA 15220

Whom It May Concern:

This letter is to certify that Mr. Stanley Conti successfully completed a course of instruction in Hazardous Materials Handling for Hazardous Waste Site Workers which meets the criteria established in 29 CFR 1910.120(e)(3)(i). This course was prepared and conducted by Tetra Tech NUS (formerly Brown and Root Environmental, a division of HALLIBURTON NUS Corporation) in September 1983. If you have any questions, please feel free to contact me.

Very truly yours,

James K. Laffey
Manager, Training Resources

JKL:lld

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Stan Conti

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

May 14, 2004
Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

WORKCARE™

A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech.

Employee Name: Stanley Conti

Office Location: Tetra Tech

Yes	No	
☒	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☒	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134.

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: [illegible] M.D.

Date: 12/13/08

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

TECHNICAL ENVIRONMENTAL SERVICE TRAINING INSTITUTE

certifies that

CHARLES C. LANEY III

has successfully met the 29 CFR 1910.120 certificate requirements for the course entitled

40 HOUR HEALTH & SAFETY TRAINING - GENERAL SITE WORKER (E-3-1) -

and in evidence thereof is awarded this

CERTIFICATE OF COMPLETION

on the 30 TH day of APRIL, 1992

APRIL 30, 1992

Passed Exam

HSW-00780

Certificate Number

TEST institute

Anthony L. Egitto, Director

1110 Navaho Dr. • Suite 602 • Raleigh, North Carolina 27609 • 919-876-8440

© 00E3 461

LITHO IN U.S.A.

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Charles C. Laney III

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

September 5, 2002

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

WorkCare™

Release to Duty

NAME OF EXAMINEE: Charles Looney III

DATE: 7-18-02

CLINIC NAME: SECURE MEDICAL CARE
803 Russell Avenue
Gaithersburg, MD 20879-3584

COMPANY NAME: TT NUS

Based on the limited information WorkCare™ has requested me to review, as stipulated in the WorkCare Clinical Operations Manual, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare, may detect health conditions not apparent to me. It is further agreed that such health conditions may necessitate the need for workplace restrictions.

MARTIN T. LISS, M.D.

Signed: _____ M.D.
Examining Physician

Dated: 7-18-2002

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Mark Peterson

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

January 29, 2004

Date of Award

Matthew M. Soltis, CIH, CSP
Manager
Health and Safety

APPLIED EDUCATIONAL SERIES

James D. Goerdt

APPLIED ASSOCIATES INTERNATIONAL INC.

CERTIFICATE

OSHA, 1910.120 Hazardous Waste Operations and Emergency Response 40 Hour Course

ISSUE DATE: December 13, 1991

EXPIRATION: December 13, 1992

CERTIFICATE: HAZ9112001058

STEVEN L. WILLIAMS
President

THOMAS O. MURRAY
Certified Industrial Hygenist

P. O. Box 300068
Fern Park, Florida 32730-0068

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Jim Goerdt

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER
REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 10, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Goerdt, James	**COMPANY:**	TT/NUS
SSN:	481-86-2691	**POSITION:**	Environmental Scientist
DATE OF EXAM:	11/07/2003	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	11/07/2005	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.
2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:
3. ☐ **NOT QUALIFIED**
4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Scott Hardy, M.D. Date: 11/11/03

Signature: Scott Hardy, MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

[redacted]

OCCUPATIONAL HEALTH & SAFETY SOLUTIONS

This certificate is confirmation that

Joshua Dutton

has successfully completed the course and examination for

40 HOUR HAZWOPER TRAINING

December, 2001

Indianapolis, Indiana

Certificate No. 010471

Course Director

TRAINING CERTIFICATE

Presented to:

Joshua Dutton

Has successfully completed the:

8-Hour HAZWOPER Refresher Course

Presented By: Scott Defenbaugh

Presented this 17th day of October, 2003

Workplace

Workplace Safety & Health Company, Inc.

Scott W. Defenbaugh – Trainer

MEDICAL APPROVAL FORM

For Employees of Environmental Field Services, Inc.

Participant Name : Joshua Dutton Date & Time of Examination: January 16th @ 8:00a.m.

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA 29 CFR 1910.120, and found to be medically
   (✓) qualified to perform work at hazardous work sites.
   ( ) not qualified to perform work at hazardous work sites.

- and -

2. Undergone a physical examination as per OSHA 29 CFR 1910.134, and found to be medically
   (✓) qualified to wear respiratory protection.
   ( ) not qualified to wear respirator protection.

My evaluation has been based on the following, as provided to me by the employer.

(✓) A Copy of OSHA Standards 29 CFR 1910.120 and appendices.
(✓) A description of the employee's duties as they relate to the employee's exposure.
( ) A list of known/suspected contaminants and their concentrations (if known)
(✓) A description of any personal protective equipment used or to be used.
(✓) Information from previous medical examinations of the employee which is used not readily available to the examining physician.

I, Josh T Perrin, have examined Josh Dutton

Physician's Name (Print) Participant's Name (Print)

and have determined the following information:

1. Results of medical examination and test (excluding finding or diagnoses unrelated to occupational exposure):

   none

2. Any detected medical conditions which place the employee at increase risk of material impairment of the employee's health :

   none

3. Recommended limitations upon the employee's assigned work :

   none

I have informed this participant of the results of this medical examination and any medical conditions which require further examination of treatment.

Based on this information provided to me, and in view of the activities and hazardous potentials involved at hazardous work sites, his participant

(✓) may
( ) may not

perform his/her assigned tasks.

Physician's Signature :

Address: 14828 Cleveland Ct 46032

Phone Number: 5829210

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Kenneth A. Boehmer

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 348
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Kenneth A Boehmer

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Donald B. Kirkpatrick

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 344
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Donald B Kirkpatrick

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

David W. Schrecengost

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 1236
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: David Schrecengost

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Dennis A. Sink

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 1270
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Dennis A Sink

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

John E. Filbrun

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 1006
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: John Filbrun

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Timothy L. Boehmer

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 349
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Timothy L Boehmer

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Jon T. Keifer

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 2012
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Jon T. Keifer

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

James Nidzgorski

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 350
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature:

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Joseph C. McCloud

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 2013
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature:

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

James R. Walsh

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 852
Expiration Date: December 31, 2004
DNR Receipt Number:
Signature:

MedWork

Occupational Health Care

001731-224
2/16/1981
295-76-2583
BOWSER MORNER

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 10-10-03

To: _____

From: _____

Re: Chad McNeffy

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 10-10-03. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF ~~CHEST X-RAY~~, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

_____
PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies

that

CHAD MAHAFFY

Has successfully completed

HAZWOPER

Annual Refresher training

Training

In Accordance with

29 CFR 1910.120

on the

29th of December 2003

Training Certificate No:

29DEC03 017

Scott Berndt, CHMM

29 Dec. 03.

Date

Occupational Hazard Management
2004 Cottonwood Street
Findlay, Ohio 45840

Occupational Hazard Management

Certifies
that

CHAD MAHAFFY

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM 29DEC03 016

Scott Berndt, CHMM — 29 Dec. 03
Date

Occupational Hazard Management
2001 Bellevue Road
Findlay, Ohio 45840

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14655 COUNTY ROAD 205
FINDLAY, OHIO 45840

CERTIFIES
THAT

CHAD R. MAHAFFY

HAS
SUCCESSFULLY
COMPLETED

40 HOUR SITE WORKER & OPERATIONS TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE NO: 020CT02 02

ON THE

2ND DAY OF OCTOBER 2002

SCOTT BERNDT, CHMM — DATE

12/29/2003

LAST NAME MAHAFFY
FIRST NAME CHAD

FIT TEST REPORT

Fit test information

ID NUMBER	295-76-2583		
LAST NAME	MAHAFFY	CUSTOM1	
FIRST NAME	CHAD	CUSTOM2	
COMPANY	BOWSER MORNER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			

TEST DATE	12/29/2003	PORTACOUNT S/N	44721
TEST TIME	09:47	N95 COMPANION	N
DUE DATE	12/29/2004		

RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	SUVIVAIR	PASS LEVEL	1000
MODEL	20/20		
MASK STYLE	FULL FACE		
MASK SIZE	STANDARD		
APPROVAL			
EFF. < 99%	N		

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	11400	Y
DEEP BREATHING	60	4230	Y
HEAD SIDE TO SIDE	60	46300	Y
HEAD UP AND DOWN	60	78900	Y
TALKING	60	4560	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	7380	Y
NORMAL BREATHING	60	26700	Y
OVERALL FF		9330	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Chad Mahaffy DATE 12-29-03
CHAD MAHAFFY

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 2-27-04

To: Bowser Morner

From: MedWork

Re: Kenneth Bohmer

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 2-27-04. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

S. Almazza MD

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies
that

KEN BOEHMER

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29DEC03 007

Scott Bernal, CHMM

29 Dec. 03
Date

Occupational Hazard Management
2001 Tollgate Road
Findlay, Ohio 45840

Occupational Hazard Management

Certifies
that

KEN BOEHMER

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM 29DEC03 007

Scott Berndt, CHMM

29 Dec. 03
Date

Occupational Hazard Management
2001 Tallamwood Street
Findlay, Ohio 45840

1203

3

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Certificate of Completion

This Certifies That

KEN BOEHMER

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Bolek
Training Director

Certificate of Completion

This is to certify that

KEN BOEHMER

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000001
Certificate Identification Number

Henry M. Butcher, REM, CEA

12/29/2003

LAST NAME BOEHMER
FIRST NAME KENNETH

FIT TEST REPORT

Fit test information

ID NUMBER 277521850
LAST NAME BOEHMER
FIRST NAME KENNETH
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 08:26
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE MED/LARGE
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	12200	Y
DEEP BREATHING	60	15000	Y
HEAD SIDE TO SIDE	60	30800	Y
HEAD UP AND DOWN	60	34300	Y
TALKING	60	3750	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	7340	Y
NORMAL BREATHING	60	8990	Y
OVERALL FF		9670	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Kenneth Boehmer DATE 12-29-03
KENNETH BOEHMER

OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

RESPIRATOR QUESTIONNAIRE

NAME: Joshua Dean **COMPANY:** Bowser Morner

A new questionnaire should be completed annually or sooner if a medical condition intervenes. OCC recommends that a pre-placement medical evaluation be done on all employees using a respirator.

PHYSICAL EXAMINATION REQUIRED: (YES) **NO**

(If examination is required, it must be completed within 30 days of questionnaire.)

Questionnaire Reviewed by: C. Van Kouffmit Date: 8/14/03
Nurse Signature

A. ✓ No limitations regarding respirator use.

B. ____ Restrictions are placed on this employee for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

C. ____ Follow-up medical evaluation is recommended as per NIOSH guidelines.
Every 5 years for persons under age 35
Every 2 years for persons aged 35 to 45
Every year for persons over the age of 45

Evaluations for persons performing strenuous work with SCBA:
Every 3 years for those under age 35
Every 18 months for those aged 35 to 45
Annually for those over the age of 45

D. ____ Your employee has been provided a copy of this Licensed Health Care Professional's written recommendation.

T.E. Lieser, MD; P.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

Occupational Hazard Management

Certifies
that

JOSH DEAN

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

18th of December 2003

Training Certificate No.
18Dec03 001

Scott Berndt, CHMM

18 Dec. 03
Date

Occupational Hazard Management
2001 Collamwood Street
Findlay, Ohio 45840

FINDLAY

THE UNIVERSITY OF FINDLAY

Certificate of Achievement

awarded by

THE NATIONAL CENTER OF EXCELLENCE FOR ENVIRONMENTAL MANAGEMENT

ENVIRONMENTAL RESOURCE TRAINING CENTER

to

JOSHUA DEAN

for Successful Completion of

OSHA 40-HOUR SAFETY TRAINING WORKSHOP
(FULFILLS THE REQUIREMENTS OF 29 CFR 1910.120 COVERING HAZARDOUS WASTE OPERATIONS)
4.0 CEU'S
APRIL 27, 2002

EXECUTIVE DIRECTOR

INSTRUCTOR

JUL. 15. 2003 9:43AM DUTCH MANAGER NO. 8093 P. 4/4

12/29/2003

LAST NAME DEAN
FIRST NAME JOSHUA

FIT TEST REPORT

Fit test Information

ID NUMBER 270869191
LAST NAME DEAN
FIRST NAME JOSHUA
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 10:24
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	44200	Y
DEEP BREATHING	60	18600	Y
HEAD SIDE TO SIDE	60	22300	Y
HEAD UP AND DOWN	60	18900	Y
TALKING	60	10400	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	11900	Y
NORMAL BREATHING	60	46800	Y
OVERALL FF		18700	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Josh Dean DATE 12-29-03
JOSHUA DEAN

OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

RESPIRATOR QUESTIONNAIRE

NAME: James R Walsh **COMPANY:** Bowser Morner

A new questionnaire should be completed annually or sooner if a medical condition intervenes. OCC recommends that a pre-placement medical evaluation be done on all employees using a respirator.

PHYSICAL EXAMINATION REQUIRED: **YES** **NO**

(If examination is required, it must be completed within 30 days of questionnaire.)

Questionnaire Reviewed by: _____ Date: 3/2/04
Nurse Signature

A. ✓ No limitations regarding respirator use.

B. ____ Restrictions are placed on this employee for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

_____

_____

C. ____ Follow-up medical evaluation is recommended as per NIOSH guidelines.
Every 5 years for persons under age 35
Every 2 years for persons aged 35 to 45
Every year for persons over the age of 45

Evaluations for persons performing strenuous work with SCBA:
Every 3 years for those under age 35
Every 18 months for those aged 35 to 45
✓ Annually for those over the age of 45

D. ____ Your employee has been provided a copy of this Licensed Health Care Professional's written recommendation.

_____

T.E. Lieser, MD; P.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

Occupational Hazard Management

Certifies
that

JAMES WALSH

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

18th of December 2003

Training Certificate No:
18Dec03 002

Scott Berndt, CHMM — 18 Dec. 03
Date

Occupational Hazard Management
1001 Tallmadge Road
Kent, Ohio 44240

HUWSER-WORNER, INC.

1203

0

Certificate of Completion

This Certifies That

James R. Walsh

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

May 8-11, 1987

Date

Training Director

12/29/2003

LAST NAME WALSH
FIRST NAME JAMES

FIT TEST REPORT

Fit test information

ID NUMBER 8185
LAST NAME WALSH
FIRST NAME JAMES
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 10:35
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	2990	Y
DEEP BREATHING	60	2760	Y
HEAD SIDE TO SIDE	60	3080	Y
HEAD UP AND DOWN	60	31300	Y
TALKING	60	374	N
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	1330	Y
NORMAL BREATHING	60	22900	Y
OVERALL FF		1550	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME James A Walsh DATE 12-29-03
JAMES WALSH

FAX TRANSMISSION

BOWSER-MORNER

4518 Taylorsville Road • P.O. Box 51 • Dayton, Ohio 45401-0051
Phone (937) 236-8805 Fax (937) 233-2016

With other offices in:	**Toledo, Ohio**	**Lexington, Ky.**
Phone:	(419) 691-4800	(606) 233-0250
Fax:	(419) 691-4805	(606) 253-0183

To: Terry Rajaha

From: Penny L. Keifer, Administrative Manager

Company: Tetra Tech

Phone No:

Date: July 28, 2004

Fax No.: 812-854-3981

No. of Pages (including cover): 5

Re:

Message:

If you have any problems with, or do not receive all the pages in this transmission, please call our office.

BOWSER-MORNER *is an accredited independent testing laboratory and engineering consultant providing services in geotechnical engineering, environmental consulting, construction monitoring and testing, analytical sciences, and subsurface exploration and sampling.*

Confidentiality Notice - The documents and materials transmitted herewith contain confidential and proprietary information belonging to the sender which are legally privileged. They are solely for the use of their intended recipient. Misdirection of this telecopy transmission does not constitute a waiver of any rights or privileges granted under law. Use of these materials by any party other than the intended recipient is strictly prohibited, and may be punishable by civil and/or criminal penalties.

MedWork

Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11-15-03

To: Bowser-Morner

From: MedWork

Re: Todd Wollenhaupt

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON Todd Wollenhaupt. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies
that

TODD WOLLENHAUPT

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29DEC03 030

Scott Gerwitz, CSHM

29 Dec 03
Date

Occupational Hazard Management
2001 Gateway Road
Fairborn, Ohio 45324

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES
THAT

TODD WALLENHAUPT

HAS SUCCESSFULLY COMPLETED

PROCESS SAFETY MANAGEMENT
TRAINING

IN ACCORDANCE WITH
29 CFR 1910.119
ON THE

28TH OF NOVEMBER 2003

TRAINING CERTIFICATE NO.
28NOV03 002

SCOTT BERNDT, CHMM

28 Nov. 03.
DATE

OCCUPATIONAL HAZARD MANAGEMENT
800 COTTONWOOD STREET
FINDLAY, OHIO 45840

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14555 COUNTY ROAD 205
FINDLAY, OHIO 45840

CERTIFIES
THAT

TODD WOLLENHAUPT

HAS
SUCCESSFULLY
COMPLETED

40 HOUR SITE WORKER & OPERATIONS TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE No: 27NOV.02 001

ON THE

27TH OF NOVEMBER 2002

SCOTT BERNDT, CHMM — DATE 27NOV02

12/29/2003

LAST NAME WOLLENHAUPT
FIRST NAME TODD

FIT TEST REPORT

Fit test information

ID NUMBER 283-61-6669
LAST NAME WOLLENHAUPT
FIRST NAME TODD
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 13:42
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	10900	Y
DEEP BREATHING	60	26300	Y
HEAD SIDE TO SIDE	60	83200	Y
HEAD UP AND DOWN	60	26600	Y
TALKING	60	12100	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	10400	Y
NORMAL BREATHING	60	56200	Y
OVERALL FF		18500	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Todd Wollenhaupt DATE 12-29-03
TODD WOLLENHAUPT

MedWork

Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 12-5-03

To: _____

From: _____

Re: John Davis
1-26-83

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 12.5.03. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF ~~CHEST X-RAY~~, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

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Occupational Hazard Management

Certifies
that

JOHN DAVIS

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29DEC03 009

President

29 Dec. 03
Date

Occupational Hazard Management
2001 Gallowood Road
Dayton, Ohio 45410

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14555 COUNTY ROAD 309
FINDLAY, OHIO 45840

CERTIFIES
THAT

JOHN DAVIS

HAS
SUCCESSFULLY
COMPLETED

40 HOUR SITE WORKER & OPERATIONS TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE NO: 27NOV.02 003

ON THE

27TH OF NOVEMBER 2002

Scott L. Berndt 27 Nov 02

SCOTT BERNDT, CHMM DATE

Occupational Hazard Management

Certifies
that

JOHN DAVIS

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM 29DEC03 009

Rod Berndt CHMM — 29 Dec. 03

Rodd Berndt, CHMM — Date

Occupational Hazard Management
[illegible] Cottonwood Road
Fairborn, Ohio [illegible]

12/29/2003

LAST NAME DAVIS
FIRST NAME JOHN

FIT TEST REPORT

Fit test information

ID NUMBER 292889571
LAST NAME DAVIS
FIRST NAME JOHN
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 08:52
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	57300	Y
DEEP BREATHING	60	23100	Y
HEAD SIDE TO SIDE	60	54200	Y
HEAD UP AND DOWN	60	15200	Y
TALKING	60	10600	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	14300	Y
NORMAL BREATHING	60	44200	Y
OVERALL FF		21200	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME John H. Davis DATE 12/29/03
JOHN DAVIS

MedWork

Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 2-27-04

To: Bowser Morner

From: MedWork

Re: Kenneth Bochner

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 2-27-04. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

J. Ahmed MD

PHYSICIAN SIGNATURE

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Occupational Hazard Management

Certifies
that

KEN BOEHMER

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29DEC03 007

29 DEC 03
Date

Occupational Hazard Management
1001 Cottonwood Road
Dayton, Ohio 45310

Occupational Hazard Management

Certifies
that

KEN BOEHMER

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM 29DEC03 007

Scott Worrell, CHMM

29 Dec. 03
Date

Occupational Hazard Management
[illegible] Rockaway Road
Dayton, Ohio [illegible]

1203

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1 0

Certificate of Completion

This Certifies That

KEN BOEHMER

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Boldt
Training Director

Certificate of Completion

This is to certify that

KEN BOEHMER

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000001
Certificate Identification Number

Henry M. Butcher, REM, CEA

12/29/2003

LAST NAME BOEHMER
FIRST NAME KENNETH

FIT TEST REPORT

Fit test Information

ID NUMBER 277521850
LAST NAME BOEHMER
FIRST NAME KENNETH
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 08:25
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE MED/LARGE
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	12200	Y
DEEP BREATHING	60	15000	Y
HEAD SIDE TO SIDE	60	30800	Y
HEAD UP AND DOWN	60	34300	Y
TALKING	60	3750	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	7340	Y
NORMAL BREATHING	60	8990	Y
OVERALL FF		9670	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Kenneth Boehmer DATE 12-29-03
KENNETH BOEHMER

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/15/2003

To: Bowser Morner

From: Medwork

Re: Donald Kirkpatrick

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON Donald Kirkpatrick. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

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Occupational Hazard Management

Certifies
that

BRUCE KIRKPATRICK

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29TH OF JANUARY 2004

Training Certificate No.
29JAN04 002

Scott Berndt, CHMM

29 Jan. 04
Date

Occupational Hazard Management
2001 Cottonwood Street
Findlay, Ohio 45840

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

BRUCE KIRKPATRICK

HAS SUCCESSFULLY COMPLETED

PROCESS SAFETY MANAGEMENT TRAINING

IN ACCORDANCE WITH

29 CFR 1910.119

ON THE

29 JANUARY 2004

TRAINING CERTIFICATE NO.

PSM 29JAN04 001

SCOTT BERNDT, CHMM

21 Jan. 04

DATE

OCCUPATIONAL HAZARD MANAGEMENT
2001 COTTONWOOD STREET
FINDLAY, OHIO 45840

Certificate of Completion

This is to certify that

BRUCE KIRKPATRICK

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

January 18, 2001

118010001
Certificate Identification Number

Henry M. Butcher, REM, CEA

1203

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Certificate of Completion

This Certifies That

Bruce Kirkpatrick

has completed the 40 hour course:

OSHA 29CFR1910.120 Personnel Safety & Health Course

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

March 12-15, 1987

Date

Training Director

Respirator Fit-Test Record

Employee: Bruce Kirkpatrick **Date:** 2/5/00

Person Fitting Respirator: Scott Pennell (illegible)

All respirator fit tests will be conducted per the protocol of Appendix A to 1910.134: Fit-testing Procedures. Any deviation from this protocol will be noted in the "Remarks" section below.

Respirator Information

Manufacturer: Survivair

Model: 9000

Size: Med

Optional Equipment

Spectacle Kit: N/A

Nose Cup: Yes

Communication: N/A

Testing

Pass: ✓ **Fail:** _____

Remarks

Stannous Chloride — Fit 5 Mo ft.

MedWork
Occupational Health Care
725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/15/03

To: Bowser Morner

From: MEDWORK

Re: Donald Null

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON Donald Null. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies
that

DONALD NULL

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29DECO3 020

Scott Berndt, CHMM

29 Dec 03
Date

Occupational Hazard Management
2001 Tallmadge Street
Findlay, Ohio 45840

Occupational Hazard Management

Certifies
that

DONALD NULL

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM 29DEC03 019

Scott Berndt, CSHM

29 Dec 03.
Date

Occupational Hazard Management
2001 Cottonwood Street
Findlay, Ohio 45840

RESPONSE
UNLIMITED

CERTIFIES THAT

DONALD NULL

HAS ATTENDED THE COURSE AND
SUCCESSFULLY COMPLETED STUDIES IN

OSHA 40 HOUR SAFETY TRAINING FOR WASTE SITE WORKERS
(FULFILLS OSHA'S TRAINING REQUIREMENTS OF 29 CFR 1910.120)
(COVERING HAZARDOUS WASTE SITE OPERATIONS)

INSTRUCTOR

April 18, 1999
CERTIFICATE EXPIRATION DATE

April 18, 1998
DATE

Certificate of Completion

This is to certify that

DONALD NULL

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000010
Certificate Identification Number

Henry M. Butcher, REM, CEA

12/29/2003

LAST NAME NULL
FIRST NAME DONALD

FIT TEST REPORT

Fit test information

ID NUMBER	297-68-4998		
LAST NAME	NULL	CUSTOM1	
FIRST NAME	DONALD	CUSTOM2	
COMPANY	BOWSER MORNER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			
TEST DATE	12/29/2003	PORTACOUNT S/N	44721
TEST TIME	09:59	N95 COMPANION	N
DUE DATE	12/29/2004		
RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	SUVIVAIR	PASS LEVEL	1000
MODEL	20/20		
MASK STYLE	FULL FACE		
MASK SIZE	STANDARD		
APPROVAL			
EFF. < 99%	N		

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	21100	Y
DEEP BREATHING	60	9370	Y
HEAD SIDE TO SIDE	60	25300	Y
HEAD UP AND DOWN	60	29000	Y
TALKING	60	664	N
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	8970	Y
NORMAL BREATHING	60	16000	Y
OVERALL FF		3670	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Donald Null DATE 12-29-03
DONALD NULL

APPENDIX G

ANALYTICAL DATA

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB051 (1)**		**16SB052 (1)**		**16SB053 (1)**		**16SB054 (1)**		**16SB055**		**16SB056**		**16SB057 (1)**		**16SB058**	
SAMPLE DATE	**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/13/2004**	
Volatile Organics (ug/kg)																
1,1,1,2-TETRACHLOROETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,1,1-TRICHLOROETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,1,2,2-TETRACHLOROETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,1,2-TRICHLOROETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	8 J	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	4	16SB0560608			1.03 U	16SB0580607
1,1-DICHLOROETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,1-DICHLOROETHENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,2,3-TRICHLOROPROPANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,2-DIBROMO-3-CHLOROPROPANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 UJ	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,2-DIBROMOETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB051 (1)**		**16SB052 (1)**		**16SB053 (1)**		**16SB054 (1)**		**16SB055**		**16SB056**		**16SB057 (1)**		**16SB058**	
SAMPLE DATE	**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/13/2004**	
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,2-DICHLOROETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,2-DICHLOROPROPANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
1,4-DIOXANE	101 U	16SS0510102	101 U	16SS0520102	87.3 U	16SS0530102	107 U	16SS0540102	92.7 U	16SS0550102	99.3 U	16SS0560102	94.6 U	16SS0570102	109 U	16SS0580102
	133 U	16SB0510204	104 U	16SB0520205	96.8 U	16SB0530205	174 U	16SB0540205	107 U	16SB0550206	104 U	16SB0560206	107 U	16SB0570206	113 U	16SB0580206
															92.8 U	16SB0580206-D
									118 U	16SB0550607	97.1 U	16SB0560608			97.2 U	16SB0580607
2-BUTANONE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
2-HEXANONE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	3 J	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
3-CHLOROPROPENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
4-METHYL-2-PENTANONE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
ACETONE	1.09 U	16SS0510102	3 J	16SS0520102	1 J	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	4 J	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	10 U	16SB0560206	8 J	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	9 U	16SB0560608			1.03 U	16SB0580607
ACETONITRILE	40.5 U	16SS0510102	40.5 U	16SS0520102	34.9 U	16SS0530102	42.8 U	16SS0540102	37.1 U	16SS0550102	39.7 U	16SS0560102	37.8 U	16SS0570102	43.4 U	16SS0580102
	53.2 U	16SB0510204	41.6 U	16SB0520205	38.7 U	16SB0530205	69.5 U	16SB0540205	43 U	16SB0550206	41.5 U	16SB0560206	42.7 U	16SB0570206	45.2 U	16SB0580206

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB051 (1)**		**16SB052 (1)**		**16SB053 (1)**		**16SB054 (1)**		**16SB055**		**16SB056**		**16SB057 (1)**		**16SB058**	
SAMPLE DATE	**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/13/2004**	
															37.1 U	16SB0580206-D
									47.4 U	16SB0550607	38.8 U	16SB0560608			38.9 U	16SB0580607
ACROLEIN	1.09 UR	16SS0510102	0.933 UR	16SS0520102	0.888 UR	16SS0530102	1.05 UR	16SS0540102	0.93 UR	16SS0550102	1.02 UR	16SS0560102	0.993 UR	16SS0570102	0.945 UR	16SS0580102
	1.17 UR	16SB0510204	1.05 UR	16SB0520205	1.01 UR	16SB0530205	1.3 UR	16SB0540205	1.07 UR	16SB0550206	1.05 UR	16SB0560206	1.04 UR	16SB0570206	1.06 UR	16SB0580206
															0.95 UR	16SB0580206-D
									0.946 UR	16SB0550607	1.13 UR	16SB0560608			1.03 UR	16SB0580607
ACRYLONITRILE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
BENZENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
BROMODICHLOROMETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
BROMOFORM	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
BROMOMETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	4 J	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 UJ	16SB0560608			1.03 U	16SB0580607
CARBON DISULFIDE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CARBON TETRACHLORIDE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CHLOROBENZENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB051 (1)**		**16SB052 (1)**		**16SB053 (1)**		**16SB054 (1)**		**16SB055**		**16SB056**		**16SB057 (1)**		**16SB058**	
SAMPLE DATE	**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/13/2004**	
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CHLORODIBROMOMETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CHLOROETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CHLOROFORM	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.1 J	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CHLOROMETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CHLOROPRENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CIS-1,2-DICHLOROETHENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
CIS-1,3-DICHLOROPROPENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
DIBROMOMETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
DICHLORODIFLUOROMETHANE	1.09 U	16SS0510102	2 J	16SS0520102	7	16SS0530102	2 J	16SS0540102	7	16SS0550102	7	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB051 (1)**		**16SB052 (1)**		**16SB053 (1)**		**16SB054 (1)**		**16SB055**		**16SB056**		**16SB057 (1)**		**16SB058**	
SAMPLE DATE	**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/13/2004**	
	1.17 J	16SB0510204	4	16SB0520205	10	16SB0530205	2 J	16SB0540205	5	16SB0550206	1.05 UR	16SB0560206	5	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									9	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
ETHYL METHACRYLATE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
ETHYLBENZENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
ISOBUTANOL	40.5 U	16SS0510102	40.5 U	16SS0520102	34.9 U	16SS0530102	42.8 U	16SS0540102	37.1 U	16SS0550102	39.7 U	16SS0560102	37.8 U	16SS0570102	43.4 U	16SS0580102
	53.2 U	16SB0510204	41.6 U	16SB0520205	38.7 U	16SB0530205	69.5 U	16SB0540205	43 U	16SB0550206	41.5 U	16SB0560206	42.7 U	16SB0570206	45.2 U	16SB0580206
															37.1 U	16SB0580206-D
									47.4 U	16SB0550607	38.8 U	16SB0560608			38.9 U	16SB0580607
METHACRYLONITRILE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
METHYL IODIDE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
METHYL METHACRYLATE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
METHYLENE CHLORIDE	1.09 UJ	16SS0510102	0.933 UJ	16SS0520102	0.888 UJ	16SS0530102	1.05 UJ	16SS0540102	0.93 UJ	16SS0550102	1.02 UJ	16SS0560102	0.993 UJ	16SS0570102	0.945 UJ	16SS0580102
	1.17 UJ	16SB0510204	1.05 UJ	16SB0520205	1.01 UJ	16SB0530205	1.3 UJ	16SB0540205	1.07 UJ	16SB0550206	1.05 UR	16SB0560206	1.04 UJ	16SB0570206	1.06 UJ	16SB0580206
															0.95 UJ	16SB0580206-D
									0.946 UJ	16SB0550607	1.13 U	16SB0560608			1.03 UJ	16SB0580607
PROPIONITRILE	40.5 U	16SS0510102	40.5 U	16SS0520102	34.9 U	16SS0530102	42.8 U	16SS0540102	37.1 U	16SS0550102	39.7 U	16SS0560102	37.8 U	16SS0570102	43.4 U	16SS0580102
	53.2 U	16SB0510204	41.6 U	16SB0520205	38.7 U	16SB0530205	69.5 U	16SB0540205	43 U	16SB0550206	41.5 U	16SB0560206	42.7 U	16SB0570206	45.2 U	16SB0580206
															37.1 U	16SB0580206-D
									47.4 U	16SB0550607	38.8 U	16SB0560608			38.9 U	16SB0580607

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB051 (1)**		**16SB052 (1)**		**16SB053 (1)**		**16SB054 (1)**		**16SB055**		**16SB056**		**16SB057 (1)**		**16SB058**	
SAMPLE DATE	**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/13/2004**	
STYRENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
TETRACHLOROETHENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
TOLUENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
TOTAL XYLENES	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
TRANS-1,2-DICHLOROETHENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
TRANS-1,3-DICHLOROPROPENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
TRANS-1,4-DICHLORO-2-BUTENE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
TRICHLOROETHENE	1.09 U	16SS0510102	8	16SS0520102	61	16SS0530102	67	16SS0540102	64	16SS0550102	34	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	14	16SB0520205	1300	16SB0530205	210	16SB0540205	79	16SB0550206	930 J	16SB0560206	1.04 U	16SB0570206	18	16SB0580206
															16	16SB0580206-D
									2 J	16SB0550607	200	16SB0560608			28	16SB0580607
TRICHLOROFLUOROMETHANE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB051 (1)**		**16SB052 (1)**		**16SB053 (1)**		**16SB054 (1)**		**16SB055**		**16SB056**		**16SB057 (1)**		**16SB058**	
SAMPLE DATE	**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/13/2004**	
VINYL ACETATE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 UR	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
VINYL CHLORIDE	1.09 U	16SS0510102	0.933 U	16SS0520102	0.888 U	16SS0530102	1.05 U	16SS0540102	0.93 U	16SS0550102	1.02 U	16SS0560102	0.993 U	16SS0570102	0.945 U	16SS0580102
	1.17 U	16SB0510204	1.05 U	16SB0520205	1.01 U	16SB0530205	1.3 U	16SB0540205	1.07 U	16SB0550206	1.05 U	16SB0560206	1.04 U	16SB0570206	1.06 U	16SB0580206
															0.95 U	16SB0580206-D
									0.946 U	16SB0550607	1.13 U	16SB0560608			1.03 U	16SB0580607
Inorganics (mg/kg)																
ALUMINUM																
ANTIMONY																
ARSENIC																
BARIUM																
BERYLLIUM																
CADMIUM																
CALCIUM																
CHROMIUM																
COBALT																
COPPER																
IRON																
LEAD																
MAGNESIUM																

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB051** (1)		**16SB052** (1)		**16SB053** (1)		**16SB054** (1)		**16SB055**		**16SB056**		**16SB057** (1)		**16SB058**	
SAMPLE DATE	**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/12/2004**		**8/12/2004**		**8/13/2004**		**8/13/2004**	
MANGANESE																
MERCURY																
NICKEL																
POTASSIUM																
SELENIUM																
SILVER																
SODIUM																
THALLIUM																
TIN																
VANADIUM																
ZINC																

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB059**		**16SB060**		**16SB061**		**16SB062**		**16SB063**		**16SB064**		**16SB065**		**16SB066**	
SAMPLE DATE	**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/11/2004**		**8/12/2004**	
Volatile Organics (ug/kg)																
1,1,1,2-TETRACHLOROETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,1,1-TRICHLOROETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,1,2,2-TETRACHLOROETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,1,2-TRICHLOROETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,1-DICHLOROETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,1-DICHLOROETHENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,2,3-TRICHLOROPROPANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,2-DIBROMO-3-CHLOROPROPANE	1.01 U	16SS0590102	1.14 UR	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 UR	16SS0630102	1.05 UR	16SS0640102	1.17 UR	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 UR	16SB0610206	1.01 U	16SB0620206	1.19 UR	16SB0630206	1.09 UR	16SB0640206	1.27 UR	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 UR	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 UR	16SB0630608	1.24 UR	16SB0640608	1.45 UR	16SB0650608	0.92 U	16SB0660608
1,2-DIBROMOETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB059**		**16SB060**		**16SB061**		**16SB062**		**16SB063**		**16SB064**		**16SB065**		**16SB066**	
SAMPLE DATE	**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/11/2004**		**8/12/2004**	
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,2-DICHLOROETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,2-DICHLOROPROPANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
1,4-DIOXANE	98.7 U	16SS0590102	105 U	16SS0600102	114 U	16SS0610102	94.2 U	16SS0620102	102 U	16SS0630102	105 U	16SS0640102	114 U	16SS0650102	108 U	16SS0660102
	136 U	16SB0590206	107 UJ	16SB0600206	124 U	16SB0610206	101 U	16SB0620206	106 U	16SB0630206	131 U	16SB0640206	113 U	16SB0650206	99.8 U	16SB0660206
	98.8 U	16SB0590608	106 U	16SB0600609	120 U	16SB0610607	103 U	16SB0620607	108 U	16SB0630608	108 U	16SB0640608	119 U	16SB0650608	123 U	16SB0660608
2-BUTANONE	1.01 U	16SS0590102	1.14 UR	16SS0600102	1.1 J	16SS0610102	1 U	16SS0620102	1.01 UR	16SS0630102	1.05 UR	16SS0640102	1.17 UR	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	2 J	16SB0600206	1.09 UR	16SB0610206	1.01 U	16SB0620206	1.19 UR	16SB0630206	1.09 UR	16SB0640206	1.27 UR	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 UR	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 UR	16SB0630608	1.24 UR	16SB0640608	1.45 UR	16SB0650608	1 J	16SB0660608
2-HEXANONE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
3-CHLOROPROPENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
4-METHYL-2-PENTANONE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
ACETONE	1.01 U	16SS0590102	13 U	16SS0600102	10 U	16SS0610102	1 U	16SS0620102	1.01 UR	16SS0630102	1.1 U	16SS0640102	1.17 UR	16SS0650102	51 BJ	16SS0660102
	1.22 U	16SB0590206	19 U	16SB0600206	3 U	16SB0610206	1.01 U	16SB0620206	1 U	16SB0630206	2 U	16SB0640206	72 J	16SB0650206	6 U	16SB0660206
	0.988 U	16SB0590608	24 U	16SB0600609	5 U	16SB0610607	0.968 U	16SB0620607	1.3 UR	16SB0630608	7 U	16SB0640608	6 U	16SB0650608	21 U	16SB0660608
ACETONITRILE	39.5 U	16SS0590102	42 U	16SS0600102	45.5 U	16SS0610102	37.7 U	16SS0620102	40.7 U	16SS0630102	41.9 U	16SS0640102	45.8 U	16SS0650102	43.1 UJ	16SS0660102
	54.5 U	16SB0590206	42.6 UJ	16SB0600206	49.8 U	16SB0610206	40.5 U	16SB0620206	42.4 U	16SB0630206	52.3 U	16SB0640206	45.1 U	16SB0650206	39.9 UJ	16SB0660206

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB059**		**16SB060**		**16SB061**		**16SB062**		**16SB063**		**16SB064**		**16SB065**		**16SB066**	
SAMPLE DATE	**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/11/2004**		**8/12/2004**	
	39.5 U	16SB0590608	42.4 U	16SB0600609	47.9 U	16SB0610607	41.2 U	16SB0620607	43.1 U	16SB0630608	43.2 U	16SB0640608	47.6 U	16SB0650608	49.2 UJ	16SB0660608
ACROLEIN	1.01 UR	16SS0590102	1.14 UR	16SS0600102	1.19 UR	16SS0610102	1 UR	16SS0620102	1.01 UR	16SS0630102	1.05 UR	16SS0640102	1.17 UR	16SS0650102	1.26 UR	16SS0660102
	1.22 UR	16SB0590206	1.04 UR	16SB0600206	1.09 UR	16SB0610206	1.01 UR	16SB0620206	1.19 UR	16SB0630206	1.09 UR	16SB0640206	1.27 UR	16SB0650206	1.23 UR	16SB0660206
	0.988 UR	16SB0590608	1.02 UR	16SB0600609	1.2 UR	16SB0610607	0.968 UR	16SB0620607	1.3 UR	16SB0630608	1.24 UR	16SB0640608	1.45 UR	16SB0650608	0.92 UR	16SB0660608
ACRYLONITRILE	1.01 U	16SS0590102	1.14 UR	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 UR	16SS0630102	1.05 UR	16SS0640102	1.17 UR	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 UR	16SB0610206	1.01 U	16SB0620206	1.19 UR	16SB0630206	1.09 UR	16SB0640206	1.27 UR	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 UR	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 UR	16SB0630608	1.24 UR	16SB0640608	1.45 UR	16SB0650608	0.92 U	16SB0660608
BENZENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
BROMODICHLOROMETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
BROMOFORM	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
BROMOMETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 UJ	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 UJ	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 UJ	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 UJ	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 UJ	16SB0660608
CARBON DISULFIDE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	2 J	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
CARBON TETRACHLORIDE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
CHLOROBENZENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB059**		**16SB060**		**16SB061**		**16SB062**		**16SB063**		**16SB064**		**16SB065**		**16SB066**	
SAMPLE DATE	**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/11/2004**		**8/12/2004**	
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
CHLORODIBROMOMETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
CHLOROETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
CHLOROFORM	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
CHLOROMETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
CHLOROPRENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
CIS-1,2-DICHLOROETHENE	1.01 U	16SS0590102	17	16SS0600102	1.1 J	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	73	16SS0660102
	1.22 U	16SB0590206	8 J	16SB0600206	86	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	24	16SB0650206	23	16SB0660206
	0.988 U	16SB0590608	4	16SB0600609	11	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	27	16SB0650608	1 J	16SB0660608
CIS-1,3-DICHLOROPROPENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
DIBROMOMETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
DICHLORODIFLUOROMETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	2 J	16SS0640102	2 J	16SS0650102	1.26 U	16SS0660102

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB059**		**16SB060**		**16SB061**		**16SB062**		**16SB063**		**16SB064**		**16SB065**		**16SB066**	
SAMPLE DATE	**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/11/2004**		**8/12/2004**	
	1.22 J	16SB0590206	22 J	16SB0600206	2 J	16SB0610206	1.01 U	16SB0620206	4 J	16SB0630206	1.1 J	16SB0640206	5	16SB0650206	5 J	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	3 J	16SB0640608	1.45 U	16SB0650608	5 J	16SB0660608
ETHYL METHACRYLATE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
ETHYLBENZENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
ISOBUTANOL	39.5 U	16SS0590102	42 U	16SS0600102	45.5 U	16SS0610102	37.7 U	16SS0620102	40.7 U	16SS0630102	41.9 U	16SS0640102	45.8 U	16SS0650102	43.1 U	16SS0660102
	54.5 U	16SB0590206	42.6 UJ	16SB0600206	49.8 U	16SB0610206	40.5 U	16SB0620206	42.4 U	16SB0630206	52.3 U	16SB0640206	45.1 U	16SB0650206	39.9 U	16SB0660206
	39.5 U	16SB0590608	42.4 U	16SB0600609	47.9 U	16SB0610607	41.2 U	16SB0620607	43.1 U	16SB0630608	43.2 U	16SB0640608	47.6 U	16SB0650608	49.2 U	16SB0660608
METHACRYLONITRILE	1.01 U	16SS0590102	1.14 UR	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 UR	16SS0630102	1.05 UR	16SS0640102	1.17 UR	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 UR	16SB0610206	1.01 U	16SB0620206	1.19 UR	16SB0630206	1.09 UR	16SB0640206	1.27 UR	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 UR	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 UR	16SB0630608	1.24 UR	16SB0640608	1.45 UR	16SB0650608	0.92 U	16SB0660608
METHYL IODIDE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
METHYL METHACRYLATE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
METHYLENE CHLORIDE	1.01 UJ	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 UJ	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 UJ	16SB0590206	16 U	16SB0600206	1.09 U	16SB0610206	1.01 UJ	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	5 U	16SB0660206
	0.988 UJ	16SB0590608	1.02 U	16SB0600609	3 U	16SB0610607	0.968 UJ	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	5 U	16SB0660608
PROPIONITRILE	39.5 U	16SS0590102	42 U	16SS0600102	45.5 U	16SS0610102	37.7 U	16SS0620102	40.7 U	16SS0630102	41.9 U	16SS0640102	45.8 U	16SS0650102	43.1 U	16SS0660102
	54.5 U	16SB0590206	42.6 UJ	16SB0600206	49.8 U	16SB0610206	40.5 U	16SB0620206	42.4 U	16SB0630206	52.3 U	16SB0640206	45.1 U	16SB0650206	39.9 U	16SB0660206
	39.5 U	16SB0590608	42.4 U	16SB0600609	47.9 U	16SB0610607	41.2 U	16SB0620607	43.1 U	16SB0630608	43.2 U	16SB0640608	47.6 U	16SB0650608	49.2 U	16SB0660608

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB059**		**16SB060**		**16SB061**		**16SB062**		**16SB063**		**16SB064**		**16SB065**		**16SB066**	
SAMPLE DATE	**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/11/2004**		**8/12/2004**	
STYRENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
TETRACHLOROETHENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
TOLUENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
TOTAL XYLENES	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
TRANS-1,2-DICHLOROETHENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 J	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	5	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	3 J	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	4 J	16SB0650608	0.92 U	16SB0660608
TRANS-1,3-DICHLOROPROPENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
TRANS-1,4-DICHLORO-2-BUTENE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
TRICHLOROETHENE	13	16SS0590102	9	16SS0600102	3 J	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	34	16SS0660102
	190	16SB0590206	28 J	16SB0600206	160	16SB0610206	5	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	3 J	16SB0650206	9	16SB0660206
	9	16SB0590608	1.02 U	16SB0600609	14	16SB0610607	6	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	17	16SB0650608	0.92 U	16SB0660608
TRICHLOROFLUOROMETHANE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	2 J	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB059**		**16SB060**		**16SB061**		**16SB062**		**16SB063**		**16SB064**		**16SB065**		**16SB066**	
SAMPLE DATE	**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/11/2004**		**8/12/2004**	
VINYL ACETATE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	1.27 U	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	1.45 U	16SB0650608	0.92 U	16SB0660608
VINYL CHLORIDE	1.01 U	16SS0590102	1.14 U	16SS0600102	1.19 U	16SS0610102	1 U	16SS0620102	1.01 U	16SS0630102	1.05 U	16SS0640102	1.17 U	16SS0650102	1.26 U	16SS0660102
	1.22 U	16SB0590206	1.04 UJ	16SB0600206	1.09 U	16SB0610206	1.01 U	16SB0620206	1.19 U	16SB0630206	1.09 U	16SB0640206	12	16SB0650206	1.23 U	16SB0660206
	0.988 U	16SB0590608	1.02 U	16SB0600609	1.2 U	16SB0610607	0.968 U	16SB0620607	1.3 U	16SB0630608	1.24 U	16SB0640608	6	16SB0650608	0.92 U	16SB0660608
Inorganics (mg/kg)																
ALUMINUM																
ANTIMONY																
ARSENIC																
BARIUM																
BERYLLIUM																
CADMIUM																
CALCIUM																
CHROMIUM																
COBALT																
COPPER																
IRON																
LEAD																
MAGNESIUM																

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB059**		**16SB060**		**16SB061**		**16SB062**		**16SB063**		**16SB064**		**16SB065**		**16SB066**	
SAMPLE DATE	**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/13/2004**		**8/11/2004**		**8/11/2004**		**8/11/2004**		**8/12/2004**	
MANGANESE																
MERCURY																
NICKEL																
POTASSIUM																
SELENIUM																
SILVER																
SODIUM																
THALLIUM																
TIN																
VANADIUM																
ZINC																

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB067**		**16SB068**		**16SB069**		**16SB070**		**16SB071 (1)**		**16SB072**		**16SB073 (1)**		**16SB074 (1)**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/17/2004**	
Volatile Organics (ug/kg)																
1,1,1,2-TETRACHLOROETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,1,1-TRICHLOROETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,1,2,2-TETRACHLOROETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,1,2-TRICHLOROETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,1-DICHLOROETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,1-DICHLOROETHENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,2,3-TRICHLOROPROPANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 UJ	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,2-DIBROMO-3-CHLOROPROPANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 UJ	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,2-DIBROMOETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 UJ	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 UJ	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 UJ	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 UJ	16SB0720206	1.03 UJ	16SB0730204	1.04 UJ	16SB0740206
			1 U	16SB0680206-D												

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB067**		**16SB068**		**16SB069**		**16SB070**		**16SB071 (1)**		**16SB072**		**16SB073 (1)**		**16SB074 (1)**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/17/2004**	
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 UJ	16SB0690607	0.978 UJ	16SB0700607			1.22 UJ	16SB0720607				
1,2-DICHLOROETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,2-DICHLOROPROPANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
1,4-DIOXANE	110 U	16SS0670102	101 U	16SS0680102	107 U	16SS0690102	96.5 U	16SS0700102	99.7 UJ	16SS0710102	91 U	16SS0720102	101 U	16SS0730102	96.1 U	16SS0740102
															114 U	16SS0740102-D
	98.7 U	16SB0670206	101 U	16SB0680206	112 U	16SB0690206	125 U	16SB0700206	113 U	16SB0710206	98.6 U	16SB0720206	105 U	16SB0730204	101 U	16SB0740206
			100 U	16SB0680206-D												
	105 U	16SB0670609	97.8 U	16SB0680609	116 U	16SB0690607	126 U	16SB0700607			109 U	16SB0720607				
2-BUTANONE	4 J	16SS0670102	2 J	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	3 J	16SS0720102	5 J	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
2-HEXANONE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
3-CHLOROPROPENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
4-METHYL-2-PENTANONE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 J	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
ACETONE	33 BJ	16SS0670102	25 BJ	16SS0680102	13 BU	16SS0690102	4 U	16SS0700102	15 J	16SS0710102	28 J	16SS0720102	51 BJ	16SS0730102	3 BU	16SS0740102
															2 BU	16SS0740102-D
	6 BU	16SB0670206	7 BU	16SB0680206	5 U	16SB0690206	2 U	16SB0700206	3 J	16SB0710206	8 BU	16SB0720206	13 BU	16SB0730204	4 BU	16SB0740206
			2 J	16SB0680206-D												
	8 U	16SB0670609	5 BU	16SB0680609	6 BU	16SB0690607	5 U	16SB0700607			7 BU	16SB0720607				
ACETONITRILE	43.9 UJ	16SS0670102	40.4 UJ	16SS0680102	42.7 UJ	16SS0690102	38.6 U	16SS0700102	39.9 UJ	16SS0710102	36.4 UJ	16SS0720102	40.5 U	16SS0730102	38.5 U	16SS0740102
															45.7 U	16SS0740102-D
	39.5 UJ	16SB0670206	40.3 UJ	16SB0680206	44.9 UJ	16SB0690206	49.8 U	16SB0700206	45.2 U	16SB0710206	39.4 U	16SB0720206	41.9 U	16SB0730204	40.3 U	16SB0740206

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB067**		**16SB068**		**16SB069**		**16SB070**		**16SB071** (1)		**16SB072**		**16SB073** (1)		**16SB074** (1)	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/17/2004**	
			40 U	16SB0680206-D												
	42.1 UJ	16SB0670609	39.1 UJ	16SB0680609	46.5 UJ	16SB0690607	50.3 U	16SB0700607			43.6 U	16SB0720607				
ACROLEIN	1.19 UR	16SS0670102	0.963 UR	16SS0680102	0.995 UR	16SS0690102	0.923 UR	16SS0700102	0.943 UR	16SS0710102	0.933 UR	16SS0720102	1 UR	16SS0730102	0.938 UR	16SS0740102
															1.02 UR	16SS0740102-D
	1.09 UR	16SB0670206	1.02 UR	16SB0680206	1.05 UR	16SB0690206	1.2 UR	16SB0700206	1.16 UR	16SB0710206	0.986 UR	16SB0720206	1.03 UR	16SB0730204	1.04 UR	16SB0740206
			1 UR	16SB0680206-D												
	1.21 UR	16SB0670609	1.12 UR	16SB0680609	1.35 UR	16SB0690607	0.978 UR	16SB0700607			1.22 UR	16SB0720607				
ACRYLONITRILE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
BENZENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
BROMODICHLOROMETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
BROMOFORM	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
BROMOMETHANE	1.19 UJ	16SS0670102	0.963 UJ	16SS0680102	0.995 UJ	16SS0690102	0.923 UJ	16SS0700102	0.943 UJ	16SS0710102	0.933 UJ	16SS0720102	1 UJ	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 UJ	16SB0670206	1.02 UJ	16SB0680206	1.05 UJ	16SB0690206	1.2 UJ	16SB0700206	1.16 U	16SB0710206	0.986 UJ	16SB0720206	1.03 UJ	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 UJ	16SB0670609	1.12 UJ	16SB0680609	1.35 UJ	16SB0690607	0.978 UJ	16SB0700607			1.22 UJ	16SB0720607				
CARBON DISULFIDE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	3	16SS0720102	2 J	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
CARBON TETRACHLORIDE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
CHLOROBENZENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB067**		**16SB068**		**16SB069**		**16SB070**		**16SB071 (1)**		**16SB072**		**16SB073 (1)**		**16SB074 (1)**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/17/2004**	
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
CHLORODIBROMOMETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
CHLOROETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
CHLOROFORM	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
CHLOROMETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
CHLOROPRENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
CIS-1,2-DICHLOROETHENE	3 J	16SS0670102	5	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	13	16SS0720102	3 J	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	7 J	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	32	16SB0720206	5	16SB0730204	1.04 U	16SB0740206
			14 J	16SB0680206-D												
	1.21 U	16SB0670609	5	16SB0680609	1.35 U	16SB0690607	2 J	16SB0700607			53	16SB0720607				
CIS-1,3-DICHLOROPROPENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
DIBROMOMETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 UJ	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
DICHLORODIFLUOROMETHANE	4	16SS0670102	2 J	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	20 J	16SS0710102	0.933 UJ	16SS0720102	1 U	16SS0730102	1 J	16SS0740102

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB067**		**16SB068**		**16SB069**		**16SB070**		**16SB071 (1)**		**16SB072**		**16SB073 (1)**		**16SB074 (1)**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/17/2004**	
															2 J	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 UJ	16SB0690206	1.2 U	16SB0700206	10	16SB0710206	0.986 U	16SB0720206	13	16SB0730204	5	16SB0740206
			1 U	16SB0680206-D												
	16 J	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
ETHYL METHACRYLATE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
ETHYLBENZENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
ISOBUTANOL	43.9 U	16SS0670102	40.4 U	16SS0680102	42.7 U	16SS0690102	38.6 U	16SS0700102	39.9 UJ	16SS0710102	36.4 U	16SS0720102	40.5 U	16SS0730102	38.5 U	16SS0740102
															45.7 U	16SS0740102-D
	39.5 U	16SB0670206	40.3 U	16SB0680206	44.9 U	16SB0690206	49.8 U	16SB0700206	45.2 U	16SB0710206	39.4 U	16SB0720206	41.9 U	16SB0730204	40.3 U	16SB0740206
			40 U	16SB0680206-D												
	42.1 U	16SB0670609	39.1 U	16SB0680609	46.5 U	16SB0690607	50.3 U	16SB0700607			43.6 U	16SB0720607				
METHACRYLONITRILE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
METHYL IODIDE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 UJ	16SS0740102
															1.02 UJ	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 UJ	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
METHYL METHACRYLATE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
METHYLENE CHLORIDE	3 BU	16SS0670102	2 BU	16SS0680102	0.995 U	16SS0690102	2 U	16SS0700102	3 J	16SS0710102	2 U	16SS0720102	2 U	16SS0730102	0.938 UJ	16SS0740102
															1.02 UJ	16SS0740102-D
	2 BU	16SB0670206	1.02 U	16SB0680206	2 U	16SB0690206	2 U	16SB0700206	1.16 UJ	16SB0710206	2 U	16SB0720206	5 U	16SB0730204	1.04 UJ	16SB0740206
			1 UJ	16SB0680206-D												
	5 U	16SB0670609	2 BU	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
PROPIONITRILE	43.9 U	16SS0670102	40.4 U	16SS0680102	42.7 U	16SS0690102	38.6 U	16SS0700102	39.9 UJ	16SS0710102	36.4 U	16SS0720102	40.5 U	16SS0730102	38.5 U	16SS0740102
															45.7 U	16SS0740102-D
	39.5 U	16SB0670206	40.3 U	16SB0680206	44.9 U	16SB0690206	49.8 U	16SB0700206	45.2 U	16SB0710206	39.4 U	16SB0720206	41.9 U	16SB0730204	40.3 U	16SB0740206
			40 U	16SB0680206-D												
	42.1 U	16SB0670609	39.1 U	16SB0680609	46.5 U	16SB0690607	50.3 U	16SB0700607			43.6 U	16SB0720607				

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB067**		**16SB068**		**16SB069**		**16SB070**		**16SB071 (1)**		**16SB072**		**16SB073 (1)**		**16SB074 (1)**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/17/2004**	
STYRENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
TETRACHLOROETHENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
TOLUENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 J	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
TOTAL XYLENES	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	3	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
TRANS-1,2-DICHLOROETHENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
TRANS-1,3-DICHLOROPROPENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
TRANS-1,4-DICHLORO-2-BUTENE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
TRICHLOROETHENE	3 J	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	2 J	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	2 J	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	5	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			2 J	16SB0680206-D												
	2 J	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	10	16SB0700607			11	16SB0720607				
TRICHLOROFLUOROMETHANE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	3 J	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 J	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	2 J	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB067**		**16SB068**		**16SB069**		**16SB070**		**16SB071 (1)**		**16SB072**		**16SB073 (1)**		**16SB074 (1)**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/17/2004**	
VINYL ACETATE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
VINYL CHLORIDE	1.19 U	16SS0670102	0.963 U	16SS0680102	0.995 U	16SS0690102	0.923 U	16SS0700102	0.943 UJ	16SS0710102	0.933 U	16SS0720102	1 U	16SS0730102	0.938 U	16SS0740102
															1.02 U	16SS0740102-D
	1.09 U	16SB0670206	1.02 U	16SB0680206	1.05 U	16SB0690206	1.2 U	16SB0700206	1.16 U	16SB0710206	0.986 U	16SB0720206	1.03 U	16SB0730204	1.04 U	16SB0740206
			1 U	16SB0680206-D												
	1.21 U	16SB0670609	1.12 U	16SB0680609	1.35 U	16SB0690607	0.978 U	16SB0700607			1.22 U	16SB0720607				
Inorganics (mg/kg)																
ALUMINUM																
ANTIMONY																
ARSENIC																
BARIUM																
BERYLLIUM																
CADMIUM																
CALCIUM																
CHROMIUM																
COBALT																
COPPER																
IRON																
LEAD																
MAGNESIUM																

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB067**		**16SB068**		**16SB069**		**16SB070**		**16SB071** (1)		**16SB072**		**16SB073** (1)		**16SB074** (1)	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/17/2004**	
MANGANESE																
MERCURY																
NICKEL																
POTASSIUM																
SELENIUM																
SILVER																
SODIUM																
THALLIUM																
TIN																
VANADIUM																
ZINC																

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB075 (1)**		**16SB076**		**16SB077**		**16SB078**		**16SB085**		**16SB086**		**16SB087**		**16SB088**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**	
Volatile Organics (ug/kg)																
1,1,1,2-TETRACHLOROETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,1,1-TRICHLOROETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,1,2,2-TETRACHLOROETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,1,2-TRICHLOROETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,1-DICHLOROETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,1-DICHLOROETHENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,2,3-TRICHLOROPROPANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,2-DIBROMO-3-CHLOROPROPANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,2-DIBROMOETHANE	0.967 UJ	16SS0750102	0.953 U	16SS0760102	0.893 UJ	16SS0770102	1.02 U	16SS0780102								
	0.975 UJ	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB075 (1)**		**16SB076**		**16SB077**		**16SB078**		**16SB085**		**16SB086**		**16SB087**		**16SB088**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**	
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,2-DICHLOROETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,2-DICHLOROPROPANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
1,4-DIOXANE	96.7 U	16SS0750102	96.4 U	16SS0760102	95.1 U	16SS0770102	94.5 U	16SS0780102								
	94.2 U	16SB0750203	102 U	16SB0760206	110 U	16SB0770206	114 U	16SB0780206								
					97.1 U	16SB0770206-D										
			121 U	16SB0760607	90.8 U	16SB0770610	112 UJ	16SB0780609								
2-BUTANONE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	1 J	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
2-HEXANONE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
3-CHLOROPROPENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
4-METHYL-2-PENTANONE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
ACETONE	5 BU	16SS0750102	2 J	16SS0760102	3 U	16SS0770102	1.02 U	16SS0780102								
	6 BU	16SB0750203	13 J	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					3 J	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	15 J	16SB0780609								
ACETONITRILE	38.7 U	16SS0750102	38.6 U	16SS0760102	38 U	16SS0770102	37.8 U	16SS0780102								
	37.7 U	16SB0750203	40.9 U	16SB0760206	44.1 U	16SB0770206	45.7 U	16SB0780206								

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB075 (1)**		**16SB076**		**16SB077**		**16SB078**		**16SB085**		**16SB086**		**16SB087**		**16SB088**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**	
					38.8 U	16SB0770206-D										
			48.6 U	16SB0760607	36.3 U	16SB0770610	45 UJ	16SB0780609								
ACROLEIN	0.967 UR	16SS0750102	0.953 UR	16SS0760102	0.893 UR	16SS0770102	1.02 UR	16SS0780102								
	0.975 UR	16SB0750203	0.929 UR	16SB0760206	0.988 UR	16SB0770206	1.01 UR	16SB0780206								
					0.976 UR	16SB0770206-D										
			1.12 UR	16SB0760607	0.92 UR	16SB0770610	1.04 UR	16SB0780609								
ACRYLONITRILE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
BENZENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
BROMODICHLOROMETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
BROMOFORM	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
BROMOMETHANE	0.967 UJ	16SS0750102	0.953 U	16SS0760102	0.893 UJ	16SS0770102	1.02 U	16SS0780102								
	0.975 UJ	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CARBON DISULFIDE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CARBON TETRACHLORIDE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CHLOROBENZENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB075 (1)**		**16SB076**		**16SB077**		**16SB078**		**16SB085**		**16SB086**		**16SB087**		**16SB088**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**	
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CHLORODIBROMOMETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CHLOROETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CHLOROFORM	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CHLOROMETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CHLOROPRENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CIS-1,2-DICHLOROETHENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
CIS-1,3-DICHLOROPROPENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
DIBROMOMETHANE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
DICHLORODIFLUOROMETHANE	2 J	16SS0750102	13	16SS0760102	0.893 UJ	16SS0770102	1.02 U	16SS0780102								

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB075 (1)**		**16SB076**		**16SB077**		**16SB078**		**16SB085**		**16SB086**		**16SB087**		**16SB088**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**	
	11	16SB0750203	12	16SB0760206	11 J	16SB0770206	6	16SB0780206								
					4 J	16SB0770206-D										
			9	16SB0760607	2 J	16SB0770610	14 J	16SB0780609								
ETHYL METHACRYLATE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
ETHYLBENZENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
ISOBUTANOL	38.7 U	16SS0750102	38.6 U	16SS0760102	38 U	16SS0770102	37.8 U	16SS0780102								
	37.7 U	16SB0750203	40.9 U	16SB0760206	44.1 U	16SB0770206	45.7 U	16SB0780206								
					38.8 U	16SB0770206-D										
			48.6 U	16SB0760607	36.3 U	16SB0770610	45 UJ	16SB0780609								
METHACRYLONITRILE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
METHYL IODIDE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 UR	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
METHYL METHACRYLATE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
METHYLENE CHLORIDE	3 U	16SS0750102	0.953 UJ	16SS0760102	0.893 UJ	16SS0770102	1.02 UJ	16SS0780102								
	4 U	16SB0750203	0.929 UJ	16SB0760206	0.988 UJ	16SB0770206	1.01 UJ	16SB0780206								
					0.976 UJ	16SB0770206-D										
			1.12 UJ	16SB0760607	0.92 UJ	16SB0770610	1.04 UJ	16SB0780609								
PROPIONITRILE	38.7 U	16SS0750102	38.6 U	16SS0760102	38 U	16SS0770102	37.8 U	16SS0780102								
	37.7 U	16SB0750203	40.9 U	16SB0760206	44.1 U	16SB0770206	45.7 U	16SB0780206								
					38.8 U	16SB0770206-D										
			48.6 U	16SB0760607	36.3 U	16SB0770610	45 UJ	16SB0780609								

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB075 (1)**		**16SB076**		**16SB077**		**16SB078**		**16SB085**		**16SB086**		**16SB087**		**16SB088**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**	
STYRENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
TETRACHLOROETHENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
TOLUENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
TOTAL XYLENES	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
TRANS-1,2-DICHLOROETHENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
TRANS-1,3-DICHLOROPROPENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
TRANS-1,4-DICHLORO-2-BUTENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
TRICHLOROETHENE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	1 J	16SB0770610	1.04 UJ	16SB0780609								
TRICHLOROFLUOROMETHANE	0.967 U	16SS0750102	1 J	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	1 J	16SB0750203	1 J	16SB0760206	1 J	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	2 J	16SB0780609								

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB075 (1)**		**16SB076**		**16SB077**		**16SB078**		**16SB085**		**16SB086**		**16SB087**		**16SB088**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**	
VINYL ACETATE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
VINYL CHLORIDE	0.967 U	16SS0750102	0.953 U	16SS0760102	0.893 U	16SS0770102	1.02 U	16SS0780102								
	0.975 U	16SB0750203	0.929 U	16SB0760206	0.988 U	16SB0770206	1.01 U	16SB0780206								
					0.976 U	16SB0770206-D										
			1.12 U	16SB0760607	0.92 U	16SB0770610	1.04 UJ	16SB0780609								
Inorganics (mg/kg)																
ALUMINUM									22300 J	16SS0850002	18000 J	16SS0860002	17800 J	16SS0870002	34200 J	16SS0880002
									21200 J	16SS0850002-D						
									26700 J	16SB0850204	22100 J	16SB0860204	24900 J	16SB0870204	14600 J	16SB0880204
ANTIMONY									0.96 U	16SS0850002	3 J	16SS0860002	0.94 U	16SS0870002	1.9 J	16SS0880002
									1.5 J	16SS0850002-D						
									0.65 U	16SB0850204	0.56 U	16SB0860204	1.4 J	16SB0870204	0.34 U	16SB0880204
ARSENIC									7.1 J	16SS0850002	5.7 J	16SS0860002	6 J	16SS0870002	12.7 J	16SS0880002
									6.6 J	16SS0850002-D						
									6.5 J	16SB0850204	7.9 J	16SB0860204	9.5 J	16SB0870204	8.6 J	16SB0880204
BARIUM									80.3 J	16SS0850002	146 J	16SS0860002	87.2 J	16SS0870002	142 J	16SS0880002
									95.8 J	16SS0850002-D						
									66.5 J	16SB0850204	58.7 J	16SB0860204	105 J	16SB0870204	44.3 J	16SB0880204
BERYLLIUM									0.55 U	16SS0850002	0.63 U	16SS0860002	0.54 U	16SS0870002	1 U	16SS0880002
									0.57 U	16SS0850002-D						
									0.81 U	16SB0850204	0.5 U	16SB0860204	0.65 U	16SB0870204	0.34 U	16SB0880204
CADMIUM									0.48 U	16SS0850002	0.53 J	16SS0860002	0.22 U	16SS0870002	0.7 U	16SS0880002
									0.32 U	16SS0850002-D						
									0.35 U	16SB0850204	0.25 U	16SB0860204	0.37 U	16SB0870204	0.13 U	16SB0880204
CALCIUM									1010 J	16SS0850002	591 J	16SS0860002	341 J	16SS0870002	708 J	16SS0880002
									1150 J	16SS0850002-D						
									403 J	16SB0850204	237 J	16SB0860204	250 J	16SB0870204	35.6 U	16SB0880204
CHROMIUM									29.1 J	16SS0850002	19.6 J	16SS0860002	23.1 J	16SS0870002	38.2 J	16SS0880002
									27.5 J	16SS0850002-D						
									41.7 J	16SB0850204	27.9 J	16SB0860204	36.3 J	16SB0870204	23.1 J	16SB0880204
COBALT									7.4 J	16SS0850002	12.4 J	16SS0860002	8.1 J	16SS0870002	9.3 J	16SS0880002
									5.4 J	16SS0850002-D						
									3.1 J	16SB0850204	3.4 J	16SB0860204	4.4 J	16SB0870204	1.1 J	16SB0880204
COPPER									19.2 J	16SS0850002	38.5 J	16SS0860002	14.6 J	16SS0870002	36.8 J	16SS0880002
									18.1 J	16SS0850002-D						
									12.5 J	16SB0850204	14.2 J	16SB0860204	25.5 J	16SB0870204	6.6 J	16SB0880204
IRON									21900 J	16SS0850002	16300 J	16SS0860002	15800 J	16SS0870002	33500 J	16SS0880002
									20800 J	16SS0850002-D						
									34500 J	16SB0850204	29900 J	16SB0860204	27900 J	16SB0870204	13000 J	16SB0880204
LEAD									26 J	16SS0850002	110 J	16SS0860002	21.4 J	16SS0870002	82.6 J	16SS0880002
									23.8 J	16SS0850002-D						
									15.6 J	16SB0850204	13.2 J	16SB0860204	71.1 J	16SB0870204	9.4 J	16SB0880204
MAGNESIUM									2340 J	16SS0850002	1900 J	16SS0860002	1510 J	16SS0870002	3610 J	16SS0880002
									2370 J	16SS0850002-D						
									1490 J	16SB0850204	2270 J	16SB0860204	1980 J	16SB0870204	1040 J	16SB0880204

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB075** [(1)]		**16SB076**		**16SB077**		**16SB078**		**16SB085**		**16SB086**		**16SB087**		**16SB088**	
SAMPLE DATE	**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/12/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**		**8/14/2004**	
MANGANESE									233 J	16SS0850002	764 J	16SS0860002	233 J	16SS0870002	448 J	16SS0880002
									170 J	16SS0850002-D						
									51.2 J	16SB0850204	106 J	16SB0860204	204 J	16SB0870204	14.5 J	16SB0880204
MERCURY									0.034 J	16SS0850002	0.034 J	16SS0860002	0.027 J	16SS0870002	0.057 J	16SS0880002
									0.043 J	16SS0850002-D						
									0.03 J	16SB0850204	0.083 J	16SB0860204	0.039 J	16SB0870204	0.021 J	16SB0880204
NICKEL									15.1 J	16SS0850002	16.6 J	16SS0860002	15.6 J	16SS0870002	26.2 J	16SS0880002
									14.7 J	16SS0850002-D						
									16.1 J	16SB0850204	15.6 J	16SB0860204	15.9 J	16SB0870204	6.5 J	16SB0880204
POTASSIUM									1920 J	16SS0850002	1520 J	16SS0860002	1710 J	16SS0870002	2980 J	16SS0880002
									2180 J	16SS0850002-D						
									1700 J	16SB0850204	1820 J	16SB0860204	2660 J	16SB0870204	1880 J	16SB0880204
SELENIUM									0.43 U	16SS0850002	0.43 U	16SS0860002	0.43 U	16SS0870002	0.7 U	16SS0880002
									0.33 U	16SS0850002-D						
									0.47 U	16SB0850204	0.35 U	16SB0860204	0.59 U	16SB0870204	0.24 U	16SB0880204
SILVER									0.21 U	16SS0850002	0.06 U	16SS0860002	0.07 U	16SS0870002	0.05 U	16SS0880002
									0.049 U	16SS0850002-D						
									0.22 U	16SB0850204	0.06 U	16SB0860204	0.06 U	16SB0870204	0.045 U	16SB0880204
SODIUM									68.6 U	16SS0850002	46.2 U	16SS0860002	40.1 U	16SS0870002	49.9 U	16SS0880002
									42.8 U	16SS0850002-D						
									43.8 U	16SB0850204	37.5 U	16SB0860204	46.3 U	16SB0870204	29.5 U	16SB0880204
THALLIUM									0.44 U	16SS0850002	0.29 U	16SS0860002	0.28 U	16SS0870002	0.5 U	16SS0880002
									0.28 U	16SS0850002-D						
									0.48 U	16SB0850204	0.3 U	16SB0860204	0.35 U	16SB0870204	0.19 U	16SB0880204
TIN									0.63 U	16SS0850002	0.69 U	16SS0860002	0.56 U	16SS0870002	0.7 U	16SS0880002
									0.58 U	16SS0850002-D						
									0.61 U	16SB0850204	0.65 U	16SB0860204	0.71 U	16SB0870204	0.35 U	16SB0880204
VANADIUM									42.9 J	16SS0850002	32.9 J	16SS0860002	34.6 J	16SS0870002	65.2 J	16SS0880002
									41.6 J	16SS0850002-D						
									44 J	16SB0850204	43.3 J	16SB0860204	48.5 J	16SB0870204	26.9 J	16SB0880204
ZINC									135	16SS0850002	368 J	16SS0860002	88.6	16SS0870002	280	16SS0880002
									159	16SS0850002-D						
									40.6	16SB0850204	35.7	16SB0860204	130	16SB0870204	18.2	16SB0880204

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB089**		**16SB090**		**16SB091**		**16SB092**		**16SB093**		**16SB094**		**16SB095**		**16SB096**	
SAMPLE DATE	**8/14/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**	
Volatile Organics (ug/kg)																
1,1,1,2-TETRACHLOROETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 UJ	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,1,1-TRICHLOROETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,1,2,2-TETRACHLOROETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,1,2-TRICHLOROETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,1-DICHLOROETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,1-DICHLOROETHENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,2,3-TRICHLOROPROPANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,2-DIBROMO-3-CHLOROPROPANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,2-DIBROMOETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB089**		**16SB090**		**16SB091**		**16SB092**		**16SB093**		**16SB094**		**16SB095**		**16SB096**	
SAMPLE DATE	**8/14/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**	
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,2-DICHLOROETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,2-DICHLOROPROPANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
1,4-DIOXANE			---		---		---		---		---		---		---	
			89.8 U	16SB0900406	94.4 U	16SB0910406	90.9 U	16SB0920406	103 U	16SB0930406	128 U	16SB0940708	102 UJ	16SB0950406	96.6 U	16SB0960406
					90.8 U	16SB0910406-D										
			97.2 U	16SB0900608	102 U	16SB0910609	96 U	16SB0920608	109 U	16SB0930608			101 U	16SB0950607	101 U	16SB0960608
2-BUTANONE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
2-HEXANONE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
3-CHLOROPROPENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
4-METHYL-2-PENTANONE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
ACETONE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	4 J	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			7 J	16SB0950607	1.06 U	16SB0960608
ACETONITRILE			---		---		---		---		---		---		---	
			35.9 U	16SB0900406	37.7 U	16SB0910406	36.4 U	16SB0920406	41.3 U	16SB0930406	51.4 U	16SB0940708	40.9 U	16SB0950406	38.6 U	16SB0960406

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB089**		**16SB090**		**16SB091**		**16SB092**		**16SB093**		**16SB094**		**16SB095**		**16SB096**	
SAMPLE DATE	**8/14/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**	
					36.3 U	16SB0910406-D										
			38.9 U	16SB0900608	40.9 U	16SB0910609	38.4 U	16SB0920608	43.6 U	16SB0930608			40.6 U	16SB0950607	40.4 U	16SB0960608
ACROLEIN			---		---		---		---		---		---		---	
			0.955 UR	16SB0900406	0.944 UR	16SB0910406	0.932 UR	16SB0920406	0.95 UR	16SB0930406	1.48 UR	16SB0940708	1.01 UR	16SB0950406	0.966 UR	16SB0960406
					0.908 UR	16SB0910406-D										
			1.17 UR	16SB0900608	0.974 UR	16SB0910609	0.869 UR	16SB0920608	1.05 UR	16SB0930608			1.05 UR	16SB0950607	1.06 UR	16SB0960608
ACRYLONITRILE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
BENZENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
BROMODICHLOROMETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
BROMOFORM			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
BROMOMETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CARBON DISULFIDE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CARBON TETRACHLORIDE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CHLOROBENZENE			---		---		---		---		---		---		---	

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB089**		**16SB090**		**16SB091**		**16SB092**		**16SB093**		**16SB094**		**16SB095**		**16SB096**	
SAMPLE DATE	**8/14/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CHLORODIBROMOMETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CHLOROETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CHLOROFORM			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	5	16SB0910406	0.932 U	16SB0920406	3	16SB0930406	1.48 U	16SB0940708	10	16SB0950406	2 J	16SB0960406
					7	16SB0910406-D										
			1.17 U	16SB0900608	6	16SB0910609	0.869 U	16SB0920608	4	16SB0930608			15	16SB0950607	1.06 U	16SB0960608
CHLOROMETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CHLOROPRENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CIS-1,2-DICHLOROETHENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	1 J	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					2 J	16SB0910406-D										
			1.17 J	16SB0900608	3 J	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
CIS-1,3-DICHLOROPROPENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
DIBROMOMETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
DICHLORODIFLUOROMETHANE			---		---		---		---		---		---		---	

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03		03		03		03		03		03		03		03	
LOCATION	16SB089		16SB090		16SB091		16SB092		16SB093		16SB094		16SB095		16SB096	
SAMPLE DATE	8/14/2004		8/16/2004		8/16/2004		8/16/2004		8/16/2004		8/16/2004		8/16/2004		8/16/2004	
			4 J	16SB0900406	9 J	16SB0910406	1 J	16SB0920406	8	16SB0930406	26	16SB0940708	1.01 J	16SB0950406	4	16SB0960406
					3 J	16SB0910406-D										
			6 J	16SB0900608	2 J	16SB0910609	5 J	16SB0920608	12	16SB0930608			6	16SB0950607	2 J	16SB0960608
ETHYL METHACRYLATE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
ETHYLBENZENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
ISOBUTANOL			---		---		---		---		---		---		---	
			35.9 U	16SB0900406	37.7 U	16SB0910406	36.4 U	16SB0920406	41.3 U	16SB0930406	51.4 U	16SB0940708	40.9 U	16SB0950406	38.6 U	16SB0960406
					36.3 U	16SB0910406-D										
			38.9 U	16SB0900608	40.9 U	16SB0910609	38.4 U	16SB0920608	43.6 U	16SB0930608			40.6 U	16SB0950607	40.4 U	16SB0960608
METHACRYLONITRILE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
METHYL IODIDE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
METHYL METHACRYLATE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
METHYLENE CHLORIDE			---		---		---		---		---		---		---	
			0.955 UJ	16SB0900406	0.944 UJ	16SB0910406	0.932 UJ	16SB0920406	0.95 UJ	16SB0930406	1.48 UJ	16SB0940708	1.01 UJ	16SB0950406	0.966 UJ	16SB0960406
					0.908 UJ	16SB0910406-D										
			1.17 UJ	16SB0900608	0.974 UJ	16SB0910609	0.869 UJ	16SB0920608	1.05 UJ	16SB0930608			1.05 UJ	16SB0950607	1.06 UJ	16SB0960608
PROPIONITRILE			---		---		---		---		---		---		---	
			35.9 U	16SB0900406	37.7 U	16SB0910406	36.4 U	16SB0920406	41.3 U	16SB0930406	51.4 U	16SB0940708	40.9 U	16SB0950406	38.6 U	16SB0960406
					36.3 U	16SB0910406-D										
			38.9 U	16SB0900608	40.9 U	16SB0910609	38.4 U	16SB0920608	43.6 U	16SB0930608			40.6 U	16SB0950607	40.4 U	16SB0960608

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB089**		**16SB090**		**16SB091**		**16SB092**		**16SB093**		**16SB094**		**16SB095**		**16SB096**	
SAMPLE DATE	**8/14/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**	
STYRENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
TETRACHLOROETHENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
TOLUENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
TOTAL XYLENES			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
TRANS-1,2-DICHLOROETHENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
TRANS-1,3-DICHLOROPROPENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
TRANS-1,4-DICHLORO-2-BUTENE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
TRICHLOROETHENE			---		---		---		---		---		---		---	
			220 J	16SB0900406	390 J	16SB0910406	32	16SB0920406	250 J	16SB0930406	20	16SB0940708	9000	16SB0950406	120 J	16SB0960406
					1500 J	16SB0910406-D										
			220 J	16SB0900608	980	16SB0910609	28	16SB0920608	360	16SB0930608			2000	16SB0950607	11	16SB0960608
TRICHLOROFLUOROMETHANE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	2 J	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB089**		**16SB090**		**16SB091**		**16SB092**		**16SB093**		**16SB094**		**16SB095**		**16SB096**	
SAMPLE DATE	**8/14/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**	
VINYL ACETATE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
VINYL CHLORIDE			---		---		---		---		---		---		---	
			0.955 U	16SB0900406	0.944 U	16SB0910406	0.932 U	16SB0920406	0.95 U	16SB0930406	1.48 U	16SB0940708	1.01 U	16SB0950406	0.966 U	16SB0960406
					0.908 U	16SB0910406-D										
			1.17 U	16SB0900608	0.974 U	16SB0910609	0.869 U	16SB0920608	1.05 U	16SB0930608			1.05 U	16SB0950607	1.06 U	16SB0960608
Inorganics (mg/kg)																
ALUMINUM	26100 J	16SS0890002														
	25500 J	16SB0890204														
ANTIMONY	5.2 J	16SS0890002														
	0.62 U	16SB0890204														
ARSENIC	9.3 J	16SS0890002														
	11.5 J	16SB0890204														
BARIUM	175 J	16SS0890002														
	93.2 J	16SB0890204														
BERYLLIUM	0.75 U	16SS0890002														
	0.77 U	16SB0890204														
CADMIUM	0.75 U	16SS0890002														
	0.23 U	16SB0890204														
CALCIUM	1390 J	16SS0890002														
	98.4 J	16SB0890204														
CHROMIUM	33.7 J	16SS0890002														
	48.2 J	16SB0890204														
COBALT	9.1 J	16SS0890002														
	4.3 J	16SB0890204														
COPPER	43.5 J	16SS0890002														
	16.7 J	16SB0890204														
IRON	24800 J	16SS0890002														
	31300 J	16SB0890204														
LEAD	112 J	16SS0890002														
	21.2 J	16SB0890204														
MAGNESIUM	2820 J	16SS0890002														
	2120 J	16SB0890204														

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**		**03**		**03**		**03**		**03**		**03**	
LOCATION	**16SB089**		**16SB090**		**16SB091**		**16SB092**		**16SB093**		**16SB094**		**16SB095**		**16SB096**	
SAMPLE DATE	**8/14/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**		**8/16/2004**	
MANGANESE	256 J	16SS0890002														
	41.2 J	16SB0890204														
MERCURY	0.043 J	16SS0890002														
	0.056 J	16SB0890204														
NICKEL	20.3 J	16SS0890002														
	16.6 J	16SB0890204														
POTASSIUM	2630 J	16SS0890002														
	2980 J	16SB0890204														
SELENIUM	0.5 U	16SS0890002														
	0.62 U	16SB0890204														
SILVER	0.048 U	16SS0890002														
	0.047 U	16SB0890204														
SODIUM	47 U	16SS0890002														
	51.8 U	16SB0890204														
THALLIUM	0.42 U	16SS0890002														
	0.31 U	16SB0890204														
TIN	1.2 U	16SS0890002														
	0.61 U	16SB0890204														
VANADIUM	53.3 J	16SS0890002														
	55.2 J	16SB0890204														
ZINC	683	16SS0890002														
	35.4	16SB0890204														

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**	
LOCATION	**16SB097**		**16SB098**		**16SB099**	
SAMPLE DATE	**8/16/2004**		**8/16/2004**		**8/16/2004**	
Volatile Organics (ug/kg)						
1,1,1,2-TETRACHLOROETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,1,1-TRICHLOROETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,1,2,2-TETRACHLOROETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,1,2-TRICHLOROETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,1-DICHLOROETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,1-DICHLOROETHENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,2,3-TRICHLOROPROPANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,2-DIBROMO-3-CHLOROPROPANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,2-DIBROMOETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**	
LOCATION	**16SB097**		**16SB098**		**16SB099**	
SAMPLE DATE	**8/16/2004**		**8/16/2004**		**8/16/2004**	
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,2-DICHLOROETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,2-DICHLOROPROPANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
1,4-DIOXANE	---		106 U	16SS0980102	96.8 U	16SS0990102
	95.7 U	16SB0970406	108 U	16SB0980206	99.8 U	16SB0990206
	105 U	16SB0970607	95.1 U	16SB0980607	111 U	16SB0990608
	97.6 U	16SB0970607-D				
2-BUTANONE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
2-HEXANONE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
3-CHLOROPROPENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
4-METHYL-2-PENTANONE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
ACETONE	---		1.24 J	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
ACETONITRILE	---		42.4 U	16SS0980102	38.7 U	16SS0990102
	38.3 U	16SB0970406	43.2 U	16SB0980206	39.9 U	16SB0990206

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**	
LOCATION	**16SB097**		**16SB098**		**16SB099**	
SAMPLE DATE	**8/16/2004**		**8/16/2004**		**8/16/2004**	
	41.9 U	16SB0970607	38 U	16SB0980607	44.3 U	16SB0990608
	39 U	16SB0970607-D				
ACROLEIN	---		1.24 UR	16SS0980102	0.98 UR	16SS0990102
	0.957 UR	16SB0970406	0.922 UR	16SB0980206	1.11 UR	16SB0990206
	1.09 UR	16SB0970607	0.929 UR	16SB0980607	1.06 UR	16SB0990608
	1.02 UR	16SB0970607-D				
ACRYLONITRILE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
BENZENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
BROMODICHLOROMETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
BROMOFORM	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
BROMOMETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CARBON DISULFIDE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CARBON TETRACHLORIDE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CHLOROBENZENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**	
LOCATION	**16SB097**		**16SB098**		**16SB099**	
SAMPLE DATE	**8/16/2004**		**8/16/2004**		**8/16/2004**	
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CHLORODIBROMOMETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CHLOROETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CHLOROFORM	---		1.24 U	16SS0980102	1 J	16SS0990102
	12 J	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CHLOROMETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CHLOROPRENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CIS-1,2-DICHLOROETHENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
CIS-1,3-DICHLOROPROPENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
DIBROMOMETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
DICHLORODIFLUOROMETHANE	---		1.24 U	16SS0980102	5 J	16SS0990102

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**	
LOCATION	**16SB097**		**16SB098**		**16SB099**	
SAMPLE DATE	**8/16/2004**		**8/16/2004**		**8/16/2004**	
	6	16SB0970406	1 J	16SB0980206	6 J	16SB0990206
	5	16SB0970607	0.929 U	16SB0980607	10 J	16SB0990608
	2 J	16SB0970607-D				
ETHYL METHACRYLATE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
ETHYLBENZENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
ISOBUTANOL	---		42.4 U	16SS0980102	38.7 U	16SS0990102
	38.3 U	16SB0970406	43.2 U	16SB0980206	39.9 U	16SB0990206
	41.9 U	16SB0970607	38 U	16SB0980607	44.3 U	16SB0990608
	39 U	16SB0970607-D				
METHACRYLONITRILE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
METHYL IODIDE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
METHYL METHACRYLATE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
METHYLENE CHLORIDE	---		1.24 UJ	16SS0980102	0.98 UJ	16SS0990102
	0.957 UJ	16SB0970406	0.922 UJ	16SB0980206	1.11 UJ	16SB0990206
	1.09 UJ	16SB0970607	0.929 UJ	16SB0980607	1.06 UJ	16SB0990608
	1.02 UJ	16SB0970607-D				
PROPIONITRILE	---		42.4 U	16SS0980102	38.7 U	16SS0990102
	38.3 U	16SB0970406	43.2 U	16SB0980206	39.9 U	16SB0990206
	41.9 U	16SB0970607	38 U	16SB0980607	44.3 U	16SB0990608
	39 U	16SB0970607-D				

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**	
LOCATION	**16SB097**		**16SB098**		**16SB099**	
SAMPLE DATE	**8/16/2004**		**8/16/2004**		**8/16/2004**	
STYRENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
TETRACHLOROETHENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
TOLUENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	1 J	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
TOTAL XYLENES	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
TRANS-1,2-DICHLOROETHENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
TRANS-1,3-DICHLOROPROPENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
TRANS-1,4-DICHLORO-2-BUTENE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
TRICHLOROETHENE	---		170	16SS0980102	103 J	16SS0990102
	1200	16SB0970406	140	16SB0980206	630	16SB0990206
	88 J	16SB0970607	200 J	16SB0980607	160	16SB0990608
	8 J	16SB0970607-D				
TRICHLOROFLUOROMETHANE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**	
LOCATION	**16SB097**		**16SB098**		**16SB099**	
SAMPLE DATE	**8/16/2004**		**8/16/2004**		**8/16/2004**	
	1.02 U	16SB0970607-D				
VINYL ACETATE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
VINYL CHLORIDE	---		1.24 U	16SS0980102	0.98 U	16SS0990102
	0.957 U	16SB0970406	0.922 U	16SB0980206	1.11 U	16SB0990206
	1.09 U	16SB0970607	0.929 U	16SB0980607	1.06 U	16SB0990608
	1.02 U	16SB0970607-D				
Inorganics (mg/kg)						
ALUMINUM						
ANTIMONY						
ARSENIC						
BARIUM						
BERYLLIUM						
CADMIUM						
CALCIUM						
CHROMIUM						
COBALT						
COPPER						
IRON						
LEAD						
MAGNESIUM						

(1) No subsurface soil sample due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**03**		**03**		**03**	
LOCATION	**16SB097**		**16SB098**		**16SB099**	
SAMPLE DATE	**8/16/2004**		**8/16/2004**		**8/16/2004**	
MANGANESE						
MERCURY						
NICKEL						
POTASSIUM						
SELENIUM						
SILVER						
SODIUM						
THALLIUM						
TIN						
VANADIUM						
ZINC						

(1) No subsurface soil sample due to refusal.

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	01	01	02	02	03	03	03	03
LOCATION	16SW/SD01	16SW/SD01	16SW/SD01	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04
SAMPLE NUMBER	16SW0101	16SW0101-F	16SW0102	16SW0201	16SW0201-F	16SW0202	16SW0202-D	16SW0301	16SW0301-F	16SW0401	16SW0401-F
SUBMATRIX	SU	SUF	SU	SU	SUF	SU	SU	SW	SF	SW	SF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/1/2003	4/1/2003	12/6/2003	4/10/2003	4/10/2003	12/6/2003	12/6/2003	11/2/2004	11/2/2004	11/11/2004	11/11/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE			0.3 U			0.3 U	0.3 U				
1,1,1-TRICHLOROETHANE			0.3 U			0.3 U	0.3 U				
1,1,2,2-TETRACHLOROETHANE			0.3 U			0.3 U	0.3 U				
1,1,2-TRICHLOROETHANE			0.3 U			0.3 U	0.3 U				
1,1-DICHLOROETHANE			0.3 U			0.3 U	0.3 U				
1,1-DICHLOROETHENE			0.3 U			0.3 U	0.3 U				
1,2,3-TRICHLOROPROPANE			0.3 U			0.3 U	0.3 U				
1,2-DIBROMO-3-CHLOROPROPANE			0.3 U			0.3 U	0.3 U				
1,2-DIBROMOETHANE			0.3 U			0.3 U	0.3 U				
1,2-DICHLOROETHANE			0.3 U			0.3 U	0.3 U				
1,2-DICHLOROPROPANE			0.3 U			0.3 U	0.3 U				
1,4-DIOXANE			50 U			50 U	50 U				
2-BUTANONE			0.5 U			0.5 U	0.5 U				
2-HEXANONE			0.5 U			0.5 U	0.5 U				
3-CHLOROPROPENE			0.5 U			0.5 U	0.5 U				
4-METHYL-2-PENTANONE			0.5 U			0.5 U	0.5 U				
ACETONE			0.5 UJ			0.5 UJ	0.5 UJ				
ACETONITRILE			20 U			20 U	20 U				
ACROLEIN			0.5 UR			0.5 UR	0.5 UR				
ACRYLONITRILE			0.5 U			0.5 U	0.5 U				
BENZENE			0.3 U			0.3 U	0.3 U				
BROMODICHLOROMETHANE			0.3 U			0.3 U	0.3 U				
BROMOFORM			0.3 U			0.3 U	0.3 U				
BROMOMETHANE			0.3 U			0.3 U	0.3 U				
CARBON DISULFIDE			0.3 U			0.3 U	0.3 U				
CARBON TETRACHLORIDE			0.3 U			0.3 U	0.3 U				
CHLOROBENZENE			0.3 U			0.3 U	0.3 U				
CHLORODIBROMOMETHANE			0.3 U			0.3 U	0.3 U				
CHLOROETHANE			0.5 U			0.5 U	0.5 U				
CHLOROFORM			0.3 U			2.4	2.5				
CHLOROMETHANE			0.3 U			0.3 U	0.3 U				
CHLOROPRENE			0.5 U			0.5 U	0.5 U				
CIS-1,2-DICHLOROETHENE			0.3 U			7.1	7.4				
CIS-1,3-DICHLOROPROPENE			0.3 U			0.3 U	0.3 U				
DIBROMOMETHANE			0.3 U			0.3 U	0.3 U				
DICHLORODIFLUOROMETHANE			0.3 U			0.3 U	0.3 U				
ETHYL METHACRYLATE			0.5 U			0.5 U	0.5 U				
ETHYLBENZENE			0.3 U			0.3 U	0.3 U				
ISOBUTANOL			20 U			20 U	20 U				
METHACRYLONITRILE			0.3 U			0.3 U	0.3 U				
METHYL IODIDE			0.5 U			0.5 U	0.5 U				

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	01	01	02	02	03	03	03	03
LOCATION	16SW/SD01	16SW/SD01	16SW/SD01	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04
SAMPLE NUMBER	16SW0101	16SW0101-F	16SW0102	16SW0201	16SW0201-F	16SW0202	16SW0202-D	16SW0301	16SW0301-F	16SW0401	16SW0401-F
SUBMATRIX	SU	SUF	SU	SU	SUF	SU	SU	SW	SF	SW	SF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/1/2003	4/1/2003	12/6/2003	4/10/2003	4/10/2003	12/6/2003	12/6/2003	11/2/2004	11/2/2004	11/11/2004	11/11/2004
METHYL METHACRYLATE			0.5 U			0.5 U	0.5 U				
METHYLENE CHLORIDE			0.3 U			0.3 U	0.3 U				
PROPIONITRILE			20 U			20 U	20 U				
STYRENE			0.3 U			0.3 U	0.3 U				
TETRACHLOROETHENE			0.3 U			0.3 U	0.3 U				
TOLUENE			0.3 U			0.3 U	0.3 U				
TOTAL XYLENES			0.3 U			0.3 U	0.3 U				
TRANS-1,2-DICHLOROETHENE			0.3 U			0.3 U	0.3 U				
TRANS-1,3-DICHLOROPROPENE			0.3 U			0.3 U	0.3 U				
TRANS-1,4-DICHLORO-2-BUTENE			0.5 U			0.5 U	0.5 U				
TRICHLOROETHENE			3.3			8.8	9.2				
TRICHLOROFLUOROMETHANE			0.3 U			0.3 U	0.3 U				
VINYL ACETATE			0.5 U			0.5 U	0.5 U				
VINYL CHLORIDE			0.3 U			0.3 U	0.7 J				
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE	1 U			1 U							
1,2,4-TRICHLOROBENZENE	1 U			1 U							
1,2-DICHLOROBENZENE	1 U			1 U							
1,3-DICHLOROBENZENE	1 U			1 U							
1,4-DICHLOROBENZENE	1 U			1 U							
1,4-NAPHTHOQUINONE	1 U			1 U							
1,4-PHENYLENEDIAMINE	1 UJ			1 UJ							
1-NAPHTHYLAMINE	1 U			1 U							
2,2'-OXYBIS(1-CHLOROPROPANE)	1 U			1 U							
2,3,4,6-TETRACHLOROPHENOL	1 U			1 U							
2,4,5-TRICHLOROPHENOL	1 U			1 U							
2,4,6-TRICHLOROPHENOL	1 U			1 U							
2,4-DICHLOROPHENOL	1 U			1 U							
2,4-DIMETHYLPHENOL	1 U			1 UJ							
2,4-DINITROPHENOL	1 U			1 UR							
2,6-DICHLOROPHENOL	1 U			1 U							
2-ACETYLAMINOFLUORENE	1 U			1 UJ							
2-CHLORONAPHTHALENE	1 UJ			1 U							
2-CHLOROPHENOL	1 U			1 U							
2-METHYLNAPHTHALENE	0.67 J			0.05 U							
2-METHYLPHENOL	1 U			1 U							
2-NAPHTHYLAMINE	1 U			1 U							
2-NITROANILINE	1 U			1 U							
2-NITROPHENOL	1 U			1 UJ							
2-PICOLINE	1 U			1 U							
3&4-METHYLPHENOL	1 U			1 U							
3,3'-DICHLOROBENZIDINE	1 U			1 U							

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	01	01	02	02	03	03	03	03
LOCATION	16SW/SD01	16SW/SD01	16SW/SD01	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04
SAMPLE NUMBER	16SW0101	16SW0101-F	16SW0102	16SW0201	16SW0201-F	16SW0202	16SW0202-D	16SW0301	16SW0301-F	16SW0401	16SW0401-F
SUBMATRIX	SU	SUF	SU	SU	SUF	SU	SU	SW	SF	SW	SF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/1/2003	4/1/2003	12/6/2003	4/10/2003	4/10/2003	12/6/2003	12/6/2003	11/2/2004	11/2/2004	11/11/2004	11/11/2004
3,3'-DIMETHYLBENZIDINE	1 U			1 U							
3-METHYLCHOLANTHRENE	1 U			1 U							
3-NITROANILINE	1 U			1 U							
4,6-DINITRO-2-METHYLPHENOL	1 U			1 UR							
4-AMINOBIPHENYL	1 U			1 U							
4-BROMOPHENYL PHENYL ETHER	1 U			1 U							
4-CHLORO-3-METHYLPHENOL	1 U			1 U							
4-CHLOROANILINE	1 U			1 U							
4-CHLOROPHENYL PHENYL ETHER	1 U			1 U							
4-NITROANILINE	1 U			1 U							
4-NITROPHENOL	1 U			1 UR							
4-NITROQUINOLINE-1-OXIDE	1 UR			1 UR							
5-NITRO-O-TOLUIDINE	1 U			1 U							
7,12-DIMETHYLBENZ(A)ANTHRACENE	1 U			1 U							
A,A-DIMETHYLPHENETHYLAMINE	1 UJ			1 UJ							
ACENAPHTHENE	0.9 J			0.05 UJ							
ACENAPHTHYLENE	0.2 UJ			0.05 U							
ACETOPHENONE	1 U			1 U							
ANILINE	1 U			1 U							
ANTHRACENE	0.31 J			0.05 U							
ARAMITE	1 UR			1 UR							
BENZO(A)ANTHRACENE	0.31 J			0.05 U							
BENZO(A)PYRENE	0.2 UJ			0.05 U							
BENZO(B)FLUORANTHENE	0.2 UJ			0.05 U							
BENZO(G,H,I)PERYLENE	0.2 UJ			0.05 U							
BENZO(K)FLUORANTHENE	0.2 UJ			0.05 U							
BENZYL ALCOHOL	1 U			1 U							
BIS(2-CHLOROETHOXY)METHANE	1 U			1 U							
BIS(2-CHLOROETHYL)ETHER	1 U			1 U							
BIS(2-ETHYLHEXYL)PHTHALATE	86 BJ			2 BU							
BUTYL BENZYL PHTHALATE	1 U			1 U							
CHLOROBENZILATE	1 U			1 U							
CHRYSENE	0.78 J			0.05 U							
DI-N-BUTYL PHTHALATE	1 U			1 U							
DI-N-OCTYL PHTHALATE	1 U			1 U							
DIALLATE	1 U			1 U							
DIBENZO(A,H)ANTHRACENE	0.2 UJ			0.05 U							
DIBENZOFURAN	1 U			1 U							
DIETHYL PHTHALATE	1 U			1 U							
DIMETHYL PHTHALATE	1 U			1 U							
DIPHENYLAMINE	1 U			1 U							
ETHYL METHANE SULFONATE	1 U			1 U							

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	01	01	02	02	03	03	03	03
LOCATION	16SW/SD01	16SW/SD01	16SW/SD01	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04
SAMPLE NUMBER	16SW0101	16SW0101-F	16SW0102	16SW0201	16SW0201-F	16SW0202	16SW0202-D	16SW0301	16SW0301-F	16SW0401	16SW0401-F
SUBMATRIX	SU	SUF	SU	SU	SUF	SU	SU	SW	SF	SW	SF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/1/2003	4/1/2003	12/6/2003	4/10/2003	4/10/2003	12/6/2003	12/6/2003	11/2/2004	11/2/2004	11/11/2004	11/11/2004
FLUORANTHENE	1.09 J			0.05 U							
FLUORENE	0.59 J			0.05 U							
HEXACHLOROBENZENE	1 U			1 U							
HEXACHLOROBUTADIENE	1 U			1 U							
HEXACHLOROCYCLOPENTADIENE	1 UR			1 UR							
HEXACHLOROETHANE	1 U			1 U							
HEXACHLOROPROPENE	1 U			1 U							
INDENO(1,2,3-CD)PYRENE	0.2 UJ			0.05 U							
ISODRIN	1 U			1 U							
ISOPHORONE	1 U			1 U							
ISOSAFROLE	1 U			1 U							
KEPONE	1 UJ			1 UR							
METHAPYRILENE	1 UJ			1 UJ							
METHYL METHANE SULFONATE	1 U			1 U							
N-NITROSO-DI-N-BUTYLAMINE	1 U			1 U							
N-NITROSO-DI-N-PROPYLAMINE	1 U			1 U							
N-NITROSODIETHYLAMINE	1 U			1 U							
N-NITROSODIMETHYLAMINE	1 U			1 U							
N-NITROSOMETHYLETHYLAMINE	1 U			1 U							
N-NITROSOMORPHOLINE	1 U			1 U							
N-NITROSOPIPERIDINE	1 U			1 U							
N-NITROSOPYRROLIDINE	1 U			1 U							
NAPHTHALENE	1.3 J			0.05 U							
O,O,O-TRIETHYL PHOSPHOROTHIOATE	1 U			1 U							
O-TOLUIDINE	1 U			1 U							
P-(DIMETHYLAMINO)AZOBENZENE	1 U			1 U							
PENTACHLOROBENZENE	1 U			1 U							
PENTACHLOROETHANE	1 U			1 U							
PENTACHLORONITROBENZENE	1 U			1 U							
PHENACETIN	1 U			1 U							
PHENANTHRENE	1.26 J			0.05 U							
PHENOL	1 U			1 U							
PRONAMIDE	1 U			1 U							
PYRENE	2.34 J			0.05 U							
PYRIDINE	1 U			1 U							
SAFROLE	1 U			1 U							
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.455 U			0.8 U							
1,3-DINITROBENZENE	0.455 U			0.8 U							
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE											
2,4,6-TRINITROTOLUENE	0.455 U			0.8 U							
2,4-DIAMINO-6-NITROTOLUENE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	01	01	02	02	03	03	03	03
LOCATION	16SW/SD01	16SW/SD01	16SW/SD01	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD02	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04
SAMPLE NUMBER	16SW0101	16SW0101-F	16SW0102	16SW0201	16SW0201-F	16SW0202	16SW0202-D	16SW0301	16SW0301-F	16SW0401	16SW0401-F
SUBMATRIX	SU	SUF	SU	SU	SUF	SU	SU	SW	SF	SW	SF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/1/2003	4/1/2003	12/6/2003	4/10/2003	4/10/2003	12/6/2003	12/6/2003	11/2/2004	11/2/2004	11/11/2004	11/11/2004
2,4-DINITROTOLUENE	0.455 U			0.8 U							
2,6-DIAMINO-4-NITROTOLUENE											
2,6-DINITROTOLUENE	0.455 U			0.8 U							
2-AMINO-4,6-DINITROTOLUENE	0.455 U			0.8 U							
2-NITROTOLUENE	0.455 U			0.8 U							
3,5-DINITROANILINE											
3-NITROTOLUENE	0.455 U			0.8 U							
4-AMINO-2,6-DINITROTOLUENE	0.455 U			0.8 U							
4-NITROTOLUENE	0.455 U			0.8 U							
DNX											
HMX	29000			1.5 J							
MNX											
NITROBENZENE	0.455 U			0.8 U							
PICRAMIC ACID	0.39 U			0.39 UJ							
PICRIC ACID	0.39 U			0.39 U							
RDX	88000			9.2							
TETRYL	0.455 U			0.8 U							
TNX											
Herbicides (ug/L)											
HEXACHLOROPHENE	0.082 J			0.025 U							
PENTACHLOROPHENOL	0.19 J			0.02 J							
Total Metals (ug/L)											
ALUMINUM	7.6 U			82.4 U				704 J		1660 J	
ANTIMONY	1.3 U			2.9 U				14.2 J		10.6 J	
ARSENIC	0.38 U			3.4 J				0.29 J		0.57 J	
BARIUM	66.3 J			91 J				371 J		210 J	
BERYLLIUM	0.03 U			0.03 U				0.02 J		0.08 J	
CADMIUM	0.05 U			0.4 U				3		3.1	
CALCIUM	30300 J			30400 J				17400 J		17100 J	
CHROMIUM	0.25 U			3.4 J				1.3 U		3.3 J	
COBALT	0.78 U			0.05 U				0.34 J		0.62 J	
COPPER	2 J			17.2 J				117 J		134 J	
IRON	60.5 J			77.1 U				816 J		1690 J	
LEAD	0.15 U			13.1 J				261		281 J	
LITHIUM	0.91 U			1.6 U							
MAGNESIUM	5190 J			5700 J				1920		2230 J	
MANGANESE	44.3 J			10.6 J				8.8 J		24.2	
MERCURY	2			0.02 U				0.03 U		0.03 U	
NICKEL	1.8 J			0.61 U				1.6 J		3.2 J	
POTASSIUM	1640 J			839 J				727		1470 J	
SELENIUM	0.13 U			0.81 U				0.15 U		0.32 U	
SILVER	0.1 U			0.04 U				0.028 U		0.028 U	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**01**	**02**	**01**	**01**	**02**	**02**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD01**	**16SW/SD01**	**16SW/SD01**	**16SW/SD02**	**16SW/SD02**	**16SW/SD02**	**16SW/SD02**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**
SAMPLE NUMBER	**16SW0101**	**16SW0101-F**	**16SW0102**	**16SW0201**	**16SW0201-F**	**16SW0202**	**16SW0202-D**	**16SW0301**	**16SW0301-F**	**16SW0401**	**16SW0401-F**
SUBMATRIX	**SU**	**SUF**	**SU**	**SU**	**SUF**	**SU**	**SU**	**SW**	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**12/6/2003**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**12/6/2003**	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**
SODIUM	12400 J			29300 J				1070 U		1180 U	
STRONTIUM	190 J			213 J							
THALLIUM	0.04 U			0.05 U				0.043 U		0.043 U	
TIN	0.67 U			0.03 U				0.52 U		0.84 J	
TITANIUM	0.24 U			2.2 J							
VANADIUM	0.05 U			0.39 U				1.6 J		3.1 J	
ZINC	3.2 U			178 J				1110 J		1340 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		575			22.3 U				49.9 J		29.5 U
ANTIMONY, FILTERED		2.1 U			2.8 U				10.8 J		5.5 J
ARSENIC, FILTERED		0.6 U			3.2 J				0.1 U		0.13 U
BARIUM, FILTERED		70.5 J			91.5 J				283 J		139 J
BERYLLIUM, FILTERED		0.03 U			0.03 U				0.02 U		0.02 U
CADMIUM, FILTERED		3.3 J			0.4 U				2.4		1.5
CALCIUM, FILTERED		31000 J			29200 J				17300 J		11100 J
CHROMIUM, FILTERED		1.7 J			3.2 J				0.47 U		0.46 U
COBALT, FILTERED		0.28 U			0.15 U				0.1 J		0.09 J
COPPER, FILTERED		17.9 J			16.2 J				32.3 J		31.6 J
IRON, FILTERED		4100 J			36.6 U				76.4 J		61.5 U
LEAD, FILTERED		26.2 J			8.4 J				35.8 J		21.6 J
LITHIUM, FILTERED		1.4 U			1.6 U						
MAGNESIUM, FILTERED		5310 J			5620 J				1920 J		1590 J
MANGANESE, FILTERED		23.4 J			10.1 J				2.7 J		4.1 J
MERCURY, FILTERED		0.02 U			0.02 U				0.03 U		0.03 U
NICKEL, FILTERED		2.2 J			0.5 U				0.99 J		1.4 J
POTASSIUM, FILTERED		1940 J			842 J				647		1220
SELENIUM, FILTERED		0.22 U			0.79 U				0.1 U		0.24 U
SILVER, FILTERED		0.12 U			0.08 U				0.028 U		0.028 U
SODIUM, FILTERED		12100 J			28200 J				1160 U		1110 U
STRONTIUM, FILTERED		196 J			207 J						
THALLIUM, FILTERED		0.04 U			0.04 U				0.043 U		0.043 U
TIN, FILTERED		0.32 U			0.03 U				0.08 U		0.08 U
TITANIUM, FILTERED		3.9 J			1.3 U						
VANADIUM, FILTERED		0.76 U			0.29 U				1.14 U		1.14 U
ZINC, FILTERED		78.6 J			170 J				200 J		218 J
Field Parameters											
DISSOLVED OXYGEN (mg/L)								10.65		5.66	
DISSOLVED OXYGEN - METER (mg/L)			12.65	10.51		10.69					
OXIDATION REDUCTION POTENTIAL (MV)			193.9	90.9		143.200000		36.6		107	
PH (S.U.)			6.65	8.13		7.61		7.93		7.49	
SPECIFIC CONDUCTANCE (MS/CM)			0.305	0.281		0.224		0.07		0.056	
TEMPERATURE (C)			6.92	9.14		9.49		16.3		10.46	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**01**	**02**	**01**	**01**	**02**	**02**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD01**	**16SW/SD01**	**16SW/SD01**	**16SW/SD02**	**16SW/SD02**	**16SW/SD02**	**16SW/SD02**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**
SAMPLE NUMBER	**16SW0101**	**16SW0101-F**	**16SW0102**	**16SW0201**	**16SW0201-F**	**16SW0202**	**16SW0202-D**	**16SW0301**	**16SW0301-F**	**16SW0401**	**16SW0401-F**
SUBMATRIX	**SU**	**SUF**	**SU**	**SU**	**SUF**	**SU**	**SU**	**SW**	**SF**	**SW**	**SF**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**12/6/2003**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**12/6/2003**	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**
TURBIDITY (NTU)			22	2.1		120		14		65	
Miscellaneous Parameters (mg/L)											
AMMONIA-N	2.8 J			0.01 U							
NITRITE/NITRATE-N	3.3 J			0.22							

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	01	01	01	01	02	03
LOCATION	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD08
SAMPLE NUMBER	16SW0501	16SW0501-F	16SW0601	16SW0601-F	16SW0701	16SW0701-D	16SW0701-F	16SW0701-F-D	16SW0702	16SW0801
SUBMATRIX	SW	SF	SW	SF	SU	SU	SUF	SUF	SU	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	11/11/2004	11/2/2004	11/2/2004	4/10/2003	4/10/2003	4/10/2003	4/10/2003	12/6/2003	11/11/2004
Volatile Organics (ug/L)										
1,1,1,2-TETRACHLOROETHANE									0.3 U	
1,1,1-TRICHLOROETHANE									0.3 U	
1,1,2,2-TETRACHLOROETHANE									0.3 U	
1,1,2-TRICHLOROETHANE									0.3 U	
1,1-DICHLOROETHANE									0.3 U	
1,1-DICHLOROETHENE									0.3 U	
1,2,3-TRICHLOROPROPANE									0.3 U	
1,2-DIBROMO-3-CHLOROPROPANE									0.3 U	
1,2-DIBROMOETHANE									0.3 U	
1,2-DICHLOROETHANE									0.3 U	
1,2-DICHLOROPROPANE									0.3 U	
1,4-DIOXANE									50 U	
2-BUTANONE									0.5 U	
2-HEXANONE									0.5 U	
3-CHLOROPROPENE									0.5 U	
4-METHYL-2-PENTANONE									0.5 U	
ACETONE									0.5 UJ	
ACETONITRILE									20 U	
ACROLEIN									0.5 UR	
ACRYLONITRILE									0.5 U	
BENZENE									0.3 U	
BROMODICHLOROMETHANE									0.3 U	
BROMOFORM									0.3 U	
BROMOMETHANE									0.3 U	
CARBON DISULFIDE									0.3 U	
CARBON TETRACHLORIDE									0.3 U	
CHLOROBENZENE									0.3 U	
CHLORODIBROMOMETHANE									0.3 U	
CHLOROETHANE									0.5 U	
CHLOROFORM									0.3 U	
CHLOROMETHANE									0.3 U	
CHLOROPRENE									0.5 U	
CIS-1,2-DICHLOROETHENE									2.9	
CIS-1,3-DICHLOROPROPENE									0.3 U	
DIBROMOMETHANE									0.3 U	
DICHLORODIFLUOROMETHANE									0.3 U	
ETHYL METHACRYLATE									0.5 U	
ETHYLBENZENE									0.3 U	
ISOBUTANOL									20 U	
METHACRYLONITRILE									0.3 U	
METHYL IODIDE									0.5 U	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	01	01	01	01	02	03
LOCATION	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD08
SAMPLE NUMBER	16SW0501	16SW0501-F	16SW0601	16SW0601-F	16SW0701	16SW0701-D	16SW0701-F	16SW0701-F-D	16SW0702	16SW0801
SUBMATRIX	SW	SF	SW	SF	SU	SU	SUF	SUF	SU	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	11/11/2004	11/2/2004	11/2/2004	4/10/2003	4/10/2003	4/10/2003	4/10/2003	12/6/2003	11/11/2004
METHYL METHACRYLATE									0.5 U	
METHYLENE CHLORIDE									0.3 U	
PROPIONITRILE									20 U	
STYRENE									0.3 U	
TETRACHLOROETHENE									0.3 U	
TOLUENE									0.3 U	
TOTAL XYLENES									0.3 U	
TRANS-1,2-DICHLOROETHENE									0.3 U	
TRANS-1,3-DICHLOROPROPENE									0.3 U	
TRANS-1,4-DICHLORO-2-BUTENE									0.5 U	
TRICHLOROETHENE									6.6	
TRICHLOROFLUOROMETHANE									0.3 U	
VINYL ACETATE									0.5 U	
VINYL CHLORIDE									0.3 U	
Semivolatile Organics (ug/L)										
1,2,4,5-TETRACHLOROBENZENE					1 U	1 U				
1,2,4-TRICHLOROBENZENE					1 U	1 U				
1,2-DICHLOROBENZENE					1 U	1 U				
1,3-DICHLOROBENZENE					1 U	1 U				
1,4-DICHLOROBENZENE					1 U	1 U				
1,4-NAPHTHOQUINONE					1 U	1 U				
1,4-PHENYLENEDIAMINE					1 UJ	1 UJ				
1-NAPHTHYLAMINE					1 U	1 U				
2,2'-OXYBIS(1-CHLOROPROPANE)					1 U	1 U				
2,3,4,6-TETRACHLOROPHENOL					1 U	1 U				
2,4,5-TRICHLOROPHENOL					1 U	1 U				
2,4,6-TRICHLOROPHENOL					1 U	1 U				
2,4-DICHLOROPHENOL					1 U	1 U				
2,4-DIMETHYLPHENOL					1 U	1 U				
2,4-DINITROPHENOL					1 U	1 U				
2,6-DICHLOROPHENOL					1 U	1 U				
2-ACETYLAMINOFLUORENE					1 UJ	1 UJ				
2-CHLORONAPHTHALENE					1 U	1 U				
2-CHLOROPHENOL					1 U	1 U				
2-METHYLNAPHTHALENE					0.05 U	0.05 U				
2-METHYLPHENOL					1 U	1 U				
2-NAPHTHYLAMINE					1 U	1 U				
2-NITROANILINE					1 U	1 U				
2-NITROPHENOL					1 U	1 U				
2-PICOLINE					1 U	1 U				
3&4-METHYLPHENOL					1 U	1 U				
3,3'-DICHLOROBENZIDINE					1 U	1 U				

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	01	01	01	01	02	03
LOCATION	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD08
SAMPLE NUMBER	16SW0501	16SW0501-F	16SW0601	16SW0601-F	16SW0701	16SW0701-D	16SW0701-F	16SW0701-F-D	16SW0702	16SW0801
SUBMATRIX	SW	SF	SW	SF	SU	SU	SUF	SUF	SU	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	11/11/2004	11/2/2004	11/2/2004	4/10/2003	4/10/2003	4/10/2003	4/10/2003	12/6/2003	11/11/2004
3,3'-DIMETHYLBENZIDINE					1 U	1 U				
3-METHYLCHOLANTHRENE					1 U	1 U				
3-NITROANILINE					1 U	1 U				
4,6-DINITRO-2-METHYLPHENOL					1 U	1 U				
4-AMINOBIPHENYL					1 U	1 U				
4-BROMOPHENYL PHENYL ETHER					1 U	1 U				
4-CHLORO-3-METHYLPHENOL					1 U	1 U				
4-CHLOROANILINE					1 U	1 U				
4-CHLOROPHENYL PHENYL ETHER					1 U	1 U				
4-NITROANILINE					1 U	1 U				
4-NITROPHENOL					1 U	1 U				
4-NITROQUINOLINE-1-OXIDE					1 UR	1 UR				
5-NITRO-O-TOLUIDINE					1 U	1 U				
7,12-DIMETHYLBENZ(A)ANTHRACENE					1 U	1 U				
A,A-DIMETHYLPHENETHYLAMINE					1 UJ	1 UJ				
ACENAPHTHENE					0.05 UJ	0.05 UJ				
ACENAPHTHYLENE					0.05 U	0.05 U				
ACETOPHENONE					1 U	1 U				
ANILINE					1 U	1 U				
ANTHRACENE					0.05 U	0.05 U				
ARAMITE					1 UR	1 UR				
BENZO(A)ANTHRACENE					0.05 U	0.05 U				
BENZO(A)PYRENE					0.05 U	0.05 U				
BENZO(B)FLUORANTHENE					0.05 U	0.05 U				
BENZO(G,H,I)PERYLENE					0.05 U	0.05 U				
BENZO(K)FLUORANTHENE					0.05 U	0.05 U				
BENZYL ALCOHOL					1 U	1 U				
BIS(2-CHLOROETHOXY)METHANE					1 U	1 U				
BIS(2-CHLOROETHYL)ETHER					1 U	1 U				
BIS(2-ETHYLHEXYL)PHTHALATE					3 BU	2 BU				
BUTYL BENZYL PHTHALATE					1 U	1 U				
CHLOROBENZILATE					1 U	1 U				
CHRYSENE					0.05 U	0.05 U				
DI-N-BUTYL PHTHALATE					1 U	1 U				
DI-N-OCTYL PHTHALATE					1 U	1 U				
DIALLATE					1 U	1 U				
DIBENZO(A,H)ANTHRACENE					0.05 U	0.05 U				
DIBENZOFURAN					1 U	1 U				
DIETHYL PHTHALATE					1 U	1 U				
DIMETHYL PHTHALATE					1 U	1 U				
DIPHENYLAMINE					1 U	1 U				
ETHYL METHANE SULFONATE					1 U	1 U				

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	01	01	01	01	02	03
LOCATION	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD08
SAMPLE NUMBER	16SW0501	16SW0501-F	16SW0601	16SW0601-F	16SW0701	16SW0701-D	16SW0701-F	16SW0701-F-D	16SW0702	16SW0801
SUBMATRIX	SW	SF	SW	SF	SU	SU	SUF	SUF	SU	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	11/11/2004	11/2/2004	11/2/2004	4/10/2003	4/10/2003	4/10/2003	4/10/2003	12/6/2003	11/11/2004
FLUORANTHENE					0.05 U	0.05 U				
FLUORENE					0.05 U	0.05 U				
HEXACHLOROBENZENE					1 U	1 U				
HEXACHLOROBUTADIENE					1 U	1 U				
HEXACHLOROCYCLOPENTADIENE					1 UR	1 UR				
HEXACHLOROETHANE					1 U	1 U				
HEXACHLOROPROPENE					1 U	1 U				
INDENO(1,2,3-CD)PYRENE					0.05 U	0.05 U				
ISODRIN					1 U	1 U				
ISOPHORONE					1 U	1 U				
ISOSAFROLE					1 U	1 U				
KEPONE					1 UR	1 UR				
METHAPYRILENE					1 UJ	1 UJ				
METHYL METHANE SULFONATE					1 U	1 U				
N-NITROSO-DI-N-BUTYLAMINE					1 U	1 U				
N-NITROSO-DI-N-PROPYLAMINE					1 U	1 U				
N-NITROSODIETHYLAMINE					1 U	1 U				
N-NITROSODIMETHYLAMINE					1 U	1 U				
N-NITROSOMETHYLETHYLAMINE					1 U	1 U				
N-NITROSOMORPHOLINE					1 U	1 U				
N-NITROSOPIPERIDINE					1 U	1 U				
N-NITROSOPYRROLIDINE					1 U	1 U				
NAPHTHALENE					0.05 U	0.05 U				
O,O,O-TRIETHYL PHOSPHOROTHIOATE					1 U	1 U				
O-TOLUIDINE					1 U	1 U				
P-(DIMETHYLAMINO)AZOBENZENE					1 U	1 U				
PENTACHLOROBENZENE					1 U	1 U				
PENTACHLOROETHANE					1 U	1 U				
PENTACHLORONITROBENZENE					1 U	1 U				
PHENACETIN					1 U	1 U				
PHENANTHRENE					0.05 U	0.05 U				
PHENOL					1 U	1 U				
PRONAMIDE					1 U	1 U				
PYRENE					0.05 U	0.05 U				
PYRIDINE					1 U	1 U				
SAFROLE					1 U	1 U				
Energetics (ug/L)										
1,3,5-TRINITROBENZENE					0.55 U	0.42 U				
1,3-DINITROBENZENE					0.55 U	0.42 U				
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE										
2,4,6-TRINITROTOLUENE					2.1	2.1				
2,4-DIAMINO-6-NITROTOLUENE										

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	01	01	01	01	02	03
LOCATION	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD07	16SW/SD08
SAMPLE NUMBER	16SW0501	16SW0501-F	16SW0601	16SW0601-F	16SW0701	16SW0701-D	16SW0701-F	16SW0701-F-D	16SW0702	16SW0801
SUBMATRIX	SW	SF	SW	SF	SU	SU	SUF	SUF	SU	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	11/11/2004	11/2/2004	11/2/2004	4/10/2003	4/10/2003	4/10/2003	4/10/2003	12/6/2003	11/11/2004
2,4-DINITROTOLUENE					0.55 U	0.42 U				
2,6-DIAMINO-4-NITROTOLUENE										
2,6-DINITROTOLUENE					0.55 U	0.42 U				
2-AMINO-4,6-DINITROTOLUENE					0.89 J	0.86 J				
2-NITROTOLUENE					0.55 U	0.42 U				
3,5-DINITROANILINE										
3-NITROTOLUENE					0.55 U	0.42 U				
4-AMINO-2,6-DINITROTOLUENE					2.2 J	2.2 J				
4-NITROTOLUENE					0.55 U	0.42 U				
DNX										
HMX					0.55 U	0.42 U				
MNX										
NITROBENZENE					0.55 U	0.42 U				
PICRAMIC ACID					0.39 U	0.39 U				
PICRIC ACID					0.39 U	0.39 U				
RDX					2.9	2.9				
TETRYL					0.55 U	0.42 U				
TNX										
Herbicides (ug/L)										
HEXACHLOROPHENE					0.025 U	0.025 U				
PENTACHLOROPHENOL					0.015 R	0.016 J				
Total Metals (ug/L)										
ALUMINUM	698 J		173 J		298 J	228 J				1650 J
ANTIMONY	4.8 J		7.3 J		2.5 U	2.6 U				4.8 J
ARSENIC	0.46 J		0.49 J		2.9 J	2.9 J				0.88 J
BARIUM	192 J		425 J		73.4 J	72.9 J				143 J
BERYLLIUM	0.03 J		0.24 J		0.04 U	0.1 U				0.09 J
CADMIUM	1.7		4.4		0.16 U	0.23 U				0.57 J
CALCIUM	18700 J		49600 J		37100 J	36500 J				25100 J
CHROMIUM	1.4 J		1.2 U		2 J	1.8 J				3.6 J
COBALT	0.33 J		0.7 J		0.76 U	0.75 U				0.71 J
COPPER	67.5 J		47.3 J		10.7 J	11 J				40.7 J
IRON	741 J		398 J		194 U	167 U				1670 J
LEAD	82.9 J		101		4.6 J	4.6 J				44.8 J
LITHIUM					1.7 U	1.7 U				
MAGNESIUM	2680 J		4270		6560 J	6540 J				4880 J
MANGANESE	11.1		38.8		5.2 J	4.9 J				39.8
MERCURY	0.03 U		0.03 U		0.02 U	0.02 U				0.03 U
NICKEL	1.8 J		2.8 J		0.95 J	0.97 J				5.4 J
POTASSIUM	2610 J		2170		2430 J	2380 J				2390 J
SELENIUM	0.24 U		0.36 U		1.3 U	1.4 U				0.41 U
SILVER	0.028 U		0.028 U		0.12 U	0.56 U				0.11 U

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**01**	**01**	**01**	**01**	**02**	**03**
LOCATION	**16SW/SD05**	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD08**
SAMPLE NUMBER	**16SW0501**	**16SW0501-F**	**16SW0601**	**16SW0601-F**	**16SW0701**	**16SW0701-D**	**16SW0701-F**	**16SW0701-F-D**	**16SW0702**	**16SW0801**
SUBMATRIX	**SW**	**SF**	**SW**	**SF**	**SU**	**SU**	**SUF**	**SUF**	**SU**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**11/11/2004**	**11/2/2004**	**11/2/2004**	**4/10/2003**	**4/10/2003**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**11/11/2004**
SODIUM	1120 U		2420 J		84800 J	83300 J				1480 U
STRONTIUM					226 J	233 J				
THALLIUM	0.043 U		0.16 J		0.08 U	0.16 U				0.05 U
TIN	0.25 U		0.31 U		0.08 U	0.11 U				0.22 U
TITANIUM					10.2 J	4.3 J				
VANADIUM	1.4 J		1.14 U		1.2 J	1 J				3.8 J
ZINC	541 J		333 J		80.1 J	79.7 J				302 J
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED		8.6 U		8.6 U			49.4 U	40.4 U		
ANTIMONY, FILTERED		3.4 U		7.8 J			2.5 U	3.2 J		
ARSENIC, FILTERED		0.2 U		0.22 U			2.8 J	2.8 J		
BARIUM, FILTERED		160 J		335 J			71.8 J	71.4 J		
BERYLLIUM, FILTERED		0.02 U		0.02 U			0.03 U	0.28 U		
CADMIUM, FILTERED		1		3.5			0.15 U	0.41 U		
CALCIUM, FILTERED		17100 J		41000 J			37700 J	38200 J		
CHROMIUM, FILTERED		0.38 U		0.6 U			1.5 J	1.6 J		
COBALT, FILTERED		0.09 J		0.12 J			0.71 U	0.7 U		
COPPER, FILTERED		33.2 J		27.1 J			9.1 J	9.3 J		
IRON, FILTERED		82 U		148 J			42.3 U	42.5 U		
LEAD, FILTERED		20.9 J		12.2 J			1.9 U	2.3 J		
LITHIUM, FILTERED							1.5 U	1.8 U		
MAGNESIUM, FILTERED		2470 J		4470 J			6560 J	6530 J		
MANGANESE, FILTERED		1.9 J		4.5 J			2.8 U	2.9 U		
MERCURY, FILTERED		0.03 U		0.03 U			0.02 U	0.02 U		
NICKEL, FILTERED		1.3 J		2.2 J			0.84 J	0.8 U		
POTASSIUM, FILTERED		2370		2310			2370 J	2360 J		
SELENIUM, FILTERED		0.21 U		0.1 U			1.4 U	1.4 U		
SILVER, FILTERED		0.028 U		0.028 U			0.25 U	0.71 U		
SODIUM, FILTERED		1060 U		2740 J			87000 J	89000 J		
STRONTIUM, FILTERED							234 J	237 J		
THALLIUM, FILTERED		0.043 U		0.043 U			0.07 U	0.33 U		
TIN, FILTERED		0.08 U		0.1 U			0.05 U	0.38 U		
TITANIUM, FILTERED							3.2 J	2.2 J		
VANADIUM, FILTERED		1.14 U		1.14 U			0.69 U	0.66 U		
ZINC, FILTERED		217 J		171 J			68 J	68.3 J		
Field Parameters										
DISSOLVED OXYGEN (mg/L)	6.62		10.33							7.62
DISSOLVED OXYGEN - METER (mg/L)					10.63				10.78	
OXIDATION REDUCTION POTENTIAL (MV)	113		48		89.1				123.4	122
PH (S.U.)	7.25		7.57		8.4				7.68	6.99
SPECIFIC CONDUCTANCE (MS/CM)	0.098		0.169		0.591				0.575	0.108
TEMPERATURE (C)	10.96		16.45		11.78				12.2	11.28

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**01**	**01**	**01**	**01**	**02**	**03**
LOCATION	**16SW/SD05**	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD07**	**16SW/SD08**
SAMPLE NUMBER	**16SW0501**	**16SW0501-F**	**16SW0601**	**16SW0601-F**	**16SW0701**	**16SW0701-D**	**16SW0701-F**	**16SW0701-F-D**	**16SW0702**	**16SW0801**
SUBMATRIX	**SW**	**SF**	**SW**	**SF**	**SU**	**SU**	**SUF**	**SUF**	**SU**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**11/11/2004**	**11/2/2004**	**11/2/2004**	**4/10/2003**	**4/10/2003**	**4/10/2003**	**4/10/2003**	**12/6/2003**	**11/11/2004**
TURBIDITY (NTU)	24		2		4.2				5.3	39
Miscellaneous Parameters (mg/L)										
AMMONIA-N					0.01 U	0.02				
NITRITE/NITRATE-N					1.5	1.5				

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	02	02	03	03
LOCATION	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SW0801-F	16SW0901	16SW0901-F	16SW1001	16SW1001-F	16SW1101	16SW1101-F	16SW1201	16SW1201-F	16SW1202	16SW1202-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/11/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004	11/11/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE								0.3 U		0.3 U	
1,1,1-TRICHLOROETHANE								0.3 U		0.3 U	
1,1,2,2-TETRACHLOROETHANE								0.3 U		0.3 U	
1,1,2-TRICHLOROETHANE								0.3 U		0.3 U	
1,1-DICHLOROETHANE								0.3 U		0.3 U	
1,1-DICHLOROETHENE								0.3 U		0.3 U	
1,2,3-TRICHLOROPROPANE								0.3 U		0.3 U	
1,2-DIBROMO-3-CHLOROPROPANE								0.3 UJ		0.3 U	
1,2-DIBROMOETHANE								0.3 U		0.3 U	
1,2-DICHLOROETHANE								0.3 U		0.3 U	
1,2-DICHLOROPROPANE								0.3 U		0.3 U	
1,4-DIOXANE								50 U		50 U	
2-BUTANONE								0.5 U		0.5 U	
2-HEXANONE								0.5 U		0.5 U	
3-CHLOROPROPENE								0.5 U		0.5 U	
4-METHYL-2-PENTANONE								0.5 U		0.5 U	
ACETONE								0.5 UJ		1.6 J	
ACETONITRILE								20 U		20 U	
ACROLEIN								0.5 UR		0.5 UR	
ACRYLONITRILE								0.5 U		0.5 U	
BENZENE								0.3 U		0.3 U	
BROMODICHLOROMETHANE								0.3 U		0.3 U	
BROMOFORM								0.3 U		0.3 U	
BROMOMETHANE								0.3 UJ		0.3 U	
CARBON DISULFIDE								0.3 U		0.3 U	
CARBON TETRACHLORIDE								0.3 U		0.3 U	
CHLOROBENZENE								0.3 U		0.3 U	
CHLORODIBROMOMETHANE								0.3 U		0.3 U	
CHLOROETHANE								0.5 U		0.5 U	
CHLOROFORM								0.3 U		0.3 U	
CHLOROMETHANE								0.3 U		0.3 U	
CHLOROPRENE								0.5 U		0.5 U	
CIS-1,2-DICHLOROETHENE								1.4		0.3 U	
CIS-1,3-DICHLOROPROPENE								0.3 U		0.3 U	
DIBROMOMETHANE								0.3 U		0.3 U	
DICHLORODIFLUOROMETHANE								0.3 U		0.3 U	
ETHYL METHACRYLATE								0.5 U		0.5 U	
ETHYLBENZENE								0.3 U		0.3 U	
ISOBUTANOL								20 U		20 U	
METHACRYLONITRILE								0.3 U		0.3 U	
METHYL IODIDE								0.5 UJ		0.5 U	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	02	02	03	03
LOCATION	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SW0801-F	16SW0901	16SW0901-F	16SW1001	16SW1001-F	16SW1101	16SW1101-F	16SW1201	16SW1201-F	16SW1202	16SW1202-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/11/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004	11/11/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004
METHYL METHACRYLATE								0.5 U		0.5 U	
METHYLENE CHLORIDE								0.3 U		0.3 U	
PROPIONITRILE								20 U		20 U	
STYRENE								0.3 U		0.3 U	
TETRACHLOROETHENE								0.3 U		0.3 U	
TOLUENE								0.3 U		0.3 U	
TOTAL XYLENES								0.3 U		0.3 U	
TRANS-1,2-DICHLOROETHENE								0.3 U		0.3 U	
TRANS-1,3-DICHLOROPROPENE								0.3 U		0.3 U	
TRANS-1,4-DICHLORO-2-BUTENE								0.5 U		0.5 U	
TRICHLOROETHENE								15		5.6	
TRICHLOROFLUOROMETHANE								0.3 UJ		0.3 U	
VINYL ACETATE								0.5 U		0.5 U	
VINYL CHLORIDE								0.3 U		0.3 U	
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	02	02	03	03
LOCATION	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SW0801-F	16SW0901	16SW0901-F	16SW1001	16SW1001-F	16SW1101	16SW1101-F	16SW1201	16SW1201-F	16SW1202	16SW1202-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/11/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004	11/11/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	02	02	03	03
LOCATION	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SW0801-F	16SW0901	16SW0901-F	16SW1001	16SW1001-F	16SW1101	16SW1101-F	16SW1201	16SW1201-F	16SW1202	16SW1202-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/11/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004	11/11/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE								0.25 U		0.255 U	
1,3-DINITROBENZENE								0.25 U		0.255 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE								0.5 U			
2,4,6-TRINITROTOLUENE								0.25 U		0.255 U	
2,4-DIAMINO-6-NITROTOLUENE								0.25 U			

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	02	02	03	03
LOCATION	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SW0801-F	16SW0901	16SW0901-F	16SW1001	16SW1001-F	16SW1101	16SW1101-F	16SW1201	16SW1201-F	16SW1202	16SW1202-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/11/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004	11/11/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004
2,4-DINITROTOLUENE								0.25 U		0.255 U	
2,6-DIAMINO-4-NITROTOLUENE								0.25 U			
2,6-DINITROTOLUENE								0.25 U		0.255 U	
2-AMINO-4,6-DINITROTOLUENE								0.25 U		0.255 U	
2-NITROTOLUENE								0.25 U		0.255 U	
3,5-DINITROANILINE								0.25 U			
3-NITROTOLUENE								0.25 U		0.255 U	
4-AMINO-2,6-DINITROTOLUENE								0.25 U		0.255 U	
4-NITROTOLUENE								0.25 U		0.255 U	
DNX								0.25 U			
HMX								0.27 J		0.255 U	
MNX								0.25 U			
NITROBENZENE								0.25 U		0.255 U	
PICRAMIC ACID											
PICRIC ACID											
RDX								0.25 U		0.255 U	
TETRYL								0.25 U		0.255 U	
TNX								0.25 U			
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		879 J		1100 J		364 J		378 J		2080 J	
ANTIMONY		6 J		9.8 J		1.9 U		0.4 U		0.085 UJ	
ARSENIC		0.51 J		0.47 J		0.76 J		0.16 U		0.79 J	
BARIUM		352 J		196 J		74 J		53 J		74.3 J	
BERYLLIUM		0.02 U		0.07 J		0.02 U		0.04 U		0.2 J	
CADMIUM		2.9		2.2		0.2 J		0.04 U		1.8	
CALCIUM		40800 J		14200 J		28200 J		19100 J		14800 J	
CHROMIUM		1.3 U		1.9 J		0.81 U		0.66 U		2.7 J	
COBALT		0.36 J		0.38 J		0.44 J		0.86 J		2.5 J	
COPPER		43.7 J		78.1 J		19.6 J		1.1 U		13.6 J	
IRON		1140 J		1020 J		447 J		278 J		2350 J	
LEAD		30.8		87.8 J		5.8 J		0.51 U		6.2	
LITHIUM											
MAGNESIUM		4590		2610 J		4110 J		8200 J		4250	
MANGANESE		11.2 J		13		4.9 J		209 J		75.4	
MERCURY		0.03 U		0.03 U		0.03 U		0.02 U		0.03 U	
NICKEL		2.2 J		2.5 J		2.5 J		3.6 J		10.9	
POTASSIUM		2740		1760 J		4520 J		1790 J		1800	
SELENIUM		0.12 U		0.33 U		0.33 U		0.1 U		0.24 U	
SILVER		0.028 U		0.04 U		0.028 U		0.03 U		0.028 U	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	02	02	03	03
LOCATION	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SW0801-F	16SW0901	16SW0901-F	16SW1001	16SW1001-F	16SW1101	16SW1101-F	16SW1201	16SW1201-F	16SW1202	16SW1202-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/11/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004	11/11/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004
SODIUM		2070 J		1820 J		18900 J		8690 J		2700 J	
STRONTIUM											
THALLIUM		0.043 U		0.043 U		0.06 U		0.04 U		0.043 U	
TIN		0.08 U		0.27 U		0.1 U		0.1 U		0.08 U	
TITANIUM								5.8 J			
VANADIUM		2		2 J		1.14 U		0.63 J		4.1	
ZINC		185 J		749 J		86.5 J		36.6 J		113 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	64.2 U		21 J		50 U		17.9 U		64.2 J		
ANTIMONY, FILTERED	4.3 J		5.8 J		8.5 J		1.9 U		0.56 U		
ARSENIC, FILTERED	0.26 J		0.21 U		0.14 U		0.65 J		0.07 U		
BARIUM, FILTERED	118 J		277 J		155 J		72.5 J		50.1 J		
BERYLLIUM, FILTERED	0.02 U		0.02 U		0.02 U		0.02 U		0.03 U		
CADMIUM, FILTERED	0.41 J		3.7		1.8		0.24 J		0.04 U		
CALCIUM, FILTERED	24600 J		32800 J		13300 J		29500 J		18300 J		
CHROMIUM, FILTERED	0.6 U		0.49 U		0.38 U		0.48 U		0.25 U		
COBALT, FILTERED	0.15 J		0.1 J		0.11 J		0.36 J		2.7 J		
COPPER, FILTERED	29.8 J		30.6 J		35.7 J		18.6 J		0.71 U		
IRON, FILTERED	131 U		120 J		81.4 U		150 J		37.7 U		
LEAD, FILTERED	17.8 J		10.5 J		22.9 J		2.6 J		0.08 U		
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	4320 J		3800 J		2290 J		4300 J		7760 J		
MANGANESE, FILTERED	18.2		4.8 J		6.5		2.4 J		171 J		
MERCURY, FILTERED	0.03 U		0.03 U		0.03 U		0.03 U		0.02 U		
NICKEL, FILTERED	3.5 J		1.7 J		1.6 J		2.2 J		3.7 J		
POTASSIUM, FILTERED	2000		2560		1520		4720		1640 J		
SELENIUM, FILTERED	0.35 U		0.1 U		0.22 U		0.28 U		0.09 U		
SILVER, FILTERED	0.03 U		0.028 U		0.028 U		0.028 U		0.03 U		
SODIUM, FILTERED	1450 U		2030 J		1480 U		19900 J		8240 J		
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.043 U		0.043 U		0.043 U		0.07 U		0.04 U		
TIN, FILTERED	0.08 U		0.08 U		0.08 U		0.09 U		0.1 U		
TITANIUM, FILTERED									1.4 J		
VANADIUM, FILTERED	1.14 U		1.14 U		1.14 U		1.14 U		0.15 U		
ZINC, FILTERED	197 U		126 J		354 J		70.3 J		39.2 J		
Field Parameters											
DISSOLVED OXYGEN (mg/L)		10.38		6.02		8.01				9.38	
DISSOLVED OXYGEN - METER (mg/L)								6			
OXIDATION REDUCTION POTENTIAL (MV)		45.9		120		96		195.4		51.4	
PH (S.U.)		7.37		7.26		7.37		7.21		7.16	
SPECIFIC CONDUCTANCE (MS/CM)		0.162		0.066		0.201		0.204		0.1	
TEMPERATURE (C)		16.42		10.74		11.99		13.24		16.24	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**02**	**02**	**03**	**03**
LOCATION	**16SW/SD08**	**16SW/SD09**	**16SW/SD09**	**16SW/SD10**	**16SW/SD10**	**16SW/SD11**	**16SW/SD11**	**16SW/SD12**	**16SW/SD12**	**16SW/SD12**	**16SW/SD12**
SAMPLE NUMBER	**16SW0801-F**	**16SW0901**	**16SW0901-F**	**16SW1001**	**16SW1001-F**	**16SW1101**	**16SW1101-F**	**16SW1201**	**16SW1201-F**	**16SW1202**	**16SW1202-D**
SUBMATRIX	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**
SAMPLE DATE	**11/11/2004**	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**
TURBIDITY (NTU)		16.5		46.7		10		4.06		38.4	
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
NITRITE/NITRATE-N								0.11		0.43	0.43

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	02	02	03	03	02	02	03	03	02	02
LOCATION	16SW/SD12	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD15	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD17
SAMPLE NUMBER	16SW1202-F	16SW1301	16SW1301-F	16SW1302	16SW1302-F	16SW1501	16SW1501-F	16SW1601	16SW1601-F	16SW1701	16SW1701-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/24/2003	10/24/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,1,1-TRICHLOROETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,1,2,2-TETRACHLOROETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,1,2-TRICHLOROETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,1-DICHLOROETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,1-DICHLOROETHENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE		0.3 UJ		0.3 U		0.3 UJ				0.3 U	0.3 U
1,2-DIBROMOETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,2-DICHLOROETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,2-DICHLOROPROPANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
1,4-DIOXANE		50 U		50 U		50 U				50 U	50 U
2-BUTANONE		0.5 U		0.5 U		0.5 U				0.5 UR	0.5 UR
2-HEXANONE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
3-CHLOROPROPENE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
4-METHYL-2-PENTANONE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
ACETONE		0.5 UJ		0.5 U		0.5 UJ				0.5 UR	0.5 UR
ACETONITRILE		20 U		20 U		20 U				20 U	20 U
ACROLEIN		0.5 UR		0.5 UR		0.5 UR				0.5 UR	0.5 UR
ACRYLONITRILE		0.5 U		0.5 U		0.5 U				0.5 UR	0.5 UR
BENZENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
BROMODICHLOROMETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
BROMOFORM		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
BROMOMETHANE		0.3 UJ		0.3 U		0.3 UJ				0.3 U	0.3 U
CARBON DISULFIDE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
CARBON TETRACHLORIDE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
CHLOROBENZENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
CHLORODIBROMOMETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
CHLOROETHANE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
CHLOROFORM		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
CHLOROMETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
CHLOROPRENE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
CIS-1,3-DICHLOROPROPENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
DIBROMOMETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
DICHLORODIFLUOROMETHANE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
ETHYL METHACRYLATE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
ETHYLBENZENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
ISOBUTANOL		20 U		20 U		20 U				20 U	20 U
METHACRYLONITRILE		0.3 U		0.3 U		0.3 U				0.3 UR	0.3 UR
METHYL IODIDE		0.5 UJ		0.5 U		0.5 UJ				0.5 UJ	0.5 UJ

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	02	02	03	03	02	02	03	03	02	02
LOCATION	16SW/SD12	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD15	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD17
SAMPLE NUMBER	16SW1202-F	16SW1301	16SW1301-F	16SW1302	16SW1302-F	16SW1501	16SW1501-F	16SW1601	16SW1601-F	16SW1701	16SW1701-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/24/2003	10/24/2003
METHYL METHACRYLATE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
METHYLENE CHLORIDE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
PROPIONITRILE		20 U		20 U		20 U				20 U	20 U
STYRENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
TETRACHLOROETHENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
TOLUENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
TOTAL XYLENES		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
TRANS-1,2-DICHLOROETHENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
TRANS-1,3-DICHLOROPROPENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
TRANS-1,4-DICHLORO-2-BUTENE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
TRICHLOROETHENE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
TRICHLOROFLUOROMETHANE		0.3 UJ		0.3 U		0.3 UJ				0.3 U	0.3 U
VINYL ACETATE		0.5 U		0.5 U		0.5 U				0.5 U	0.5 U
VINYL CHLORIDE		0.3 U		0.3 U		0.3 U				0.3 U	0.3 U
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	02	02	03	03	02	02	03	03	02	02
LOCATION	16SW/SD12	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD15	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD17
SAMPLE NUMBER	16SW1202-F	16SW1301	16SW1301-F	16SW1302	16SW1302-F	16SW1501	16SW1501-F	16SW1601	16SW1601-F	16SW1701	16SW1701-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/24/2003	10/24/2003
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	02	02	03	03	02	02	03	03	02	02
LOCATION	16SW/SD12	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD15	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD17
SAMPLE NUMBER	16SW1202-F	16SW1301	16SW1301-F	16SW1302	16SW1302-F	16SW1501	16SW1501-F	16SW1601	16SW1601-F	16SW1701	16SW1701-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/24/2003	10/24/2003
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
1,3-DINITROBENZENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.5 U				0.5 U				0.5 U	0.49 U
2,4,6-TRINITROTOLUENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE		0.25 U				0.25 U				0.25 U	0.25 U

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	02	02	03	03	02	02	03	03	02	02
LOCATION	16SW/SD12	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD15	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD17
SAMPLE NUMBER	16SW1202-F	16SW1301	16SW1301-F	16SW1302	16SW1302-F	16SW1501	16SW1501-F	16SW1601	16SW1601-F	16SW1701	16SW1701-D
SUBMATRIX	SF	SW	SF	SW	SF	SW	SF	SW	SF	SW	SW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/25/2003	10/25/2003	11/2/2004	11/2/2004	10/24/2003	10/24/2003
2,4-DINITROTOLUENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
2,6-DIAMINO-4-NITROTOLUENE		0.25 U				0.25 U				0.25 U	0.25 U
2,6-DINITROTOLUENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
2-NITROTOLUENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
3,5-DINITROANILINE		0.25 U				0.25 U				0.25 U	0.25 U
3-NITROTOLUENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
4-NITROTOLUENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
DNX		0.25 U				0.25 U				0.25 U	0.25 U
HMX		0.25 U		0.25 U		0.51 J				0.25 U	0.25 U
MNX		0.25 U				0.25 U				0.25 U	0.25 U
NITROBENZENE		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
PICRAMIC ACID											
PICRIC ACID											
RDX		0.25 U		0.25 U		0.29 J				0.25 U	0.25 U
TETRYL		0.25 U		0.25 U		0.25 U				0.25 U	0.25 U
TNX		0.25 U				0.25 U				0.25 U	0.25 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		1130 J		1260 J		9510 J		840 J		87.3 U	143 J
ANTIMONY		0.53 U		0.45 U		0.28 U		2.6 U		0.63 U	0.21 U
ARSENIC		0.35 U		0.5 J		3.8 J		0.37 J		0.52 U	0.16 U
BARIUM		86 J		84.9 J		150 J		114 J		69.4 J	70.5 J
BERYLLIUM		0.06 U		0.2 J		0.52 U		0.08 J		0.39 U	0.03 U
CADMIUM		0.24 U		1.8		0.17 U		2.8		0.4 U	0.04 U
CALCIUM		13900 J		9740 J		49500 J		6800 J		19700 J	20300 J
CHROMIUM		1.8 J		1.7 J		11.8 J		1.2 U		0.78 U	0.48 U
COBALT		2 J		1.8 J		4.6 J		0.26 J		0.48 U	0.17 U
COPPER		3.1 J		14.8 J		5.9 J		25.2 J		1.5 U	1.1 U
IRON		817 J		1510 J		9990 J		890 J		44.6 U	95.8 U
LEAD		5.2 J		8.9		4.8 J		7.2		0.55 U	0.3 U
LITHIUM											
MAGNESIUM		7340 J		4180		9450 J		3470		6100 J	6330 J
MANGANESE		282 J		58.2		443 J		11.4		10 U	16.8 J
MERCURY		0.02 U		0.03 U		0.02 U		0.03 U		0.02 U	0.02 U
NICKEL		6.3 J		11.5		11.2 J		6.4 J		1.3 U	0.95 U
POTASSIUM		1870 J		1760		3860 J		2040		1590 J	1710 J
SELENIUM		0.08 U		0.18 U		0.22 U		0.15 U		0.16 U	0.11 U
SILVER		0.04 U		0.028 U		0.2 U		0.028 U		0.32 U	0.03 U

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**02**	**02**	**03**	**03**	**02**	**02**	**03**	**03**	**02**	**02**
LOCATION	**16SW/SD12**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD15**	**16SW/SD15**	**16SW/SD16**	**16SW/SD16**	**16SW/SD17**	**16SW/SD17**
SAMPLE NUMBER	**16SW1202-F**	**16SW1301**	**16SW1301-F**	**16SW1302**	**16SW1302-F**	**16SW1501**	**16SW1501-F**	**16SW1601**	**16SW1601-F**	**16SW1701**	**16SW1701-D**
SUBMATRIX	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**
SAMPLE DATE	**11/2/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/24/2003**	**10/24/2003**
SODIUM		6040 J		3360 J		17400 J		2210 J		5080 J	5210 J
STRONTIUM											
THALLIUM		0.04 U		0.043 U		0.25 U		0.043 U		0.41 U	0.04 U
TIN		0.1 U		0.08 U		0.3 U		0.08 U		0.4 U	0.1 U
TITANIUM		21.2 J				156 J				2 J	2.7 J
VANADIUM		2.2 J		2.8		19 J		1.5 J		0.56 U	0.29 U
ZINC		120		150 J		31.5 J		445 J		12.3 U	15.6 U
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	84.2		63.7 J		87.4		22.4 U		64		
ANTIMONY, FILTERED	0.43 U		0.47 U		0.3 U		0.29 U		2.5 U		
ARSENIC, FILTERED	0.13 U		0.07 U		0.09 U		0.11 U		0.14 U		
BARIUM, FILTERED	60.4 J		73.4 J		71.2 J		76.4 J		101 J		
BERYLLIUM, FILTERED	0.09 J		0.03 U		0.1 J		0.06 U		0.04 J		
CADMIUM, FILTERED	1.8		0.06 U		1.7		0.09 U		2		
CALCIUM, FILTERED	14100 J		13600 J		9450 J		49100 J		6570 J		
CHROMIUM, FILTERED	0.67 U		0.28 U		0.56 U		0.16 U		0.45 U		
COBALT, FILTERED	1.5		2.9 J		0.76 J		2.6 J		0.088 U		
COPPER, FILTERED	10.1 J		0.89 U		10.4 J		0.57 U		21.8 J		
IRON, FILTERED	121 J		62.2 U		86.8 J		18.1 U		111 J		
LEAD, FILTERED	0.81 J		0.38 U		2.4 J		0.15 U		3.2 J		
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	3570 J		7140 J		3300 J		8870 J		2780 J		
MANGANESE, FILTERED	47.4		154 J		27.8		36 J		4.6 J		
MERCURY, FILTERED	0.03 U		0.02 U		0.03 U		0.04 J		0.03 U		
NICKEL, FILTERED	9.4		4.3 J		8.8		1.2 J		5.8 J		
POTASSIUM, FILTERED	1490		1500 J		1570		2170 J		1880		
SELENIUM, FILTERED	0.22 U		0.07 U		0.18 U		0.11 U		0.16 U		
SILVER, FILTERED	0.028 U		0.03 U		0.028 U		0.05 U		0.028 U		
SODIUM, FILTERED	2600 J		5940 J		3280 J		17800 J		2160 J		
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.043 U		0.04 U		0.043 U		0.08 U		0.043 U		
TIN, FILTERED	0.32 U		0.1 U		0.08 U		0.19 U		0.09 U		
TITANIUM, FILTERED			1.6 J				1.1 U				
VANADIUM, FILTERED	1.14 U		0.18 U		1.14 U		0.12 U		1.14 U		
ZINC, FILTERED	76 J		82.2		117 J		3.1 J		421 J		
Field Parameters											
DISSOLVED OXYGEN (mg/L)				9.18				6.7			
DISSOLVED OXYGEN - METER (mg/L)		2.94				2.87				6.49	
OXIDATION REDUCTION POTENTIAL (MV)		68.3		49.4		194.100000		64.2		204	
PH (S.U.)		6.4		7.64		6.51		7.55		6.93	
SPECIFIC CONDUCTANCE (MS/CM)		0.168		0.84		0.378		0.067		0.154	
TEMPERATURE (C)		13.68		16.03		12.45		15.97		9.61	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**02**	**02**	**03**	**03**	**02**	**02**	**03**	**03**	**02**	**02**
LOCATION	**16SW/SD12**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD15**	**16SW/SD15**	**16SW/SD16**	**16SW/SD16**	**16SW/SD17**	**16SW/SD17**
SAMPLE NUMBER	**16SW1202-F**	**16SW1301**	**16SW1301-F**	**16SW1302**	**16SW1302-F**	**16SW1501**	**16SW1501-F**	**16SW1601**	**16SW1601-F**	**16SW1701**	**16SW1701-D**
SUBMATRIX	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SW**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**
SAMPLE DATE	**11/2/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/25/2003**	**10/25/2003**	**11/2/2004**	**11/2/2004**	**10/24/2003**	**10/24/2003**
TURBIDITY (NTU)		15.9		22.8		15.9		14.9		3.39	
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
NITRITE/NITRATE-N		0.27		0.55		0.05 U				0.05 U	0.05

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY	TCMS	TCMS	TCMS	TCMS
SAMPLING ROUND	02	02	03	03	02	03	03	03	03	03	03
LOCATION	16SW/SD17	16SW/SD17	16SW/SD19	16SW/SD19	16SW/SD22	16SW/SD23	16SW/SD23	16SW/SD24	16SW/SD24	16SW/SD24	16SW/SD25
SAMPLE NUMBER	16SW1701-F	16SW1701-F-D	16SW1901	16SW1901-F	16SW2201	16SW2301	16SW2301-F	16SW2401	16SW2401-D	16SW2401-F	16SW2501
SUBMATRIX	SF	SF	SW	SF	SF	SW	SF	SW	SW	SF	SW
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	DRY	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
SAMPLE DATE	10/24/2003	10/24/2003	11/2/2004	11/2/2004	10/24/2003	11/11/2004	11/11/2004	10/8/2004	10/8/2004	10/12/2004	10/8/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE								0.3 U	0.3 U		
1,1,1-TRICHLOROETHANE								0.3 U	0.3 U		
1,1,2,2-TETRACHLOROETHANE								0.3 U	0.3 U		
1,1,2-TRICHLOROETHANE								0.3 U	0.3 U		
1,1-DICHLOROETHANE								0.3 U	0.3 U		
1,1-DICHLOROETHENE								0.3 U	0.3 U		
1,2,3-TRICHLOROPROPANE								0.3 U	0.3 U		
1,2-DIBROMO-3-CHLOROPROPANE								0.3 U	0.3 U		
1,2-DIBROMOETHANE								0.3 U	0.3 U		
1,2-DICHLOROETHANE								0.3 U	0.3 U		
1,2-DICHLOROPROPANE								0.3 U	0.3 U		
1,4-DIOXANE								50 U	50 U		
2-BUTANONE								0.5 U	0.5 U		
2-HEXANONE								0.5 U	0.5 U		
3-CHLOROPROPENE								0.5 U	0.5 U		
4-METHYL-2-PENTANONE								0.5 U	0.5 U		
ACETONE								0.5 U	0.5 U		
ACETONITRILE								20 U	20 U		
ACROLEIN								0.5 UR	0.5 UR		
ACRYLONITRILE								0.5 U	0.5 U		
BENZENE								0.3 U	0.3 U		
BROMODICHLOROMETHANE								0.3 U	0.3 U		
BROMOFORM								0.3 U	0.3 U		
BROMOMETHANE								0.3 U	0.3 U		
CARBON DISULFIDE								0.3 U	0.3 U		
CARBON TETRACHLORIDE								0.3 U	0.3 U		
CHLOROBENZENE								0.3 U	0.3 U		
CHLORODIBROMOMETHANE								0.3 U	0.3 U		
CHLOROETHANE								0.5 U	0.5 U		
CHLOROFORM								0.3 U	0.3 U		
CHLOROMETHANE								0.3 U	0.3 U		
CHLOROPRENE								0.5 U	0.5 U		
CIS-1,2-DICHLOROETHENE								0.3 U	0.3 U		
CIS-1,3-DICHLOROPROPENE								0.3 U	0.3 U		
DIBROMOMETHANE								0.3 U	0.3 U		
DICHLORODIFLUOROMETHANE								0.3 U	0.3 U		
ETHYL METHACRYLATE								0.5 U	0.5 U		
ETHYLBENZENE								0.3 U	0.3 U		
ISOBUTANOL								20 U	20 U		
METHACRYLONITRILE								0.3 U	0.3 U		
METHYL IODIDE								0.5 U	0.5 U		

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY	TCMS	TCMS	TCMS	TCMS
SAMPLING ROUND	02	02	03	03	02	03	03	03	03	03	03
LOCATION	16SW/SD17	16SW/SD17	16SW/SD19	16SW/SD19	16SW/SD22	16SW/SD23	16SW/SD23	16SW/SD24	16SW/SD24	16SW/SD24	16SW/SD25
SAMPLE NUMBER	16SW1701-F	16SW1701-F-D	16SW1901	16SW1901-F	16SW2201	16SW2301	16SW2301-F	16SW2401	16SW2401-D	16SW2401-F	16SW2501
SUBMATRIX	SF	SF	SW	SF	SF	SW	SF	SW	SW	SF	SW
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	DRY	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
SAMPLE DATE	10/24/2003	10/24/2003	11/2/2004	11/2/2004	10/24/2003	11/11/2004	11/11/2004	10/8/2004	10/8/2004	10/12/2004	10/8/2004
METHYL METHACRYLATE								0.5 U	0.5 U		
METHYLENE CHLORIDE								0.3 U	0.3 U		
PROPIONITRILE								20 U	20 U		
STYRENE								0.3 U	0.3 U		
TETRACHLOROETHENE								0.3 U	0.3 U		
TOLUENE								0.3 U	0.3 U		
TOTAL XYLENES								0.3 U	0.3 U		
TRANS-1,2-DICHLOROETHENE								0.3 U	0.3 U		
TRANS-1,3-DICHLOROPROPENE								0.3 U	0.3 U		
TRANS-1,4-DICHLORO-2-BUTENE								0.5 U	0.5 U		
TRICHLOROETHENE								0.3 U	0.3 U		
TRICHLOROFLUOROMETHANE								0.3 U	0.3 U		
VINYL ACETATE								0.5 U	0.5 U		
VINYL CHLORIDE								0.3 U	0.3 U		
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											

TCMS - Turkey Creek Main Stream

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SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY	TCMS	TCMS	TCMS	TCMS
SAMPLING ROUND	02	02	03	03	02	03	03	03	03	03	03
LOCATION	16SW/SD17	16SW/SD17	16SW/SD19	16SW/SD19	16SW/SD22	16SW/SD23	16SW/SD23	16SW/SD24	16SW/SD24	16SW/SD24	16SW/SD25
SAMPLE NUMBER	16SW1701-F	16SW1701-F-D	16SW1901	16SW1901-F	16SW2201	16SW2301	16SW2301-F	16SW2401	16SW2401-D	16SW2401-F	16SW2501
SUBMATRIX	SF	SF	SW	SF	SF	SW	SF	SW	SW	SF	SW
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	DRY	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
SAMPLE DATE	10/24/2003	10/24/2003	11/2/2004	11/2/2004	10/24/2003	11/11/2004	11/11/2004	10/8/2004	10/8/2004	10/12/2004	10/8/2004
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY	TCMS	TCMS	TCMS	TCMS
SAMPLING ROUND	02	02	03	03	02	03	03	03	03	03	03
LOCATION	16SW/SD17	16SW/SD17	16SW/SD19	16SW/SD19	16SW/SD22	16SW/SD23	16SW/SD23	16SW/SD24	16SW/SD24	16SW/SD24	16SW/SD25
SAMPLE NUMBER	16SW1701-F	16SW1701-F-D	16SW1901	16SW1901-F	16SW2201	16SW2301	16SW2301-F	16SW2401	16SW2401-D	16SW2401-F	16SW2501
SUBMATRIX	SF	SF	SW	SF	SF	SW	SF	SW	SW	SF	SW
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	DRY	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
SAMPLE DATE	10/24/2003	10/24/2003	11/2/2004	11/2/2004	10/24/2003	11/11/2004	11/11/2004	10/8/2004	10/8/2004	10/12/2004	10/8/2004
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE								0.25 U			
1,3-DINITROBENZENE								0.25 U			
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE											
2,4,6-TRINITROTOLUENE								0.25 U			
2,4-DIAMINO-6-NITROTOLUENE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY	TCMS	TCMS	TCMS	TCMS
SAMPLING ROUND	02	02	03	03	02	03	03	03	03	03	03
LOCATION	16SW/SD17	16SW/SD17	16SW/SD19	16SW/SD19	16SW/SD22	16SW/SD23	16SW/SD23	16SW/SD24	16SW/SD24	16SW/SD24	16SW/SD25
SAMPLE NUMBER	16SW1701-F	16SW1701-F-D	16SW1901	16SW1901-F	16SW2201	16SW2301	16SW2301-F	16SW2401	16SW2401-D	16SW2401-F	16SW2501
SUBMATRIX	SF	SF	SW	SF	SF	SW	SF	SW	SW	SF	SW
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	DRY	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
SAMPLE DATE	10/24/2003	10/24/2003	11/2/2004	11/2/2004	10/24/2003	11/11/2004	11/11/2004	10/8/2004	10/8/2004	10/12/2004	10/8/2004
2,4-DINITROTOLUENE								0.25 U			
2,6-DIAMINO-4-NITROTOLUENE											
2,6-DINITROTOLUENE								0.25 U			
2-AMINO-4,6-DINITROTOLUENE								0.25 U			
2-NITROTOLUENE								0.25 U			
3,5-DINITROANILINE											
3-NITROTOLUENE								0.25 U			
4-AMINO-2,6-DINITROTOLUENE								0.25 U			
4-NITROTOLUENE								0.25 U			
DNX											
HMX								0.32 J			
MNX											
NITROBENZENE								0.25 U			
PICRAMIC ACID											
PICRIC ACID											
RDX								0.25 U			
TETRYL								0.25 U			
TNX											
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM			822 J			273 J		146 J			48.7 U
ANTIMONY			0.085 UJ			2.7 U		0.085 U			0.085 U
ARSENIC			0.37 J			0.19 U		0.09 U			0.23 U
BARIUM			48.1 J			203 J		95.7 J			78.6 J
BERYLLIUM			0.09 J			0.02 U		0.03 U			0.02 U
CADMIUM			0.66 J			0.6 J		0.05 U			0.039 U
CALCIUM			9360 J			13900 J		17200 J			17900 J
CHROMIUM			1.2 U			0.8 U		0.42 U			0.34 U
COBALT			0.44 J			0.11 J		0.14 J			0.72 J
COPPER			4.1 J			21 J		0.3 J			0.24 J
IRON			886 J			311 J		43.6 J			440
LEAD			1.2			18.4 J		0.11 U			0.31 U
LITHIUM											
MAGNESIUM			3370			1310 J		6300 J			6340 J
MANGANESE			21.5			5.7		102			476
MERCURY			0.03 U			0.03 U		0.03 U			0.031 U
NICKEL			4.5 J			1.2 J		5.7			5.7
POTASSIUM			1680			1000 J		989 J			1340 J
SELENIUM			0.17 U			0.21 U		0.094 U			0.094 U
SILVER			0.028 U			0.028 U		0.03 U			0.028 U

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY	TCMS	TCMS	TCMS	TCMS
SAMPLING ROUND	02	02	03	03	02	03	03	03	03	03	03
LOCATION	16SW/SD17	16SW/SD17	16SW/SD19	16SW/SD19	16SW/SD22	16SW/SD23	16SW/SD23	16SW/SD24	16SW/SD24	16SW/SD24	16SW/SD25
SAMPLE NUMBER	16SW1701-F	16SW1701-F-D	16SW1901	16SW1901-F	16SW2201	16SW2301	16SW2301-F	16SW2401	16SW2401-D	16SW2401-F	16SW2501
SUBMATRIX	SF	SF	SW	SF	SF	SW	SF	SW	SW	SF	SW
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	DRY	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
SAMPLE DATE	10/24/2003	10/24/2003	11/2/2004	11/2/2004	10/24/2003	11/11/2004	11/11/2004	10/8/2004	10/8/2004	10/12/2004	10/8/2004
SODIUM			3660 J			2110 J		8600 J			7850 J
STRONTIUM											
THALLIUM			0.043 U			0.043 U		0.043 U			0.043 U
TIN			0.21 U			0.08 U		0.05 U			0.048 U
TITANIUM											
VANADIUM			1.5 J			1.14 U		1.14 U			1.14 U
ZINC			18.7 J			149 J		7.7 J			6.9 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	10.8 U	11.2 U		90.1			68.5 U			119 J	
ANTIMONY, FILTERED	0.25 U	0.31 U		0.085 UJ			2.7 U			0.085 U	
ARSENIC, FILTERED	0.11 U	0.09 U		0.16 U			0.11 U			0.047 U	
BARIUM, FILTERED	68.5 J	69.2 J		43.7 J			194 J			98.3 J	
BERYLLIUM, FILTERED	0.03 U	0.03 U		0.04 J			0.02 U			0.02 U	
CADMIUM, FILTERED	0.04 U	0.04 U		1.4			0.49 J			0.039 U	
CALCIUM, FILTERED	19800 J	20400 J		9910 J			13900 J			16200 J	
CHROMIUM, FILTERED	0.27 U	0.29 U		0.55 U			0.51 U			0.3 U	
COBALT, FILTERED	0.11 U	1.6 U		0.16 J			0.1 J			0.17 J	
COPPER, FILTERED	0.93 U	1 U		3.9 J			16.5 J			0.22 J	
IRON, FILTERED	44.3 U	15.9 U		104 J			99.3 U			11.8 J	
LEAD, FILTERED	0.08 U	0.07 U		0.54 J			7.6 J			0.19 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	5890 J	5970 J		3020 J			1280 J			5940	
MANGANESE, FILTERED	9.7 U	12.2 J		7.7			2.5 J			128 J	
MERCURY, FILTERED	0.02 U	0.02 U		0.03 U			0.03 U			0.03 U	
NICKEL, FILTERED	0.83 U	1 U		4 J			0.95 J			6.9	
POTASSIUM, FILTERED	1660 J	1680 J		1640			969			1030 J	
SELENIUM, FILTERED	0.06 U	0.04 U		0.17 U			0.12 U			0.094 U	
SILVER, FILTERED	0.03 U	0.03 U		0.028 U			0.028 U			0.028 U	
SODIUM, FILTERED	4850 J	4920 J		3840 J			2130 J			8190 J	
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.04 U	0.04 U		0.043 U			0.043 U			0.043 U	
TIN, FILTERED	0.1 U	0.1 U		0.08 U			0.08 U			0.048 U	
TITANIUM, FILTERED	0.55 U	1.2 U									
VANADIUM, FILTERED	0.09 U	0.07 U		1.14 U			1.14 U			1.14 U	
ZINC, FILTERED	13.8 U	10.3 U		16.6 J			116 J			21.8 J	
Field Parameters											
DISSOLVED OXYGEN (mg/L)			7.72			7.41		4.78			3.86
DISSOLVED OXYGEN - METER (mg/L)											
OXIDATION REDUCTION POTENTIAL (MV)			55.3			95		205			269
PH (S.U.)			7.53			7.75		6.35			6.57
SPECIFIC CONDUCTANCE (MS/CM)			0.081			0.064		130			126
TEMPERATURE (C)			15.83			10.9		12.92			11.21

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**TCMS**	**TCMS**	**GULLY**	**GULLY**	**GULLY**	**TCMS**	**TCMS**	**TCMS**	**TCMS**
SAMPLING ROUND	**02**	**02**	**03**	**03**	**02**	**03**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD17**	**16SW/SD17**	**16SW/SD19**	**16SW/SD19**	**16SW/SD22**	**16SW/SD23**	**16SW/SD23**	**16SW/SD24**	**16SW/SD24**	**16SW/SD24**	**16SW/SD25**
SAMPLE NUMBER	**16SW1701-F**	**16SW1701-F-D**	**16SW1901**	**16SW1901-F**	**16SW2201**	**16SW2301**	**16SW2301-F**	**16SW2401**	**16SW2401-D**	**16SW2401-F**	**16SW2501**
SUBMATRIX	**SF**	**SF**	**SW**	**SF**	**SF**	**SW**	**SF**	**SW**	**SW**	**SF**	**SW**
SAMPLE CODE	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**DRY**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**ORIG**
SAMPLE DATE	**10/24/2003**	**10/24/2003**	**11/2/2004**	**11/2/2004**	**10/24/2003**	**11/11/2004**	**11/11/2004**	**10/8/2004**	**10/8/2004**	**10/12/2004**	**10/8/2004**
TURBIDITY (NTU)			25			7.2		1			2
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
NITRITE/NITRATE-N								0.05			

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	TCMS	TCMS	TCMS	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SW/SD25	16SW/SD25	16SW/SD25	16SW/SD26	16SW/SD26	16SW/SD26	16SW/SD27	16SW/SD27	16SW/SD28	16SW/SD28	16SW/SD29
SAMPLE NUMBER	16SW2501-D	16SW2501-F	16SW2501-F-D	16SW2601	16SW2601-D	16SW2601-F	16SW2701	16SW2701-F	16SW2801	16SW2801-F	16SW2901
SUBMATRIX	SW	SF	SF	SW	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/8/2004	10/12/2004	10/12/2004	10/26/2004	10/26/2004	10/26/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE				0.3 U			0.3 U		0.3 U		0.3 U
1,1,1-TRICHLOROETHANE				0.3 U			0.3 U		0.3 U		0.3 U
1,1,2,2-TETRACHLOROETHANE				0.3 U			0.3 U		0.3 U		0.3 U
1,1,2-TRICHLOROETHANE				0.3 U			0.3 U		0.3 U		0.3 U
1,1-DICHLOROETHANE				0.3 U			0.3 U		0.3 U		0.3 U
1,1-DICHLOROETHENE				0.3 U			0.3 U		0.3 U		0.3 U
1,2,3-TRICHLOROPROPANE				0.3 U			0.3 U		0.3 U		0.3 U
1,2-DIBROMO-3-CHLOROPROPANE				0.3 U			0.3 U		0.3 U		0.3 U
1,2-DIBROMOETHANE				0.3 U			0.3 U		0.3 U		0.3 U
1,2-DICHLOROETHANE				0.3 U			0.3 U		0.3 U		0.3 U
1,2-DICHLOROPROPANE				0.3 U			0.3 U		0.3 U		0.3 U
1,4-DIOXANE				50 U			50 U		50 U		50 U
2-BUTANONE				0.5 U			0.5 U		0.5 U		0.5 U
2-HEXANONE				0.5 U			0.5 U		0.5 U		0.5 U
3-CHLOROPROPENE				0.5 U			0.5 U		0.5 U		0.5 U
4-METHYL-2-PENTANONE				0.5 U			0.5 U		0.5 U		0.5 U
ACETONE				0.5 U			2.8 J		0.5 UJ		0.5 J
ACETONITRILE				20 U			20 U		20 U		20 U
ACROLEIN				0.5 UR			0.5 UR		0.5 UR		0.5 UR
ACRYLONITRILE				0.5 U			0.5 U		0.5 U		0.5 U
BENZENE				0.3 U			0.3 U		0.3 U		0.3 U
BROMODICHLOROMETHANE				0.3 U			0.3 U		0.3 U		0.3 U
BROMOFORM				0.3 U			0.3 U		0.3 U		0.3 U
BROMOMETHANE				0.3 U			0.3 U		0.3 U		0.3 U
CARBON DISULFIDE				0.3 U			0.3 U		0.3 U		0.3 U
CARBON TETRACHLORIDE				0.3 U			0.3 U		0.3 U		0.3 U
CHLOROBENZENE				0.3 U			0.3 U		0.3 U		0.3 U
CHLORODIBROMOMETHANE				0.3 U			0.3 U		0.3 U		0.3 U
CHLOROETHANE				0.5 U			0.5 U		0.5 U		0.5 U
CHLOROFORM				0.3 U			0.3 U		0.3 U		0.3 U
CHLOROMETHANE				0.3 U			0.3 U		0.3 U		0.3 U
CHLOROPRENE				0.5 U			0.5 U		0.5 U		0.5 U
CIS-1,2-DICHLOROETHENE				0.3 U			0.3 U		0.3 U		3.4
CIS-1,3-DICHLOROPROPENE				0.3 U			0.3 U		0.3 U		0.3 U
DIBROMOMETHANE				0.3 U			0.3 U		0.3 U		0.3 U
DICHLORODIFLUOROMETHANE				0.3 UJ			0.3 U		0.3 U		0.3 U
ETHYL METHACRYLATE				0.5 U			0.5 U		0.5 U		0.5 U
ETHYLBENZENE				0.3 U			0.3 U		0.3 U		0.3 U
ISOBUTANOL				20 U			20 U		20 U		20 U
METHACRYLONITRILE				0.3 U			0.3 U		0.3 U		0.3 U
METHYL IODIDE				0.5 U			0.5 U		0.5 U		0.5 U

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	TCMS	TCMS	TCMS	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SW/SD25	16SW/SD25	16SW/SD25	16SW/SD26	16SW/SD26	16SW/SD26	16SW/SD27	16SW/SD27	16SW/SD28	16SW/SD28	16SW/SD29
SAMPLE NUMBER	16SW2501-D	16SW2501-F	16SW2501-F-D	16SW2601	16SW2601-D	16SW2601-F	16SW2701	16SW2701-F	16SW2801	16SW2801-F	16SW2901
SUBMATRIX	SW	SF	SF	SW	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/8/2004	10/12/2004	10/12/2004	10/26/2004	10/26/2004	10/26/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004
METHYL METHACRYLATE				0.5 U			0.5 U		0.5 U		0.5 U
METHYLENE CHLORIDE				0.3 U			0.3 U		0.3 UJ		0.3 UJ
PROPIONITRILE				20 U			20 U		20 U		20 U
STYRENE				0.3 U			0.3 U		0.3 U		0.3 U
TETRACHLOROETHENE				0.3 U			0.3 U		0.3 U		0.3 U
TOLUENE				0.3 U			0.3 U		0.3 U		0.3 U
TOTAL XYLENES				0.3 U			0.3 U		0.3 U		0.3 U
TRANS-1,2-DICHLOROETHENE				0.3 U			0.3 U		0.3 U		0.3 U
TRANS-1,3-DICHLOROPROPENE				0.3 U			0.3 U		0.3 U		0.3 U
TRANS-1,4-DICHLORO-2-BUTENE				0.5 U			0.5 U		0.5 U		0.5 U
TRICHLOROETHENE				0.3 U			0.8 J		1.3		26
TRICHLOROFLUOROMETHANE				0.3 U			0.3 U		0.3 U		0.3 U
VINYL ACETATE				0.5 U			0.5 U		0.5 U		0.5 U
VINYL CHLORIDE				0.3 U			0.3 U		0.3 U		0.3 U
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	TCMS	TCMS	TCMS	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SW/SD25	16SW/SD25	16SW/SD25	16SW/SD26	16SW/SD26	16SW/SD26	16SW/SD27	16SW/SD27	16SW/SD28	16SW/SD28	16SW/SD29
SAMPLE NUMBER	16SW2501-D	16SW2501-F	16SW2501-F-D	16SW2601	16SW2601-D	16SW2601-F	16SW2701	16SW2701-F	16SW2801	16SW2801-F	16SW2901
SUBMATRIX	SW	SF	SF	SW	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/8/2004	10/12/2004	10/12/2004	10/26/2004	10/26/2004	10/26/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	TCMS	TCMS	TCMS	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SW/SD25	16SW/SD25	16SW/SD25	16SW/SD26	16SW/SD26	16SW/SD26	16SW/SD27	16SW/SD27	16SW/SD28	16SW/SD28	16SW/SD29
SAMPLE NUMBER	16SW2501-D	16SW2501-F	16SW2501-F-D	16SW2601	16SW2601-D	16SW2601-F	16SW2701	16SW2701-F	16SW2801	16SW2801-F	16SW2901
SUBMATRIX	SW	SF	SF	SW	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/8/2004	10/12/2004	10/12/2004	10/26/2004	10/26/2004	10/26/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE											
1,3-DINITROBENZENE											
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE											
2,4,6-TRINITROTOLUENE											
2,4-DIAMINO-6-NITROTOLUENE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	TCMS	TCMS	TCMS	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	16SW/SD25	16SW/SD25	16SW/SD25	16SW/SD26	16SW/SD26	16SW/SD26	16SW/SD27	16SW/SD27	16SW/SD28	16SW/SD28	16SW/SD29
SAMPLE NUMBER	16SW2501-D	16SW2501-F	16SW2501-F-D	16SW2601	16SW2601-D	16SW2601-F	16SW2701	16SW2701-F	16SW2801	16SW2801-F	16SW2901
SUBMATRIX	SW	SF	SF	SW	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/8/2004	10/12/2004	10/12/2004	10/26/2004	10/26/2004	10/26/2004	11/2/2004	11/2/2004	11/11/2004	11/11/2004	11/11/2004
2,4-DINITROTOLUENE											
2,6-DIAMINO-4-NITROTOLUENE											
2,6-DINITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
2-NITROTOLUENE											
3,5-DINITROANILINE											
3-NITROTOLUENE											
4-AMINO-2,6-DINITROTOLUENE											
4-NITROTOLUENE											
DNX											
HMX											
MNX											
NITROBENZENE											
PICRAMIC ACID											
PICRIC ACID											
RDX											
TETRYL											
TNX											
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	107 J			94 U			1770 J		8790 J		1170 J
ANTIMONY	0.37 U			0.49 U			0.72 U		1.6 U		4.2 J
ARSENIC	0.34 U			0.24 U			0.73 J		3.6 J		0.64 J
BARIUM	77.6 J			44.3 J			94.3 J		120 J		128 J
BERYLLIUM	0.18 U			0.17 U			0.2 J		0.5 J		0.07 J
CADMIUM	0.2 U			0.17 U			1.8		0.4 J		0.61 J
CALCIUM	16100 J			17400 J			11200 J		14200 J		21000 J
CHROMIUM	0.41 U			0.39 U			2.2 J		11 J		2.6 J
COBALT	0.77 J			0.29 U			1.9 J		4.1 J		0.59 J
COPPER	1.2 J			0.95 J			16.7 J		29.4 J		34.3 J
IRON	428			77.8 U			2220 J		9810 J		1310 J
LEAD	0.24 U			0.27 U			10.1		34.8 J		25.8 J
LITHIUM											
MAGNESIUM	6340 J			5700 J			4280		3620 J		5400 J
MANGANESE	443			3 U			50.4		164		32.1
MERCURY	0.032 U			0.03 U			0.03 U		0.03 U		0.03 U
NICKEL	5.6			0.94 U			11.8		10.6 J		7.7 J
POTASSIUM	1360 J			1380 J			1880		3650 J		2540 J
SELENIUM	0.1 U			0.27 U			0.25 U		0.57 U		0.45 U
SILVER	0.22 U			0.18 U			0.028 U		0.29 U		0.3 U

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**TCMS**	**TCMS**	**TCMS**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD25**	**16SW/SD25**	**16SW/SD25**	**16SW/SD26**	**16SW/SD26**	**16SW/SD26**	**16SW/SD27**	**16SW/SD27**	**16SW/SD28**	**16SW/SD28**	**16SW/SD29**
SAMPLE NUMBER	**16SW2501-D**	**16SW2501-F**	**16SW2501-F-D**	**16SW2601**	**16SW2601-D**	**16SW2601-F**	**16SW2701**	**16SW2701-F**	**16SW2801**	**16SW2801-F**	**16SW2901**
SUBMATRIX	**SW**	**SF**	**SF**	**SW**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**
SAMPLE CODE	**DUP**	**ORIG**	**DUP**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**10/8/2004**	**10/12/2004**	**10/12/2004**	**10/26/2004**	**10/26/2004**	**10/26/2004**	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**
SODIUM	7740 J			10300 J			3490 J		1540 U		3310 J
STRONTIUM											
THALLIUM	0.17 U			0.16 U			0.043 U		0.2 U		0.043 U
TIN	0.24 U			0.21 U			0.16 U		0.47 J		0.17 U
TITANIUM											
VANADIUM	1.14 U			1.14 U			4.7		16.3 J		2.5 J
ZINC	9.3 J			4.2 U			159 J		208 J		380 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		61.8 U	14.3 U			8.35 U		124		71.1 U	
ANTIMONY, FILTERED		0.085 U	0.26 U			0.21 U		0.63 U		1.4 U	
ARSENIC, FILTERED		0.37 U	0.4 U			0.15 U		0.12 U		0.31 J	
BARIUM, FILTERED		90.9 J	93.2 J			43.9 J		81.7 J		43.2 J	
BERYLLIUM, FILTERED		0.02 U	0.09 U			0.03 U		0.1 J		0.02 J	
CADMIUM, FILTERED		0.039 U	0.1 U			0.039 U		2.4		0.12 J	
CALCIUM, FILTERED		17400 J	16900 J			18200 J		10600 J		12100 J	
CHROMIUM, FILTERED		0.28 U	0.33 U			0.28 U		0.7 U		0.54 U	
COBALT, FILTERED		1.9	1.9			0.088 U		1.1		0.36 J	
COPPER, FILTERED		0.34 J	0.41 J			1 J		12.8 J		12.1 J	
IRON, FILTERED		163	165			7.8 U		97.6 J		106 U	
LEAD, FILTERED		0.11 U	0.15 U			0.14 U		3 J		0.89 J	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED		6450	6610			5920 J		3710 J		2510 J	
MANGANESE, FILTERED		1970 J	1670 J			0.82 U		32.1		21.2	
MERCURY, FILTERED		0.03 U	0.03 U			0.03 U		0.03 U		0.03 U	
NICKEL, FILTERED		8.6	8.8			1.2 U		9.2		2.9 J	
POTASSIUM, FILTERED		1900 J	1940 J			1430 J		1590		2790	
SELENIUM, FILTERED		0.094 U	0.094 U			0.094 U		0.19 U		0.4 U	
SILVER, FILTERED		0.028 U	0.12 U			0.028 U		0.028 U		0.16 U	
SODIUM, FILTERED		7560 J	7760 J			10800 J		3320 J		1390 U	
STRONTIUM, FILTERED											
THALLIUM, FILTERED		0.043 U	0.08 U			0.043 U		0.043 U		0.05 U	
TIN, FILTERED		0.048 U	0.11 U			0.048 U		0.08 U		0.16 U	
TITANIUM, FILTERED											
VANADIUM, FILTERED		1.14 U	1.14 U			1.14 U		1.14 U		1.14 U	
ZINC, FILTERED		9.1 J	8.9 J			6 U		118 J		77.8 J	
Field Parameters											
DISSOLVED OXYGEN (mg/L)				9			8.87		7.86		7.96
DISSOLVED OXYGEN - METER (mg/L)											
OXIDATION REDUCTION POTENTIAL (MV)				55.8			55.2		126		147
PH (S.U.)				7.5			7.23		7.17		7.95
SPECIFIC CONDUCTANCE (MS/CM)				0.171			0.091		0.068		0.116
TEMPERATURE (C)				12.65			16.06		11.33		11.28

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**TCMS**	**TCMS**	**TCMS**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**	**03**
LOCATION	**16SW/SD25**	**16SW/SD25**	**16SW/SD25**	**16SW/SD26**	**16SW/SD26**	**16SW/SD26**	**16SW/SD27**	**16SW/SD27**	**16SW/SD28**	**16SW/SD28**	**16SW/SD29**
SAMPLE NUMBER	**16SW2501-D**	**16SW2501-F**	**16SW2501-F-D**	**16SW2601**	**16SW2601-D**	**16SW2601-F**	**16SW2701**	**16SW2701-F**	**16SW2801**	**16SW2801-F**	**16SW2901**
SUBMATRIX	**SW**	**SF**	**SF**	**SW**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**
SAMPLE CODE	**DUP**	**ORIG**	**DUP**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**10/8/2004**	**10/12/2004**	**10/12/2004**	**10/26/2004**	**10/26/2004**	**10/26/2004**	**11/2/2004**	**11/2/2004**	**11/11/2004**	**11/11/2004**	**11/11/2004**
TURBIDITY (NTU)				4.74			31.9		179		32.2
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
NITRITE/NITRATE-N				0.025 U	0.025 U						

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	02	02	02	02	02	02	02
LOCATION	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD30	16SW/SD14	16SW/SD14	16SW/SD18	16SW/SD18	16SW/SD20	16SW/SD20	16SW/SD21
SAMPLE NUMBER	16SW2901-F	16SW3001	16SW3001-D	16SW3001-F	16SW1401	16SW1401-F	16SW1801	16SW1801-F	16SW2001	16SW2001-F	16SW2101
SUBMATRIX	SF	SW	SW	SF	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	10/26/2004	10/26/2004	10/26/2004	10/24/2003	10/24/2003	10/24/2003	10/24/2003	10/25/2003	10/25/2003	10/24/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,1,1-TRICHLOROETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,1,2,2-TETRACHLOROETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,1,2-TRICHLOROETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,1-DICHLOROETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,1-DICHLOROETHENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,2,3-TRICHLOROPROPANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,2-DIBROMO-3-CHLOROPROPANE		0.3 U			0.3 U		0.3 U		0.3 UJ		0.3 U
1,2-DIBROMOETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,2-DICHLOROETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,2-DICHLOROPROPANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
1,4-DIOXANE		50 U			50 U		50 U		50 U		50 U
2-BUTANONE		0.5 U			0.5 UR		0.5 UR		0.5 U		0.5 UR
2-HEXANONE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
3-CHLOROPROPENE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
4-METHYL-2-PENTANONE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
ACETONE		0.5 U			0.5 UR		0.5 UR		0.6 J		0.5 UR
ACETONITRILE		20 U			20 U		20 U		20 U		20 U
ACROLEIN		0.5 UR			0.5 UR		0.5 UR		0.5 UR		0.5 UR
ACRYLONITRILE		0.5 U			0.5 UR		0.5 UR		0.5 U		0.5 UR
BENZENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
BROMODICHLOROMETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
BROMOFORM		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
BROMOMETHANE		0.3 U			0.3 U		0.3 U		0.3 UJ		0.3 U
CARBON DISULFIDE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
CARBON TETRACHLORIDE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
CHLOROBENZENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
CHLORODIBROMOMETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
CHLOROETHANE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
CHLOROFORM		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
CHLOROMETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
CHLOROPRENE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
CIS-1,2-DICHLOROETHENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
CIS-1,3-DICHLOROPROPENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
DIBROMOMETHANE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
DICHLORODIFLUOROMETHANE		0.3 UJ			0.3 U		0.3 U		0.3 U		0.3 U
ETHYL METHACRYLATE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
ETHYLBENZENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
ISOBUTANOL		20 U			20 U		20 U		20 U		20 U
METHACRYLONITRILE		0.3 U			0.3 UR		0.3 UR		0.3 U		0.3 UR
METHYL IODIDE		0.5 U			0.5 UJ		0.5 UJ		0.5 UJ		0.5 UJ

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	02	02	02	02	02	02	02
LOCATION	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD30	16SW/SD14	16SW/SD14	16SW/SD18	16SW/SD18	16SW/SD20	16SW/SD20	16SW/SD21
SAMPLE NUMBER	16SW2901-F	16SW3001	16SW3001-D	16SW3001-F	16SW1401	16SW1401-F	16SW1801	16SW1801-F	16SW2001	16SW2001-F	16SW2101
SUBMATRIX	SF	SW	SW	SF	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	10/26/2004	10/26/2004	10/26/2004	10/24/2003	10/24/2003	10/24/2003	10/24/2003	10/25/2003	10/25/2003	10/24/2003
METHYL METHACRYLATE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
METHYLENE CHLORIDE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
PROPIONITRILE		20 U			20 U		20 U		20 U		20 U
STYRENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
TETRACHLOROETHENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
TOLUENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
TOTAL XYLENES		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
TRANS-1,2-DICHLOROETHENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
TRANS-1,3-DICHLOROPROPENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
TRANS-1,4-DICHLORO-2-BUTENE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
TRICHLOROETHENE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
TRICHLOROFLUOROMETHANE		0.3 U			0.3 U		0.3 U		0.3 UJ		0.3 U
VINYL ACETATE		0.5 U			0.5 U		0.5 U		0.5 U		0.5 U
VINYL CHLORIDE		0.3 U			0.3 U		0.3 U		0.3 U		0.3 U
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	02	02	02	02	02	02	02
LOCATION	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD30	16SW/SD14	16SW/SD14	16SW/SD18	16SW/SD18	16SW/SD20	16SW/SD20	16SW/SD21
SAMPLE NUMBER	16SW2901-F	16SW3001	16SW3001-D	16SW3001-F	16SW1401	16SW1401-F	16SW1801	16SW1801-F	16SW2001	16SW2001-F	16SW2101
SUBMATRIX	SF	SW	SW	SF	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	10/26/2004	10/26/2004	10/26/2004	10/24/2003	10/24/2003	10/24/2003	10/24/2003	10/25/2003	10/25/2003	10/24/2003
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	02	02	02	02	02	02	02
LOCATION	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD30	16SW/SD14	16SW/SD14	16SW/SD18	16SW/SD18	16SW/SD20	16SW/SD20	16SW/SD21
SAMPLE NUMBER	16SW2901-F	16SW3001	16SW3001-D	16SW3001-F	16SW1401	16SW1401-F	16SW1801	16SW1801-F	16SW2001	16SW2001-F	16SW2101
SUBMATRIX	SF	SW	SW	SF	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	10/26/2004	10/26/2004	10/26/2004	10/24/2003	10/24/2003	10/24/2003	10/24/2003	10/25/2003	10/25/2003	10/24/2003
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
1,3-DINITROBENZENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE					0.5 U		0.49 U		0.52 U		0.51 U
2,4,6-TRINITROTOLUENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
2,4-DIAMINO-6-NITROTOLUENE					0.25 U		0.25 U		0.26 U		0.25 U

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	02	02	02	02	02	02	02
LOCATION	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD30	16SW/SD14	16SW/SD14	16SW/SD18	16SW/SD18	16SW/SD20	16SW/SD20	16SW/SD21
SAMPLE NUMBER	16SW2901-F	16SW3001	16SW3001-D	16SW3001-F	16SW1401	16SW1401-F	16SW1801	16SW1801-F	16SW2001	16SW2001-F	16SW2101
SUBMATRIX	SF	SW	SW	SF	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	10/26/2004	10/26/2004	10/26/2004	10/24/2003	10/24/2003	10/24/2003	10/24/2003	10/25/2003	10/25/2003	10/24/2003
2,4-DINITROTOLUENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
2,6-DIAMINO-4-NITROTOLUENE					0.25 U		0.25 U		0.26 U		0.25 U
2,6-DINITROTOLUENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
2-AMINO-4,6-DINITROTOLUENE		0.29 J	0.28 J		0.25 U		0.25 U		0.26 U		0.25 U
2-NITROTOLUENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
3,5-DINITROANILINE					0.25 U		0.25 U		0.26 U		0.25 U
3-NITROTOLUENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
4-AMINO-2,6-DINITROTOLUENE		0.63	0.61		0.25 U		0.25 U		0.26 U		0.25 U
4-NITROTOLUENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
DNX					0.25 U		0.25 U		0.26 U		0.25 U
HMX		4.8	4.6		0.25 U		0.25 U		0.26 U		0.25 U
MNX					0.25 U		0.25 U		0.26 U		0.25 U
NITROBENZENE		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
PICRAMIC ACID											
PICRIC ACID											
RDX		24	23		0.25 U		0.25 U		0.26 U		0.25 U
TETRYL		0.24 U	0.255 U		0.25 U		0.25 U		0.26 U		0.25 U
TNX					0.25 U		0.25 U		0.26 U		0.25 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		128 U			87.6 U		32.9 U		485 J		891 J
ANTIMONY		0.58 U			0.26 U		0.14 U		0.03 U		0.05 U
ARSENIC		0.21 U			0.25 U		0.57 U		0.16 U		0.39 U
BARIUM		61.5 J			57.3 J		23 J		54.2 J		53.4 J
BERYLLIUM		0.04 U			0.15 U		0.06 U		0.03 U		0.04 U
CADMIUM		0.07 U			0.13 U		0.04 U		0.04 U		0.05 U
CALCIUM		16000 J			38700 J		9930 J		18400 J		16600 J
CHROMIUM		0.34 U			0.41 U		0.63 U		0.78 J		1.3 U
COBALT		0.1 U			0.15 U		0.33 U		0.32 U		0.38 U
COPPER		1.5 J			0.72 U		2.7 J		0.96 U		1.7 U
IRON		114 U			47.7 U		15 U		263 J		599 J
LEAD		0.31 U			0.26 U		0.64 U		0.26 U		0.5 U
LITHIUM											
MAGNESIUM		5500 J			7810 J		2460 J		6700 J		5820 J
MANGANESE		5.8 U			9.1 U		30 J		19.2 J		135 J
MERCURY		0.03 U			0.02 U		0.02 U		0.02 U		0.02 U
NICKEL		1.6 U			0.71 U		0.61 U		1.1 J		2.3 J
POTASSIUM		1710 J			1780 J		790 J		2230 J		2030 J
SELENIUM		0.13 U			0.17 U		0.11 U		0.07 U		0.11 U
SILVER		0.03 U			0.04 U		0.03 U		0.03 U		0.03 U

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	TCMS	TCMS	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	03	03	02	02	02	02	02	02	02
LOCATION	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD30	16SW/SD14	16SW/SD14	16SW/SD18	16SW/SD18	16SW/SD20	16SW/SD20	16SW/SD21
SAMPLE NUMBER	16SW2901-F	16SW3001	16SW3001-D	16SW3001-F	16SW1401	16SW1401-F	16SW1801	16SW1801-F	16SW2001	16SW2001-F	16SW2101
SUBMATRIX	SF	SW	SW	SF	SW	SF	SW	SF	SW	SF	SW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/11/2004	10/26/2004	10/26/2004	10/26/2004	10/24/2003	10/24/2003	10/24/2003	10/24/2003	10/25/2003	10/25/2003	10/24/2003
SODIUM		9430 J			15000 J		8330 J		10700 J		9580 J
STRONTIUM											
THALLIUM		0.043 U			0.17 U		0.06 U		0.04 U		0.04 U
TIN		0.05 U			0.16 U		0.11 U		0.1 U		0.1 U
TITANIUM					3.4 J		0.52 U		9.5 J		19.7 J
VANADIUM		1.14 U			0.33 U		0.39 U		0.85 J		1.6 U
ZINC		16.9 J			5.7 U		4.9 U		16.6 J		10.9 U
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	49.4 U			38.2 U		54.4 U		18.2 U		33.9 U	
ANTIMONY, FILTERED	3.2 U			0.6 U		0.32 U		0.2 U		0.14 U	
ARSENIC, FILTERED	0.2 U			0.19 U		0.15 U		0.1 U		0.09 U	
BARIUM, FILTERED	113 J			63.1 J		57.2 J		48.2 J		50.9 J	
BERYLLIUM, FILTERED	0.02 J			0.02 U		0.03 U		0.1 U		0.03 U	
CADMIUM, FILTERED	0.52 J			0.039 U		0.04 U		0.1 U		0.04 U	
CALCIUM, FILTERED	21300 J			16500 J		37400 J		10100 J		18100 J	
CHROMIUM, FILTERED	0.61 U			2.1 J		0.35 U		0.28 U		0.24 U	
COBALT, FILTERED	0.24 J			0.09 U		2.7 J		2.6 J		2.9 J	
COPPER, FILTERED	27.2 J			1.9 J		0.7 U		0.26 U		0.64 U	
IRON, FILTERED	188 J			45.2 U		34.9 U		17.4 U		30.1 U	
LEAD, FILTERED	10.2 J			0.1 U		0.06 U		0.14 U		0.08 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	5040 J			5580 J		7390 J		3770 J		6510 J	
MANGANESE, FILTERED	21.3			1.7 U		10.9 J		12.5 J		14.5 J	
MERCURY, FILTERED	0.03 U			0.03 U		0.02 U		0.02 U		0.02 U	
NICKEL, FILTERED	6.4 J			1.4 U		0.74 U		1.4 U		1.2 J	
POTASSIUM, FILTERED	2270			1740 J		1810 J		846 J		2140 J	
SELENIUM, FILTERED	0.36 U			0.094 U		0.06 U		0.09 U		0.04 U	
SILVER, FILTERED	0.028 U			0.028 U		0.03 U		0.03 U		0.03 U	
SODIUM, FILTERED	3240 J			9580 J		14000 J		4360 J		10600 J	
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.043 U			0.043 U		0.04 U		0.1 U		0.04 U	
TIN, FILTERED	0.08 U			0.048 U		0.12 U		0.11 U		0.1 U	
TITANIUM, FILTERED						3.4 J		0.1 U		1.5 J	
VANADIUM, FILTERED	1.14 U			1.14 U		0.2 U		0.06 U		0.11 U	
ZINC, FILTERED	265 J			17.5 J		13.8 U		3.5 U		18.1 J	
Field Parameters											
DISSOLVED OXYGEN (mg/L)		8.9									
DISSOLVED OXYGEN - METER (mg/L)					7.22		5.74		7.23		1.91
OXIDATION REDUCTION POTENTIAL (MV)		53.6			254.700000		251.600000		183.4		239.600000
PH (S.U.)		7.37			7.14		6.39		7.08		6.78
SPECIFIC CONDUCTANCE (MS/CM)		0.159			0.299		0.108		0.202		0.184
TEMPERATURE (C)		13.28			11.7		12.88		13.75		15.12

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**TCMS**	**TCMS**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**02**	**02**	**02**	**02**	**02**	**02**	**02**
LOCATION	**16SW/SD29**	**16SW/SD30**	**16SW/SD30**	**16SW/SD30**	**16SW/SD14**	**16SW/SD14**	**16SW/SD18**	**16SW/SD18**	**16SW/SD20**	**16SW/SD20**	**16SW/SD21**
SAMPLE NUMBER	**16SW2901-F**	**16SW3001**	**16SW3001-D**	**16SW3001-F**	**16SW1401**	**16SW1401-F**	**16SW1801**	**16SW1801-F**	**16SW2001**	**16SW2001-F**	**16SW2101**
SUBMATRIX	**SF**	**SW**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**	**SF**	**SW**
SAMPLE CODE	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**11/11/2004**	**10/26/2004**	**10/26/2004**	**10/26/2004**	**10/24/2003**	**10/24/2003**	**10/24/2003**	**10/24/2003**	**10/25/2003**	**10/25/2003**	**10/24/2003**
TURBIDITY (NTU)		9.49			2.57		1		7.95		10.59
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
NITRITE/NITRATE-N					3.2		0.05 U		0.05 U		0.07

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**
STREAM ORDER	**GULLY**
SAMPLING ROUND	**02**
LOCATION	**16SW/SD21**
SAMPLE NUMBER	**16SW2101-F**
SUBMATRIX	**SF**
SAMPLE CODE	**NORMAL**
SAMPLE DATE	**10/24/2003**
Volatile Organics (ug/L)	
1,1,1,2-TETRACHLOROETHANE	
1,1,1-TRICHLOROETHANE	
1,1,2,2-TETRACHLOROETHANE	
1,1,2-TRICHLOROETHANE	
1,1-DICHLOROETHANE	
1,1-DICHLOROETHENE	
1,2,3-TRICHLOROPROPANE	
1,2-DIBROMO-3-CHLOROPROPANE	
1,2-DIBROMOETHANE	
1,2-DICHLOROETHANE	
1,2-DICHLOROPROPANE	
1,4-DIOXANE	
2-BUTANONE	
2-HEXANONE	
3-CHLOROPROPENE	
4-METHYL-2-PENTANONE	
ACETONE	
ACETONITRILE	
ACROLEIN	
ACRYLONITRILE	
BENZENE	
BROMODICHLOROMETHANE	
BROMOFORM	
BROMOMETHANE	
CARBON DISULFIDE	
CARBON TETRACHLORIDE	
CHLOROBENZENE	
CHLORODIBROMOMETHANE	
CHLOROETHANE	
CHLOROFORM	
CHLOROMETHANE	
CHLOROPRENE	
CIS-1,2-DICHLOROETHENE	
CIS-1,3-DICHLOROPROPENE	
DIBROMOMETHANE	
DICHLORODIFLUOROMETHANE	
ETHYL METHACRYLATE	
ETHYLBENZENE	
ISOBUTANOL	
METHACRYLONITRILE	
METHYL IODIDE	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**
STREAM ORDER	**GULLY**
SAMPLING ROUND	**02**
LOCATION	**16SW/SD21**
SAMPLE NUMBER	**16SW2101-F**
SUBMATRIX	**SF**
SAMPLE CODE	**NORMAL**
SAMPLE DATE	**10/24/2003**
METHYL METHACRYLATE	
METHYLENE CHLORIDE	
PROPIONITRILE	
STYRENE	
TETRACHLOROETHENE	
TOLUENE	
TOTAL XYLENES	
TRANS-1,2-DICHLOROETHENE	
TRANS-1,3-DICHLOROPROPENE	
TRANS-1,4-DICHLORO-2-BUTENE	
TRICHLOROETHENE	
TRICHLOROFLUOROMETHANE	
VINYL ACETATE	
VINYL CHLORIDE	
Semivolatile Organics (ug/L)	
1,2,4,5-TETRACHLOROBENZENE	
1,2,4-TRICHLOROBENZENE	
1,2-DICHLOROBENZENE	
1,3-DICHLOROBENZENE	
1,4-DICHLOROBENZENE	
1,4-NAPHTHOQUINONE	
1,4-PHENYLENEDIAMINE	
1-NAPHTHYLAMINE	
2,2'-OXYBIS(1-CHLOROPROPANE)	
2,3,4,6-TETRACHLOROPHENOL	
2,4,5-TRICHLOROPHENOL	
2,4,6-TRICHLOROPHENOL	
2,4-DICHLOROPHENOL	
2,4-DIMETHYLPHENOL	
2,4-DINITROPHENOL	
2,6-DICHLOROPHENOL	
2-ACETYLAMINOFLUORENE	
2-CHLORONAPHTHALENE	
2-CHLOROPHENOL	
2-METHYLNAPHTHALENE	
2-METHYLPHENOL	
2-NAPHTHYLAMINE	
2-NITROANILINE	
2-NITROPHENOL	
2-PICOLINE	
3&4-METHYLPHENOL	
3,3'-DICHLOROBENZIDINE	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**
STREAM ORDER	**GULLY**
SAMPLING ROUND	**02**
LOCATION	**16SW/SD21**
SAMPLE NUMBER	**16SW2101-F**
SUBMATRIX	**SF**
SAMPLE CODE	**NORMAL**
SAMPLE DATE	**10/24/2003**
3,3'-DIMETHYLBENZIDINE	
3-METHYLCHOLANTHRENE	
3-NITROANILINE	
4,6-DINITRO-2-METHYLPHENOL	
4-AMINOBIPHENYL	
4-BROMOPHENYL PHENYL ETHER	
4-CHLORO-3-METHYLPHENOL	
4-CHLOROANILINE	
4-CHLOROPHENYL PHENYL ETHER	
4-NITROANILINE	
4-NITROPHENOL	
4-NITROQUINOLINE-1-OXIDE	
5-NITRO-O-TOLUIDINE	
7,12-DIMETHYLBENZ(A)ANTHRACENE	
A,A-DIMETHYLPHENETHYLAMINE	
ACENAPHTHENE	
ACENAPHTHYLENE	
ACETOPHENONE	
ANILINE	
ANTHRACENE	
ARAMITE	
BENZO(A)ANTHRACENE	
BENZO(A)PYRENE	
BENZO(B)FLUORANTHENE	
BENZO(G,H,I)PERYLENE	
BENZO(K)FLUORANTHENE	
BENZYL ALCOHOL	
BIS(2-CHLOROETHOXY)METHANE	
BIS(2-CHLOROETHYL)ETHER	
BIS(2-ETHYLHEXYL)PHTHALATE	
BUTYL BENZYL PHTHALATE	
CHLOROBENZILATE	
CHRYSENE	
DI-N-BUTYL PHTHALATE	
DI-N-OCTYL PHTHALATE	
DIALLATE	
DIBENZO(A,H)ANTHRACENE	
DIBENZOFURAN	
DIETHYL PHTHALATE	
DIMETHYL PHTHALATE	
DIPHENYLAMINE	
ETHYL METHANE SULFONATE	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**
STREAM ORDER	**GULLY**
SAMPLING ROUND	**02**
LOCATION	**16SW/SD21**
SAMPLE NUMBER	**16SW2101-F**
SUBMATRIX	**SF**
SAMPLE CODE	**NORMAL**
SAMPLE DATE	**10/24/2003**
FLUORANTHENE	
FLUORENE	
HEXACHLOROBENZENE	
HEXACHLOROBUTADIENE	
HEXACHLOROCYCLOPENTADIENE	
HEXACHLOROETHANE	
HEXACHLOROPROPENE	
INDENO(1,2,3-CD)PYRENE	
ISODRIN	
ISOPHORONE	
ISOSAFROLE	
KEPONE	
METHAPYRILENE	
METHYL METHANE SULFONATE	
N-NITROSO-DI-N-BUTYLAMINE	
N-NITROSO-DI-N-PROPYLAMINE	
N-NITROSODIETHYLAMINE	
N-NITROSODIMETHYLAMINE	
N-NITROSOMETHYLETHYLAMINE	
N-NITROSOMORPHOLINE	
N-NITROSOPIPERIDINE	
N-NITROSOPYRROLIDINE	
NAPHTHALENE	
O,O,O-TRIETHYL PHOSPHOROTHIOATE	
O-TOLUIDINE	
P-(DIMETHYLAMINO)AZOBENZENE	
PENTACHLOROBENZENE	
PENTACHLOROETHANE	
PENTACHLORONITROBENZENE	
PHENACETIN	
PHENANTHRENE	
PHENOL	
PRONAMIDE	
PYRENE	
PYRIDINE	
SAFROLE	
Energetics (ug/L)	
1,3,5-TRINITROBENZENE	
1,3-DINITROBENZENE	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	
2,4,6-TRINITROTOLUENE	
2,4-DIAMINO-6-NITROTOLUENE	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**
STREAM ORDER	**GULLY**
SAMPLING ROUND	**02**
LOCATION	**16SW/SD21**
SAMPLE NUMBER	**16SW2101-F**
SUBMATRIX	**SF**
SAMPLE CODE	**NORMAL**
SAMPLE DATE	**10/24/2003**
2,4-DINITROTOLUENE	
2,6-DIAMINO-4-NITROTOLUENE	
2,6-DINITROTOLUENE	
2-AMINO-4,6-DINITROTOLUENE	
2-NITROTOLUENE	
3,5-DINITROANILINE	
3-NITROTOLUENE	
4-AMINO-2,6-DINITROTOLUENE	
4-NITROTOLUENE	
DNX	
HMX	
MNX	
NITROBENZENE	
PICRAMIC ACID	
PICRIC ACID	
RDX	
TETRYL	
TNX	
Herbicides (ug/L)	
HEXACHLOROPHENE	
PENTACHLOROPHENOL	
Total Metals (ug/L)	
ALUMINUM	
ANTIMONY	
ARSENIC	
BARIUM	
BERYLLIUM	
CADMIUM	
CALCIUM	
CHROMIUM	
COBALT	
COPPER	
IRON	
LEAD	
LITHIUM	
MAGNESIUM	
MANGANESE	
MERCURY	
NICKEL	
POTASSIUM	
SELENIUM	
SILVER	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**
STREAM ORDER	**GULLY**
SAMPLING ROUND	**02**
LOCATION	**16SW/SD21**
SAMPLE NUMBER	**16SW2101-F**
SUBMATRIX	**SF**
SAMPLE CODE	**NORMAL**
SAMPLE DATE	**10/24/2003**
SODIUM	
STRONTIUM	
THALLIUM	
TIN	
TITANIUM	
VANADIUM	
ZINC	
Dissolved Metals (ug/L)	
ALUMINUM, FILTERED	164 J
ANTIMONY, FILTERED	0.25 U
ARSENIC, FILTERED	0.18 U
BARIUM, FILTERED	46.6 J
BERYLLIUM, FILTERED	0.03 U
CADMIUM, FILTERED	0.04 U
CALCIUM, FILTERED	15700 J
CHROMIUM, FILTERED	0.49 U
COBALT, FILTERED	3.1 J
COPPER, FILTERED	0.78 U
IRON, FILTERED	123 U
LEAD, FILTERED	0.11 U
LITHIUM, FILTERED	
MAGNESIUM, FILTERED	5400 J
MANGANESE, FILTERED	29.8 J
MERCURY, FILTERED	0.02 U
NICKEL, FILTERED	1.3 U
POTASSIUM, FILTERED	1550 J
SELENIUM, FILTERED	0.07 U
SILVER, FILTERED	0.03 U
SODIUM, FILTERED	9010 J
STRONTIUM, FILTERED	
THALLIUM, FILTERED	0.04 U
TIN, FILTERED	0.2 U
TITANIUM, FILTERED	8.5 J
VANADIUM, FILTERED	0.35 U
ZINC, FILTERED	33.3 J
Field Parameters	
DISSOLVED OXYGEN (mg/L)	
DISSOLVED OXYGEN - METER (mg/L)	
OXIDATION REDUCTION POTENTIAL (MV)	
PH (S.U.)	
SPECIFIC CONDUCTANCE (MS/CM)	
TEMPERATURE (C)	

TCMS - Turkey Creek Main Stream

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER AND SUMP SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**
STREAM ORDER	**GULLY**
SAMPLING ROUND	**02**
LOCATION	**16SW/SD21**
SAMPLE NUMBER	**16SW2101-F**
SUBMATRIX	**SF**
SAMPLE CODE	**NORMAL**
SAMPLE DATE	**10/24/2003**
TURBIDITY (NTU)	
Miscellaneous Parameters (mg/L)	
AMMONIA-N	
NITRITE/NITRATE-N	

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	01	03	01	03	01	01	03	01
LOCATION	16SW/SD01	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD06	16SW/SD07
SAMPLE NUMBER	16SD0101	16SD0301	16SD0302	16SD0401	16SD0402	16SD0501	16SD0502	16SD0601	16SD0601-D	16SD0602	16SD0701
SAMPLE CODE	NO SED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NO SED
DEPTH RANGE	---	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	---
SAMPLE DATE	4/1/2003	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	4/1/2003	10/10/2004	4/1/2003
Volatile Organics (ug/kg)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	01	03	01	03	01	01	03	01
LOCATION	16SW/SD01	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD06	16SW/SD07
SAMPLE NUMBER	16SD0101	16SD0301	16SD0302	16SD0401	16SD0402	16SD0501	16SD0502	16SD0601	16SD0601-D	16SD0602	16SD0701
SAMPLE CODE	NO SED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NO SED
DEPTH RANGE	---	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	---
SAMPLE DATE	4/1/2003	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	4/1/2003	10/10/2004	4/1/2003
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/kg)											
1,2,4,5-TETRACHLOROBENZENE		79 U		86 U		82 U		84 U	85 U		
1,2,4-TRICHLOROBENZENE		79 U		86 U		82 U		84 U	85 U		
1,2-DICHLOROBENZENE		79 U		86 U		82 U		84 U	85 U		
1,3-DICHLOROBENZENE		79 U		86 U		82 U		84 U	85 U		
1,4-DICHLOROBENZENE		79 U		86 U		82 U		84 U	85 U		
1,4-NAPHTHOQUINONE		79 U		86 U		82 U		84 U	85 U		
1,4-PHENYLENEDIAMINE		79 UJ		86 UJ		82 UJ		84 UJ	85 UJ		
1-NAPHTHYLAMINE		79 U		86 U		82 U		84 U	85 U		
2,2'-OXYBIS(1-CHLOROPROPANE)		79 U		86 U		82 U		84 U	85 U		
2,3,4,6-TETRACHLOROPHENOL		79 U		86 U		82 U		84 U	85 U		
2,4,5-TRICHLOROPHENOL		79 U		86 U		82 U		84 U	85 U		
2,4,6-TRICHLOROPHENOL		79 U		86 U		82 U		84 U	85 U		
2,4-DICHLOROPHENOL		79 U		86 U		82 U		84 U	85 U		
2,4-DIMETHYLPHENOL		79 U		86 U		82 U		84 U	85 U		
2,4-DINITROPHENOL		79 U		86 U		82 U		84 UJ	85 UJ		
2,6-DICHLOROPHENOL		79 U		86 U		82 U		84 U	85 U		
2-ACETYLAMINOFLUORENE		79 UJ		86 U		82 U		84 UJ	85 UJ		
2-CHLORONAPHTHALENE		79 U		86 U		82 U		84 U	85 U		
2-CHLOROPHENOL		79 U		86 U		82 U		84 U	85 U		
2-METHYLNAPHTHALENE		5 J		4.3 U		4 U		4.1 U	4.2 U		
2-METHYLPHENOL		79 U		86 U		82 U		84 U	85 U		
2-NAPHTHYLAMINE		79 U		86 U		82 U		84 U	85 U		
2-NITROANILINE		79 U		86 U		82 U		84 U	85 U		
2-NITROPHENOL		79 U		86 U		82 U		84 U	85 U		
2-PICOLINE		79 U		86 U		82 U		84 U	85 U		

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**01**	**03**	**01**	**03**	**01**	**03**	**01**	**01**	**03**	**01**
LOCATION	**16SW/SD01**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**	**16SW/SD05**	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**
SAMPLE NUMBER	**16SD0101**	**16SD0301**	**16SD0302**	**16SD0401**	**16SD0402**	**16SD0501**	**16SD0502**	**16SD0601**	**16SD0601-D**	**16SD0602**	**16SD0701**
SAMPLE CODE	**NO SED**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NO SED**
DEPTH RANGE	**---**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**---**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**4/1/2003**	**10/10/2004**	**4/1/2003**
3&4-METHYLPHENOL		79 U		86 U		82 U		84 U	85 U		
3,3'-DICHLOROBENZIDINE		79 U		86 UJ		82 UJ		84 U	85 U		
3,3'-DIMETHYLBENZIDINE		79 U		86 U		82 U		84 U	85 U		
3-METHYLCHOLANTHRENE		79 U		86 U		82 U		84 U	85 U		
3-NITROANILINE		79 U		86 U		82 U		84 U	85 U		
4,6-DINITRO-2-METHYLPHENOL		79 U		86 U		82 U		84 U	85 U		
4-AMINOBIPHENYL		79 U		86 U		82 U		84 U	85 U		
4-BROMOPHENYL PHENYL ETHER		79 U		86 U		82 U		84 U	85 U		
4-CHLORO-3-METHYLPHENOL		79 U		86 U		82 U		84 U	85 U		
4-CHLOROANILINE		79 U		86 U		82 U		84 U	85 U		
4-CHLOROPHENYL PHENYL ETHER		79 U		86 U		82 U		84 U	85 U		
4-NITROANILINE		79 U		86 U		82 U		84 U	85 U		
4-NITROPHENOL		79 U		86 U		82 U		84 U	85 U		
4-NITROQUINOLINE-1-OXIDE		79 UR		86 UR		82 UR		84 UR	85 UR		
5-NITRO-O-TOLUIDINE		79 U		86 U		82 U		84 UJ	85 UJ		
7,12-DIMETHYLBENZ(A)ANTHRACENE		79 U		86 U		82 U		84 U	85 U		
A,A-DIMETHYLPHENETHYLAMINE		79 UJ		86 UJ		82 UJ		84 UJ	85 UJ		
ACENAPHTHENE		3.9 U		4.3 U		8 J		4.1 U	4.2 U		
ACENAPHTHYLENE		8		5 J		4 J		4.1 U	4.2 U		
ACETOPHENONE		79 U		86 U		82 U		84 U	85 U		
ANILINE		79 U		86 U		82 U		84 U	85 U		
ANTHRACENE		3.9 U		5 J		15		4.1 U	4.2 U		
ARAMITE		79 UR		86 UR		82 UR		84 U	85 U		
BENZO(A)ANTHRACENE		13 J		7 J		66		5 J	5 J		
BENZO(A)PYRENE		3.9 UJ		12		84		7 J	7 J		
BENZO(B)FLUORANTHENE		3.9 UJ		32		120		10	9		
BENZO(G,H,I)PERYLENE		62 J		33		65		5 J	7 J		
BENZO(K)FLUORANTHENE		3.9 UJ		8 J		65		7 J	5 J		
BENZYL ALCOHOL		79 U		86 U		82 U		84 UJ	85 UJ		
BIS(2-CHLOROETHOXY)METHANE		79 U		86 U		82 U		84 U	85 U		
BIS(2-CHLOROETHYL)ETHER		79 U		86 U		82 U		84 U	85 U		
BIS(2-ETHYLHEXYL)PHTHALATE		1000 U		250 U		210 U		130 BU	110 BU		
BUTYL BENZYL PHTHALATE		79 U		86 U		82 U		84 U	85 U		
CHLOROBENZILATE		79 U		86 U		82 U		84 U	85 U		
CHRYSENE		60 J		18		100		12	7 J		
DI-N-BUTYL PHTHALATE		79 U		86 U		82 U		84 U	85 U		
DI-N-OCTYL PHTHALATE		79 U		86 U		82 U		84 U	85 U		
DIALLATE		79 U		86 U		82 U		84 U	85 U		
DIBENZO(A,H)ANTHRACENE		3.9 UJ		4.3 U		18		4.1 U	4.2 U		
DIBENZOFURAN		79 U		86 U		82 U		84 U	85 U		
DIETHYL PHTHALATE		79 U		86 U		82 U		84 U	85 U		

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**01**	**03**	**01**	**03**	**01**	**03**	**01**	**01**	**03**	**01**
LOCATION	**16SW/SD01**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**	**16SW/SD05**	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**
SAMPLE NUMBER	**16SD0101**	**16SD0301**	**16SD0302**	**16SD0401**	**16SD0402**	**16SD0501**	**16SD0502**	**16SD0601**	**16SD0601-D**	**16SD0602**	**16SD0701**
SAMPLE CODE	**NO SED**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NO SED**
DEPTH RANGE	**---**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**---**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**4/1/2003**	**10/10/2004**	**4/1/2003**
DIMETHYL PHTHALATE		79 U		86 U		82 U		84 U	85 U		
DIPHENYLAMINE		170 J		86 U		82 U		84 UJ	460 J		
ETHYL METHANE SULFONATE		79 U		86 U		82 U		84 U	85 U		
FLUORANTHENE		22		12		160		11	8 J		
FLUORENE		3.9 U		4.3 U		8 J		4.1 U	4.2 U		
HEXACHLOROBENZENE		79 U		86 U		82 U		84 U	85 U		
HEXACHLOROBUTADIENE		79 U		86 U		82 U		84 U	85 U		
HEXACHLOROCYCLOPENTADIENE		79 U		86 U		82 U		84 UR	85 UJ		
HEXACHLOROETHANE		79 U		86 U		82 U		84 U	85 U		
HEXACHLOROPROPENE		79 U		86 U		82 U		84 U	85 U		
INDENO(1,2,3-CD)PYRENE		43 J		24		55		4.1 U	6 J		
ISODRIN		79 U		86 U		82 U		84 U	85 U		
ISOPHORONE		79 U		86 U		82 U		84 U	85 U		
ISOSAFROLE		79 U		86 U		82 U		84 U	85 U		
KEPONE		79 UR		86 UR		82 UR		84 UR	85 UR		
METHAPYRILENE		79 UJ		86 U		82 U		84 UJ	85 UJ		
METHYL METHANE SULFONATE		79 U		86 U		82 U		84 U	85 U		
N-NITROSO-DI-N-BUTYLAMINE		79 U		86 U		82 U		84 U	85 U		
N-NITROSO-DI-N-PROPYLAMINE		79 U		86 U		82 U		84 U	85 U		
N-NITROSODIETHYLAMINE		79 U		86 U		82 U		84 U	85 U		
N-NITROSODIMETHYLAMINE		79 U		86 U		82 U		84 U	85 U		
N-NITROSOMETHYLETHYLAMINE		79 U		86 U		82 U		84 U	85 U		
N-NITROSOMORPHOLINE		79 U		86 U		82 U		84 U	85 U		
N-NITROSOPIPERIDINE		79 U		86 U		82 U		84 U	85 U		
N-NITROSOPYRROLIDINE		79 U		86 U		82 U		84 U	85 U		
NAPHTHALENE		6 J		4.3 U		5 J		4.1 U	4.2 U		
O,O,O-TRIETHYL PHOSPHOROTHIOATE		79 U		86 U		82 U		84 U	85 U		
O-TOLUIDINE		79 U		86 U		82 U		84 U	85 U		
P-(DIMETHYLAMINO)AZOBENZENE		79 U		86 U		82 U		84 U	85 U		
PENTACHLOROBENZENE		79 U		86 U		82 U		84 U	85 U		
PENTACHLOROETHANE		79 U		86 U		82 U		84 U	85 U		
PENTACHLORONITROBENZENE		79 U		86 U		82 U		84 U	85 U		
PHENACETIN		79 U		86 U		82 U		84 U	85 U		
PHENANTHRENE		14		8 J		100		6 J	6 J		
PHENOL		79 U		86 U		82 U		84 U	85 U		
PRONAMIDE		79 U		86 U		82 U		84 U	85 U		
PYRENE		44 J		17		170		13	10		
PYRIDINE		79 U		86 U		82 U		84 U	85 U		
SAFROLE		79 U		86 U		82 U		84 U	85 U		
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	01	03	01	03	01	01	03	01
LOCATION	16SW/SD01	16SW/SD03	16SW/SD03	16SW/SD04	16SW/SD04	16SW/SD05	16SW/SD05	16SW/SD06	16SW/SD06	16SW/SD06	16SW/SD07
SAMPLE NUMBER	16SD0101	16SD0301	16SD0302	16SD0401	16SD0402	16SD0501	16SD0502	16SD0601	16SD0601-D	16SD0602	16SD0701
SAMPLE CODE	NO SED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NO SED
DEPTH RANGE	---	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	---
SAMPLE DATE	4/1/2003	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	10/10/2004	4/1/2003	4/1/2003	10/10/2004	4/1/2003
1,3-DINITROBENZENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
2,4,6-TRINITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
2,4-DINITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
2,6-DINITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
2-AMINO-4,6-DINITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
2-NITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
3-NITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
4-AMINO-2,6-DINITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
4-NITROTOLUENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
HMX		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
NITROBENZENE		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
PICRAMIC ACID		0.019 U		0.021 U		0.02 U		0.021 U	0.021 U		
PICRIC ACID		0.019 U		0.021 U		0.02 U		0.021 U	0.021 U		
RDX		0.27 J		0.25 U		0.25 U		0.25 U	0.25 U		
TETRYL		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		
Herbicides (ug/kg)											
HEXACHLOROPHENE		0.71 U		0.77 U		0.73 U		1.1 U	1.1 U		
PENTACHLOROPHENOL		2.9 J		7.6		0.55 U		0.56 U	0.57 U		
Inorganics (mg/kg)											
ALUMINUM		6060 J	9300 J	12900 J	19500 J	6620 J	12100 J	5560	6950	11900 J	
ANTIMONY		69.6 J	22.4 J	42 J	159 J	35.3 J	55.4 J	174 J	4.8 J	152 J	
ARSENIC		3.4 J	2.5 J	8.7 J	11.1 J	6.6 J	4.8 J	3.9 J	2.6 J	5.2 J	
BARIUM		2820 J	306 J	231 J	1520 J	1460 J	1030 J	1680 J	357 J	1120 J	
BERYLLIUM		0.39 U	0.43 U	0.56 J	0.69 U	0.43 J	0.4 U	0.52 J	0.41 U	0.5 U	
CADMIUM		18.1 J	3.1 J	7.1 J	27.2 J	18.1 J	12.9 J	19.5 J	4.5 J	15.4 J	
CALCIUM		54200 J	7820 J	2450 J	38900 J	59800 J	8250 J	28600 J	6760 J	98100 J	
CHROMIUM		15.4 J	15.4 J	19.6 J	71 J	24.7 J	22.4 J	23.8 J	12.9 J	36.2 J	
COBALT		3.4 J	2.5 J	11.2 J	10.1 J	9.3 J	5.5 J	6.3 J	4.3 J	8 J	
COPPER		1980 J	294 J	68.7 J	1340 J	1790 J	1630 J	2570 J	274 J	1660 J	
IRON		21000 J	18500 J	25500 J	37700 J	25800 J	17300 J	30500 J	20900 J	24200 J	
LEAD		4990 J	748 J	229 J	4640 J	3570 J	2530 J	15200 J	2510 J	8830 J	
LITHIUM		2.9 J		10.4 J		4.7 J		4.1 J	5.1 J		
MAGNESIUM		4820 J	1850 J	2100 J	3660 J	6080 J	2320 J	2220 J	1320 J	4420 J	
MANGANESE		175 J	54.6 J	300 J	504 J	790 J	349 J	376 J	63.9 J	415 J	
MERCURY		2.7 J	0.043 J	0.35 J	4.6	0.18 J	0.23	0.22 J	0.006 J	0.12	
NICKEL		12.5 J	8.9 J	13.2 J	21.5 J	17.6 J	15 J	16.5 J	8.8 J	804 J	
POTASSIUM		282 J	884 J	645 J	1520 J	350 J	1000 J	438 J	581 J	1180 J	
SELENIUM		0.17 U	0.17 U	0.46 J	0.56 U	0.33 J	0.3 U	0.14 U	0.12 U	0.38 U	
SILVER		0.29 U	0.05 U	0.15 U	0.53 U	0.21 U	0.2 U	0.39 U	0.19 U	0.41 U	
SODIUM		43.8 U	31.1 U	23.6 U	86.7 J	34.4 U	42 U	20.6 U	18.5 U	66.8 J	
STRONTIUM		2740 J		109 J		791 J		886 J	196 J		

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**01**	**03**	**01**	**03**	**01**	**03**	**01**	**01**	**03**	**01**
LOCATION	**16SW/SD01**	**16SW/SD03**	**16SW/SD03**	**16SW/SD04**	**16SW/SD04**	**16SW/SD05**	**16SW/SD05**	**16SW/SD06**	**16SW/SD06**	**16SW/SD06**	**16SW/SD07**
SAMPLE NUMBER	**16SD0101**	**16SD0301**	**16SD0302**	**16SD0401**	**16SD0402**	**16SD0501**	**16SD0502**	**16SD0601**	**16SD0601-D**	**16SD0602**	**16SD0701**
SAMPLE CODE	**NO SED**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NO SED**
DEPTH RANGE	**---**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**---**
SAMPLE DATE	**4/1/2003**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**4/1/2003**	**10/10/2004**	**4/1/2003**
THALLIUM		0.06 U	0.11 U	0.19 U	0.35 U	0.09 U	0.2 U	0.09 U	0.15 U	0.33 U	
TIN		12.3 J	3.8 J	3.2 J	15.7 J	12.5 J	15.7 J	19 J	1.1 J	19.6 J	
TITANIUM		35.7 J		156 J		64.3 J		9.4 J	20.6 J		
VANADIUM		12.8 J	16.5 J	35.8 J	36 J	21 J	20.1 J	17.1 J	16.1 J	22 J	
ZINC		23400 J	3120 J	952 J	14700 J	14300 J	17000 J	7700 J	826 J	6670 J	
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM								0.56	0.54		
CADMIUM, SEM								0.145 J	0.084 J		
COPPER, SEM								18.3	17.4		
LEAD, SEM								16.3	14.6		
MERCURY, SEM								0.00014	0.00009		
NICKEL, SEM								0.068	0.063		
SEM/AVS, SE(S.U.)								220	190		
ZINC, SEM								91 J	72.6 J		
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)								5.7 J	17 J		
PH (S.U.)								8	8		
TOTAL ORGANIC CARBON (mg/kg)								1600	1000 U		

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	03	01	03	01	01	03	02	03
LOCATION	16SW/SD08	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SD0801	16SD0802	16SD0901	16SD0902	16SD1001	16SD1002	16SD1101	16SD1101-D	16SD1102	16SD1201	16SD1202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33
SAMPLE DATE	4/1/2003	10/10/2004	4/1/2003	10/7/2004	4/1/2003	10/10/2004	4/1/2003	4/1/2003	10/10/2004	10/25/2003	10/10/2004
Volatile Organics (ug/kg)											
1,1,1,2-TETRACHLOROETHANE										1.4 U	
1,1,1-TRICHLOROETHANE										1.4 U	
1,1,2,2-TETRACHLOROETHANE										1.4 U	
1,1,2-TRICHLOROETHANE										1.4 U	
1,1-DICHLOROETHANE										1.4 U	
1,1-DICHLOROETHENE										1.4 U	
1,2,3-TRICHLOROPROPANE										1.4 U	
1,2-DIBROMO-3-CHLOROPROPANE										1.4 U	
1,2-DIBROMOETHANE										1.4 U	
1,2-DICHLOROETHANE										1.4 U	
1,2-DICHLOROPROPANE										1.4 U	
1,4-DIOXANE										131 U	
2-BUTANONE										1.4 U	
2-HEXANONE										1.4 U	
3-CHLOROPROPENE										1.4 U	
4-METHYL-2-PENTANONE										1.4 U	
ACETONE										11 J	
ACETONITRILE										52.4 U	
ACROLEIN										1.4 UR	
ACRYLONITRILE										1.4 U	
BENZENE										1.4 U	
BROMODICHLOROMETHANE										1.4 U	
BROMOFORM										1.4 U	
BROMOMETHANE										1.4 U	
CARBON DISULFIDE										1.4 U	
CARBON TETRACHLORIDE										1.4 U	
CHLOROBENZENE										1.4 U	
CHLORODIBROMOMETHANE										1.4 U	
CHLOROETHANE										1.4 U	
CHLOROFORM										1.4 U	
CHLOROMETHANE										1.4 U	
CHLOROPRENE										1.4 U	
CIS-1,2-DICHLOROETHENE										3 J	
CIS-1,3-DICHLOROPROPENE										1.4 U	
DIBROMOMETHANE										1.4 U	
DICHLORODIFLUOROMETHANE										1.4 U	
ETHYL METHACRYLATE										1.4 U	
ETHYLBENZENE										1.4 U	
ISOBUTANOL										52.4 U	
METHACRYLONITRILE										1.4 U	

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	03	01	03	01	01	03	02	03
LOCATION	16SW/SD08	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SD0801	16SD0802	16SD0901	16SD0902	16SD1001	16SD1002	16SD1101	16SD1101-D	16SD1102	16SD1201	16SD1202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33
SAMPLE DATE	4/1/2003	10/10/2004	4/1/2003	10/7/2004	4/1/2003	10/10/2004	4/1/2003	4/1/2003	10/10/2004	10/25/2003	10/10/2004
METHYL IODIDE										1.4 UJ	
METHYL METHACRYLATE										1.4 U	
METHYLENE CHLORIDE										1.4 UJ	
PROPIONITRILE										52.4 U	
STYRENE										1.4 U	
TETRACHLOROETHENE										1.4 U	
TOLUENE										1.4 U	
TOTAL XYLENES										1.4 U	
TRANS-1,2-DICHLOROETHENE										1.4 U	
TRANS-1,3-DICHLOROPROPENE										1.4 U	
TRANS-1,4-DICHLORO-2-BUTENE										1.4 U	
TRICHLOROETHENE										2 J	
TRICHLOROFLUOROMETHANE										1.4 U	
VINYL ACETATE										1.4 U	
VINYL CHLORIDE										1.4 U	
Semivolatile Organics (ug/kg)											
1,2,4,5-TETRACHLOROBENZENE	90 U		87 U		87 U		120 U	120 U			
1,2,4-TRICHLOROBENZENE	90 U		87 U		87 U		120 U	120 U			
1,2-DICHLOROBENZENE	90 U		87 U		87 U		120 U	120 U			
1,3-DICHLOROBENZENE	90 U		87 U		87 U		120 U	120 U			
1,4-DICHLOROBENZENE	90 U		87 U		87 U		120 U	120 U			
1,4-NAPHTHOQUINONE	90 U		87 U		87 U		120 U	120 U			
1,4-PHENYLENEDIAMINE	90 UJ		87 UJ		87 UJ		120 UJ	120 UJ			
1-NAPHTHYLAMINE	90 U		87 U		87 U		120 U	120 U			
2,2'-OXYBIS(1-CHLOROPROPANE)	90 U		87 U		87 U		120 U	120 U			
2,3,4,6-TETRACHLOROPHENOL	90 U		87 U		87 U		120 U	120 U			
2,4,5-TRICHLOROPHENOL	90 U		87 U		87 U		120 U	120 U			
2,4,6-TRICHLOROPHENOL	90 U		87 U		87 U		120 U	120 U			
2,4-DICHLOROPHENOL	90 U		87 U		87 U		120 U	120 U			
2,4-DIMETHYLPHENOL	90 U		87 U		87 U		120 U	120 U			
2,4-DINITROPHENOL	90 U		87 UJ		87 U		120 U	120 U			
2,6-DICHLOROPHENOL	90 U		87 U		87 U		120 U	120 U			
2-ACETYLAMINOFLUORENE	90 U		87 UJ		87 U		120 U	120 U			
2-CHLORONAPHTHALENE	90 U		87 U		87 U		120 U	120 U			
2-CHLOROPHENOL	90 U		87 U		87 U		120 U	120 U			
2-METHYLNAPHTHALENE	4.4 U		4.3 U		4.3 U		5.8 U	6 J			
2-METHYLPHENOL	90 U		87 U		87 U		120 U	120 U			
2-NAPHTHYLAMINE	90 U		87 U		87 U		120 U	120 U			
2-NITROANILINE	90 U		87 U		87 U		120 U	120 U			
2-NITROPHENOL	90 U		87 U		87 U		120 U	120 U			
2-PICOLINE	90 U		87 U		87 U		120 U	120 U			

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**03**	**01**	**03**	**01**	**03**	**01**	**01**	**03**	**02**	**03**
LOCATION	**16SW/SD08**	**16SW/SD08**	**16SW/SD09**	**16SW/SD09**	**16SW/SD10**	**16SW/SD10**	**16SW/SD11**	**16SW/SD11**	**16SW/SD11**	**16SW/SD12**	**16SW/SD12**
SAMPLE NUMBER	**16SD0801**	**16SD0802**	**16SD0901**	**16SD0902**	**16SD1001**	**16SD1002**	**16SD1101**	**16SD1101-D**	**16SD1102**	**16SD1201**	**16SD1202**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**
SAMPLE DATE	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/7/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**4/1/2003**	**10/10/2004**	**10/25/2003**	**10/10/2004**
3&4-METHYLPHENOL	90 U		87 U		87 U		120 U	120 U			
3,3'-DICHLOROBENZIDINE	90 UJ		87 U		87 UJ		120 UJ	120 UJ			
3,3'-DIMETHYLBENZIDINE	90 U		87 U		87 U		120 U	120 U			
3-METHYLCHOLANTHRENE	90 U		87 U		87 U		120 U	120 U			
3-NITROANILINE	90 U		87 U		87 U		120 U	120 U			
4,6-DINITRO-2-METHYLPHENOL	90 U		87 U		87 U		120 U	120 U			
4-AMINOBIPHENYL	90 U		87 U		87 U		120 U	120 U			
4-BROMOPHENYL PHENYL ETHER	90 U		87 U		87 U		120 U	120 U			
4-CHLORO-3-METHYLPHENOL	90 U		87 U		87 U		120 U	120 U			
4-CHLOROANILINE	90 U		87 U		87 U		120 U	120 U			
4-CHLOROPHENYL PHENYL ETHER	90 U		87 U		87 U		120 U	120 U			
4-NITROANILINE	90 U		87 U		87 U		120 U	120 U			
4-NITROPHENOL	90 U		87 U		87 U		120 U	120 U			
4-NITROQUINOLINE-1-OXIDE	90 UR		87 UR		87 UR		120 UR	120 UR			
5-NITRO-O-TOLUIDINE	90 U		87 UJ		87 U		120 U	120 U			
7,12-DIMETHYLBENZ(A)ANTHRACENE	90 U		87 U		87 U		120 U	120 U			
A,A-DIMETHYLPHENETHYLAMINE	90 UJ		87 UJ		87 UJ		120 UJ	120 UJ			
ACENAPHTHENE	4.4 U		4.3 U		4.3 U		5.8 U	5.9 U			
ACENAPHTHYLENE	4.4 U		4.3 U		4.3 U		5.8 U	6 J			
ACETOPHENONE	90 U		87 U		87 U		120 U	120 U			
ANILINE	90 U		87 U		87 U		120 U	120 U			
ANTHRACENE	4.4 U		4.3 U		5 J		6 J	9 J			
ARAMITE	90 UR		87 U		87 UR		120 UR	120 UR			
BENZO(A)ANTHRACENE	4.4 UJ		4.3 U		15		31 J	52 J			
BENZO(A)PYRENE	4.4 UJ		4.3 U		21		43 J	69 J			
BENZO(B)FLUORANTHENE	4.4 UJ		6 J		30		57 J	87 J			
BENZO(G,H,I)PERYLENE	4.4 UJ		4.3 U		29		63 J	110 J			
BENZO(K)FLUORANTHENE	4.4 UJ		4.3 U		18		28 J	59 J			
BENZYL ALCOHOL	90 U		87 UJ		87 U		120 U	120 U			
BIS(2-CHLOROETHOXY)METHANE	90 U		87 U		87 U		120 U	120 U			
BIS(2-CHLOROETHYL)ETHER	90 U		87 U		87 U		120 U	120 U			
BIS(2-ETHYLHEXYL)PHTHALATE	260 U		87 U		110 U		200 U	160 U			
BUTYL BENZYL PHTHALATE	90 U		87 U		87 U		120 U	120 U			
CHLOROBENZILATE	90 U		87 U		87 U		120 U	120 U			
CHRYSENE	4.4 UJ		5 J		31		52	74 J			
DI-N-BUTYL PHTHALATE	130 J		87 U		87 U		120 U	120 U			
DI-N-OCTYL PHTHALATE	90 U		87 U		87 U		120 U	120 U			
DIALLATE	90 U		87 U		87 U		120 U	120 U			
DIBENZO(A,H)ANTHRACENE	4.4 UJ		4.3 U		4.3 U		5.8 UJ	5.9 UJ			
DIBENZOFURAN	90 U		87 U		87 U		120 U	120 U			
DIETHYL PHTHALATE	90 U		87 U		87 U		120 U	120 U			

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	03	01	03	01	01	03	02	03
LOCATION	16SW/SD08	16SW/SD08	16SW/SD09	16SW/SD09	16SW/SD10	16SW/SD10	16SW/SD11	16SW/SD11	16SW/SD11	16SW/SD12	16SW/SD12
SAMPLE NUMBER	16SD0801	16SD0802	16SD0901	16SD0902	16SD1001	16SD1002	16SD1101	16SD1101-D	16SD1102	16SD1201	16SD1202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33
SAMPLE DATE	4/1/2003	10/10/2004	4/1/2003	10/7/2004	4/1/2003	10/10/2004	4/1/2003	4/1/2003	10/10/2004	10/25/2003	10/10/2004
DIMETHYL PHTHALATE	90 U		87 U		87 U		120 U	120 U			
DIPHENYLAMINE	90 U		140 J		87 U		120 U	120 U			
ETHYL METHANE SULFONATE	90 U		87 U		87 U		120 U	120 U			
FLUORANTHENE	5 J		6 J		30		55	85			
FLUORENE	4.4 U		4.3 U		4.3 U		5.8 U	5.9 U			
HEXACHLOROBENZENE	90 U		87 U		87 U		120 U	120 U			
HEXACHLOROBUTADIENE	90 U		87 U		87 U		120 U	120 U			
HEXACHLOROCYCLOPENTADIENE	90 U		87 UJ		87 U		120 U	120 U			
HEXACHLOROETHANE	90 U		87 U		87 U		120 U	120 U			
HEXACHLOROPROPENE	90 U		87 U		87 U		120 U	120 U			
INDENO(1,2,3-CD)PYRENE	4.4 UJ		4.3 U		19		38 J	73 J			
ISODRIN	90 U		87 U		87 U		120 U	120 U			
ISOPHORONE	90 U		87 U		87 U		120 U	120 U			
ISOSAFROLE	90 U		87 U		87 U		120 U	120 U			
KEPONE	90 UR		87 UR		87 UR		120 UR	120 UR			
METHAPYRILENE	90 U		87 UJ		87 U		120 U	120 U			
METHYL METHANE SULFONATE	90 U		87 U		87 U		120 U	120 U			
N-NITROSO-DI-N-BUTYLAMINE	90 U		87 U		87 U		120 U	120 U			
N-NITROSO-DI-N-PROPYLAMINE	90 U		87 U		87 U		120 U	120 U			
N-NITROSODIETHYLAMINE	90 U		87 U		87 U		120 U	120 U			
N-NITROSODIMETHYLAMINE	90 U		87 U		87 U		120 U	120 U			
N-NITROSOMETHYLETHYLAMINE	90 U		87 U		87 U		120 U	120 U			
N-NITROSOMORPHOLINE	90 U		87 U		87 U		120 U	120 U			
N-NITROSOPIPERIDINE	90 U		87 U		87 U		120 U	120 U			
N-NITROSOPYRROLIDINE	90 U		87 U		87 U		120 U	120 U			
NAPHTHALENE	4.4 U		4.3 U		4.3 U		5.8 U	5.9 U			
O,O,O-TRIETHYL PHOSPHOROTHIOATE	90 U		87 U		87 U		120 U	120 U			
O-TOLUIDINE	90 U		87 U		87 U		120 U	120 U			
P-(DIMETHYLAMINO)AZOBENZENE	90 U		87 U		87 U		120 U	120 U			
PENTACHLOROBENZENE	90 U		87 U		87 U		120 U	120 U			
PENTACHLOROETHANE	90 U		87 U		87 U		120 U	120 U			
PENTACHLORONITROBENZENE	90 U		87 U		87 U		120 U	120 U			
PHENACETIN	90 U		87 U		87 U		120 U	120 U			
PHENANTHRENE	4 J		4.3 U		18		30	42			
PHENOL	90 U		87 U		87 U		120 U	120 U			
PRONAMIDE	90 U		87 U		87 U		120 U	120 U			
PYRENE	9 J		6 J		39		88	130 J			
PYRIDINE	90 U		87 U		87 U		120 U	120 U			
SAFROLE	90 U		87 U		87 U		120 U	120 U			
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**03**	**01**	**03**	**01**	**03**	**01**	**01**	**03**	**02**	**03**
LOCATION	**16SW/SD08**	**16SW/SD08**	**16SW/SD09**	**16SW/SD09**	**16SW/SD10**	**16SW/SD10**	**16SW/SD11**	**16SW/SD11**	**16SW/SD11**	**16SW/SD12**	**16SW/SD12**
SAMPLE NUMBER	**16SD0801**	**16SD0802**	**16SD0901**	**16SD0902**	**16SD1001**	**16SD1002**	**16SD1101**	**16SD1101-D**	**16SD1102**	**16SD1201**	**16SD1202**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**
SAMPLE DATE	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/7/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**4/1/2003**	**10/10/2004**	**10/25/2003**	**10/10/2004**
1,3-DINITROBENZENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
2,4,6-TRINITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
2,4-DINITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
2,6-DINITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.54 J	
2-AMINO-4,6-DINITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
2-NITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
3-NITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
4-AMINO-2,6-DINITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
4-NITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
HMX	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
NITROBENZENE	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
PICRAMIC ACID	0.022 U		0.021 U		0.021 U		0.029 U	0.029 U			
PICRIC ACID	0.022 U		0.021 U		0.021 U		0.029 U	0.029 U			
RDX	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
TETRYL	0.25 U		0.25 U		0.25 U		0.25 U	0.25 U		0.25 U	
Herbicides (ug/kg)											
HEXACHLOROPHENE	0.81 U		1.1 U		0.78 U		1.1 U	1.1 U			
PENTACHLOROPHENOL	0.6 U		2.6 J		9.4 J		19 J	24 J			
Inorganics (mg/kg)											
ALUMINUM	8190 J	16300 J	9830	17100 J	6940 J	15600 J	10300 J	9650 J	19200 J	9490 J	14200 J
ANTIMONY	4.3 J	5 J	15.1 J	55.8 J	25.5 J	42.8 J	8.1 J	7.6 J	11 J	2.7 J	1.9 J
ARSENIC	8.8 J	7.9 J	9.8 J	8.2 J	14.1 J	21.7 J	10.3 J	8.4 J	8.9 J	9.8 J	8 J
BARIUM	143 J	168 J	572 J	534 J	257 J	346 J	171 J	351 J	172 J	107 J	123 J
BERYLLIUM	0.59 J	0.64 U	0.56 J	0.57 J	0.88 J	1.4 U	0.8 J	0.64 J	0.68 U	1.1 J	1.3 J
CADMIUM	0.8 J	1.1 J	11.1 J	11.9 J	6.8 J	11 J	3 J	3.4 J	2.9 J	0.81 J	0.83 J
CALCIUM	1520 J	2020 J	4240 J	10800 J	1480 J	3970 J	7740 J	9750 J	7710 J	891 J	1260 J
CHROMIUM	13.3 J	22.3 J	19.6 J	22.6 J	68.5 J	85.2 J	27 J	17.7 J	30.3 J	19.8 J	25.4 J
COBALT	12.8 J	10.6 J	11.6 J	7.3 J	14 J	24.5 J	10.2 J	13.1 J	9.3 J	41.2 J	26.7 J
COPPER	85.3 J	69.4 J	332 J	402 J	250 J	386 J	266 J	282 J	260 J	20.1 J	22.2 J
IRON	18200 J	19400 J	25700 J	20600 J	65100 J	127000 J	28500 J	20900 J	33800 J	43300 J	27100 J
LEAD	336 J	310 J	1480 J	1490 J	1010 J	1740 J	1120 J	991 J	1060 J	81.4 J	77.4 J
LITHIUM	7.2 J		8.1 J		4.5 J		8.1 J	8.4 J			
MAGNESIUM	1310 J	1920 J	1540 J	2430 J	677 J	1190 J	1700 J	1870 J	2100 J	705 J	1210 J
MANGANESE	966 J	1100 J	596 J	483 J	918 J	1520 J	976 J	1630 J	890 J	1460 J	1330 J
MERCURY	0.08 J	0.023 J	0.1 J	0.14 J	1.1 J	0.77	0.25 J	0.26 J	0.23	0.036 J	0.085 J
NICKEL	10.6 J	15.2 J	12.1 J	16.5 J	12.1 J	30.2 J	22.5 J	22.6 J	24.9 J	43 J	40.6 J
POTASSIUM	492 J	1360 J	605 J	1530 J	328 J	1030 J	589 J	672 J	1420 J	866 J	1390 J
SELENIUM	0.5 J	0.56 U	0.47 J	0.43 J	0.39 J	1.1 J	0.9 J	0.98 J	1 J	0.57 J	0.57 U
SILVER	0.11 U	0.09 U	0.11 U	0.11 U	0.09 U	0.09 U	0.46 U	0.54 U	0.38 U	0.24 U	0.41 U
SODIUM	44 U	119 J	16.3 U	54.4 U	11.7 U	37.1 U	160 J	203 J	283 J	34.1 U	62.1 U
STRONTIUM	62.2 J		227 J		57.8 J		58 J	79 J			

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**01**	**03**	**01**	**03**	**01**	**03**	**01**	**01**	**03**	**02**	**03**
LOCATION	**16SW/SD08**	**16SW/SD08**	**16SW/SD09**	**16SW/SD09**	**16SW/SD10**	**16SW/SD10**	**16SW/SD11**	**16SW/SD11**	**16SW/SD11**	**16SW/SD12**	**16SW/SD12**
SAMPLE NUMBER	**16SD0801**	**16SD0802**	**16SD0901**	**16SD0902**	**16SD1001**	**16SD1002**	**16SD1101**	**16SD1101-D**	**16SD1102**	**16SD1201**	**16SD1202**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**
SAMPLE DATE	**4/1/2003**	**10/10/2004**	**4/1/2003**	**10/7/2004**	**4/1/2003**	**10/10/2004**	**4/1/2003**	**4/1/2003**	**10/10/2004**	**10/25/2003**	**10/10/2004**
THALLIUM	0.16 U	0.23 U	0.14 U	0.23 U	0.09 U	0.19 U	0.16 U	0.29 U	0.25 U	0.14 U	0.29 U
TIN	1.1 J	1.1 U	2.4 J	13.3 J	2.8 J	2.4 J	5.3 J	4.3 J	4.2 J	0.4 J	0.57 U
TITANIUM	112 J		60.7 J		95.3 J		100 J	103 J		43.8 J	
VANADIUM	25 J	32.9 J	29.5 J	32.3 J	48.9 J	71 J	40.3 J	35.3 J	45 J	24.6 J	29.2 J
ZINC	573 J	624 J	1570 J	2590 J	2330 J	4530 J	2680 J	2250 J	2240 J	243 J	270 U
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM			0.59								
CADMIUM, SEM			0.075 J								
COPPER, SEM			4.98								
LEAD, SEM			4.14								
MERCURY, SEM			0.00015								
NICKEL, SEM			0.035								
SEM/AVS, SE(S.U.)			50								
ZINC, SEM			20.6 J								
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)			18 J								
PH (S.U.)			7.8								
TOTAL ORGANIC CARBON (mg/kg)			3900								

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**02**	**02**	**03**	**02**	**02**	**03**	**02**	**02**	**02**	**01**	**03**
LOCATION	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD15**	**16SW/SD16**	**16SW/SD16**	**16SW/SD17**	**16SW/SD17**	**16SW/SD22**	**16SW/SD23**	**16SW/SD23**
SAMPLE NUMBER	**16SD1301**	**16SD1301-D**	**16SD1302**	**16SD1501**	**16SD1601**	**16SD1602**	**16SD1701**	**16SD1701-D**	**16SD2201**	**16SD2301**	**16SD2302**
SAMPLE CODE	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**
SAMPLE DATE	**10/25/2003**	**10/25/2003**	**10/7/2004**	**10/24/2003**	**10/24/2003**	**10/14/2004**	**10/24/2003**	**10/24/2003**	**10/24/2003**	**4/1/2003**	**10/10/2004**
Volatile Organics (ug/kg)											
1,1,1,2-TETRACHLOROETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,1,1-TRICHLOROETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,1,2,2-TETRACHLOROETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,1,2-TRICHLOROETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,1-DICHLOROETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,1-DICHLOROETHENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,2,3-TRICHLOROPROPANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 UJ	1.2 U	1.58 U		
1,2-DIBROMO-3-CHLOROPROPANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 UJ	1.2 U	1.58 U		
1,2-DIBROMOETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,2-DICHLOROETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,2-DICHLOROPROPANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
1,4-DIOXANE	124 U	126 U		125 U	113 U		133 UJ	117 U	0.158 U		
2-BUTANONE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
2-HEXANONE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
3-CHLOROPROPENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
4-METHYL-2-PENTANONE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
ACETONE	6 J	1.3 U		7 J	3 J		1.3 U	5 J	69 J		
ACETONITRILE	49.3 U	50.4 U		50.1 U	45.1 U		53.1 U	46.7 U	63.1 U		
ACROLEIN	1.2 UR	1.3 UR		1.2 UR	1.3 UR		1.3 UR	1.2 UR	1.58 UR		
ACRYLONITRILE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
BENZENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
BROMODICHLOROMETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
BROMOFORM	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
BROMOMETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CARBON DISULFIDE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CARBON TETRACHLORIDE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CHLOROBENZENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CHLORODIBROMOMETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CHLOROETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CHLOROFORM	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CHLOROMETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CHLOROPRENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CIS-1,2-DICHLOROETHENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
CIS-1,3-DICHLOROPROPENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
DIBROMOMETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
DICHLORODIFLUOROMETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 UJ	1.2 U	1.58 U		
ETHYL METHACRYLATE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
ETHYLBENZENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
ISOBUTANOL	49.3 U	50.4 U		50.1 U	45.1 U		53.1 U	46.7 U	63.1 U		
METHACRYLONITRILE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	03	02	02	02	01	03
LOCATION	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD17	16SW/SD22	16SW/SD23	16SW/SD23
SAMPLE NUMBER	16SD1301	16SD1301-D	16SD1302	16SD1501	16SD1601	16SD1602	16SD1701	16SD1701-D	16SD2201	16SD2301	16SD2302
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.33
SAMPLE DATE	10/25/2003	10/25/2003	10/7/2004	10/24/2003	10/24/2003	10/14/2004	10/24/2003	10/24/2003	10/24/2003	4/1/2003	10/10/2004
METHYL IODIDE	1.2 UJ	1.3 UJ		1.2 UJ	1.3 UJ		1.3 UJ	1.2 UJ	1.58 UJ		
METHYL METHACRYLATE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
METHYLENE CHLORIDE	1.2 UJ	1.3 UJ		1.2 UJ	1.3 UJ		1.3 UJ	1.2 UJ	6 BU		
PROPIONITRILE	49.3 U	50.4 U		50.1 U	45.1 U		53.1 U	46.7 U	63.1 U		
STYRENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
TETRACHLOROETHENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
TOLUENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
TOTAL XYLENES	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
TRANS-1,2-DICHLOROETHENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
TRANS-1,3-DICHLOROPROPENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
TRANS-1,4-DICHLORO-2-BUTENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
TRICHLOROETHENE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
TRICHLOROFLUOROMETHANE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
VINYL ACETATE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
VINYL CHLORIDE	1.2 U	1.3 U		1.2 U	1.3 U		1.3 U	1.2 U	1.58 U		
Semivolatile Organics (ug/kg)											
1,2,4,5-TETRACHLOROBENZENE										89 U	
1,2,4-TRICHLOROBENZENE										89 U	
1,2-DICHLOROBENZENE										89 U	
1,3-DICHLOROBENZENE										89 U	
1,4-DICHLOROBENZENE										89 U	
1,4-NAPHTHOQUINONE										89 U	
1,4-PHENYLENEDIAMINE										89 UJ	
1-NAPHTHYLAMINE										89 U	
2,2'-OXYBIS(1-CHLOROPROPANE)										89 U	
2,3,4,6-TETRACHLOROPHENOL										89 U	
2,4,5-TRICHLOROPHENOL										89 U	
2,4,6-TRICHLOROPHENOL										89 U	
2,4-DICHLOROPHENOL										89 U	
2,4-DIMETHYLPHENOL										89 U	
2,4-DINITROPHENOL										89 UJ	
2,6-DICHLOROPHENOL										89 U	
2-ACETYLAMINOFLUORENE										89 UJ	
2-CHLORONAPHTHALENE										89 U	
2-CHLOROPHENOL										89 U	
2-METHYLNAPHTHALENE									4.6 U	4.4 U	
2-METHYLPHENOL										89 U	
2-NAPHTHYLAMINE										89 U	
2-NITROANILINE										89 U	
2-NITROPHENOL										89 U	
2-PICOLINE										89 U	

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	03	02	02	02	01	03
LOCATION	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD17	16SW/SD22	16SW/SD23	16SW/SD23
SAMPLE NUMBER	16SD1301	16SD1301-D	16SD1302	16SD1501	16SD1601	16SD1602	16SD1701	16SD1701-D	16SD2201	16SD2301	16SD2302
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.33
SAMPLE DATE	10/25/2003	10/25/2003	10/7/2004	10/24/2003	10/24/2003	10/14/2004	10/24/2003	10/24/2003	10/24/2003	4/1/2003	10/10/2004
3&4-METHYLPHENOL										89 U	
3,3'-DICHLOROBENZIDINE										89 U	
3,3'-DIMETHYLBENZIDINE										89 U	
3-METHYLCHOLANTHRENE										89 U	
3-NITROANILINE										89 U	
4,6-DINITRO-2-METHYLPHENOL										89 U	
4-AMINOBIPHENYL										89 U	
4-BROMOPHENYL PHENYL ETHER										89 U	
4-CHLORO-3-METHYLPHENOL										89 U	
4-CHLOROANILINE										89 U	
4-CHLOROPHENYL PHENYL ETHER										89 U	
4-NITROANILINE										89 U	
4-NITROPHENOL										89 U	
4-NITROQUINOLINE-1-OXIDE										89 UR	
5-NITRO-O-TOLUIDINE										89 UJ	
7,12-DIMETHYLBENZ(A)ANTHRACENE										89 U	
A,A-DIMETHYLPHENETHYLAMINE										89 UJ	
ACENAPHTHENE									4.6 U	4.4 U	
ACENAPHTHYLENE									4.6 U	4.4 U	
ACETOPHENONE										89 U	
ANILINE										89 U	
ANTHRACENE									4.6 U	4.4 U	
ARAMITE										89 U	
BENZO(A)ANTHRACENE									5 J	6 J	
BENZO(A)PYRENE									4.6 U	8 J	
BENZO(B)FLUORANTHENE									4.6 U	20	
BENZO(G,H,I)PERYLENE									4.6 U	11	
BENZO(K)FLUORANTHENE									4.6 U	9	
BENZYL ALCOHOL										89 UJ	
BIS(2-CHLOROETHOXY)METHANE										89 U	
BIS(2-CHLOROETHYL)ETHER										89 U	
BIS(2-ETHYLHEXYL)PHTHALATE										120 BU	
BUTYL BENZYL PHTHALATE										89 U	
CHLOROBENZILATE										89 U	
CHRYSENE									4.6 U	19	
DI-N-BUTYL PHTHALATE										89 U	
DI-N-OCTYL PHTHALATE										89 U	
DIALLATE										89 U	
DIBENZO(A,H)ANTHRACENE									4.6 U	4.4 U	
DIBENZOFURAN										89 U	
DIETHYL PHTHALATE										89 U	

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	03	02	02	02	01	03
LOCATION	16SW/SD13	16SW/SD13	16SW/SD13	16SW/SD15	16SW/SD16	16SW/SD16	16SW/SD17	16SW/SD17	16SW/SD22	16SW/SD23	16SW/SD23
SAMPLE NUMBER	16SD1301	16SD1301-D	16SD1302	16SD1501	16SD1601	16SD1602	16SD1701	16SD1701-D	16SD2201	16SD2301	16SD2302
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.33
SAMPLE DATE	10/25/2003	10/25/2003	10/7/2004	10/24/2003	10/24/2003	10/14/2004	10/24/2003	10/24/2003	10/24/2003	4/1/2003	10/10/2004
DIMETHYL PHTHALATE										89 U	
DIPHENYLAMINE										89 U	
ETHYL METHANE SULFONATE										89 U	
FLUORANTHENE									4.6 U	25	
FLUORENE									4.6 U	4.4 U	
HEXACHLOROBENZENE										89 U	
HEXACHLOROBUTADIENE										89 U	
HEXACHLOROCYCLOPENTADIENE										89 UJ	
HEXACHLOROETHANE										89 U	
HEXACHLOROPROPENE										89 U	
INDENO(1,2,3-CD)PYRENE									4.6 U	7 J	
ISODRIN										89 U	
ISOPHORONE										89 U	
ISOSAFROLE										89 U	
KEPONE										89 UR	
METHAPYRILENE										89 UJ	
METHYL METHANE SULFONATE										89 U	
N-NITROSO-DI-N-BUTYLAMINE										89 U	
N-NITROSO-DI-N-PROPYLAMINE										89 U	
N-NITROSODIETHYLAMINE										89 U	
N-NITROSODIMETHYLAMINE										89 U	
N-NITROSOMETHYLETHYLAMINE										89 U	
N-NITROSOMORPHOLINE										89 U	
N-NITROSOPIPERIDINE										89 U	
N-NITROSOPYRROLIDINE										89 U	
NAPHTHALENE									4.6 U	4.4 U	
O,O,O-TRIETHYL PHOSPHOROTHIOATE										89 U	
O-TOLUIDINE										89 U	
P-(DIMETHYLAMINO)AZOBENZENE										89 U	
PENTACHLOROBENZENE										89 U	
PENTACHLOROETHANE										89 U	
PENTACHLORONITROBENZENE										89 U	
PHENACETIN										89 U	
PHENANTHRENE									4.6 U	14	
PHENOL										89 U	
PRONAMIDE										89 U	
PYRENE									4.6 U	20	
PYRIDINE										89 U	
SAFROLE										89 U	
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**02**	**02**	**03**	**02**	**02**	**03**	**02**	**02**	**02**	**01**	**03**
LOCATION	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD15**	**16SW/SD16**	**16SW/SD16**	**16SW/SD17**	**16SW/SD17**	**16SW/SD22**	**16SW/SD23**	**16SW/SD23**
SAMPLE NUMBER	**16SD1301**	**16SD1301-D**	**16SD1302**	**16SD1501**	**16SD1601**	**16SD1602**	**16SD1701**	**16SD1701-D**	**16SD2201**	**16SD2301**	**16SD2302**
SAMPLE CODE	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**
SAMPLE DATE	**10/25/2003**	**10/25/2003**	**10/7/2004**	**10/24/2003**	**10/24/2003**	**10/14/2004**	**10/24/2003**	**10/24/2003**	**10/24/2003**	**4/1/2003**	**10/10/2004**
1,3-DINITROBENZENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
2,4-DINITROTOLUENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
2,6-DINITROTOLUENE	0.25 U	0.25 U		0.92 J	0.25 U		0.25 U	0.25 U		0.25 U	
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
2-NITROTOLUENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
3-NITROTOLUENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
4-NITROTOLUENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
HMX	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
NITROBENZENE	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
PICRAMIC ACID										0.022 U	
PICRIC ACID										0.022 U	
RDX	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
TETRYL	0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	0.25 U		0.25 U	
Herbicides (ug/kg)											
HEXACHLOROPHENE										1.1 U	
PENTACHLOROPHENOL										0.6 U	
Inorganics (mg/kg)											
ALUMINUM	11200 J	10800 J	12000 J	13700 J	12700 J	14600 J	11200 J	10800 J		11800	11100 J
ANTIMONY	4.1 J	3.2 J	3.9 J	0.65 J	9.5 J	10.9 J	1 J	0.71 J		7.8 J	19.9 J
ARSENIC	29.8 J	34.6 J	10.5 J	18.7 J	9.5 J	6 J	17.4 J	46.4 J		11.2 J	4.6 J
BARIUM	137 J	92.2 J	126 J	76.6 J	198 J	201 J	113 J	115 J		1240 J	421 J
BERYLLIUM	2.3 J	2.2 J	1.4 J	1.8 J	1.1 J	0.85 U	1.5 J	1.8 J		0.63 J	0.49 U
CADMIUM	1.9 J	1.4 J	1.8 J	0.47 J	3 J	2.3 J	0.53 J	0.7 J		4.8 J	2.3 J
CALCIUM	616 J	495 J	2200 J	779 J	1120 J	1350 J	1980 J	916 J		2980 J	1860 J
CHROMIUM	80.9 J	60.4 J	36.3 J	57.2 J	22.7 J	18 J	38.3 J	44.7 J		20.5 J	17.2 J
COBALT	39.9 J	40.7 J	34.8 J	17.8 J	20.2 J	11.5 J	21.2 J	24.2 J		12.4 J	4.7 J
COPPER	28.5 J	29.9 J	40.9 J	13.1 J	121 J	160 J	13.4 J	15.9 J		172 J	315 J
IRON	126000 J	125000 J	60000 J	87700 J	29800 J	16500 J	58500 J	81400 J		30600 J	20500 J
LEAD	145 J	137 J	128 J	19.7 J	371 J	466 J	34.1 J	50.3 J		770 J	1300 J
LITHIUM										8.8 J	
MAGNESIUM	470 J	395 J	1190 J	748 J	838 J	1310 J	839 J	844 J		1620 J	982 J
MANGANESE	2410 J	2110 J	1230 J	834 J	2140 J	1450 J	1650 J	1400 J		893 J	594 J
MERCURY	0.037 J	0.048 J	0.036 U	0.034 J	0.93	0.71	0.037 J	0.032 J		0.17 J	0.15
NICKEL	58 J	60.8 J	49.4 J	34.4 J	21 J	21.5 J	27.1 J	40.2 J		13.5 J	10.8 J
POTASSIUM	704 J	739 J	1320 J	1030 J	1120 J	1450 J	1130 J	945 J		606 J	957 J
SELENIUM	1.5 J	1.5 J	0.77 J	0.53 J	0.47 J	0.45 U	0.59 J	0.64 J		0.55 J	0.41 U
SILVER	0.13 U	0.08 U	0.14 U	0.01 U	0.06 U	0.07 U	0.15 U	0.26 U		0.04 U	0.06 U
SODIUM	34.9 J	20.1 U	65.3 U	33.8 J	26.5 U	38.8 U	25.9 U	30.7 U		40.2 U	28.5 U
STRONTIUM										51 J	

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**
SAMPLING ROUND	**02**	**02**	**03**	**02**	**02**	**03**	**02**	**02**	**02**	**01**	**03**
LOCATION	**16SW/SD13**	**16SW/SD13**	**16SW/SD13**	**16SW/SD15**	**16SW/SD16**	**16SW/SD16**	**16SW/SD17**	**16SW/SD17**	**16SW/SD22**	**16SW/SD23**	**16SW/SD23**
SAMPLE NUMBER	**16SD1301**	**16SD1301-D**	**16SD1302**	**16SD1501**	**16SD1601**	**16SD1602**	**16SD1701**	**16SD1701-D**	**16SD2201**	**16SD2301**	**16SD2302**
SAMPLE CODE	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**	**0 - 0.33**
SAMPLE DATE	**10/25/2003**	**10/25/2003**	**10/7/2004**	**10/24/2003**	**10/24/2003**	**10/14/2004**	**10/24/2003**	**10/24/2003**	**10/24/2003**	**4/1/2003**	**10/10/2004**
THALLIUM	0.16 U	0.1 U	0.15 U	0.17 U	0.21 U	0.2 U	0.14 U	0.1 U		0.14 U	0.15 U
TIN	0.31 U	0.26 U	0.56 U	0.31 U	1.8 U	2.5 J	0.59 U	0.21 U		2.2 J	5.3 J
TITANIUM	61.2 J	41.9 J		77.6 J	61.7 J		73.4 J	31.8 J		82.5 J	
VANADIUM	71.7 J	60.8 J	33.5 J	47.6 J	28.3 J	24.2 J	36.1 J	42.3 J		34.9 J	24 J
ZINC	514 J	502 J	527 J	74.9 J	844 J	936 J	79.9 J	212 J		1700 J	1860 J
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM										0.53	
CADMIUM, SEM										0.024 J	
COPPER, SEM										1.83	
LEAD, SEM										2.6	
MERCURY, SEM										0.00011	
NICKEL, SEM										0.028	
SEM/AVS, SE(S.U.)										51	
ZINC, SEM										22.4 J	
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)										25 J	
PH (S.U.)										7.4	
TOTAL ORGANIC CARBON (mg/kg)										8600	

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**02**	**03**	**03**	**03**	**02**
LOCATION	**16SW/SD26**	**16SW/SD27**	**16SW/SD28**	**16SW/SD29**	**16SW/SD30**	**16SW/SD30**	**16SW/SD19**	**16SW/SD19**	**16SW/SD24**	**16SW/SD25**	**16SW/SD14**
SAMPLE NUMBER	**16SD2601**	**16SD2701**	**16SD2801**	**16SD2901**	**16SD3001**	**16SD3001-D**	**16SD1901**	**16SD1902**	**16SD2401**	**16SD2501**	**16SD1401**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**
SAMPLE DATE	**10/7/2004**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**
Volatile Organics (ug/kg)											
1,1,1,2-TETRACHLOROETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
1,1,1-TRICHLOROETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
1,1,2,2-TETRACHLOROETHANE		1.49 U	1.12 U	1.4 UJ	0.948 U	0.975 U	1 U				1.2 U
1,1,2-TRICHLOROETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
1,1-DICHLOROETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
1,1-DICHLOROETHENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
1,2,3-TRICHLOROPROPANE		1.49 U	1.12 U	1.4 UJ	0.948 U	0.975 U	1 U				1.2 U
1,2-DIBROMO-3-CHLOROPROPANE		1.49 U	1.12 U	1.4 UJ	0.948 U	0.975 U	1 U				1.2 U
1,2-DIBROMOETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
1,2-DICHLOROETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
1,2-DICHLOROPROPANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
1,4-DIOXANE		165 U	117 U	137 UJ	94.8 U	97.5 U	137 U				118 U
2-BUTANONE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
2-HEXANONE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
3-CHLOROPROPENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
4-METHYL-2-PENTANONE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
ACETONE		7 BU	35 BJ	10 BU	2 BU	0.975 U	7 J				7 J
ACETONITRILE		66 U	46.9 U	55 UJ	37.9 U	39 U	54.8 U				47.2 U
ACROLEIN		1.49 UR	1.12 UR	1.4 UR	0.948 UR	0.975 UR	1 UR				1.2 UR
ACRYLONITRILE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
BENZENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
BROMODICHLOROMETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
BROMOFORM		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
BROMOMETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CARBON DISULFIDE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CARBON TETRACHLORIDE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CHLOROBENZENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CHLORODIBROMOMETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CHLOROETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CHLOROFORM		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CHLOROMETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CHLOROPRENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CIS-1,2-DICHLOROETHENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
CIS-1,3-DICHLOROPROPENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
DIBROMOMETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
DICHLORODIFLUOROMETHANE		2 J	1.12 U	1.4 U	0.948 U	0.975 U	22				1.2 U
ETHYL METHACRYLATE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
ETHYLBENZENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
ISOBUTANOL		66 U	46.9 U	55 UJ	37.9 U	39 U	54.8 U				47.2 U
METHACRYLONITRILE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**02**	**03**	**03**	**03**	**02**
LOCATION	**16SW/SD26**	**16SW/SD27**	**16SW/SD28**	**16SW/SD29**	**16SW/SD30**	**16SW/SD30**	**16SW/SD19**	**16SW/SD19**	**16SW/SD24**	**16SW/SD25**	**16SW/SD14**
SAMPLE NUMBER	**16SD2601**	**16SD2701**	**16SD2801**	**16SD2901**	**16SD3001**	**16SD3001-D**	**16SD1901**	**16SD1902**	**16SD2401**	**16SD2501**	**16SD1401**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**
SAMPLE DATE	**10/7/2004**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**
METHYL IODIDE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 UJ				1.2 UJ
METHYL METHACRYLATE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
METHYLENE CHLORIDE		1.49 U	4 BU	6 BU	0.948 UJ	3 BU	1 UJ				1.2 UJ
PROPIONITRILE		66 U	46.9 U	55 UJ	37.9 U	39 U	54.8 U				47.2 U
STYRENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
TETRACHLOROETHENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
TOLUENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
TOTAL XYLENES		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
TRANS-1,2-DICHLOROETHENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
TRANS-1,3-DICHLOROPROPENE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
TRANS-1,4-DICHLORO-2-BUTENE		1.49 U	1.12 U	1.4 UJ	0.948 U	0.975 U	1 U				1.2 U
TRICHLOROETHENE		1.49 U	1.12 U	19	0.948 U	0.975 U	1 U				1.2 U
TRICHLOROFLUOROMETHANE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
VINYL ACETATE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
VINYL CHLORIDE		1.49 U	1.12 U	1.4 U	0.948 U	0.975 U	1 U				1.2 U
Semivolatile Organics (ug/kg)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	TCMS	TCMS	TCMS	TCMS	GULLY
SAMPLING ROUND	03	03	03	03	03	03	02	03	03	03	02
LOCATION	16SW/SD26	16SW/SD27	16SW/SD28	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD19	16SW/SD19	16SW/SD24	16SW/SD25	16SW/SD14
SAMPLE NUMBER	16SD2601	16SD2701	16SD2801	16SD2901	16SD3001	16SD3001-D	16SD1901	16SD1902	16SD2401	16SD2501	16SD1401
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3
SAMPLE DATE	10/7/2004	10/7/2004	10/8/2004	10/8/2004	10/8/2004	10/8/2004	10/24/2003	10/7/2004	10/8/2004	10/8/2004	10/24/2003
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	TCMS	TCMS	TCMS	TCMS	GULLY
SAMPLING ROUND	03	03	03	03	03	03	02	03	03	03	02
LOCATION	16SW/SD26	16SW/SD27	16SW/SD28	16SW/SD29	16SW/SD30	16SW/SD30	16SW/SD19	16SW/SD19	16SW/SD24	16SW/SD25	16SW/SD14
SAMPLE NUMBER	16SD2601	16SD2701	16SD2801	16SD2901	16SD3001	16SD3001-D	16SD1901	16SD1902	16SD2401	16SD2501	16SD1401
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3
SAMPLE DATE	10/7/2004	10/7/2004	10/8/2004	10/8/2004	10/8/2004	10/8/2004	10/24/2003	10/7/2004	10/8/2004	10/8/2004	10/24/2003
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE							0.25 U				0.25 U

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**02**	**03**	**03**	**03**	**02**
LOCATION	**16SW/SD26**	**16SW/SD27**	**16SW/SD28**	**16SW/SD29**	**16SW/SD30**	**16SW/SD30**	**16SW/SD19**	**16SW/SD19**	**16SW/SD24**	**16SW/SD25**	**16SW/SD14**
SAMPLE NUMBER	**16SD2601**	**16SD2701**	**16SD2801**	**16SD2901**	**16SD3001**	**16SD3001-D**	**16SD1901**	**16SD1902**	**16SD2401**	**16SD2501**	**16SD1401**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**
SAMPLE DATE	**10/7/2004**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**
1,3-DINITROBENZENE							0.25 U				0.25 U
2,4,6-TRINITROTOLUENE							0.25 U				0.25 U
2,4-DINITROTOLUENE							0.25 U				0.25 U
2,6-DINITROTOLUENE							0.25 U				0.25 U
2-AMINO-4,6-DINITROTOLUENE							0.25 U				0.25 U
2-NITROTOLUENE							0.25 U				0.25 U
3-NITROTOLUENE							0.25 U				0.25 U
4-AMINO-2,6-DINITROTOLUENE							0.25 U				0.25 U
4-NITROTOLUENE							0.25 U				0.25 U
HMX							0.25 U				0.25 U
NITROBENZENE							0.25 U				0.25 U
PICRAMIC ACID											
PICRIC ACID											
RDX							0.25 U				0.25 U
TETRYL							0.25 U				0.25 U
Herbicides (ug/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM	11300 J	8760 J	11700 J	11800 J	15500 J	16200 J	8730 J	10500 J	9940 J	9460 J	8930 J
ANTIMONY	1.7 J	4.4 J	1.8 J	9.4 J	0.6 U	0.42 U	1.1 J	0.8 J	0.74 U	1.1 J	1.7 J
ARSENIC	34.1 J	6.6 J	12.7 J	10.3 J	12.3 J	17.8 J	30.8 J	19.2 J	27.5 J	7 J	27.5 J
BARIUM	105 J	145 J	83.9 J	168 J	56.6 J	87.3 J	110 J	88.9 J	77.2 J	69.7 J	84.5 J
BERYLLIUM	1.9 J	0.99 J	1 J	0.75 J	0.94 J	1 J	2.4 J	1.5 J	2.1 J	0.4 U	1.6 J
CADMIUM	0.64 J	1.8 J	0.73 J	2.4 J	0.33 U	0.43 U	0.79 J	0.57 J	0.54 J	0.47 U	0.38 J
CALCIUM	843 J	2260 J	1150 J	2940 J	395 J	358 J	973 J	875 J	539 J	843 J	846 J
CHROMIUM	73.1 J	17.2 J	34.6 J	25.7 J	24.7 J	25.6 J	71.8 J	38.7 J	79.9 J	16.3 J	36.9 J
COBALT	34.6 J	24.5 J	29.5 J	14.2 J	13.8 J	14.9 J	26.9 J	22.2 J	22.8 J	16.1 J	38.7 J
COPPER	14.5 J	67.9 J	17.9 J	120 J	9.2 J	9.2 J	13.5 J	15.1 J	14.3 J	13.4 J	14.8 J
IRON	91700 J	17700 J	45400 J	40800 J	30300 J	56600 J	122000 J	68600 J	90900 J	15800 J	74000 J
LEAD	55.2 J	242 J	69.5 J	565 J	13.6 J	21.8 J	27.1 J	23.3 J	28.6 J	32.9 J	29.6 J
LITHIUM											
MAGNESIUM	655 J	1030 J	908 J	1390 J	1140 J	1160 J	400 J	884 J	547 J	916 J	491 J
MANGANESE	2510 J	867 J	1630 J	924 J	809 J	1280 J	1900 J	1730 J	1320 J	398 J	2270 J
MERCURY	0.056 U	0.048 U	0.033 U	0.13 J	0.03 U	0.035 U	0.022 J	0.045 U	0.036 U	0.046 U	0.026 J
NICKEL	29.9 J	40.2 J	27.1 J	22.3 J	18 J	17.8 J	43.4 J	35.2 J	38.8 J	20.8 J	39.2 J
POTASSIUM	872 J	928 J	965 J	1220 J	1500 J	1590 J	462 J	950 J	790 J	1040 J	739 J
SELENIUM	1.4 J	0.43 U	0.64 J	0.54 U	0.36 U	0.48 J	0.72 J	0.5 J	0.8 J	0.31 U	0.99 J
SILVER	0.05 U	0.19 U	0.15 U	1.5 J	0.045 U	0.08 U	0.03 U	0.06 U	0.05 U	0.056 U	0.16 U
SODIUM	154 J	49.4 U	47.6 U	63.6 U	44 U	47.2 U	9.8 U	35.3 U	36.7 U	42.8 U	43.9 J
STRONTIUM											

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**GULLY**	**TCMS**	**TCMS**	**TCMS**	**TCMS**	**GULLY**
SAMPLING ROUND	**03**	**03**	**03**	**03**	**03**	**03**	**02**	**03**	**03**	**03**	**02**
LOCATION	**16SW/SD26**	**16SW/SD27**	**16SW/SD28**	**16SW/SD29**	**16SW/SD30**	**16SW/SD30**	**16SW/SD19**	**16SW/SD19**	**16SW/SD24**	**16SW/SD25**	**16SW/SD14**
SAMPLE NUMBER	**16SD2601**	**16SD2701**	**16SD2801**	**16SD2901**	**16SD3001**	**16SD3001-D**	**16SD1901**	**16SD1902**	**16SD2401**	**16SD2501**	**16SD1401**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**	**0 - 0.33**	**0 - 0.33**	**0 - 0.33**	**0 - 0.3**
SAMPLE DATE	**10/7/2004**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**	**10/7/2004**	**10/8/2004**	**10/8/2004**	**10/24/2003**
THALLIUM	0.13 U	0.13 U	0.14 U	0.17 U	0.17 U	0.17 U	0.1 U	0.12 U	0.09 U	0.12 U	0.26 U
TIN	0.33 U	1 U	0.43 U	1.5 J	0.43 U	0.45 U	0.24 U	0.35 U	0.36 U	0.47 U	0.17 U
TITANIUM							50.6 J				54.3 J
VANADIUM	60.9 J	20 J	38.1 J	32.8 J	34.1 J	40.6 J	50.2 J	37.5 J	51.2 J	21.1 J	43.7 J
ZINC	155 J	447 J	220 J	971 J	68.3 J	52 J	206 J	84.4 J	89.4 J	114 J	124 J
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM											
CADMIUM, SEM											
COPPER, SEM											
LEAD, SEM											
MERCURY, SEM											
NICKEL, SEM											
SEM/AVS, SE(S.U.)											
ZINC, SEM											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	TCMS
SAMPLING ROUND	02	02	02
LOCATION	16SW/SD20	16SW/SD21	16SW/SD18
SAMPLE NUMBER	16SD2001	16SD2101	16SD1801
SAMPLE CODE	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	10/25/2003	10/24/2003	10/24/2003
Volatile Organics (ug/kg)			
1,1,1,2-TETRACHLOROETHANE	1.2 U	1.1 U	1.2 U
1,1,1-TRICHLOROETHANE	1.2 U	1.1 U	1.2 U
1,1,2,2-TETRACHLOROETHANE	1.2 U	1.1 U	1.2 U
1,1,2-TRICHLOROETHANE	1.2 U	1.1 U	1.2 U
1,1-DICHLOROETHANE	1.2 U	1.1 U	1.2 U
1,1-DICHLOROETHENE	1.2 U	1.1 U	1.2 U
1,2,3-TRICHLOROPROPANE	1.2 U	1.1 U	1.2 U
1,2-DIBROMO-3-CHLOROPROPANE	1.2 U	1.1 U	1.2 U
1,2-DIBROMOETHANE	1.2 U	1.1 U	1.2 U
1,2-DICHLOROETHANE	1.2 U	1.1 U	1.2 U
1,2-DICHLOROPROPANE	1.2 U	1.1 U	1.2 U
1,4-DIOXANE	123 U	113 U	119 U
2-BUTANONE	1.2 U	1.1 U	1.2 U
2-HEXANONE	1.2 U	1.1 U	1.2 U
3-CHLOROPROPENE	1.2 U	1.1 U	1.2 U
4-METHYL-2-PENTANONE	1.2 U	1.1 U	1.2 U
ACETONE	5 J	1.1 UJ	1.2 U
ACETONITRILE	49.3 U	45.3 U	47.3 U
ACROLEIN	1.2 UR	1.1 UR	1.2 UR
ACRYLONITRILE	1.2 U	1.1 U	1.2 U
BENZENE	1.2 U	1.1 U	1.2 U
BROMODICHLOROMETHANE	1.2 U	1.1 U	1.2 U
BROMOFORM	1.2 U	1.1 U	1.2 U
BROMOMETHANE	1.2 U	1.1 U	1.2 U
CARBON DISULFIDE	1.2 U	1.1 U	1.2 U
CARBON TETRACHLORIDE	1.2 U	1.1 U	1.2 U
CHLOROBENZENE	1.2 U	1.1 U	1.2 U
CHLORODIBROMOMETHANE	1.2 U	1.1 U	1.2 U
CHLOROETHANE	1.2 U	1.1 U	1.2 U
CHLOROFORM	1.2 U	1.1 U	1.2 U
CHLOROMETHANE	1.2 U	1.1 U	1.2 U
CHLOROPRENE	1.2 U	1.1 U	1.2 U
CIS-1,2-DICHLOROETHENE	1.2 U	1.1 U	1.2 U
CIS-1,3-DICHLOROPROPENE	1.2 U	1.1 U	1.2 U
DIBROMOMETHANE	1.2 U	1.1 U	1.2 U
DICHLORODIFLUOROMETHANE	1.2 U	1.1 U	1.2 U
ETHYL METHACRYLATE	1.2 U	1.1 U	1.2 U
ETHYLBENZENE	1.2 U	1.1 U	1.2 U
ISOBUTANOL	49.3 U	45.3 U	47.3 U
METHACRYLONITRILE	1.2 U	1.1 U	1.2 U

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	TCMS
SAMPLING ROUND	02	02	02
LOCATION	16SW/SD20	16SW/SD21	16SW/SD18
SAMPLE NUMBER	16SD2001	16SD2101	16SD1801
SAMPLE CODE	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	10/25/2003	10/24/2003	10/24/2003
METHYL IODIDE	1.2 UJ	1.1 UJ	1.2 UJ
METHYL METHACRYLATE	1.2 U	1.1 U	1.2 U
METHYLENE CHLORIDE	1.2 UJ	1.1 UJ	1.2 UJ
PROPIONITRILE	49.3 U	45.3 U	47.3 U
STYRENE	1.2 U	1.1 U	1.2 U
TETRACHLOROETHENE	1.2 U	1.1 U	1.2 U
TOLUENE	1.2 U	1.1 U	1.2 U
TOTAL XYLENES	1.2 U	1.1 U	1.2 U
TRANS-1,2-DICHLOROETHENE	1.2 U	1.1 U	1.2 U
TRANS-1,3-DICHLOROPROPENE	1.2 U	1.1 U	1.2 U
TRANS-1,4-DICHLORO-2-BUTENE	1.2 U	1.1 U	1.2 U
TRICHLOROETHENE	1.2 U	1.1 U	1.2 U
TRICHLOROFLUOROMETHANE	1.2 U	1.1 U	1.2 U
VINYL ACETATE	1.2 U	1.1 U	1.2 U
VINYL CHLORIDE	1.2 U	1.1 U	1.2 U
Semivolatile Organics (ug/kg)			
1,2,4,5-TETRACHLOROBENZENE			
1,2,4-TRICHLOROBENZENE			
1,2-DICHLOROBENZENE			
1,3-DICHLOROBENZENE			
1,4-DICHLOROBENZENE			
1,4-NAPHTHOQUINONE			
1,4-PHENYLENEDIAMINE			
1-NAPHTHYLAMINE			
2,2'-OXYBIS(1-CHLOROPROPANE)			
2,3,4,6-TETRACHLOROPHENOL			
2,4,5-TRICHLOROPHENOL			
2,4,6-TRICHLOROPHENOL			
2,4-DICHLOROPHENOL			
2,4-DIMETHYLPHENOL			
2,4-DINITROPHENOL			
2,6-DICHLOROPHENOL			
2-ACETYLAMINOFLUORENE			
2-CHLORONAPHTHALENE			
2-CHLOROPHENOL			
2-METHYLNAPHTHALENE			
2-METHYLPHENOL			
2-NAPHTHYLAMINE			
2-NITROANILINE			
2-NITROPHENOL			
2-PICOLINE			

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	TCMS
SAMPLING ROUND	02	02	02
LOCATION	16SW/SD20	16SW/SD21	16SW/SD18
SAMPLE NUMBER	16SD2001	16SD2101	16SD1801
SAMPLE CODE	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	10/25/2003	10/24/2003	10/24/2003
3&4-METHYLPHENOL			
3,3'-DICHLOROBENZIDINE			
3,3'-DIMETHYLBENZIDINE			
3-METHYLCHOLANTHRENE			
3-NITROANILINE			
4,6-DINITRO-2-METHYLPHENOL			
4-AMINOBIPHENYL			
4-BROMOPHENYL PHENYL ETHER			
4-CHLORO-3-METHYLPHENOL			
4-CHLOROANILINE			
4-CHLOROPHENYL PHENYL ETHER			
4-NITROANILINE			
4-NITROPHENOL			
4-NITROQUINOLINE-1-OXIDE			
5-NITRO-O-TOLUIDINE			
7,12-DIMETHYLBENZ(A)ANTHRACENE			
A,A-DIMETHYLPHENETHYLAMINE			
ACENAPHTHENE			
ACENAPHTHYLENE			
ACETOPHENONE			
ANILINE			
ANTHRACENE			
ARAMITE			
BENZO(A)ANTHRACENE			
BENZO(A)PYRENE			
BENZO(B)FLUORANTHENE			
BENZO(G,H,I)PERYLENE			
BENZO(K)FLUORANTHENE			
BENZYL ALCOHOL			
BIS(2-CHLOROETHOXY)METHANE			
BIS(2-CHLOROETHYL)ETHER			
BIS(2-ETHYLHEXYL)PHTHALATE			
BUTYL BENZYL PHTHALATE			
CHLOROBENZILATE			
CHRYSENE			
DI-N-BUTYL PHTHALATE			
DI-N-OCTYL PHTHALATE			
DIALLATE			
DIBENZO(A,H)ANTHRACENE			
DIBENZOFURAN			
DIETHYL PHTHALATE			

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	TCMS
SAMPLING ROUND	02	02	02
LOCATION	16SW/SD20	16SW/SD21	16SW/SD18
SAMPLE NUMBER	16SD2001	16SD2101	16SD1801
SAMPLE CODE	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	10/25/2003	10/24/2003	10/24/2003
DIMETHYL PHTHALATE			
DIPHENYLAMINE			
ETHYL METHANE SULFONATE			
FLUORANTHENE			
FLUORENE			
HEXACHLOROBENZENE			
HEXACHLOROBUTADIENE			
HEXACHLOROCYCLOPENTADIENE			
HEXACHLOROETHANE			
HEXACHLOROPROPENE			
INDENO(1,2,3-CD)PYRENE			
ISODRIN			
ISOPHORONE			
ISOSAFROLE			
KEPONE			
METHAPYRILENE			
METHYL METHANE SULFONATE			
N-NITROSO-DI-N-BUTYLAMINE			
N-NITROSO-DI-N-PROPYLAMINE			
N-NITROSODIETHYLAMINE			
N-NITROSODIMETHYLAMINE			
N-NITROSOMETHYLETHYLAMINE			
N-NITROSOMORPHOLINE			
N-NITROSOPIPERIDINE			
N-NITROSOPYRROLIDINE			
NAPHTHALENE			
O,O,O-TRIETHYL PHOSPHOROTHIOATE			
O-TOLUIDINE			
P-(DIMETHYLAMINO)AZOBENZENE			
PENTACHLOROBENZENE			
PENTACHLOROETHANE			
PENTACHLORONITROBENZENE			
PHENACETIN			
PHENANTHRENE			
PHENOL			
PRONAMIDE			
PYRENE			
PYRIDINE			
SAFROLE			
Energetics (mg/kg)			
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**TCMS**
SAMPLING ROUND	**02**	**02**	**02**
LOCATION	**16SW/SD20**	**16SW/SD21**	**16SW/SD18**
SAMPLE NUMBER	**16SD2001**	**16SD2101**	**16SD1801**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**
SAMPLE DATE	**10/25/2003**	**10/24/2003**	**10/24/2003**
1,3-DINITROBENZENE	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U	0.25 U
2,4-DINITROTOLUENE	0.25 U	0.25 U	0.25 U
2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U
2-NITROTOLUENE	0.25 U	0.25 U	0.25 U
3-NITROTOLUENE	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U
4-NITROTOLUENE	0.25 U	0.25 U	0.25 U
HMX	0.25 U	0.25 U	0.25 U
NITROBENZENE	0.25 U	0.25 U	0.25 U
PICRAMIC ACID			
PICRIC ACID			
RDX	0.25 U	0.25 U	0.25 U
TETRYL	0.25 U	0.25 U	0.25 U
Herbicides (ug/kg)			
HEXACHLOROPHENE			
PENTACHLOROPHENOL			
Inorganics (mg/kg)			
ALUMINUM	8710 J	12800 J	8090 J
ANTIMONY	1.4 J	1.3 J	1.2 J
ARSENIC	24.4 J	25.9 J	34.8 J
BARIUM	454 J	127 J	62.5 J
BERYLLIUM	3 J	1.9 J	2.6 J
CADMIUM	0.62 J	0.45 J	0.54 J
CALCIUM	539 J	805 J	362 J
CHROMIUM	85 J	48 J	78.5 J
COBALT	29.7 J	38.2 J	21.4 J
COPPER	14.9 J	15 J	12.6 J
IRON	141000 J	80800 J	124000 J
LEAD	73.2 J	39.6 J	28.1 J
LITHIUM			
MAGNESIUM	646 J	916 J	292 J
MANGANESE	3650 J	2670 J	1370 J
MERCURY	0.043 J	0.034 J	0.025 J
NICKEL	34.5 J	36.4 J	43 J
POTASSIUM	757 J	1120 J	438 J
SELENIUM	0.7 J	1.2 J	0.5 J
SILVER	0.8 U	0.04 U	0.01 U
SODIUM	26.7 U	40.3 J	15.2 U
STRONTIUM			

TCMS - Turkey Creek Main Stream

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**UPGRAD**	**UPGRAD**	**UPGRAD**
STREAM ORDER	**GULLY**	**GULLY**	**TCMS**
SAMPLING ROUND	**02**	**02**	**02**
LOCATION	**16SW/SD20**	**16SW/SD21**	**16SW/SD18**
SAMPLE NUMBER	**16SD2001**	**16SD2101**	**16SD1801**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**0 - 0.3**	**0 - 0.3**	**0 - 0.3**
SAMPLE DATE	**10/25/2003**	**10/24/2003**	**10/24/2003**
THALLIUM	0.48 J	0.19 U	0.08 U
TIN	0.26 U	0.25 U	0.31 U
TITANIUM	39.5 J	44 J	56.4 J
VANADIUM	46.3 J	52.4 J	56.3 J
ZINC	131 J	109 J	92.5 J
AVS/SEM Parameters (UMO/G)			
ACID VOLATILE SULFIDE, SEM			
CADMIUM, SEM			
COPPER, SEM			
LEAD, SEM			
MERCURY, SEM			
NICKEL, SEM			
SEM/AVS, SE(S.U.)			
ZINC, SEM			
Miscellaneous Parameters			
CATION EXCHANGE CAPACITY (MEQ/1)			
PH (S.U.)			
TOTAL ORGANIC CARBON (mg/kg)			

TCMS - Turkey Creek Main Stream

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
SAMPLING ROUND	02	03	02	02	03	02	02	03	02	02	03
LOCATION	16MWT08	16MWT08	16MWT11	16MWT11	16MWT11	16MWT15	16MWT15	16MWT15	16MWT18	16MWT18	16MWT18
SAMPLE NUMBER	16GWT0801	16GWT0802	16GWT1101	16GWT1101-F	16GWT1102	16GWT1501	16GWT1501-F	16GWT1502	16GWT1801	16GWT1801-F	16GWT1802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/6/2003	10/30/2004	12/6/2003	12/7/2003	8/25/2004	12/6/2003	12/6/2003	8/17/2004	1/25/2004	1/25/2004	8/27/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,1,1-TRICHLOROETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,1,2,2-TETRACHLOROETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,1,2-TRICHLOROETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,1-DICHLOROETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,1-DICHLOROETHENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,2,3-TRICHLOROPROPANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,2-DIBROMOETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,2-DICHLOROETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,2-DICHLOROPROPANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
1,4-DIOXANE	50 U		50 U		50 U	50 U		50 U	50 U		50 U
2-BUTANONE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
2-HEXANONE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
3-CHLOROPROPENE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
4-METHYL-2-PENTANONE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
ACETONE	3.7 J		0.8 J		0.5 UJ	1.6 J		0.5 UJ	0.5 UJ		0.5 UJ
ACETONITRILE	20 U		20 U		20 U	20 U		20 U	20 U		20 U
ACROLEIN	0.5 UR		0.5 UR		0.5 UR	0.5 UR		0.5 UR	0.5 UR		0.5 UR
ACRYLONITRILE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
BENZENE	0.3 U		0.3 U		0.3 U	0.7 J		0.3 U	0.3 U		0.3 U
BROMODICHLOROMETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
BROMOFORM	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
BROMOMETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
CARBON DISULFIDE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 UJ		0.3 U
CARBON TETRACHLORIDE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
CHLOROBENZENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
CHLORODIBROMOMETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
CHLOROETHANE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
CHLOROFORM	15		16		0.3 U	4		0.8 J	1		0.3 U
CHLOROMETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
CHLOROPRENE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.3 U		0.5 U
CIS-1,2-DICHLOROETHENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
CIS-1,3-DICHLOROPROPENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
DIBROMOMETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
DICHLORODIFLUOROMETHANE	0.3 U		0.3 U		0.3 UJ	0.3 U		0.3 UJ	0.3 U		0.3 UJ
ETHANE						1			5.4		
ETHENE						0.22			0.14		
ETHYL METHACRYLATE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
ETHYLBENZENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
SAMPLING ROUND	02	03	02	02	03	02	02	03	02	02	03
LOCATION	16MWT08	16MWT08	16MWT11	16MWT11	16MWT11	16MWT15	16MWT15	16MWT15	16MWT18	16MWT18	16MWT18
SAMPLE NUMBER	16GWT0801	16GWT0802	16GWT1101	16GWT1101-F	16GWT1102	16GWT1501	16GWT1501-F	16GWT1502	16GWT1801	16GWT1801-F	16GWT1802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/6/2003	10/30/2004	12/6/2003	12/7/2003	8/25/2004	12/6/2003	12/6/2003	8/17/2004	1/25/2004	1/25/2004	8/27/2004
ISOBUTANOL	20 U		20 U		20 U	20 U		20 U	20 U		20 U
METHACRYLONITRILE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
METHANE						4500			5800		
METHYL IODIDE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
METHYL METHACRYLATE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
METHYLENE CHLORIDE	0.6 J		0.3 U		0.3 U	0.3 U		0.3 UJ	0.3 UJ		0.3 U
PROPIONITRILE	20 U		20 U		20 U	26 J		20 U	20 U		20 U
STYRENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
TETRACHLOROETHENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
TOLUENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
TOTAL XYLENES	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
TRANS-1,2-DICHLOROETHENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
TRANS-1,3-DICHLOROPROPENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
TRANS-1,4-DICHLORO-2-BUTENE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
TRICHLOROETHENE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
TRICHLOROFLUOROMETHANE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
VINYL ACETATE	0.5 U		0.5 U		0.5 U	0.5 U		0.5 U	0.5 U		0.5 U
VINYL CHLORIDE	0.3 U		0.3 U		0.3 U	0.3 U		0.3 U	0.3 U		0.3 U
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
SAMPLING ROUND	02	03	02	02	03	02	02	03	02	02	03
LOCATION	16MWT08	16MWT08	16MWT11	16MWT11	16MWT11	16MWT15	16MWT15	16MWT15	16MWT18	16MWT18	16MWT18
SAMPLE NUMBER	16GWT0801	16GWT0802	16GWT1101	16GWT1101-F	16GWT1102	16GWT1501	16GWT1501-F	16GWT1502	16GWT1801	16GWT1801-F	16GWT1802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/6/2003	10/30/2004	12/6/2003	12/7/2003	8/25/2004	12/6/2003	12/6/2003	8/17/2004	1/25/2004	1/25/2004	8/27/2004
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
SAMPLING ROUND	02	03	02	02	03	02	02	03	02	02	03
LOCATION	16MWT08	16MWT08	16MWT11	16MWT11	16MWT11	16MWT15	16MWT15	16MWT15	16MWT18	16MWT18	16MWT18
SAMPLE NUMBER	16GWT0801	16GWT0802	16GWT1101	16GWT1101-F	16GWT1102	16GWT1501	16GWT1501-F	16GWT1502	16GWT1801	16GWT1801-F	16GWT1802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/6/2003	10/30/2004	12/6/2003	12/7/2003	8/25/2004	12/6/2003	12/6/2003	8/17/2004	1/25/2004	1/25/2004	8/27/2004
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
SAMPLING ROUND	02	03	02	02	03	02	02	03	02	02	03
LOCATION	16MWT08	16MWT08	16MWT11	16MWT11	16MWT11	16MWT15	16MWT15	16MWT15	16MWT18	16MWT18	16MWT18
SAMPLE NUMBER	16GWT0801	16GWT0802	16GWT1101	16GWT1101-F	16GWT1102	16GWT1501	16GWT1501-F	16GWT1502	16GWT1801	16GWT1801-F	16GWT1802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/6/2003	10/30/2004	12/6/2003	12/7/2003	8/25/2004	12/6/2003	12/6/2003	8/17/2004	1/25/2004	1/25/2004	8/27/2004
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
1,3-DINITROBENZENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.521 U		0.495 UJ			0.495 U			0.49 U		
2,4,6-TRINITROTOLUENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
2,4-DIAMINO-6-NITROTOLUENE	0.26 U		0.248 UJ			0.248 U			0.25 U		
2,4-DINITROTOLUENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
2,6-DIAMINO-4-NITROTOLUENE	0.26 U		0.248 UJ			0.248 U			0.25 U		
2,6-DINITROTOLUENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
2-NITROTOLUENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
3,5-DINITROANILINE	0.26 U		0.248 UJ			0.248 U			0.25 U		
3-NITROTOLUENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 UJ		0.301 U
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
4-NITROTOLUENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
DNX	0.26 U		0.248 UJ			0.248 U			0.25 U		
HMX	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 UJ		0.301 U
MNX	0.26 U		0.248 UJ			0.248 U			0.25 U		
NITROBENZENE	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
PICRAMIC ACID											
PICRIC ACID											
RDX	0.26 U	0.358 U	0.248 UJ		0.242 U	0.248 U		0.26 U	0.26 U		0.301 U
TETRYL	0.26 U	0.358 U	0.248 UJ		0.242 UJ	0.248 U		0.26 U	0.26 U		0.301 UJ
TNX	0.26 U		0.248 UJ			0.248 U			0.25 U		
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	296000 J		77200 J		8.35 U	2930 J			10700 J		
ANTIMONY	1.2 U		6.3 J		1.1 U	1.3 U			2.1 J		
ARSENIC	29.2 J		11.8 J		3.8 J	1.5 U			2.2 J		
BARIUM	1700 J		1170 J		1250 J	262 J			444 J		
BERYLLIUM	15.1 J		4.8 J		0.02 U	0.15 U			0.42 U		
CADMIUM	1.4 U		0.34 U		0.039 U	0.08 U			0.27 U		
CALCIUM	19700 U		12700 J		26600 J	10000 J			8240 J		
CHROMIUM	452 J		84.9 J		0.77 U	5.1 J			14.8 J		
COBALT	95.7 J		31.3 J		2.3 J	0.71 U			4.2 J		
COPPER	86.1 J		33.1 J		0.24 U	4.5 J			3.1 J		
IRON	241000 J		46200 J		1350 J	1110 J			3520 J		
LEAD	127 J		34.2 J		0.069 U	2 U			3 J		

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
SAMPLING ROUND	02	03	02	02	03	02	02	03	02	02	03
LOCATION	16MWT08	16MWT08	16MWT11	16MWT11	16MWT11	16MWT15	16MWT15	16MWT15	16MWT18	16MWT18	16MWT18
SAMPLE NUMBER	16GWT0801	16GWT0802	16GWT1101	16GWT1101-F	16GWT1102	16GWT1501	16GWT1501-F	16GWT1502	16GWT1801	16GWT1801-F	16GWT1802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/6/2003	10/30/2004	12/6/2003	12/7/2003	8/25/2004	12/6/2003	12/6/2003	8/17/2004	1/25/2004	1/25/2004	8/27/2004
LITHIUM											
MAGNESIUM	36700 J		9370 J		8510 J	3130 J			3970 J		
MANGANESE	3800 J		991 J		224 J	33.6 J			93.7 J		
MERCURY	0.12 J		0.028 J		0.03 U	0.007 U			0.03 U		
NICKEL	338 J		84.7 J		7 J	3 J			9.6 J		
POTASSIUM	74400 J		13900 J		5300 J	5170 J			8410 J		
SELENIUM	5 J		2.8 J		0.094 U	1.4 U			0.44 U		
SILVER	0.76 U		0.31 U		0.04 U	0.04 U			0.37 U		
SODIUM	71300 J		70500 J		211000 J	96200 J			224000 J		
STRONTIUM											
THALLIUM	2.3 U		0.69 U		0.043 U	0.06 U			0.11 U		
TIN	3.9 J		2.6 U		0.08 U	1.6 U			0.54 U		
TITANIUM	1020 J		203 J			32.3 J			59.1 J		
VANADIUM	410 J		80.9 J		1.14 U	4.4 J			15.6		
ZINC	454 J		143 J		2.7 U	11.3 J			10.6 J		
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED				85.5 U			65.9 U			126 J	
ANTIMONY, FILTERED				8.8 J			1.5 U			1.5 J	
ARSENIC, FILTERED				1.3 U			1.5 U			1.3 J	
BARIUM, FILTERED				28 J			215 J			341 J	
BERYLLIUM, FILTERED				0.23 U			0.23 U			0.1 U	
CADMIUM, FILTERED				0.25 U			0.22 U			0.15 U	
CALCIUM, FILTERED				10600 J			10300 J			7910 J	
CHROMIUM, FILTERED				0.42 U			0.69 U			0.59 J	
COBALT, FILTERED				7.5 J			1.1 U			4.8 J	
COPPER, FILTERED				1.5 U			2.8 J			0.72 U	
IRON, FILTERED				50.3 U			25.4 U			104 U	
LEAD, FILTERED				0.6 U			0.39 U			0.22 U	
MAGNESIUM, FILTERED				2850 J			3060 J			3500 J	
MANGANESE, FILTERED				194 J			17.7 J			57.9 J	
MERCURY, FILTERED				0.007 U			0.007 U			0.03 U	
NICKEL, FILTERED				5.2 J			1.4 U			4.6 J	
POTASSIUM, FILTERED				3410 J			4660 J			5880 J	
SELENIUM, FILTERED				1.8 U			1.5 U			0.68 U	
SILVER, FILTERED				0.27 U			0.22 U			0.11 U	
SODIUM, FILTERED				77500 J			97300 J			218000 J	
THALLIUM, FILTERED				0.27 U			0.24 U			0.11 U	
TIN, FILTERED				0.4 U			0.69 U			0.27 U	
TITANIUM, FILTERED				0.85 U			0.68 U			1.9 J	
VANADIUM, FILTERED				0.31 U			0.59 U			0.53 J	
ZINC, FILTERED				48.2 J			8.3 J			1.6 J	

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**	**LOWER**
SAMPLING ROUND	**02**	**03**	**02**	**02**	**03**	**02**	**02**	**03**	**02**	**02**	**03**
LOCATION	**16MWT08**	**16MWT08**	**16MWT11**	**16MWT11**	**16MWT11**	**16MWT15**	**16MWT15**	**16MWT15**	**16MWT18**	**16MWT18**	**16MWT18**
SAMPLE NUMBER	**16GWT0801**	**16GWT0802**	**16GWT1101**	**16GWT1101-F**	**16GWT1102**	**16GWT1501**	**16GWT1501-F**	**16GWT1502**	**16GWT1801**	**16GWT1801-F**	**16GWT1802**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**12/6/2003**	**10/30/2004**	**12/6/2003**	**12/7/2003**	**8/25/2004**	**12/6/2003**	**12/6/2003**	**8/17/2004**	**1/25/2004**	**1/25/2004**	**8/27/2004**
Field Parameters (mg/L)											
ALKALINITY						250			500		
CARBON DIOXIDE						10 U			18		
DISSOLVED OXYGEN					0.87	3.5		1.77	4		3.31
DISSOLVED OXYGEN - METER	2.13		4.51			2.57			3.07		
HYDROGEN SULFIDE (H2S)						0					
IRON(+2)						0			0.12		
MANGANESE(+2)						0.3			0		
NITRITE-N						0.007			0.005		
OXIDATION REDUCTION POTENTIAL (MV)	64.3		188		95	174.100000		143.100000	-69		6.7
PH (S.U.)	7.16		7.35		5.47	7.99		6.15	7.23		6.58
SPECIFIC CONDUCTANCE (MS/CM)	0.257		0.256		1.004	0.392		0.411	0.65		1.043
SULFIDE						0.01			0.04		
TEMPERATURE (C)	11.9		7.29		24.93	12.78		15.85	14.18		23.89
TURBIDITY (NTU)	1000 >		650		4.7	22.5		2	1000 >		150
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
CHLORIDE						4			4		
NITRITE/NITRATE-N						0.05 UJ			0.05 U		
SULFATE						8			6		
TOTAL ORGANIC CARBON						2.6					

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	03	01	02	02	03	01	02
LOCATION	16MWT21	WES-14-01-83	WES-14-01-83	WES-14-01-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-05-83	WES-14-05-83
SAMPLE NUMBER	16GWT2101	16GW0101	16GW0102	16GW0103	16GW0401	16GW0402	16GW0402-D	16GW0403	16GW0501	16GW0502
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/16/2004	4/23/2003	10/26/2003	8/26/2004	4/23/2003	10/26/2003	10/26/2003	8/25/2004	4/22/2003	10/26/2003
Volatile Organics (ug/L)										
1,1,1,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,2,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,2-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-DICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 UJ	0.3 UJ	0.3 U	0.3 U	0.3 UJ
1,2-DIBROMOETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DICHLOROPROPANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,4-DIOXANE	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-BUTANONE	0.5 U	0.5 UR	0.5 U	0.5 U	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 UR	0.5 U
2-HEXANONE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
3-CHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-METHYL-2-PENTANONE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ACETONE	7.4 J	0.5 UR	0.5 UJ	0.5 UJ	0.5 UR	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UR	0.5 UJ
ACETONITRILE	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
ACROLEIN	0.5 U	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR
ACRYLONITRILE	0.5 U	0.5 UR	0.5 U	0.5 U	0.5 UR	0.5 U	0.5 U	0.5 U	0.5 UR	0.5 U
BENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMODICHLOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOFORM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 UJ	0.3 UJ	0.3 U	0.3 UJ	0.3 UJ
CARBON DISULFIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON TETRACHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROBENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLORODIBROMOMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U
CHLOROPRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CIS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
DIBROMOMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
DICHLORODIFLUOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U
ETHANE										0.032
ETHENE										0.0093
ETHYL METHACRYLATE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.9 J	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	03	01	02	02	03	01	02
LOCATION	16MWT21	WES-14-01-83	WES-14-01-83	WES-14-01-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-05-83	WES-14-05-83
SAMPLE NUMBER	16GWT2101	16GW0101	16GW0102	16GW0103	16GW0401	16GW0402	16GW0402-D	16GW0403	16GW0501	16GW0502
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/16/2004	4/23/2003	10/26/2003	8/26/2004	4/23/2003	10/26/2003	10/26/2003	8/25/2004	4/22/2003	10/26/2003
ISOBUTANOL	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
METHACRYLONITRILE	0.3 U	0.3 UR	0.3 UJ	0.3 U	0.3 UR	0.3 U	0.3 UJ	0.3 U	0.3 UR	0.3 U
METHANE										0.86
METHYL IODIDE	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ
METHYL METHACRYLATE	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
PROPIONITRILE	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
STYRENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TETRACHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TOLUENE	1.3	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TOTAL XYLENES	2.2	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,4-DICHLORO-2-BUTENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	0.3 U	2	0.6 J	0.3 U	0.5 J	0.3 U	0.5 J	0.7 J	0.5 J	0.5 J
TRICHLOROFLUOROMETHANE	0.3 UJ	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 U	0.3 UJ
VINYL ACETATE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Semivolatile Organics (ug/L)										
1,2,4,5-TETRACHLOROBENZENE		1 U			1 U				1 U	
1,2,4-TRICHLOROBENZENE		1 U			1 U				1 U	
1,2-DICHLOROBENZENE		1 U			1 U				1 U	
1,3-DICHLOROBENZENE		1 U			1 U				1 U	
1,4-DICHLOROBENZENE		1 U			1 U				1 U	
1,4-NAPHTHOQUINONE		1 U			1 U				1 U	
1,4-PHENYLENEDIAMINE		1 UJ			1 U				1 U	
1-NAPHTHYLAMINE		1 U			1 U				1 U	
2,2'-OXYBIS(1-CHLOROPROPANE)		1 U			1 U				1 U	
2,3,4,6-TETRACHLOROPHENOL		1 U			1 U				1 U	
2,4,5-TRICHLOROPHENOL		1 U			1 U				1 UJ	
2,4,6-TRICHLOROPHENOL		1 U			1 U				1 UJ	
2,4-DICHLOROPHENOL		1 U			1 U				1 UJ	
2,4-DIMETHYLPHENOL		1 U			1 U				1 U	
2,4-DINITROPHENOL		1 U			1 U				1 UR	
2,6-DICHLOROPHENOL		1 U			1 U				1 U	
2-ACETYLAMINOFLUORENE		1 U			1 U				1 U	
2-CHLORONAPHTHALENE		1 U			1 U				1 U	
2-CHLOROPHENOL		1 U			1 U				1 U	
2-METHYLNAPHTHALENE		0.05 U			0.05 U				0.05 U	
2-METHYLPHENOL		1 U			1 U				1 U	
2-NAPHTHYLAMINE		1 U			1 U				1 U	

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	03	01	02	02	03	01	02
LOCATION	16MWT21	WES-14-01-83	WES-14-01-83	WES-14-01-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-05-83	WES-14-05-83
SAMPLE NUMBER	16GWT2101	16GW0101	16GW0102	16GW0103	16GW0401	16GW0402	16GW0402-D	16GW0403	16GW0501	16GW0502
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/16/2004	4/23/2003	10/26/2003	8/26/2004	4/23/2003	10/26/2003	10/26/2003	8/25/2004	4/22/2003	10/26/2003
2-NITROANILINE		1 U			1 U				1 U	
2-NITROPHENOL		1 U			1 U				1 UJ	
2-PICOLINE		1 U			1 U				1 U	
3&4-METHYLPHENOL		1 U			1 U				1 U	
3,3'-DICHLOROBENZIDINE		1 U			1 U				1 U	
3,3'-DIMETHYLBENZIDINE		1 U			1 U				1 U	
3-METHYLCHOLANTHRENE		1 U			1 U				1 U	
3-NITROANILINE		1 U			1 U				1 U	
4,6-DINITRO-2-METHYLPHENOL		1 U			1 U				1 UR	
4-AMINOBIPHENYL		1 U			1 U				1 U	
4-BROMOPHENYL PHENYL ETHER		1 U			1 U				1 U	
4-CHLORO-3-METHYLPHENOL		1 U			1 U				1 UJ	
4-CHLOROANILINE		1 U			1 U				1 U	
4-CHLOROPHENYL PHENYL ETHER		1 U			1 U				1 U	
4-NITROANILINE		1 U			1 U				1 U	
4-NITROPHENOL		1 U			1 U				1 UR	
4-NITROQUINOLINE-1-OXIDE		1 UR			1 UR				1 UR	
5-NITRO-O-TOLUIDINE		1 U			1 U				1 U	
7,12-DIMETHYLBENZ(A)ANTHRACENE		1 U			1 U				1 U	
A,A-DIMETHYLPHENETHYLAMINE		1 UJ			1 UJ				1 UJ	
ACENAPHTHENE		0.05 U			0.05 U				0.05 U	
ACENAPHTHYLENE		0.05 U			0.05 U				0.05 U	
ACETOPHENONE		1 U			1 U				1 U	
ANILINE		1 U			1 U				1 U	
ANTHRACENE		0.05 U			0.05 U				0.05 U	
ARAMITE		1 UR			1 UR				1 UR	
BENZO(A)ANTHRACENE		0.05 U			0.05 U				0.05 U	
BENZO(A)PYRENE		0.05 U			0.05 U				0.05 U	
BENZO(B)FLUORANTHENE		0.05 U			0.05 U				0.05 U	
BENZO(G,H,I)PERYLENE		0.05 U			0.05 U				0.05 U	
BENZO(K)FLUORANTHENE		0.05 U			0.05 U				0.05 U	
BENZYL ALCOHOL		1 U			1 U				1 U	
BIS(2-CHLOROETHOXY)METHANE		1 U			1 U				1 U	
BIS(2-CHLOROETHYL)ETHER		1 U			1 U				1 U	
BIS(2-ETHYLHEXYL)PHTHALATE		1 U			1 U				1 U	
BUTYL BENZYL PHTHALATE		1 U			1 U				1 U	
CHLOROBENZILATE		1 U			1 U				1 U	
CHRYSENE		0.05 U			0.05 U				0.05 U	
DI-N-BUTYL PHTHALATE		1 U			1 U				1 U	
DI-N-OCTYL PHTHALATE		1 U			1 U				1 U	
DIALLATE		1 U			1 U				1 U	

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	03	01	02	02	03	01	02
LOCATION	16MWT21	WES-14-01-83	WES-14-01-83	WES-14-01-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-05-83	WES-14-05-83
SAMPLE NUMBER	16GWT2101	16GW0101	16GW0102	16GW0103	16GW0401	16GW0402	16GW0402-D	16GW0403	16GW0501	16GW0502
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/16/2004	4/23/2003	10/26/2003	8/26/2004	4/23/2003	10/26/2003	10/26/2003	8/25/2004	4/22/2003	10/26/2003
DIBENZO(A,H)ANTHRACENE		0.05 U			0.05 U				0.05 U	
DIBENZOFURAN		1 U			1 U				1 U	
DIETHYL PHTHALATE		1 U			1 U				1 U	
DIMETHYL PHTHALATE		1 U			1 U				1 U	
DIPHENYLAMINE		1 U			1 U				1 U	
ETHYL METHANE SULFONATE		1 U			1 U				1 U	
FLUORANTHENE		0.05 U			0.05 U				0.05 U	
FLUORENE		0.05 U			0.05 U				0.05 U	
HEXACHLOROBENZENE		1 U			1 U				1 U	
HEXACHLOROBUTADIENE		1 U			1 U				1 U	
HEXACHLOROCYCLOPENTADIENE		1 U			1 U				1 UR	
HEXACHLOROETHANE		1 U			1 U				1 U	
HEXACHLOROPROPENE		1 U			1 U				1 U	
INDENO(1,2,3-CD)PYRENE		0.05 U			0.05 U				0.05 U	
ISODRIN		1 U			1 U				1 U	
ISOPHORONE		1 U			1 U				1 U	
ISOSAFROLE		1 U			1 U				1 U	
KEPONE		1 UR			1 UR				1 UR	
METHAPYRILENE		1 U			1 U				1 U	
METHYL METHANE SULFONATE		1 U			1 U				1 U	
N-NITROSO-DI-N-BUTYLAMINE		1 U			1 U				1 U	
N-NITROSO-DI-N-PROPYLAMINE		1 U			1 U				1 U	
N-NITROSODIETHYLAMINE		1 U			1 U				1 U	
N-NITROSODIMETHYLAMINE		1 U			1 U				1 U	
N-NITROSOMETHYLETHYLAMINE		1 U			1 U				1 U	
N-NITROSOMORPHOLINE		1 U			1 U				1 U	
N-NITROSOPIPERIDINE		1 U			1 U				1 U	
N-NITROSOPYRROLIDINE		1 U			1 U				1 U	
NAPHTHALENE		0.05 U			0.05 U				0.05 U	
O,O,O-TRIETHYL PHOSPHOROTHIOATE		1 U			1 U				1 U	
O-TOLUIDINE		1 U			1 U				1 U	
P-(DIMETHYLAMINO)AZOBENZENE		1 U			1 U				1 U	
PENTACHLOROBENZENE		1 U			1 U				1 U	
PENTACHLOROETHANE		1 U			1 U				1 U	
PENTACHLORONITROBENZENE		1 U			1 U				1 U	
PHENACETIN		1 U			1 U				1 U	
PHENANTHRENE		0.05 U			0.05 U				0.05 U	
PHENOL		1 U			1 U				1 U	
PRONAMIDE		1 U			1 U				1 U	
PYRENE		0.05 U			0.05 U				0.05 U	
PYRIDINE		1 U			1 U				1 U	

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	03	01	02	02	03	01	02
LOCATION	16MWT21	WES-14-01-83	WES-14-01-83	WES-14-01-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-05-83	WES-14-05-83
SAMPLE NUMBER	16GWT2101	16GW0101	16GW0102	16GW0103	16GW0401	16GW0402	16GW0402-D	16GW0403	16GW0501	16GW0502
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/16/2004	4/23/2003	10/26/2003	8/26/2004	4/23/2003	10/26/2003	10/26/2003	8/25/2004	4/22/2003	10/26/2003
SAFROLE		1 U			1 U				1 U	
Energetics (ug/L)										
1,3,5-TRINITROBENZENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
1,3-DINITROBENZENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.52 U			0.5 U	0.5 U			0.5 U
2,4,6-TRINITROTOLUENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE			0.26 U			0.25 U	0.25 U			0.25 U
2,4-DINITROTOLUENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
2,6-DIAMINO-4-NITROTOLUENE			0.26 U			0.25 U	0.25 U			0.25 U
2,6-DINITROTOLUENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
2-NITROTOLUENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
3,5-DINITROANILINE			0.26 U			0.25 U	0.25 U			0.25 U
3-NITROTOLUENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
4-NITROTOLUENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
DNX			0.26 U			0.25 U	0.25 U			0.25 U
HMX	0.242 U	0.65 U	0.26 U	0.27 U	0.39	0.45 J	0.62	0.264 U	1.2 J	0.81
MNX			0.26 U			0.25 U	0.25 U			0.25 U
NITROBENZENE	0.242 U	0.65 U	0.26 U	0.27 U	0.165 U	0.25 U	0.25 U	0.264 U	0.42 U	0.25 U
PICRAMIC ACID		0.39 U			0.39 U				0.39 U	
PICRIC ACID		0.39 U			0.39 U				0.39 U	
RDX	0.242 U	0.6 U	0.26 U	0.27 U	1.7	1.9	2.1	0.66	4.8	1.8
TETRYL	0.242 U	0.65 U	0.26 U	0.27 UJ	0.165 U	0.25 U	0.25 U	0.264 UJ	0.42 U	0.25 U
TNX			0.26 U			0.25 U	0.25 U			0.25 U
Herbicides (ug/L)										
HEXACHLOROPHENE		0.025 U			0.025 U				0.025 U	
PENTACHLOROPHENOL		0.013 U			0.013 U				0.013 U	
Total Metals (ug/L)										
ALUMINUM	356 J	19.2 J	26.4 U		9680	9330 J	9370 J		5030	4730 J
ANTIMONY	0.56 U	0.06 U	0.16 U		0.03 U	0.14 U	0.02 U		0.11 U	0.02 U
ARSENIC	1.9 J	2.7 J	32.1 J		1.5 J	1.1 J	0.98 J		1.6 J	1.3 J
BARIUM	64.2 J	5 J	6 J		9.4 J	7.8 J	8.1 J		12 J	9.4 J
BERYLLIUM	0.03 U	0.16 U	0.66 U		2 J	2.7 U	2.5 U		1.1 U	1.3 U
CADMIUM	0.039 U	0.05 U	0.05 U		0.83 J	0.91 U	0.9 U		1.1 J	0.93 U
CALCIUM	91800 J	194000 J	106000 U		66900 J	64000 J	63300 J		72800 J	63100 J
CHROMIUM	24.5 J	0.27 U	0.38 U		0.55 U	0.64 U	0.64 U		0.51 U	0.51 U
COBALT	0.3 J	154 J	129 J		51.7 J	57.3 J	56.8 J		34.4 J	32 J
COPPER	2.5	0.06 U	0.07 U		0.12 U	0.26 U	0.1 U		0.11 U	0.12 U
IRON	376	52700 J	83900 J		4870 J	6580 J	6520 J		2190 J	2820 J
LEAD	0.2 U	0.03 U	0.12 U		0.43 U	0.53 U	0.48 U		0.89 J	0.7 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	LOWER	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	03	01	02	02	03	01	02
LOCATION	16MWT21	WES-14-01-83	WES-14-01-83	WES-14-01-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-04-83	WES-14-05-83	WES-14-05-83
SAMPLE NUMBER	16GWT2101	16GW0101	16GW0102	16GW0103	16GW0401	16GW0402	16GW0402-D	16GW0403	16GW0501	16GW0502
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/16/2004	4/23/2003	10/26/2003	8/26/2004	4/23/2003	10/26/2003	10/26/2003	8/25/2004	4/22/2003	10/26/2003
LITHIUM		328 J			120 J				92.7 J	
MAGNESIUM	108 J	84500 J	63100 J		29000 J	25000 J	24900 J		30600 J	25500 J
MANGANESE	5.7	29300 J	12600 J		3710 J	4310 J	4450 J		2550 J	2450 J
MERCURY	0.03 U	0.02 U	0.02 U		0.02 U	0.02 U	0.02 U		0.02 U	0.02 U
NICKEL	1.6	198 J	169 J		186 J	195 J	194 J		134 J	124 J
POTASSIUM	22200 J	9390 J	8490 J		3240 J	3070 J	3090 J		3760 J	2970 J
SELENIUM	2.1 J	0.05 U	0.05 U		0.05 U	0.04 U	0.04 U		0.05 U	0.04 U
SILVER	0.03 U	0.04 U	0.07 U		0.04 U	0.03 U	0.03 U		0.04 U	0.03 U
SODIUM	231000 J	25900 J	21300 J		13400 J	11500 J	11600 J		13500 J	10400 J
STRONTIUM		197 J			199 J				279 J	
THALLIUM	0.043 U	0.04 U	0.05 U		0.04 U	0.05 U	0.05 U		0.13 U	0.08 U
TIN	0.15 U	0.03 U	0.1 U		0.03 U	0.1 U	0.1 U		0.05 U	0.1 U
TITANIUM		1.2 J	0.07 U		2 J	0.31 U	0.07 U		2 J	0.83 U
VANADIUM	5.9	0.05 U	0.21 U		0.86 J	0.74 J	0.77 J		0.6 J	0.65 J
ZINC	6.5 J	157 J	231 J		244 J	260	253		222 J	227
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED										
ANTIMONY, FILTERED										
ARSENIC, FILTERED										
BARIUM, FILTERED										
BERYLLIUM, FILTERED										
CADMIUM, FILTERED										
CALCIUM, FILTERED										
CHROMIUM, FILTERED										
COBALT, FILTERED										
COPPER, FILTERED										
IRON, FILTERED										
LEAD, FILTERED										
MAGNESIUM, FILTERED										
MANGANESE, FILTERED										
MERCURY, FILTERED										
NICKEL, FILTERED										
POTASSIUM, FILTERED										
SELENIUM, FILTERED										
SILVER, FILTERED										
SODIUM, FILTERED										
THALLIUM, FILTERED										
TIN, FILTERED										
TITANIUM, FILTERED										
VANADIUM, FILTERED										
ZINC, FILTERED										

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**LOWER**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**
SAMPLING ROUND	**03**	**01**	**02**	**03**	**01**	**02**	**02**	**03**	**01**	**02**
LOCATION	**16MWT21**	**WES-14-01-83**	**WES-14-01-83**	**WES-14-01-83**	**WES-14-04-83**	**WES-14-04-83**	**WES-14-04-83**	**WES-14-04-83**	**WES-14-05-83**	**WES-14-05-83**
SAMPLE NUMBER	**16GWT2101**	**16GW0101**	**16GW0102**	**16GW0103**	**16GW0401**	**16GW0402**	**16GW0402-D**	**16GW0403**	**16GW0501**	**16GW0502**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**10/16/2004**	**4/23/2003**	**10/26/2003**	**8/26/2004**	**4/23/2003**	**10/26/2003**	**10/26/2003**	**8/25/2004**	**4/22/2003**	**10/26/2003**
Field Parameters (mg/L)										
ALKALINITY										10 U
CARBON DIOXIDE										150
DISSOLVED OXYGEN	1.04			54.72						0.25
DISSOLVED OXYGEN - METER		0.32	0.7		0.29	0.54			0.9	0.28
HYDROGEN SULFIDE (H2S)										0
IRON(+2)										2.91
MANGANESE(+2)										2.7
NITRITE-N										0.005
OXIDATION REDUCTION POTENTIAL (MV)	52.8	-130	-5	-69.9	207.4	328.700000		124	152	263
PH (S.U.)	11.96	6.4	6.17	5.76	3.68	3.65		4.1	4.38	4.77
SPECIFIC CONDUCTANCE (MS/CM)	2.48	1.606	1.452	1.5	0.72	0.735		0.838	0.625	0.587
SULFIDE										0.1
TEMPERATURE (C)	13.22	13.79	12.72	17.28	13.31	13.21		15.03	12.95	13.39
TURBIDITY (NTU)	21.8	0.05	0.61	4.53	0.5	0.13		8.9	0	1.96
Miscellaneous Parameters (mg/L)										
AMMONIA-N		0.41			0.08				0.03	
CHLORIDE			7			12	13			7
NITRITE/NITRATE-N		0.02 U	0.07		0.02 U	0.05 U	0.05 U		0.02 U	0.05 U
SULFATE			860			430	410			340
TOTAL ORGANIC CARBON										

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	02	03	01	01	02	03	02	02
LOCATION	WES-14-05-83	16MWT03	16MWT03	16MWT03	16MWT03	16MWT05	16MWT05	16MWT05	16MWT05	16MWT12	16MWT12
SAMPLE NUMBER	16GW0503	16GWT0301	16GWT0302	16GWT0302-F	16GWT0303	16GWT0501	16GWT0501-D	16GWT0502	16GWT0503	16GWT1201	16GWT1201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	8/25/2004	4/25/2003	11/9/2003	11/9/2003	8/28/2004	4/24/2003	4/24/2003	11/22/2003	8/26/2004	11/21/2003	11/21/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,2,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,2-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-DICHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-DICHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DIBROMOETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DICHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DICHLOROPROPANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,4-DIOXANE	50 U	50 UJ	50 U		50 U	50 UJ	50 UJ	50 U	50 U	50 U	50 U
2-BUTANONE	0.5 U	0.5 UR	0.5 U		0.5 U	0.5 UR	0.5 UR	0.5 UR	0.5 U	0.5 UR	0.5 UR
2-HEXANONE	0.5 U	0.5 UJ	0.5 U		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ
3-CHLOROPROPENE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-METHYL-2-PENTANONE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ACETONE	0.5 UJ	0.5 UR	0.5 UJ		0.5 UJ	0.5 UR	0.5 UR	0.5 UR	0.5 UJ	0.5 UR	0.5 UR
ACETONITRILE	20 U	20 UJ	20 U		20 U	20 UJ	20 UJ	20 U	20 U	20 U	20 U
ACROLEIN	0.5 UR	0.5 UR	0.5 UR		0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR
ACRYLONITRILE	0.5 U	0.5 UR	0.5 U		0.5 U	0.5 UR	0.5 UR	0.5 UR	0.5 U	0.5 UR	0.5 UR
BENZENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMODICHLOROMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOFORM	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON DISULFIDE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON TETRACHLORIDE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROBENZENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLORODIBROMOMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROPRENE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CIS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
DIBROMOMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
DICHLORODIFLUOROMETHANE	0.3 UJ	0.3 U	0.3 UJ		0.3 UJ	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U
ETHANE										0.37 J	0.13 J
ETHENE										0.031 J	0.075 J
ETHYL METHACRYLATE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	02	03	01	01	02	03	02	02
LOCATION	WES-14-05-83	16MWT03	16MWT03	16MWT03	16MWT03	16MWT05	16MWT05	16MWT05	16MWT05	16MWT12	16MWT12
SAMPLE NUMBER	16GW0503	16GWT0301	16GWT0302	16GWT0302-F	16GWT0303	16GWT0501	16GWT0501-D	16GWT0502	16GWT0503	16GWT1201	16GWT1201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	8/25/2004	4/25/2003	11/9/2003	11/9/2003	8/28/2004	4/24/2003	4/24/2003	11/22/2003	8/26/2004	11/21/2003	11/21/2003
ISOBUTANOL	20 U	20 UJ	20 U		20 U	20 UJ	20 UJ	20 U	20 U	20 U	20 U
METHACRYLONITRILE	0.3 U	0.3 UR	0.3 U		0.3 U	0.3 UR	0.3 UR	0.3 UR	0.3 U	0.3 UR	0.3 UR
METHANE										11	10
METHYL IODIDE	0.5 U	0.5 UJ	0.5 UJ		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ
METHYL METHACRYLATE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 UJ	0.3 UJ
PROPIONITRILE	20 U	20 UJ	20 U		20 U	20 UJ	20 UJ	20 U	20 U	20 U	20 U
STYRENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TETRACHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TOLUENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TOTAL XYLENES	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,4-DICHLORO-2-BUTENE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	0.3 U	0.3 U	0.7 J		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRICHLOROFLUOROMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
VINYL ACETATE	0.5 U	0.5 U	0.5 UJ		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE		1 U				1 U	1 U				
1,2,4-TRICHLOROBENZENE		1 U				1 U	1 U				
1,2-DICHLOROBENZENE		1 U				1 U	1 U				
1,3-DICHLOROBENZENE		1 U				1 U	1 U				
1,4-DICHLOROBENZENE		1 U				1 U	1 U				
1,4-NAPHTHOQUINONE		1 U				1 UJ	1 UJ				
1,4-PHENYLENEDIAMINE		1 U				1 UJ	1 UJ				
1-NAPHTHYLAMINE		1 U				1 U	1 U				
2,2'-OXYBIS(1-CHLOROPROPANE)		1 U				1 U	1 U				
2,3,4,6-TETRACHLOROPHENOL		1 U				1 U	1 U				
2,4,5-TRICHLOROPHENOL		1 U				1 U	1 U				
2,4,6-TRICHLOROPHENOL		1 U				1 U	1 U				
2,4-DICHLOROPHENOL		1 U				1 U	1 U				
2,4-DIMETHYLPHENOL		1 U				1 U	1 U				
2,4-DINITROPHENOL		1 UR				1 UR	1 UR				
2,6-DICHLOROPHENOL		1 U				1 U	1 U				
2-ACETYLAMINOFLUORENE		1 U				1 U	1 U				
2-CHLORONAPHTHALENE		1 U				1 UJ	1 UJ				
2-CHLOROPHENOL		1 U				1 U	1 U				
2-METHYLNAPHTHALENE		0.05 U				0.05 U	0.05 U				
2-METHYLPHENOL		1 U				1 U	1 U				
2-NAPHTHYLAMINE		1 U				1 U	1 U				

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	02	03	01	01	02	03	02	02
LOCATION	WES-14-05-83	16MWT03	16MWT03	16MWT03	16MWT03	16MWT05	16MWT05	16MWT05	16MWT05	16MWT12	16MWT12
SAMPLE NUMBER	16GW0503	16GWT0301	16GWT0302	16GWT0302-F	16GWT0303	16GWT0501	16GWT0501-D	16GWT0502	16GWT0503	16GWT1201	16GWT1201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	8/25/2004	4/25/2003	11/9/2003	11/9/2003	8/28/2004	4/24/2003	4/24/2003	11/22/2003	8/26/2004	11/21/2003	11/21/2003
2-NITROANILINE		1 U				1 U	1 U				
2-NITROPHENOL		1 U				1 U	1 U				
2-PICOLINE		1 U				1 U	1 U				
3&4-METHYLPHENOL		1 U				1 U	1 U				
3,3'-DICHLOROBENZIDINE		1 U				1 U	1 U				
3,3'-DIMETHYLBENZIDINE		1 U				1 U	1 U				
3-METHYLCHOLANTHRENE		1 U				1 U	1 U				
3-NITROANILINE		1 U				1 U	1 U				
4,6-DINITRO-2-METHYLPHENOL		1 UJ				1 UJ	1 UJ				
4-AMINOBIPHENYL		1 U				1 U	1 U				
4-BROMOPHENYL PHENYL ETHER		1 U				1 U	1 U				
4-CHLORO-3-METHYLPHENOL		1 U				1 U	1 U				
4-CHLOROANILINE		1 U				1 U	1 U				
4-CHLOROPHENYL PHENYL ETHER		1 U				1 U	1 U				
4-NITROANILINE		1 U				1 U	1 U				
4-NITROPHENOL		1 UR				1 UR	1 UR				
4-NITROQUINOLINE-1-OXIDE		1 UR				1 UR	1 UR				
5-NITRO-O-TOLUIDINE		1 U				1 U	1 U				
7,12-DIMETHYLBENZ(A)ANTHRACENE		1 U				1 U	1 U				
A,A-DIMETHYLPHENETHYLAMINE		1 U				1 U	1 U				
ACENAPHTHENE		0.05 U				0.05 U	0.05 U				
ACENAPHTHYLENE		0.05 U				0.05 U	0.05 U				
ACETOPHENONE		1 U				1 U	1 U				
ANILINE		1 U				1 U	1 U				
ANTHRACENE		0.05 U				0.05 U	0.05 U				
ARAMITE		1 UR				1 UR	1 UR				
BENZO(A)ANTHRACENE		0.05 U				0.05 U	0.05 U				
BENZO(A)PYRENE		0.05 U				0.05 U	0.05 U				
BENZO(B)FLUORANTHENE		0.05 U				0.05 U	0.05 U				
BENZO(G,H,I)PERYLENE		0.05 U				0.05 U	0.05 U				
BENZO(K)FLUORANTHENE		0.05 U				0.05 U	0.05 U				
BENZYL ALCOHOL		1 U				1 U	1 U				
BIS(2-CHLOROETHOXY)METHANE		1 U				1 U	1 U				
BIS(2-CHLOROETHYL)ETHER		1 U				1 U	1 U				
BIS(2-ETHYLHEXYL)PHTHALATE		1 U				1 U	1 U				
BUTYL BENZYL PHTHALATE		1 U				1 U	1 U				
CHLOROBENZILATE		1 U				1 U	1 U				
CHRYSENE		0.05 U				0.05 U	0.05 U				
DI-N-BUTYL PHTHALATE		1 U				1 U	1 U				
DI-N-OCTYL PHTHALATE		1 U				1 U	1 U				
DIALLATE		1 U				1 U	1 U				

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	02	03	01	01	02	03	02	02
LOCATION	WES-14-05-83	16MWT03	16MWT03	16MWT03	16MWT03	16MWT05	16MWT05	16MWT05	16MWT05	16MWT12	16MWT12
SAMPLE NUMBER	16GW0503	16GWT0301	16GWT0302	16GWT0302-F	16GWT0303	16GWT0501	16GWT0501-D	16GWT0502	16GWT0503	16GWT1201	16GWT1201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	8/25/2004	4/25/2003	11/9/2003	11/9/2003	8/28/2004	4/24/2003	4/24/2003	11/22/2003	8/26/2004	11/21/2003	11/21/2003
DIBENZO(A,H)ANTHRACENE		0.05 U				0.05 U	0.05 U				
DIBENZOFURAN		1 U				1 U	1 U				
DIETHYL PHTHALATE		1 U				1 U	1 U				
DIMETHYL PHTHALATE		1 U				1 U	1 U				
DIPHENYLAMINE		1 U				1 U	1 U				
ETHYL METHANE SULFONATE		1 U				1 U	1 U				
FLUORANTHENE		0.05 U				0.05 U	0.05 U				
FLUORENE		0.05 U				0.05 U	0.05 U				
HEXACHLOROBENZENE		1 U				1 U	1 U				
HEXACHLOROBUTADIENE		1 U				1 U	1 U				
HEXACHLOROCYCLOPENTADIENE		1 UR				1 UR	1 UR				
HEXACHLOROETHANE		1 U				1 U	1 U				
HEXACHLOROPROPENE		1 U				1 U	1 U				
INDENO(1,2,3-CD)PYRENE		0.05 U				0.05 U	0.05 U				
ISODRIN		1 U				1 U	1 U				
ISOPHORONE		1 U				1 U	1 U				
ISOSAFROLE		1 U				1 U	1 U				
KEPONE		1 U				1 U	1 U				
METHAPYRILENE		1 U				1 U	1 U				
METHYL METHANE SULFONATE		1 U				1 U	1 U				
N-NITROSO-DI-N-BUTYLAMINE		1 U				1 U	1 U				
N-NITROSO-DI-N-PROPYLAMINE		1 U				1 U	1 U				
N-NITROSODIETHYLAMINE		1 U				1 U	1 U				
N-NITROSODIMETHYLAMINE		1 U				1 U	1 U				
N-NITROSOMETHYLETHYLAMINE		1 U				1 U	1 U				
N-NITROSOMORPHOLINE		1 U				1 U	1 U				
N-NITROSOPIPERIDINE		1 U				1 U	1 U				
N-NITROSOPYRROLIDINE		1 U				1 U	1 U				
NAPHTHALENE		0.05 U				0.05 U	0.05 U				
O,O,O-TRIETHYL PHOSPHOROTHIOATE		1 U				1 U	1 U				
O-TOLUIDINE		1 U				1 U	1 U				
P-(DIMETHYLAMINO)AZOBENZENE		1 U				1 U	1 U				
PENTACHLOROBENZENE		1 U				1 U	1 U				
PENTACHLOROETHANE		1 U				1 U	1 U				
PENTACHLORONITROBENZENE		1 U				1 U	1 U				
PHENACETIN		1 U				1 U	1 U				
PHENANTHRENE		0.05 U				0.05 U	0.05 U				
PHENOL		1 U				1 U	1 U				
PRONAMIDE		1 U				1 U	1 U				
PYRENE		0.05 U				0.05 U	0.05 U				
PYRIDINE		1 U				1 U	1 U				

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	02	03	01	01	02	03	02	02
LOCATION	WES-14-05-83	16MWT03	16MWT03	16MWT03	16MWT03	16MWT05	16MWT05	16MWT05	16MWT05	16MWT12	16MWT12
SAMPLE NUMBER	16GW0503	16GWT0301	16GWT0302	16GWT0302-F	16GWT0303	16GWT0501	16GWT0501-D	16GWT0502	16GWT0503	16GWT1201	16GWT1201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	8/25/2004	4/25/2003	11/9/2003	11/9/2003	8/28/2004	4/24/2003	4/24/2003	11/22/2003	8/26/2004	11/21/2003	11/21/2003
SAFROLE		1 U				1 U	1 U				
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.27 U	0.5 U	0.255 UJ		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
1,3-DINITROBENZENE	0.27 U	0.5 U	0.255 U		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.51 U					0.526 U		0.538 U	0.556 U
2,4,6-TRINITROTOLUENE	0.27 U	0.5 U	0.255 UJ		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
2,4-DIAMINO-6-NITROTOLUENE			0.255 U					0.263 U		0.269 U	0.278 U
2,4-DINITROTOLUENE	0.27 U	0.5 U	0.255 UJ		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
2,6-DIAMINO-4-NITROTOLUENE			0.255 U					0.263 U		0.269 U	0.278 U
2,6-DINITROTOLUENE	0.27 U	0.5 U	0.255 UJ		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.5 U	0.255 UJ		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
2-NITROTOLUENE	0.27 U	0.5 U	0.255 UJ		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
3,5-DINITROANILINE			0.255 U					0.263 UJ		0.269 U	0.278 U
3-NITROTOLUENE	0.27 U	0.5 U	0.255 UJ		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
4-AMINO-2,6-DINITROTOLUENE	0.27 U	0.5 U	0.255 U		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
4-NITROTOLUENE	0.27 U	0.5 U	0.255 UJ		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
DNX			0.255 U					0.263 U		0.269 U	0.278 U
HMX	1 J	0.5 U	0.255 U		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	1.3 J	0.278 UJ
MNX			0.255 U					0.263 U		0.269 U	0.278 U
NITROBENZENE	0.27 U	0.5 U	0.255 U		0.29 U	0.375 U	0.135 U	0.263 U	0.28 U	0.269 U	0.278 U
PICRAMIC ACID		0.39 U				0.39 U	0.39 U				
PICRIC ACID		0.39 U				0.39 U	0.39 U				
RDX	3	0.48 U	0.255 U		0.29 U	0.355 U	0.13 U	0.263 U	0.28 U	0.269 U	0.278 U
TETRYL	0.27 UJ	0.5 U	0.255 U		0.29 UJ	0.375 U	0.135 U	0.263 U	0.28 UJ	0.269 U	0.278 U
TNX			0.255 U					0.263 U		0.269 U	0.278 U
Herbicides (ug/L)											
HEXACHLOROPHENE		0.025 U				0.025 U	0.025 U				
PENTACHLOROPHENOL		0.013 U				0.013 U	0.013 U				
Total Metals (ug/L)											
ALUMINUM		140	29200 J			6020	6120	6650 J		6740 J	6810 J
ANTIMONY		0.11 U	0.25 U			0.08 U	0.04 U	0.02 U		0.04 U	0.02 U
ARSENIC		1.6 J	6.6 J			3.5 J	3.3 J	1.5 U		2.3 J	2.2 J
BARIUM		18.1 J	139 J			14.2 J	14.7 J	9.7 J		17.5 J	17.6 J
BERYLLIUM		0.28 U	1.1 U			4.7 J	4.2 J	4.6 J		3.5 J	3.5 J
CADMIUM		0.2 U	0.1 U			0.21 U	0.22 U	0.17 U		1.4 U	1.4 U
CALCIUM		39500 J	45600 J			57000 J	56800 J	62100 J		45600 J	46000 J
CHROMIUM		0.41 U	16.7 J			0.58 U	0.73 J	0.53 U		0.68 U	0.54 U
COBALT		40.9 J	37.3 J			92.1 J	93.4 J	77.2 J		113 J	116 J
COPPER		2.1 J	6.1 J			1.4 J	1.5 J	0.32 U		2.8 J	2.7 J
IRON		39400 J	79600 J			29700 J	30400 J	30600 J		28000 J	27600 J
LEAD		1.1 J	15.5 J			1.8 J	1.9 J	0.57 U		2.4 J	2.2 J

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	02	03	01	01	02	03	02	02
LOCATION	WES-14-05-83	16MWT03	16MWT03	16MWT03	16MWT03	16MWT05	16MWT05	16MWT05	16MWT05	16MWT12	16MWT12
SAMPLE NUMBER	16GW0503	16GWT0301	16GWT0302	16GWT0302-F	16GWT0303	16GWT0501	16GWT0501-D	16GWT0502	16GWT0503	16GWT1201	16GWT1201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	8/25/2004	4/25/2003	11/9/2003	11/9/2003	8/28/2004	4/24/2003	4/24/2003	11/22/2003	8/26/2004	11/21/2003	11/21/2003
LITHIUM		101 J				310 J	318 J				
MAGNESIUM		25000 J	33600 J			27200 J	27900 J	31600 J		32700 J	33100 J
MANGANESE		3930 J	4500 J			6510 J	6680 J	7030 J		8120 J	8340 J
MERCURY		0.02 U	0.02 U			0.02 U	0.02 U	0.007 U		0.007 U	0.007 U
NICKEL		93.4 J	86.3 J			304 J	301 J	284 J		312 J	319 J
POTASSIUM		4260 J	6300 J			3590 J	3660 J	3100 J		3610 J	3670 J
SELENIUM		0.32 U	0.48 U			0.19 U	0.19 U	0.04 U		0.9 U	0.86 U
SILVER		0.04 U	0.03 U			0.04 U	0.04 U	0.03 U		0.03 U	0.03 U
SODIUM		26700 J	33100 J			14300 J	14700 J	13800 J		14300 J	14600 J
STRONTIUM		158 J				106 J	109 J				
THALLIUM		0.04 U	0.1 U			0.04 U	0.04 U	0.04 U		0.08 U	0.08 U
TIN		0.06 U	0.48 U			0.03 U	0.05 U	0.1 U		0.58 U	0.1 U
TITANIUM		2.9 J	95.1 J			3.2 J	3.1 J	1.5 U		0.77 U	0.24 U
VANADIUM		0.14 U	15.7 J			0.6 J	0.58 J	1.7 U		0.46 U	0.43 U
ZINC		108 J	86.1 J			329 J	294 J	254 J		290 J	277 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED				33 U							
ANTIMONY, FILTERED				0.11 U							
ARSENIC, FILTERED				1.2 U							
BARIUM, FILTERED				12.9 J							
BERYLLIUM, FILTERED				0.17 U							
CADMIUM, FILTERED				0.04 U							
CALCIUM, FILTERED				38900 J							
CHROMIUM, FILTERED				0.26 U							
COBALT, FILTERED				36.9 J							
COPPER, FILTERED				0.49 U							
IRON, FILTERED				43200 J							
LEAD, FILTERED				0.15 U							
MAGNESIUM, FILTERED				27200 J							
MANGANESE, FILTERED				4030 J							
MERCURY, FILTERED				0.02 U							
NICKEL, FILTERED				80.6 J							
POTASSIUM, FILTERED				3920 J							
SELENIUM, FILTERED				0.05 U							
SILVER, FILTERED				0.03 U							
SODIUM, FILTERED				29000 J							
THALLIUM, FILTERED				0.04 U							
TIN, FILTERED				0.1 U							
TITANIUM, FILTERED				2.3 U							
VANADIUM, FILTERED				0.06 U							
ZINC, FILTERED				67 J							

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
SAMPLING ROUND	03	01	02	02	03	01	01	02	03	02	02
LOCATION	WES-14-05-83	16MWT03	16MWT03	16MWT03	16MWT03	16MWT05	16MWT05	16MWT05	16MWT05	16MWT12	16MWT12
SAMPLE NUMBER	16GW0503	16GWT0301	16GWT0302	16GWT0302-F	16GWT0303	16GWT0501	16GWT0501-D	16GWT0502	16GWT0503	16GWT1201	16GWT1201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	8/25/2004	4/25/2003	11/9/2003	11/9/2003	8/28/2004	4/24/2003	4/24/2003	11/22/2003	8/26/2004	11/21/2003	11/21/2003
Field Parameters (mg/L)											
ALKALINITY										10 U	
CARBON DIOXIDE										260	
DISSOLVED OXYGEN	19.79								0.06	0.1	
DISSOLVED OXYGEN - METER		0.64	1.23			0.2		1.3		0.64	
HYDROGEN SULFIDE (H2S)										0	
IRON(+2)										3.3 >	
MANGANESE(+2)										9.4	
NITRITE-N										0	
OXIDATION REDUCTION POTENTIAL (MV)	57.5	35	129.9		259.900000	185		210	231.600000	306.8	
PH (S.U.)	5.73	5.23	5.46		4.54	4.42		4.38	4.92	4.27	
SPECIFIC CONDUCTANCE (MS/CM)	0.694	0.607	0.536		0.62	0.684		0.663	0.67	0.795	
SULFIDE										0.01	
TEMPERATURE (C)	15.26	12.26	12.35		18.06	14.47		15.85	16.63	16.04	
TURBIDITY (NTU)	9.7	10	49		7.25	6.8		7.72	9.55	4.11	
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.33				0.32	0.33				
CHLORIDE			9					2 U		15 U	14 U
NITRITE/NITRATE-N		0.02 U	0.025 U			0.02 U	0.02 U	0.025 U		0.025 U	0.025 U
SULFATE			290					390 J		260 J	320 J
TOTAL ORGANIC CARBON											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	02	02	03	01	02	03	01	02	03	01
LOCATION	16MWT12	16MWT16	16MWT16	16MWT16	WES-14-03-83	WES-14-03-83	WES-14-03-83	16MWT01	16MWT01	16MWT01	16MWT02
SAMPLE NUMBER	16GWT1202	16GWT1601	16GWT1601-F	16GWT1602	16GW0301	16GW0302	16GW0303	16GWT0101	16GWT0102	16GWT0103	16GWT0201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/24/2004	11/22/2003	11/23/2003	8/27/2004	5/11/2003	11/8/2003	8/24/2004	4/22/2003	11/9/2003	8/28/2004	4/22/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,2,2-TETRACHLOROETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1,2-TRICHLOROETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	2.1	0.3 U
1,1-DICHLOROETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,1-DICHLOROETHENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	1.4	0.3 U
1,2,3-TRICHLOROPROPANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U
1,2-DIBROMOETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DICHLOROETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,2-DICHLOROPROPANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,4-DIOXANE	50 U	50 U		50 U	50 UJ	50 U	50 U	50 U	50 U	50 U	50 U
2-BUTANONE	0.5 U	0.5 U		0.5 U	0.5 UR	0.5 UJ	0.5 U	0.5 UR	0.5 U	0.5 U	0.5 UR
2-HEXANONE	0.5 U	0.5 UJ		0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
3-CHLOROPROPENE	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-METHYL-2-PENTANONE	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ACETONE	0.5 UJ	0.5 UR		0.5 UJ	0.5 UR	0.5 UJ	0.5 UJ	1.3 J	0.5 UJ	0.5 UJ	0.5 UR
ACETONITRILE	20 U	20 U		20 U	20 UJ	20 U	20 U	20 U	20 U	20 U	20 U
ACROLEIN	0.5 UR	0.5 UR		0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR
ACRYLONITRILE	0.5 U	0.5 UR		0.5 U	0.5 UR	0.5 U	0.5 U	0.5 UR	0.5 U	0.5 U	0.5 UR
BENZENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMODICHLOROMETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOFORM	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BROMOMETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U
CARBON DISULFIDE	0.3 U	0.3 J		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CARBON TETRACHLORIDE	0.3 U	0.3 U		0.3 U	15	11	14	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROBENZENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLORODIBROMOMETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROETHANE	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.3 U	0.3 U		0.3 U	5.6	3.8	4.2	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROMETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CHLOROPRENE	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 J		0.3 U	0.4 J	0.5 J	0.6 J	1.9	42	130	0.3 U
CIS-1,3-DICHLOROPROPENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
DIBROMOMETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
DICHLORODIFLUOROMETHANE	0.3 U	0.3 U		0.3 UJ	0.3 U	0.3 UJ	0.3 UJ	0.3 U	0.3 UJ	0.3 UJ	0.3 U
ETHANE											
ETHENE											
ETHYL METHACRYLATE	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	02	02	03	01	02	03	01	02	03	01
LOCATION	16MWT12	16MWT16	16MWT16	16MWT16	WES-14-03-83	WES-14-03-83	WES-14-03-83	16MWT01	16MWT01	16MWT01	16MWT02
SAMPLE NUMBER	16GWT1202	16GWT1601	16GWT1601-F	16GWT1602	16GW0301	16GW0302	16GW0303	16GWT0101	16GWT0102	16GWT0103	16GWT0201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/24/2004	11/22/2003	11/23/2003	8/27/2004	5/11/2003	11/8/2003	8/24/2004	4/22/2003	11/9/2003	8/28/2004	4/22/2003
ISOBUTANOL	20 U	20 U		20 U	20 UJ	20 U	20 U	20 U	20 U	20 U	20 U
METHACRYLONITRILE	0.3 U	0.3 UR		0.3 U	0.3 UR	0.3 U	0.3 U	0.3 UR	0.3 U	0.3 U	0.3 UR
METHANE											
METHYL IODIDE	0.5 U	0.5 UJ		0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
METHYL METHACRYLATE	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.3 UJ	0.3 UJ		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
PROPIONITRILE	20 U	20 U		20 U	20 UJ	20 U	20 U	20 U	20 U	20 U	20 U
STYRENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TETRACHLOROETHENE	0.3 U	0.3 J		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TOLUENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TOTAL XYLENES	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,2-DICHLOROETHENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	1	0.3 U
TRANS-1,3-DICHLOROPROPENE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
TRANS-1,4-DICHLORO-2-BUTENE	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	0.3 U	190		340	5.6	5	4.3	16	230	1100	1.2
TRICHLOROFLUOROMETHANE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
VINYL ACETATE	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
VINYL CHLORIDE	0.3 U	0.3 U		0.3 U	0.3 U	0.3 U	0.3 U	0.3 J	0.3 U	0.7 J	0.3 U
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE					1 U						1 U
1,2,4-TRICHLOROBENZENE					1 U						1 U
1,2-DICHLOROBENZENE					1 U						1 U
1,3-DICHLOROBENZENE					1 U						1 U
1,4-DICHLOROBENZENE					1 U						1 U
1,4-NAPHTHOQUINONE					1 UJ						1 U
1,4-PHENYLENEDIAMINE					1 UJ						1 U
1-NAPHTHYLAMINE					1 U						1 U
2,2'-OXYBIS(1-CHLOROPROPANE)					1 U						1 U
2,3,4,6-TETRACHLOROPHENOL					1 U						1 U
2,4,5-TRICHLOROPHENOL					1 U						1 U
2,4,6-TRICHLOROPHENOL					1 U						1 U
2,4-DICHLOROPHENOL					1 U						1 U
2,4-DIMETHYLPHENOL					1 U						1 U
2,4-DINITROPHENOL					1 UR						1 U
2,6-DICHLOROPHENOL					1 U						1 U
2-ACETYLAMINOFLUORENE					1 U						1 U
2-CHLORONAPHTHALENE					1 UJ						1 U
2-CHLOROPHENOL					1 U						1 U
2-METHYLNAPHTHALENE					0.05 U						0.05 U
2-METHYLPHENOL					1 U						1 U
2-NAPHTHYLAMINE					1 U						1 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	02	02	03	01	02	03	01	02	03	01
LOCATION	16MWT12	16MWT16	16MWT16	16MWT16	WES-14-03-83	WES-14-03-83	WES-14-03-83	16MWT01	16MWT01	16MWT01	16MWT02
SAMPLE NUMBER	16GWT1202	16GWT1601	16GWT1601-F	16GWT1602	16GW0301	16GW0302	16GW0303	16GWT0101	16GWT0102	16GWT0103	16GWT0201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/24/2004	11/22/2003	11/23/2003	8/27/2004	5/11/2003	11/8/2003	8/24/2004	4/22/2003	11/9/2003	8/28/2004	4/22/2003
2-NITROANILINE					1 U						1 U
2-NITROPHENOL					1 U						1 U
2-PICOLINE					1 U						1 U
3&4-METHYLPHENOL					1 U						1 U
3,3'-DICHLOROBENZIDINE					1 U						1 U
3,3'-DIMETHYLBENZIDINE					1 U						1 U
3-METHYLCHOLANTHRENE					1 U						1 U
3-NITROANILINE					1 U						1 U
4,6-DINITRO-2-METHYLPHENOL					1 UJ						1 U
4-AMINOBIPHENYL					1 U						1 U
4-BROMOPHENYL PHENYL ETHER					1 U						1 U
4-CHLORO-3-METHYLPHENOL					1 U						1 U
4-CHLOROANILINE					1 U						1 U
4-CHLOROPHENYL PHENYL ETHER					1 U						1 U
4-NITROANILINE					1 U						1 U
4-NITROPHENOL					1 UR						1 U
4-NITROQUINOLINE-1-OXIDE					1 UR						1 UR
5-NITRO-O-TOLUIDINE					1 U						1 U
7,12-DIMETHYLBENZ(A)ANTHRACENE					1 U						1 U
A,A-DIMETHYLPHENETHYLAMINE					1 U						1 UJ
ACENAPHTHENE					0.05 U						0.05 U
ACENAPHTHYLENE					0.05 U						0.05 U
ACETOPHENONE					1 U						1 U
ANILINE					1 U						1 U
ANTHRACENE					0.05 U						0.05 U
ARAMITE					1 UR						1 UR
BENZO(A)ANTHRACENE					0.05 U						0.05 U
BENZO(A)PYRENE					0.05 U						0.05 U
BENZO(B)FLUORANTHENE					0.05 U						0.05 U
BENZO(G,H,I)PERYLENE					0.05 U						0.05 U
BENZO(K)FLUORANTHENE					0.05 U						0.05 U
BENZYL ALCOHOL					1 U						1 U
BIS(2-CHLOROETHOXY)METHANE					1 U						1 U
BIS(2-CHLOROETHYL)ETHER					1 U						1 U
BIS(2-ETHYLHEXYL)PHTHALATE					1 U						1 U
BUTYL BENZYL PHTHALATE					1 U						1 U
CHLOROBENZILATE					1 U						1 U
CHRYSENE					0.05 U						0.05 U
DI-N-BUTYL PHTHALATE					1 U						1 U
DI-N-OCTYL PHTHALATE					1 U						1 U
DIALLATE					1 U						1 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	02	02	03	01	02	03	01	02	03	01
LOCATION	16MWT12	16MWT16	16MWT16	16MWT16	WES-14-03-83	WES-14-03-83	WES-14-03-83	16MWT01	16MWT01	16MWT01	16MWT02
SAMPLE NUMBER	16GWT1202	16GWT1601	16GWT1601-F	16GWT1602	16GW0301	16GW0302	16GW0303	16GWT0101	16GWT0102	16GWT0103	16GWT0201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/24/2004	11/22/2003	11/23/2003	8/27/2004	5/11/2003	11/8/2003	8/24/2004	4/22/2003	11/9/2003	8/28/2004	4/22/2003
DIBENZO(A,H)ANTHRACENE					0.05 U						0.05 U
DIBENZOFURAN					1 U						1 U
DIETHYL PHTHALATE					1 U						1 U
DIMETHYL PHTHALATE					1 U						1 U
DIPHENYLAMINE					1 U						1 U
ETHYL METHANE SULFONATE					1 U						1 U
FLUORANTHENE					0.05 U						0.05 U
FLUORENE					0.05 U						0.05 U
HEXACHLOROBENZENE					1 U						1 U
HEXACHLOROBUTADIENE					1 U						1 U
HEXACHLOROCYCLOPENTADIENE					1 UR						1 U
HEXACHLOROETHANE					1 U						1 U
HEXACHLOROPROPENE					1 U						1 U
INDENO(1,2,3-CD)PYRENE					0.05 U						0.05 U
ISODRIN					1 U						1 U
ISOPHORONE					1 U						1 U
ISOSAFROLE					1 U						1 U
KEPONE					1 U						1 UR
METHAPYRILENE					1 U						1 U
METHYL METHANE SULFONATE					1 U						1 U
N-NITROSO-DI-N-BUTYLAMINE					1 U						1 U
N-NITROSO-DI-N-PROPYLAMINE					1 U						1 U
N-NITROSODIETHYLAMINE					1 U						1 U
N-NITROSODIMETHYLAMINE					1 U						1 U
N-NITROSOMETHYLETHYLAMINE					1 U						1 U
N-NITROSOMORPHOLINE					1 U						1 U
N-NITROSOPIPERIDINE					1 U						1 U
N-NITROSOPYRROLIDINE					1 U						1 U
NAPHTHALENE					0.05 U						0.05 U
O,O,O-TRIETHYL PHOSPHOROTHIOATE					1 U						1 U
O-TOLUIDINE					1 U						1 U
P-(DIMETHYLAMINO)AZOBENZENE					1 U						1 U
PENTACHLOROBENZENE					1 U						1 U
PENTACHLOROETHANE					1 U						1 U
PENTACHLORONITROBENZENE					1 U						1 U
PHENACETIN					1 U						1 U
PHENANTHRENE					0.05 U						0.05 U
PHENOL					1 U						1 U
PRONAMIDE					1 U						1 U
PYRENE					0.05 U						0.05 U
PYRIDINE					1 U						1 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	02	02	03	01	02	03	01	02	03	01
LOCATION	16MWT12	16MWT16	16MWT16	16MWT16	WES-14-03-83	WES-14-03-83	WES-14-03-83	16MWT01	16MWT01	16MWT01	16MWT02
SAMPLE NUMBER	16GWT1202	16GWT1601	16GWT1601-F	16GWT1602	16GW0301	16GW0302	16GW0303	16GWT0101	16GWT0102	16GWT0103	16GWT0201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/24/2004	11/22/2003	11/23/2003	8/27/2004	5/11/2003	11/8/2003	8/24/2004	4/22/2003	11/9/2003	8/28/2004	4/22/2003
SAFROLE					1 U						1 U
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.264 U	0.253 U		0.25 U	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U
1,3-DINITROBENZENE	0.264 U	0.253 U		0.25 U	0.45 U	0.25 U	0.242 U			0.275 U	0.385 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.505 U				0.5 U					
2,4,6-TRINITROTOLUENE	0.264 U	0.253 U		0.25 U	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U
2,4-DIAMINO-6-NITROTOLUENE		0.253 U				0.25 U					
2,4-DINITROTOLUENE	0.264 U	0.253 U		0.25 U	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U
2,6-DIAMINO-4-NITROTOLUENE		0.253 U				0.25 U					
2,6-DINITROTOLUENE	0.264 U	0.253 U		0.25 U	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U
2-AMINO-4,6-DINITROTOLUENE	0.264 U	0.253 U		0.25 U	0.48 J	0.62 J	0.89			0.275 U	0.385 U
2-NITROTOLUENE	0.264 U	0.253 U		1	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U
3,5-DINITROANILINE		0.253 UJ				0.25 U					
3-NITROTOLUENE	0.264 U	0.253 U		0.25 U	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U
4-AMINO-2,6-DINITROTOLUENE	0.264 U	0.253 U		0.25 U	0.86 J	1.1	1 J			0.275 U	0.385 U
4-NITROTOLUENE	0.264 U	0.253 U		0.25 U	0.45 U	0.25 UJ	0.242 U			0.275 U	0.385 U
DNX		0.253 U				0.25 U					
HMX	0.264 U	0.253 U		0.25 U	5.7	7.5	6.1			0.275 U	0.385 U
MNX		0.253 U				0.82					
NITROBENZENE	0.264 U	0.253 U		0.25 U	0.45 U	0.25 U	0.242 U			0.275 U	0.385 U
PICRAMIC ACID					0.39 U						0.39 U
PICRIC ACID					0.39 U						0.39 U
RDX	0.264 U	0.253 U		0.25 U	52	71	50			0.275 U	0.79
TETRYL	0.264 UJ	0.253 U		0.25 UJ	0.45 U	0.25 U	0.242 UJ			0.275 UJ	0.385 U
TNX		0.253 U				0.25 U					
Herbicides (ug/L)											
HEXACHLOROPHENE					0.025 U						0.025 U
PENTACHLOROPHENOL					0.013 U						0.013 U
Total Metals (ug/L)											
ALUMINUM		53900 J		6060 J	1050	1550 J					168
ANTIMONY		1.8 U		1.7 U	0.03 U	0.02 U					0.89 U
ARSENIC		26.1 J		17.9 J	0.1 U	0.11 U					0.81 J
BARIUM		286 J		95.6 J	13.5 J	13.4 J					107 J
BERYLLIUM		8.3 J		6.1 J	0.48 U	0.77 U					0.06 U
CADMIUM		4 J		2.7 J	0.17 U	0.05 U					0.13 U
CALCIUM		168000 J		136000 J	48900 J	43200 J					47200 J
CHROMIUM		73.6 J		12.4 J	0.44 U	0.32 U					0.56 U
COBALT		530 J		563 J	15.1 J	13.9 J					3.9 J
COPPER		43.3 J		51.5 J	0.82 J	0.92 U					2.8 J
IRON		64700 J		18200 J	698 J	1380 J					5850 J
LEAD		54.8 J		33.3 J	0.12 U	0.28 U					0.51 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	02	02	03	01	02	03	01	02	03	01
LOCATION	16MWT12	16MWT16	16MWT16	16MWT16	WES-14-03-83	WES-14-03-83	WES-14-03-83	16MWT01	16MWT01	16MWT01	16MWT02
SAMPLE NUMBER	16GWT1202	16GWT1601	16GWT1601-F	16GWT1602	16GW0301	16GW0302	16GW0303	16GWT0101	16GWT0102	16GWT0103	16GWT0201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/24/2004	11/22/2003	11/23/2003	8/27/2004	5/11/2003	11/8/2003	8/24/2004	4/22/2003	11/9/2003	8/28/2004	4/22/2003
LITHIUM					33.2 J						0.72 U
MAGNESIUM		133000 J		120000 J	14000 J	12400 J					10900 J
MANGANESE		17900 J		16400 J	1960 J	2160 J					2590 J
MERCURY		0.007 U		0.046 U	0.02 U	0.02 U					0.02 U
NICKEL		714 J		808 J	43.1 J	37.5 J					1.5 J
POTASSIUM		19300 J		14900 J	2780 J	2990 J					1400 J
SELENIUM		5.2 J		2.8 J	0.36 U	0.31 U					0.2 U
SILVER		0.09 U		0.028 U	0.04 U	0.03 U					0.15 U
SODIUM		107000 J		91800 J	7190 J	6770 J					26900 J
STRONTIUM					254 J						387 J
THALLIUM		0.59 U		0.2 U	0.08 U	0.04 U					0.06 U
TIN		2.5 J		1.8 J	0.06 U	0.1 U					0.13 U
TITANIUM		134 J			1 J	4.5 U					4.3 J
VANADIUM		64.8 J		14.8	0.05 U	0.13 U					0.36 U
ZINC		791 J		661 J	69.5 J	61.5 J					31.9 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED			2460 J								
ANTIMONY, FILTERED			0.63 U								
ARSENIC, FILTERED			4.6 J								
BARIUM, FILTERED			17 J								
BERYLLIUM, FILTERED			3.8 J								
CADMIUM, FILTERED			3 J								
CALCIUM, FILTERED			158000 J								
CHROMIUM, FILTERED			0.71 U								
COBALT, FILTERED			522 J								
COPPER, FILTERED			20 J								
IRON, FILTERED			1140 U								
LEAD, FILTERED			6.2 J								
MAGNESIUM, FILTERED			131000 J								
MANGANESE, FILTERED			16700 J								
MERCURY, FILTERED			0.007 U								
NICKEL, FILTERED			622 J								
POTASSIUM, FILTERED			16500 J								
SELENIUM, FILTERED			3.1 J								
SILVER, FILTERED			0.03 U								
SODIUM, FILTERED			105000 J								
THALLIUM, FILTERED			0.13 U								
TIN, FILTERED			0.19 U								
TITANIUM, FILTERED			2.4 J								
VANADIUM, FILTERED			0.1 U								
ZINC, FILTERED			596 J								

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**MIDDLE**	**MIDDLE**	**MIDDLE**	**MIDDLE**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**03**	**02**	**02**	**03**	**01**	**02**	**03**	**01**	**02**	**03**	**01**
LOCATION	**16MWT12**	**16MWT16**	**16MWT16**	**16MWT16**	**WES-14-03-83**	**WES-14-03-83**	**WES-14-03-83**	**16MWT01**	**16MWT01**	**16MWT01**	**16MWT02**
SAMPLE NUMBER	**16GWT1202**	**16GWT1601**	**16GWT1601-F**	**16GWT1602**	**16GW0301**	**16GW0302**	**16GW0303**	**16GWT0101**	**16GWT0102**	**16GWT0103**	**16GWT0201**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**8/24/2004**	**11/22/2003**	**11/23/2003**	**8/27/2004**	**5/11/2003**	**11/8/2003**	**8/24/2004**	**4/22/2003**	**11/9/2003**	**8/28/2004**	**4/22/2003**
Field Parameters (mg/L)											
ALKALINITY						10 U					
CARBON DIOXIDE						130					
DISSOLVED OXYGEN	3.66			5.5		1	0.1			5.43	
DISSOLVED OXYGEN - METER		5.24			1.63	0.74		4.51	2.59		0.82
HYDROGEN SULFIDE (H2S)						0					
IRON(+2)						0.54					
MANGANESE(+2)						2.1					
NITRITE-N						0.007					
OXIDATION REDUCTION POTENTIAL (MV)	220.700000	306		58	154.200000	350	438.1	63.1	177	244.600000	-7.1
PH (S.U.)	4.64	5.03		6.24	5.84	4.82	5.28	6.51	5.97	5.83	6.33
SPECIFIC CONDUCTANCE (MS/CM)	2.785	1.86		1.789	0.483	0.355	0.43	1.061	2.322	2.5	0.4
SULFIDE						0.01					
TEMPERATURE (C)	17.81	17.61		20.33	14.17	13.62	18.66	13.01	15.05	17.28	11.51
TURBIDITY (NTU)	7.63	1000 >		1000 >	2.8	1.06	15.5	999 >	85.7	48.7	3.4
Miscellaneous Parameters (mg/L)											
AMMONIA-N					0.02						0.53
CHLORIDE						5					
NITRITE/NITRATE-N					0.54	0.7					0.03
SULFATE						170					
TOTAL ORGANIC CARBON											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	02	03
LOCATION	16MWT02	16MWT02	16MWT04	16MWT04	16MWT04	16MWT06	16MWT06	16MWT06	16MWT06	16MWT07	16MWT07
SAMPLE NUMBER	16GWT0202	16GWT0203	16GWT0401	16GWT0402	16GWT0403	16GWT0601	16GWT0602	16GWT0603	16GWT0604	16GWT0701	16GWT0702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DRY	DRY
SAMPLE DATE	10/26/2003	8/29/2004	4/22/2003	11/8/2003	8/15/2004	4/28/2003	5/11/2003	11/8/2003	8/24/2004	11/8/2003	8/24/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U		
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
1,1,2,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		1.6 J	2.1		
1,1,2-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	38 J		220 J	190		
1,1-DICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U		
1,1-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	26 J		120	160		
1,2,3-TRICHLOROPROPANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		0.3 UJ	0.6 J		
1,2-DIBROMO-3-CHLOROPROPANE	0.3 UJ	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 UJ		0.3 UJ	0.3 U		
1,2-DIBROMOETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
1,2-DICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	2.3		
1,2-DICHLOROPROPANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
1,4-DIOXANE	50 U	50 U	50 U	50 U	50 U	50 UJ		50 U	50 U		
2-BUTANONE	0.5 U	0.5 U	0.5 UR	0.5 U	0.5 U	0.5 U		0.5 UJ	0.5 U		
2-HEXANONE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ		16 J	1.4 J		
3-CHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U		
4-METHYL-2-PENTANONE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3.5 J		7.1	27		
ACETONE	0.5 UJ	0.5 UJ	0.5 UR	0.5 UJ	0.5 UJ	10 U		18 J	12 U		
ACETONITRILE	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U		
ACROLEIN	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR		0.5 UR	0.5 UR		
ACRYLONITRILE	0.5 U	0.5 U	0.5 UR	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U		
BENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.9 J		3.3	3.5		
BROMODICHLOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.8 J		0.3 U	0.3 U		
BROMOFORM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
BROMOMETHANE	0.3 UJ	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 UJ		0.3 UJ	0.3 U		
CARBON DISULFIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.8 J		4.3	3.04		
CARBON TETRACHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.8 J	0.3 U		
CHLOROBENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
CHLORODIBROMOMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U		
CHLOROFORM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	12 J		10	15		
CHLOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U		
CHLOROPRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U		
CIS-1,2-DICHLOROETHENE	0.8 J	0.3 U	0.3 U	0.3 U	0.3 U	600		4200	4100		
CIS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
DIBROMOMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U		
DICHLORODIFLUOROMETHANE	0.3 U	0.3 UJ	0.3 U	0.3 UJ	0.3 UJ	0.3 U		0.3 UJ	0.3 U		
ETHANE				0.013				7.7			
ETHENE				0.027				65			
ETHYL METHACRYLATE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U		
ETHYLBENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		2.6	3.9		

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	02	03
LOCATION	16MWT02	16MWT02	16MWT04	16MWT04	16MWT04	16MWT06	16MWT06	16MWT06	16MWT06	16MWT07	16MWT07
SAMPLE NUMBER	16GWT0202	16GWT0203	16GWT0401	16GWT0402	16GWT0403	16GWT0601	16GWT0602	16GWT0603	16GWT0604	16GWT0701	16GWT0702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DRY	DRY
SAMPLE DATE	10/26/2003	8/29/2004	4/22/2003	11/8/2003	8/15/2004	4/28/2003	5/11/2003	11/8/2003	8/24/2004	11/8/2003	8/24/2004
ISOBUTANOL	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U		
METHACRYLONITRILE	0.3 UJ	0.3 U	0.3 UR	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U		
METHANE				0.93				280			
METHYL IODIDE	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U		0.5 UJ	0.5 U		
METHYL METHACRYLATE	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U		
METHYLENE CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U		0.3 U	0.3 UJ		
PROPIONITRILE	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U		
STYRENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
TETRACHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	13 J		160	150		
TOLUENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	32 J		270 J	310 J		
TOTAL XYLENES	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		3.5	6.5		
TRANS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	3.1 J		22	20		
TRANS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ		0.3 U	0.3 U		
TRANS-1,4-DICHLORO-2-BUTENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U		
TRICHLOROETHENE	6.5	3.5	2.2	3.9	2.1	35000		250000	330000		
TRICHLOROFLUOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U		
VINYL ACETATE	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U		0.5 U	0.5 U		
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	65 J		340 J	390 J		
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE			1 U			1 U	1 U				
1,2,4-TRICHLOROBENZENE			1 U			1 U	1 U				
1,2-DICHLOROBENZENE			1 U			1 U	1 U				
1,3-DICHLOROBENZENE			1 U			1 U	1 U				
1,4-DICHLOROBENZENE			1 U			1 U	1 U				
1,4-NAPHTHOQUINONE			1 U			1 UJ	1 U				
1,4-PHENYLENEDIAMINE			1 U			1 UJ	1 UJ				
1-NAPHTHYLAMINE			1 U			1 U	1 U				
2,2'-OXYBIS(1-CHLOROPROPANE)			1 U			1 U	1 U				
2,3,4,6-TETRACHLOROPHENOL			1 U			1 UR	1 U				
2,4,5-TRICHLOROPHENOL			1 U			1 UR	1 U				
2,4,6-TRICHLOROPHENOL			1 U			1 UR	1 U				
2,4-DICHLOROPHENOL			1 U			1 UR	1 U				
2,4-DIMETHYLPHENOL			1 U			1 UR	1 U				
2,4-DINITROPHENOL			1 U			1 UR	1 UJ				
2,6-DICHLOROPHENOL			1 U			1 UR	1 U				
2-ACETYLAMINOFLUORENE			1 U			1 U	1 U				
2-CHLORONAPHTHALENE			1 U			1 UJ	1 U				
2-CHLOROPHENOL			1 U			1 UR	1 U				
2-METHYLNAPHTHALENE			0.05 U			0.11					
2-METHYLPHENOL			1 U			1 UR	1 U				
2-NAPHTHYLAMINE			1 U			1 U	1 U				

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	02	03
LOCATION	16MWT02	16MWT02	16MWT04	16MWT04	16MWT04	16MWT06	16MWT06	16MWT06	16MWT06	16MWT07	16MWT07
SAMPLE NUMBER	16GWT0202	16GWT0203	16GWT0401	16GWT0402	16GWT0403	16GWT0601	16GWT0602	16GWT0603	16GWT0604	16GWT0701	16GWT0702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DRY	DRY
SAMPLE DATE	10/26/2003	8/29/2004	4/22/2003	11/8/2003	8/15/2004	4/28/2003	5/11/2003	11/8/2003	8/24/2004	11/8/2003	8/24/2004
2-NITROANILINE			1 U			1 U	1 U				
2-NITROPHENOL			1 U			1 UR	1 U				
2-PICOLINE			1 U			1 U	1 U				
3&4-METHYLPHENOL			1 U			1 UR	1 U				
3,3'-DICHLOROBENZIDINE			1 U			1 U	1 U				
3,3'-DIMETHYLBENZIDINE			1 U			1 U	1 U				
3-METHYLCHOLANTHRENE			1 U			1 U	1 U				
3-NITROANILINE			1 U			1 U	1 U				
4,6-DINITRO-2-METHYLPHENOL			1 U			1 UR	1 U				
4-AMINOBIPHENYL			1 U			1 U	1 U				
4-BROMOPHENYL PHENYL ETHER			1 U			1 U	1 U				
4-CHLORO-3-METHYLPHENOL			1 U			1 UR	1 U				
4-CHLOROANILINE			1 U			1 U	1 U				
4-CHLOROPHENYL PHENYL ETHER			1 U			1 U	1 U				
4-NITROANILINE			1 U			1 U	1 U				
4-NITROPHENOL			1 U			1 UR	1 U				
4-NITROQUINOLINE-1-OXIDE			1 UR			1 UR	1 UR				
5-NITRO-O-TOLUIDINE			1 U			1 U	1 U				
7,12-DIMETHYLBENZ(A)ANTHRACENE			1 U			1 U	1 U				
A,A-DIMETHYLPHENETHYLAMINE			1 UJ			1 U	1 U				
ACENAPHTHENE			0.05 U			0.07 J					
ACENAPHTHYLENE			0.05 U			0.05 U					
ACETOPHENONE			1 U			1 U	1 U				
ANILINE			1 U			1 U	1 UJ				
ANTHRACENE			0.05 U			0.05 U					
ARAMITE			1 UR			1 UR	1 UR				
BENZO(A)ANTHRACENE			0.05 U			0.05 U					
BENZO(A)PYRENE			0.05 U			0.05 U					
BENZO(B)FLUORANTHENE			0.05 U			0.09 J					
BENZO(G,H,I)PERYLENE			0.05 U			0.05 U					
BENZO(K)FLUORANTHENE			0.05 U			0.05 U					
BENZYL ALCOHOL			1 U			1 U	1 U				
BIS(2-CHLOROETHOXY)METHANE			1 U			1 U	1 U				
BIS(2-CHLOROETHYL)ETHER			1 U			1 U	1 U				
BIS(2-ETHYLHEXYL)PHTHALATE			1 U			1 BU	1 U				
BUTYL BENZYL PHTHALATE			1 U			1 U	1 U				
CHLOROBENZILATE			1 U			1 U	1 U				
CHRYSENE			0.05 U			0.1 J					
DI-N-BUTYL PHTHALATE			1 U			1 U	1 U				
DI-N-OCTYL PHTHALATE			1 U			1 U	1 U				
DIALLATE			1 U			1 U	1 U				

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	02	03
LOCATION	16MWT02	16MWT02	16MWT04	16MWT04	16MWT04	16MWT06	16MWT06	16MWT06	16MWT06	16MWT07	16MWT07
SAMPLE NUMBER	16GWT0202	16GWT0203	16GWT0401	16GWT0402	16GWT0403	16GWT0601	16GWT0602	16GWT0603	16GWT0604	16GWT0701	16GWT0702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DRY	DRY
SAMPLE DATE	10/26/2003	8/29/2004	4/22/2003	11/8/2003	8/15/2004	4/28/2003	5/11/2003	11/8/2003	8/24/2004	11/8/2003	8/24/2004
DIBENZO(A,H)ANTHRACENE			0.05 U			0.05 U					
DIBENZOFURAN			1 U			1 U	1 U				
DIETHYL PHTHALATE			1 U			1 J	1 U				
DIMETHYL PHTHALATE			1 U			1 U	1 U				
DIPHENYLAMINE			1 U			1 U	1 U				
ETHYL METHANE SULFONATE			1 U			1 U	1 U				
FLUORANTHENE			0.05 U			0.11					
FLUORENE			0.05 U			0.1 J					
HEXACHLOROBENZENE			1 U			1 U	1 U				
HEXACHLOROBUTADIENE			1 U			1 U	1 U				
HEXACHLOROCYCLOPENTADIENE			1 U			1 UR	1 UR				
HEXACHLOROETHANE			1 U			1 U	1 U				
HEXACHLOROPROPENE			1 U			1 U	1 U				
INDENO(1,2,3-CD)PYRENE			0.05 U			0.05 U					
ISODRIN			1 U			1 U	1 U				
ISOPHORONE			1 U			1 U	1 U				
ISOSAFROLE			1 U			1 U	1 U				
KEPONE			1 UR			1 UJ	1 UR				
METHAPYRILENE			1 U			1 U	1 U				
METHYL METHANE SULFONATE			1 U			1 U	1 U				
N-NITROSO-DI-N-BUTYLAMINE			1 U			1 U	1 U				
N-NITROSO-DI-N-PROPYLAMINE			1 U			1 U	1 U				
N-NITROSODIETHYLAMINE			1 U			1 U	1 U				
N-NITROSODIMETHYLAMINE			1 U			1 U	1 UJ				
N-NITROSOMETHYLETHYLAMINE			1 U			1 U	1 U				
N-NITROSOMORPHOLINE			1 U			1 U	1 U				
N-NITROSOPIPERIDINE			1 U			1 U	1 U				
N-NITROSOPYRROLIDINE			1 U			1 U	1 U				
NAPHTHALENE			0.05 U			0.05 U					
O,O,O-TRIETHYL PHOSPHOROTHIOATE			1 U			1 U	1 U				
O-TOLUIDINE			1 U			1 U	1 U				
P-(DIMETHYLAMINO)AZOBENZENE			1 U			1 U	1 U				
PENTACHLOROBENZENE			1 U			1 U	1 U				
PENTACHLOROETHANE			1 U			1 U	1 U				
PENTACHLORONITROBENZENE			1 U			1 U	1 U				
PHENACETIN			1 U			1 U	1 U				
PHENANTHRENE			0.05 U			0.54					
PHENOL			1 U			1 UR	1 U				
PRONAMIDE			1 U			1 U	1 U				
PYRENE			0.05 U			0.2					
PYRIDINE			1 U			1 U	9				

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	02	03
LOCATION	16MWT02	16MWT02	16MWT04	16MWT04	16MWT04	16MWT06	16MWT06	16MWT06	16MWT06	16MWT07	16MWT07
SAMPLE NUMBER	16GWT0202	16GWT0203	16GWT0401	16GWT0402	16GWT0403	16GWT0601	16GWT0602	16GWT0603	16GWT0604	16GWT0701	16GWT0702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DRY	DRY
SAMPLE DATE	10/26/2003	8/29/2004	4/22/2003	11/8/2003	8/15/2004	4/28/2003	5/11/2003	11/8/2003	8/24/2004	11/8/2003	8/24/2004
SAFROLE			1 U			1 U	1 U				
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.26 U	0.26 U	0.55 U	0.255 UJ	0.27 U	0.34 U		0.25 UJ	1.8		
1,3-DINITROBENZENE	0.26 U	0.26 U	0.55 U	0.255 U	0.27 U	0.34 U		0.25 U	0.25 U		
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.52 U			0.51 U				0.5 U			
2,4,6-TRINITROTOLUENE	0.26 U	0.26 U	0.55 U	0.255 UJ	0.27 U	0.34 U		0.25 UJ	4.8		
2,4-DIAMINO-6-NITROTOLUENE	0.26 U			0.255 U				0.27 J			
2,4-DINITROTOLUENE	0.26 U	0.26 U	0.55 U	0.255 UJ	0.27 U	0.34 U		0.25 UJ	0.8		
2,6-DIAMINO-4-NITROTOLUENE	0.26 U			0.255 U				0.25 U			
2,6-DINITROTOLUENE	0.26 U	0.26 U	0.55 U	0.255 UJ	0.27 U	0.34 U		0.25 UJ	0.25 U		
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.26 U	0.55 U	0.47 J	0.27 U	0.34 U		4.2 J	29 J		
2-NITROTOLUENE	0.26 U	0.26 U	0.55 U	0.255 UJ	0.27 U	0.34 U		0.25 UJ	0.25 U		
3,5-DINITROANILINE	0.26 U			0.255 U				0.25 U			
3-NITROTOLUENE	0.26 U	0.26 U	0.55 U	0.255 UJ	0.27 U	0.34 U		0.25 UJ	0.25 U		
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.26 U	0.55 U	1 J	0.56	0.34 U		1.5	14		
4-NITROTOLUENE	0.26 U	0.26 U	0.55 U	0.255 UJ	0.27 U	0.34 U		0.25 UJ	0.25 U		
DNX	0.26 U			0.63 J				0.25 U			
HMX	0.26 U	0.26 U	7.8	21	8.6	0.34 U		0.27 J	0.93 J		
MNX	0.26 U			4.1				0.25 U			
NITROBENZENE	0.26 U	0.26 U	0.55 U	0.255 U	0.27 U	0.34 U		0.25 U	0.25 U		
PICRAMIC ACID			0.39 U			0.39 U					
PICRIC ACID			0.39 U			0.39 U					
RDX	0.26 U	0.26 U	77	200	70	4		1.8	8.8		
TETRYL	0.26 U	0.26 UJ	0.55 U	0.255 U	0.27 U	0.34 U		0.25 U	0.25 UJ		
TNX	0.26 U			0.255 U				0.25 U			
Herbicides (ug/L)											
HEXACHLOROPHENE			0.025 U			0.025 U					
PENTACHLOROPHENOL			0.013 U			0.013 U					
Total Metals (ug/L)											
ALUMINUM	29.1 U		1050	554 J		222 J		1060 J			
ANTIMONY	0.31 U		1.4 U	1.5 U		2.4 U		0.26 U			
ARSENIC	1.2 J		0.41 U	0.1 U		4.5 J		1.5 J			
BARIUM	88.3 J		68.7 J	71.2 J		36.9 J		49.5 J			
BERYLLIUM	0.07 U		0.16 U	0.25 U		0.03 U		0.07 U			
CADMIUM	0.09 U		0.16 U	0.04 U		0.05 UJ		0.04 U			
CALCIUM	39900 J		22600 J	32600 J		96800 J		101000 J			
CHROMIUM	0.3 U		0.68 J	0.31 U		0.93 J		3.5 J			
COBALT	7 J		7.1 J	9.7 J		2 J		49.5 J			
COPPER	1.1 U		3.4 J	1.2 U		4.9 J		0.85 U			
IRON	7490 J		568 J	3180 J		171 J		1240 J			
LEAD	0.44 U		0.43 U	0.28 U		0.4 U		0.55 U			

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	02	03
LOCATION	16MWT02	16MWT02	16MWT04	16MWT04	16MWT04	16MWT06	16MWT06	16MWT06	16MWT06	16MWT07	16MWT07
SAMPLE NUMBER	16GWT0202	16GWT0203	16GWT0401	16GWT0402	16GWT0403	16GWT0601	16GWT0602	16GWT0603	16GWT0604	16GWT0701	16GWT0702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DRY	DRY
SAMPLE DATE	10/26/2003	8/29/2004	4/22/2003	11/8/2003	8/15/2004	4/28/2003	5/11/2003	11/8/2003	8/24/2004	11/8/2003	8/24/2004
LITHIUM			8.5 J			21.9 J					
MAGNESIUM	9120 J		8270 J	10400 J		19700 J		72800 J			
MANGANESE	5830 J		353 J	962 J		482 J		3210 J			
MERCURY	0.02 U		0.02 U	0.02 U		0.02 U		0.02 U			
NICKEL	3.3 J		21.1 J	24.9 J		8.1 J		119 J			
POTASSIUM	1790 J		1360 J	1530 J		11900 J		8440 J			
SELENIUM	0.11 U		0.43 U	0.04 U		1.2 J		1.4 U			
SILVER	0.06 U		0.13 U	0.03 U		0.04 U		0.03 U			
SODIUM	31900 J		18200 J	12000 J		37100 J		149000 J			
STRONTIUM			278 J			186 J					
THALLIUM	0.19 U		0.1 U	0.04 U		0.04 U		0.04 U			
TIN	0.12 U		0.24 U	0.1 U		0.08 U		0.1 U			
TITANIUM	0.45 U		8.4 J	1.7 U		4 J		35 J			
VANADIUM	0.12 U		0.51 J	0.16 U		0.8 J		2.2 J			
ZINC	17.5 J		15.9 J	42.5 J		6.2 J		19.9 J			
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED											
ANTIMONY, FILTERED											
ARSENIC, FILTERED											
BARIUM, FILTERED											
BERYLLIUM, FILTERED											
CADMIUM, FILTERED											
CALCIUM, FILTERED											
CHROMIUM, FILTERED											
COBALT, FILTERED											
COPPER, FILTERED											
IRON, FILTERED											
LEAD, FILTERED											
MAGNESIUM, FILTERED											
MANGANESE, FILTERED											
MERCURY, FILTERED											
NICKEL, FILTERED											
POTASSIUM, FILTERED											
SELENIUM, FILTERED											
SILVER, FILTERED											
SODIUM, FILTERED											
THALLIUM, FILTERED											
TIN, FILTERED											
TITANIUM, FILTERED											
VANADIUM, FILTERED											
ZINC, FILTERED											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**	**DOWNGRAD**
WATER BEARING ZONE	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**	**UPPER**
SAMPLING ROUND	**02**	**03**	**01**	**02**	**03**	**01**	**01**	**02**	**03**	**02**	**03**
LOCATION	**16MWT02**	**16MWT02**	**16MWT04**	**16MWT04**	**16MWT04**	**16MWT06**	**16MWT06**	**16MWT06**	**16MWT06**	**16MWT07**	**16MWT07**
SAMPLE NUMBER	**16GWT0202**	**16GWT0203**	**16GWT0401**	**16GWT0402**	**16GWT0403**	**16GWT0601**	**16GWT0602**	**16GWT0603**	**16GWT0604**	**16GWT0701**	**16GWT0702**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**DRY**	**DRY**
SAMPLE DATE	**10/26/2003**	**8/29/2004**	**4/22/2003**	**11/8/2003**	**8/15/2004**	**4/28/2003**	**5/11/2003**	**11/8/2003**	**8/24/2004**	**11/8/2003**	**8/24/2004**
Field Parameters (mg/L)											
ALKALINITY				75				200			
CARBON DIOXIDE				19				40			
DISSOLVED OXYGEN		0.87		2	1.81			1.5	0.39		
DISSOLVED OXYGEN - METER	1.08		5.41	0.89		0.48	6.94	1.67			
HYDROGEN SULFIDE (H2S)				0				0			
IRON(+2)				5.19				0.03			
MANGANESE(+2)				1				3.8			
NITRITE-N				0.004				0.016			
OXIDATION REDUCTION POTENTIAL (MV)	273.200000	60	79.7	152	54	-106	-117.10000	188.600000	402		
PH (S.U.)	5.76	6.03	6.28	5.84	5.6	7.7	6.93	6.49	4.69		
SPECIFIC CONDUCTANCE (MS/CM)	0.391	0.343	0.225	0.582	0.232	0.516	0.96	1.216	1.219		
SULFIDE				0				0.07			
TEMPERATURE (C)	14.81	20.46	12.41	15.73	19.45	15	14.2	14.55	18.77		
TURBIDITY (NTU)	6.7	8.7	9.2	2.2	5.13	8.8	43.1	1.99	29		
Miscellaneous Parameters (mg/L)											
AMMONIA-N			0.03			0.57					
CHLORIDE	83			10				47			
NITRITE/NITRATE-N	0.05 U		0.6	0.49		0.5		0.025 U			
SULFATE	40			70				520			
TOTAL ORGANIC CARBON				1.4							

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	VALLEY
SAMPLING ROUND	02	03	02	03	03	02	02	03	02	03	03
LOCATION	16MWT09	16MWT09	16MWT10	16MWT10	16MWT10	16MWT13	16MWT13	16MWT13	16MWT17	16MWT17	16MWT19
SAMPLE NUMBER	16GWT0901	16GWT0902	16GWT1001	16GWT1002	16GWT1002-D	16GWT1301	16GWT1301-F	16GWT1302	16GWT1701	16GWT1702	16GWT1901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	11/22/2003	8/17/2004	11/21/2003	8/17/2004	8/17/2004	11/22/2003	11/22/2003	8/18/2004	12/5/2003	8/25/2004	8/29/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
1,1,2,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
1,1,2-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	81 J		39	32	60 U	0.3 U
1,1-DICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
1,1-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		4.4	5.3	60 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
1,2-DIBROMOETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
1,2-DICHLOROETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.6 J	0.3 U	60 U	0.3 U
1,2-DICHLOROPROPANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
1,4-DIOXANE	50 U	50 U	50 U	50 U	50 U	50 U		50 U	50 U	50 U	50 U
2-BUTANONE	0.5 UR	0.5 U	0.5 UR	0.5 U	0.5 U	50 UR		0.5 U	0.5 U	100 U	0.5 U
2-HEXANONE	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	50 UJ		0.5 U	0.5 U	100 U	0.5 U
3-CHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	50 U		0.5 U	0.5 U	100 U	0.5 U
4-METHYL-2-PENTANONE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	50 U		0.5 U	0.5 U	100 U	0.5 U
ACETONE	0.5 UR	0.5 UJ	0.5 UR	0.5 UJ	0.5 UJ	50 UR		0.5 UJ	0.5 J	100 UJ	0.5 UJ
ACETONITRILE	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U	20 U	20 U
ACROLEIN	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	50 UR		0.5 UR	0.5 UR	100 UR	0.5 UR
ACRYLONITRILE	0.5 UR	0.5 U	0.5 UR	0.5 U	0.5 U	50 UR		0.5 U	0.5 U	100 U	0.5 U
BENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		1.1	1.1	60 U	0.3 U
BROMODICHLOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
BROMOFORM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
BROMOMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
CARBON DISULFIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
CARBON TETRACHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
CHLOROBENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
CHLORODIBROMOMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	50 U		0.5 U	0.5 U	100 U	0.5 U
CHLOROFORM	0.9 J	0.8 J	3.4	2.6	2.5	30 U		3.1	2.8	60 U	0.3 U
CHLOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 UJ	0.3 U	60 U	0.3 U
CHLOROPRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	50 U		0.5 U	0.5 U	100 U	0.5 U
CIS-1,2-DICHLOROETHENE	0.2 J	0.3 U	0.2 J	0.3 U	0.3 U	280		140	210	290	0.3 U
CIS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
DIBROMOMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
DICHLORODIFLUOROMETHANE	0.3 U	0.3 UJ	0.3 U	0.3 UJ	0.3 UJ	30 U		0.3 UJ	0.3 U	60 U	0.3 U
ETHANE			0.33			0.45					
ETHENE			0.16			0.67					
ETHYL METHACRYLATE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	50 U		0.5 U	0.5 U	100 U	0.5 U
ETHYLBENZENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		1.6	0.3 U	60 U	0.3 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	VALLEY
SAMPLING ROUND	02	03	02	03	03	02	02	03	02	03	03
LOCATION	16MWT09	16MWT09	16MWT10	16MWT10	16MWT10	16MWT13	16MWT13	16MWT13	16MWT17	16MWT17	16MWT19
SAMPLE NUMBER	16GWT0901	16GWT0902	16GWT1001	16GWT1002	16GWT1002-D	16GWT1301	16GWT1301-F	16GWT1302	16GWT1701	16GWT1702	16GWT1901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	11/22/2003	8/17/2004	11/21/2003	8/17/2004	8/17/2004	11/22/2003	11/22/2003	8/18/2004	12/5/2003	8/25/2004	8/29/2004
ISOBUTANOL	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U	20 U	20 U
METHACRYLONITRILE	0.3 UR	0.3 U	0.3 UR	0.3 U	0.3 U	30 UR		0.3 U	0.3 U	60 U	0.3 U
METHANE			19			0.032					
METHYL IODIDE	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	50 UJ		0.5 U	0.5 U	100 U	0.5 U
METHYL METHACRYLATE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	50 U		0.5 U	0.5 U	100 U	0.5 U
METHYLENE CHLORIDE	0.3 UJ	0.3 UJ	0.3 UJ	0.3 UJ	0.3 UJ	59 J		0.3 UJ	0.3 U	60 U	0.3 U
PROPIONITRILE	20 U	20 U	20 U	20 U	20 U	20 U		20 U	20 U	20 U	20 U
STYRENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
TETRACHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		7.2	1.4	60 U	0.3 U
TOLUENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		2.8	0.3 U	60 U	0.3 U
TOTAL XYLENES	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		2.8	0.3 U	60 U	0.3 U
TRANS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		1.9	4.1	60 U	0.3 U
TRANS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
TRANS-1,4-DICHLORO-2-BUTENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	50 U		0.5 U	0.5 U	100 UJ	0.5 UJ
TRICHLOROETHENE	7.6	7.1	1.9	1.9	1.9	62000		28000	11000	19000	0.3 U
TRICHLOROFLUOROMETHANE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.3 U	0.3 U	60 U	0.3 U
VINYL ACETATE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	50 U		0.5 U	0.5 U	100 U	0.5 U
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	30 U		0.8 J	2.1	60 U	0.3 U
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	VALLEY
SAMPLING ROUND	02	03	02	03	03	02	02	03	02	03	03
LOCATION	16MWT09	16MWT09	16MWT10	16MWT10	16MWT10	16MWT13	16MWT13	16MWT13	16MWT17	16MWT17	16MWT19
SAMPLE NUMBER	16GWT0901	16GWT0902	16GWT1001	16GWT1002	16GWT1002-D	16GWT1301	16GWT1301-F	16GWT1302	16GWT1701	16GWT1702	16GWT1901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	11/22/2003	8/17/2004	11/21/2003	8/17/2004	8/17/2004	11/22/2003	11/22/2003	8/18/2004	12/5/2003	8/25/2004	8/29/2004
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	VALLEY
SAMPLING ROUND	02	03	02	03	03	02	02	03	02	03	03
LOCATION	16MWT09	16MWT09	16MWT10	16MWT10	16MWT10	16MWT13	16MWT13	16MWT13	16MWT17	16MWT17	16MWT19
SAMPLE NUMBER	16GWT0901	16GWT0902	16GWT1001	16GWT1002	16GWT1002-D	16GWT1301	16GWT1301-F	16GWT1302	16GWT1701	16GWT1702	16GWT1901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	11/22/2003	8/17/2004	11/21/2003	8/17/2004	8/17/2004	11/22/2003	11/22/2003	8/18/2004	12/5/2003	8/25/2004	8/29/2004
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	VALLEY
SAMPLING ROUND	02	03	02	03	03	02	02	03	02	03	03
LOCATION	16MWT09	16MWT09	16MWT10	16MWT10	16MWT10	16MWT13	16MWT13	16MWT13	16MWT17	16MWT17	16MWT19
SAMPLE NUMBER	16GWT0901	16GWT0902	16GWT1001	16GWT1002	16GWT1002-D	16GWT1301	16GWT1301-F	16GWT1302	16GWT1701	16GWT1702	16GWT1901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	11/22/2003	8/17/2004	11/21/2003	8/17/2004	8/17/2004	11/22/2003	11/22/2003	8/18/2004	12/5/2003	8/25/2004	8/29/2004
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
1,3-DINITROBENZENE	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.543 U		0.575 U			0.549 U			0.538 U		
2,4,6-TRINITROTOLUENE	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
2,4-DIAMINO-6-NITROTOLUENE	0.272 U		0.287 U			0.275 U			0.269 U		
2,4-DINITROTOLUENE	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
2,6-DIAMINO-4-NITROTOLUENE	0.272 U		0.287 U			0.275 U			0.269 U		
2,6-DINITROTOLUENE	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
2-AMINO-4,6-DINITROTOLUENE	0.31 J	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
2-NITROTOLUENE	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
3,5-DINITROANILINE	0.272 UJ		0.287 U			0.275 U			0.269 U		
3-NITROTOLUENE	0.272 U	1.5 J	0.287 U	2.1 J	2.1 J	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
4-AMINO-2,6-DINITROTOLUENE	0.69 J	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
4-NITROTOLUENE	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
DNX	0.272 U		0.287 U			0.275 U			0.269 U		
HMX	11	8.1	6.7	5.2	5	0.275 U		0.271 U	0.43 J	0.27 U	2.71 U
MNX	1.1		0.5 J			0.275 U			0.269 U		
NITROBENZENE	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 U	2.71 U
PICRAMIC ACID											
PICRIC ACID											
RDX	110	79	55	55	49	6.7		1.1	4.3	5.2	2.71 U
TETRYL	0.272 U	0.27 U	0.287 U	0.27 U	0.27 U	0.275 U		0.271 U	0.269 U	0.27 UJ	2.71 UJ
TNX	0.272 U		0.287 U			0.275 U			0.269 U		
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	1050 J		5810 J			2290 J			187 J		89.2 J
ANTIMONY	0.03 U		0.02 U			0.13 U			0.05 U		0.09 U
ARSENIC	0.65 U		1.5 U			1.9 U			1.3 U		0.13 U
BARIUM	28 J		15.7 J			71.2 J			42.7 J		41.7 J
BERYLLIUM	0.78 U		1.9 J			1.3 U			0.69 U		0.5 U
CADMIUM	0.22 U		1.2 U			0.61 U			0.53 U		0.33 U
CALCIUM	33300 J		85100 J			94100 J			42200 J		38100 J
CHROMIUM	0.42 U		1.3 U			5.5 J			0.39 U		1.1 U
COBALT	44.3 J		131 J			62.1 J			64.4 J		6.4 J
COPPER	5.8 J		12.4 J			7.3 J			0.56 U		0.47 U
IRON	15800 J		50200 J			9220 J			27000 J		19.8 U
LEAD	2.6 J		6.6 J			4.4 J			0.24 U		0.07 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	VALLEY
SAMPLING ROUND	02	03	02	03	03	02	02	03	02	03	03
LOCATION	16MWT09	16MWT09	16MWT10	16MWT10	16MWT10	16MWT13	16MWT13	16MWT13	16MWT17	16MWT17	16MWT19
SAMPLE NUMBER	16GWT0901	16GWT0902	16GWT1001	16GWT1002	16GWT1002-D	16GWT1301	16GWT1301-F	16GWT1302	16GWT1701	16GWT1702	16GWT1901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	11/22/2003	8/17/2004	11/21/2003	8/17/2004	8/17/2004	11/22/2003	11/22/2003	8/18/2004	12/5/2003	8/25/2004	8/29/2004
LITHIUM											
MAGNESIUM	17100 J		78800 J			12400 J			16700 J		39000 J
MANGANESE	4350 J		24600 J			3600 J			5940 J		502 J
MERCURY	0.007 U		0.007 U			0.007 U			0.007 U		0.049 U
NICKEL	87.8 J		219 J			212 J			125 J		82.1 J
POTASSIUM	3300 J		4060 J			7850 J			5380 J		1140 J
SELENIUM	0.33 U		0.43 U			0.73 U			0.07 U		0.1 U
SILVER	0.03 U		0.03 U			0.03 U			0.03 U		0.03 U
SODIUM	16700 J		13400 J			18300 J			61300 J		12800 J
STRONTIUM											
THALLIUM	0.13 U		0.05 U			0.15 U			0.12 U		0.043 U
TIN	0.1 U		0.1 U			0.21 U			0.1 U		0.06 U
TITANIUM	0.63 U		2.6 J			17.4 J			0.74 U		
VANADIUM	0.07 U		0.3 U			4.1 J			0.17 U		1.14 U
ZINC	94.1 J		443 J			248 J			122 J		56 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED							342 J				
ANTIMONY, FILTERED							0.19 U				
ARSENIC, FILTERED							0.82 U				
BARIUM, FILTERED							56.6 J				
BERYLLIUM, FILTERED							0.94 U				
CADMIUM, FILTERED							0.62 U				
CALCIUM, FILTERED							38800 J				
CHROMIUM, FILTERED							0.4 U				
COBALT, FILTERED							58.5 J				
COPPER, FILTERED							5.4 J				
IRON, FILTERED							5230 J				
LEAD, FILTERED							1.4 U				
MAGNESIUM, FILTERED							11800 J				
MANGANESE, FILTERED							3600 J				
MERCURY, FILTERED							0.007 U				
NICKEL, FILTERED							193 J				
POTASSIUM, FILTERED							7280 J				
SELENIUM, FILTERED							0.81 U				
SILVER, FILTERED							0.03 U				
SODIUM, FILTERED							18500 J				
THALLIUM, FILTERED							0.18 U				
TIN, FILTERED							0.1 U				
TITANIUM, FILTERED							0.83 U				
VANADIUM, FILTERED							0.17 U				
ZINC, FILTERED							244 J				

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	VALLEY
SAMPLING ROUND	02	03	02	03	03	02	02	03	02	03	03
LOCATION	16MWT09	16MWT09	16MWT10	16MWT10	16MWT10	16MWT13	16MWT13	16MWT13	16MWT17	16MWT17	16MWT19
SAMPLE NUMBER	16GWT0901	16GWT0902	16GWT1001	16GWT1002	16GWT1002-D	16GWT1301	16GWT1301-F	16GWT1302	16GWT1701	16GWT1702	16GWT1901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	11/22/2003	8/17/2004	11/21/2003	8/17/2004	8/17/2004	11/22/2003	11/22/2003	8/18/2004	12/5/2003	8/25/2004	8/29/2004
Field Parameters (mg/L)											
ALKALINITY			10 U			10 U					
CARBON DIOXIDE			280			140					
DISSOLVED OXYGEN		0.37	0.35	0.14		6		0.08		0.18	3.32
DISSOLVED OXYGEN - METER	2.33		1.28			7.27			0.63		
HYDROGEN SULFIDE (H2S)			0			0					
IRON(+2)			3.3 >			3.3 >					
MANGANESE(+2)			22 >			4.1					
NITRITE-N			0.002			0.008					
OXIDATION REDUCTION POTENTIAL (MV)	329.8	199.700000	328.900000	501.200000		264.8		541	111.5	274.3	341.900000
PH (S.U.)	4.1	4.7	3.72	3.21		4.72		5.42	5.58	4.59	4.73
SPECIFIC CONDUCTANCE (MS/CM)	0.502	0.937	1.178	1.284		0.433		0.42	0.649	0.786	0.412
SULFIDE			0.02			0.02					
TEMPERATURE (C)	16.56	19.68	14.77	16.75		21.88		18.44	11.63	18.56	19.6
TURBIDITY (NTU)	4.82	2.32	5.56	6.31		8.67		105	5.92	9.1	2.91
Miscellaneous Parameters (mg/L)											
AMMONIA-N											
CHLORIDE	14 U		8 J			17 U			120		
NITRITE/NITRATE-N	0.05 U		0.27 J			0.19 J			0.05 UJ		
SULFATE	210 U		980 J			180 U			150		
TOTAL ORGANIC CARBON											

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	VALLEY	VALLEY	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	03	01	01	02	03
LOCATION	16MWT19	16MWT20	WES-14-02-83	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GWT1901-D	16GWT2001	16GW0201	16GW0202	16GW0203	16GW0204
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/29/2004	8/29/2004	4/24/2003	5/11/2003	10/26/2003	8/25/2004
Volatile Organics (ug/L)						
1,1,1,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,1,2,2-TETRACHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,1,2-TRICHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,1-DICHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,1-DICHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,2,3-TRICHLOROPROPANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,2-DIBROMO-3-CHLOROPROPANE	0.3 U	0.3 U	0.3 U		0.3 UJ	0.3 U
1,2-DIBROMOETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,2-DICHLOROETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,2-DICHLOROPROPANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
1,4-DIOXANE	50 U	50 U	50 U		50 U	50 U
2-BUTANONE	0.5 U	0.5 U	0.5 UR		0.5 U	0.5 U
2-HEXANONE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U
3-CHLOROPROPENE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U
4-METHYL-2-PENTANONE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U
ACETONE	0.5 UJ	0.5 UJ	0.5 UR		0.5 UJ	0.5 UJ
ACETONITRILE	20 U	20 U	20 U		20 U	20 U
ACROLEIN	0.5 UR	0.5 UR	0.5 UR		0.5 UR	0.5 UR
ACRYLONITRILE	0.5 U	0.5 U	0.5 UR		0.5 U	0.5 U
BENZENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
BROMODICHLOROMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
BROMOFORM	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
BROMOMETHANE	0.3 U	0.3 U	0.3 U		0.3 UJ	0.3 U
CARBON DISULFIDE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
CARBON TETRACHLORIDE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
CHLOROBENZENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
CHLORODIBROMOMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U
CHLOROFORM	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
CHLOROMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
CHLOROPRENE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
CIS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
DIBROMOMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
DICHLORODIFLUOROMETHANE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 UJ
ETHANE					0.062	
ETHENE					0.018	
ETHYL METHACRYLATE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U
ETHYLBENZENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	VALLEY	VALLEY	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	03	01	01	02	03
LOCATION	16MWT19	16MWT20	WES-14-02-83	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GWT1901-D	16GWT2001	16GW0201	16GW0202	16GW0203	16GW0204
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/29/2004	8/29/2004	4/24/2003	5/11/2003	10/26/2003	8/25/2004
ISOBUTANOL	20 U	20 U	20 U		20 U	20 U
METHACRYLONITRILE	0.3 U	0.3 U	0.3 UR		0.3 U	0.3 U
METHANE					15	
METHYL IODIDE	0.5 U	0.5 U	0.5 U		0.5 UJ	0.5 U
METHYL METHACRYLATE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U
METHYLENE CHLORIDE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
PROPIONITRILE	20 U	20 U	20 U		20 U	20 U
STYRENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
TETRACHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
TOLUENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
TOTAL XYLENES	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
TRANS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
TRANS-1,3-DICHLOROPROPENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
TRANS-1,4-DICHLORO-2-BUTENE	0.5 UJ	0.5 UJ	0.5 U		0.5 U	0.5 U
TRICHLOROETHENE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
TRICHLOROFLUOROMETHANE	0.3 U	0.3 U	0.3 U		0.3 UJ	0.3 U
VINYL ACETATE	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U		0.3 U	0.3 U
Semivolatile Organics (ug/L)						
1,2,4,5-TETRACHLOROBENZENE			1 U	1 U		
1,2,4-TRICHLOROBENZENE			1 U	1 U		
1,2-DICHLOROBENZENE			1 U	1 U		
1,3-DICHLOROBENZENE			1 U	1 U		
1,4-DICHLOROBENZENE			1 U	1 U		
1,4-NAPHTHOQUINONE			1 UJ	1 U		
1,4-PHENYLENEDIAMINE			1 UJ	1 UJ		
1-NAPHTHYLAMINE			1 U	1 U		
2,2'-OXYBIS(1-CHLOROPROPANE)			1 U	1 U		
2,3,4,6-TETRACHLOROPHENOL			1 UR	1 U		
2,4,5-TRICHLOROPHENOL			1 UR	1 U		
2,4,6-TRICHLOROPHENOL			1 UR	1 U		
2,4-DICHLOROPHENOL			1 UR	1 U		
2,4-DIMETHYLPHENOL			1 UR	1 U		
2,4-DINITROPHENOL			1 UR	1 UJ		
2,6-DICHLOROPHENOL			1 UR	1 U		
2-ACETYLAMINOFLUORENE			1 U	1 U		
2-CHLORONAPHTHALENE			1 UJ	1 U		
2-CHLOROPHENOL			1 UR	1 U		
2-METHYLNAPHTHALENE			0.05 U			
2-METHYLPHENOL			1 UR	1 U		
2-NAPHTHYLAMINE			1 U	1 U		

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	VALLEY	VALLEY	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	03	01	01	02	03
LOCATION	16MWT19	16MWT20	WES-14-02-83	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GWT1901-D	16GWT2001	16GW0201	16GW0202	16GW0203	16GW0204
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/29/2004	8/29/2004	4/24/2003	5/11/2003	10/26/2003	8/25/2004
2-NITROANILINE			1 U	1 U		
2-NITROPHENOL			1 UR	1 U		
2-PICOLINE			1 U	1 U		
3&4-METHYLPHENOL			1 UR	1 U		
3,3'-DICHLOROBENZIDINE			1 U	1 U		
3,3'-DIMETHYLBENZIDINE			1 U	1 U		
3-METHYLCHOLANTHRENE			1 U	1 U		
3-NITROANILINE			1 U	1 U		
4,6-DINITRO-2-METHYLPHENOL			1 UR	1 U		
4-AMINOBIPHENYL			1 U	1 U		
4-BROMOPHENYL PHENYL ETHER			1 U	1 U		
4-CHLORO-3-METHYLPHENOL			1 UR	1 U		
4-CHLOROANILINE			1 U	1 U		
4-CHLOROPHENYL PHENYL ETHER			1 U	1 U		
4-NITROANILINE			1 U	1 U		
4-NITROPHENOL			1 UR	1 U		
4-NITROQUINOLINE-1-OXIDE			1 UR	1 UR		
5-NITRO-O-TOLUIDINE			1 U	1 U		
7,12-DIMETHYLBENZ(A)ANTHRACENE			1 U	1 U		
A,A-DIMETHYLPHENETHYLAMINE			1 U	1 U		
ACENAPHTHENE			0.05 U			
ACENAPHTHYLENE			0.05 U			
ACETOPHENONE			1 U	1 U		
ANILINE			1 U	1 UJ		
ANTHRACENE			0.05 U			
ARAMITE			1 UR	1 UR		
BENZO(A)ANTHRACENE			0.05 U			
BENZO(A)PYRENE			0.05 U			
BENZO(B)FLUORANTHENE			0.05 U			
BENZO(G,H,I)PERYLENE			0.05 U			
BENZO(K)FLUORANTHENE			0.05 U			
BENZYL ALCOHOL			1 UR	1 U		
BIS(2-CHLOROETHOXY)METHANE			1 U	1 U		
BIS(2-CHLOROETHYL)ETHER			1 U	1 U		
BIS(2-ETHYLHEXYL)PHTHALATE			1 U	1 U		
BUTYL BENZYL PHTHALATE			1 U	1 U		
CHLOROBENZILATE			1 U	1 U		
CHRYSENE			0.05 U			
DI-N-BUTYL PHTHALATE			1 U	1 U		
DI-N-OCTYL PHTHALATE			1 U	1 U		
DIALLATE			1 U	1 U		

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	VALLEY	VALLEY	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	03	01	01	02	03
LOCATION	16MWT19	16MWT20	WES-14-02-83	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GWT1901-D	16GWT2001	16GW0201	16GW0202	16GW0203	16GW0204
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/29/2004	8/29/2004	4/24/2003	5/11/2003	10/26/2003	8/25/2004
DIBENZO(A,H)ANTHRACENE			0.05 U			
DIBENZOFURAN			1 U	1 U		
DIETHYL PHTHALATE			1 U	1 U		
DIMETHYL PHTHALATE			1 U	1 U		
DIPHENYLAMINE			1 U	1 U		
ETHYL METHANE SULFONATE			1 U	1 U		
FLUORANTHENE			0.05 U			
FLUORENE			0.05 U			
HEXACHLOROBENZENE			1 U	1 U		
HEXACHLOROBUTADIENE			1 U	1 U		
HEXACHLOROCYCLOPENTADIENE			1 UR	1 UR		
HEXACHLOROETHANE			1 U	1 U		
HEXACHLOROPROPENE			1 U	1 U		
INDENO(1,2,3-CD)PYRENE			0.05 U			
ISODRIN			1 U	1 U		
ISOPHORONE			1 U	1 U		
ISOSAFROLE			1 U	1 U		
KEPONE			1 U	1 UR		
METHAPYRILENE			1 U	1 U		
METHYL METHANE SULFONATE			1 U	1 U		
N-NITROSO-DI-N-BUTYLAMINE			1 U	1 U		
N-NITROSO-DI-N-PROPYLAMINE			1 U	1 U		
N-NITROSODIETHYLAMINE			1 U	1 U		
N-NITROSODIMETHYLAMINE			1 U	1 UJ		
N-NITROSOMETHYLETHYLAMINE			1 U	1 U		
N-NITROSOMORPHOLINE			1 U	1 U		
N-NITROSOPIPERIDINE			1 U	1 U		
N-NITROSOPYRROLIDINE			1 U	1 U		
NAPHTHALENE			0.05 U			
O,O,O-TRIETHYL PHOSPHOROTHIOATE			1 U	1 U		
O-TOLUIDINE			1 U	1 U		
P-(DIMETHYLAMINO)AZOBENZENE			1 U	1 U		
PENTACHLOROBENZENE			1 U	1 U		
PENTACHLOROETHANE			1 U	1 U		
PENTACHLORONITROBENZENE			1 U	1 U		
PHENACETIN			1 U	1 U		
PHENANTHRENE			0.05 U			
PHENOL			1 UR	1 U		
PRONAMIDE			1 U	1 U		
PYRENE			0.05 U			
PYRIDINE			1 U	1 U		

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	VALLEY	VALLEY	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	03	01	01	02	03
LOCATION	16MWT19	16MWT20	WES-14-02-83	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GWT1901-D	16GWT2001	16GW0201	16GW0202	16GW0203	16GW0204
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/29/2004	8/29/2004	4/24/2003	5/11/2003	10/26/2003	8/25/2004
SAFROLE			1 U	1 U		
Energetics (ug/L)						
1,3,5-TRINITROBENZENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
1,3-DINITROBENZENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE					0.48 U	
2,4,6-TRINITROTOLUENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
2,4-DIAMINO-6-NITROTOLUENE					0.24 U	
2,4-DINITROTOLUENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
2,6-DIAMINO-4-NITROTOLUENE					0.24 U	
2,6-DINITROTOLUENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
2-NITROTOLUENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
3,5-DINITROANILINE					0.24 U	
3-NITROTOLUENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
4-AMINO-2,6-DINITROTOLUENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
4-NITROTOLUENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
DNX					0.24 U	
HMX	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
MNX					0.24 U	
NITROBENZENE	0.27 U	0.24 U	0.21 U		0.24 U	0.27 U
PICRAMIC ACID			0.39 U			
PICRIC ACID			0.39 U			
RDX	0.27 U	0.24 U	0.195 U		0.24 U	0.27 U
TETRYL	0.27 UJ	0.24 UJ	0.21 U		0.24 U	0.27 UJ
TNX					0.24 U	
Herbicides (ug/L)						
HEXACHLOROPHENE			0.025 U			
PENTACHLOROPHENOL			0.013 U			
Total Metals (ug/L)						
ALUMINUM	84.5 J	65.8 J	85.6	60.6 U	8.3 U	
ANTIMONY	0.13 U	0.42 U	0.1 U	0.03 U	0.02 U	
ARSENIC	0.53 U	0.32 U	0.16 U	0.33 U	0.66 J	
BARIUM	40.9 J	57.6 J	21.6 J	18 J	17.8 J	
BERYLLIUM	0.56 U	0.33 U	0.42 U	0.34 U	0.06 U	
CADMIUM	0.36 U	0.27 U	0.31 U	0.22 U	0.04 U	
CALCIUM	33900 J	6800 J	99400 J	97300 J	212000 J	
CHROMIUM	1.3 U	0.69 U	0.43 U	0.29 U	0.17 U	
COBALT	6.5 J	4.1 J	12.9 J	9.2 J	18.7 J	
COPPER	0.56 U	0.4 U	0.87 J	0.15 U	0.12 U	
IRON	17.8 U	73.5 U	287 J	415 J	13700 J	
LEAD	0.11 U	0.3 U	0.21 U	0.28 U	0.18 U	

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	VALLEY	VALLEY	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	03	01	01	02	03
LOCATION	16MWT19	16MWT20	WES-14-02-83	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GWT1901-D	16GWT2001	16GW0201	16GW0202	16GW0203	16GW0204
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/29/2004	8/29/2004	4/24/2003	5/11/2003	10/26/2003	8/25/2004
LITHIUM			32.7 J	33.6 J		
MAGNESIUM	34600 J	4520 J	6240 J	6480 J	35200 J	
MANGANESE	449 J	228 J	916 J	864 J	2440 J	
MERCURY	0.052 U	0.046 U	0.02 U	0.2 U	0.02 U	
NICKEL	84.1 J	7 J	34.2 J	27 J	36.7 J	
POTASSIUM	1150 J	1410 J	738 J	3390 U	2640 J	
SELENIUM	0.094 U	0.19 U	0.05 U	0.06 U	0.04 U	
SILVER	0.08 U	0.38 U	0.09 U	0.04 U	0.03 U	
SODIUM	13000 J	11100 J	18000 J	17900 J	20200 J	
STRONTIUM			88.4 J	98.4 J		
THALLIUM	0.07 U	0.26 U	0.1 U	0.11 U	0.08 U	
TIN	0.1 U	0.39 U	0.06 U	0.07 U	0.1 U	
TITANIUM			3.8 J	3 J	0.17 U	
VANADIUM	1.14 U	1.14 U	0.3 U	0.35 U	0.09 U	
ZINC	58.8 J	4.8 U	50 J	42.9 J	15.8 J	
Dissolved Metals (ug/L)						
ALUMINUM, FILTERED						
ANTIMONY, FILTERED						
ARSENIC, FILTERED						
BARIUM, FILTERED						
BERYLLIUM, FILTERED						
CADMIUM, FILTERED						
CALCIUM, FILTERED						
CHROMIUM, FILTERED						
COBALT, FILTERED						
COPPER, FILTERED						
IRON, FILTERED						
LEAD, FILTERED						
MAGNESIUM, FILTERED						
MANGANESE, FILTERED						
MERCURY, FILTERED						
NICKEL, FILTERED						
POTASSIUM, FILTERED						
SELENIUM, FILTERED						
SILVER, FILTERED						
SODIUM, FILTERED						
THALLIUM, FILTERED						
TIN, FILTERED						
TITANIUM, FILTERED						
VANADIUM, FILTERED						
ZINC, FILTERED						

Location 16MW02 will be used as an upgradient well for all water bearing zones.

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
WATER BEARING ZONE	VALLEY	VALLEY	UPPER	UPPER	UPPER	UPPER
SAMPLING ROUND	03	03	01	01	02	03
LOCATION	16MWT19	16MWT20	WES-14-02-83	WES-14-02-83	WES-14-02-83	WES-14-02-83
SAMPLE NUMBER	16GWT1901-D	16GWT2001	16GW0201	16GW0202	16GW0203	16GW0204
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/29/2004	8/29/2004	4/24/2003	5/11/2003	10/26/2003	8/25/2004
Field Parameters (mg/L)						
ALKALINITY					300	
CARBON DIOXIDE					105	
DISSOLVED OXYGEN		6.91			0.2	0.12
DISSOLVED OXYGEN - METER			0.64	1.18	6.3	
HYDROGEN SULFIDE (H2S)					0	
IRON(+2)					3.3 >	
MANGANESE(+2)					1.5	
NITRITE-N					0.003	
OXIDATION REDUCTION POTENTIAL (MV)		84	7.1	-46.1	-0.8	124
PH (S.U.)		5.53	6.65	6.69	6.54	5.75
SPECIFIC CONDUCTANCE (MS/CM)		0.126	0.568	0.496	1.75	0.502
SULFIDE					0	
TEMPERATURE (C)		20.62	11.8	12.84	15.27	17.24
TURBIDITY (NTU)		5.6	2.2	0.4	0.8	0
Miscellaneous Parameters (mg/L)						
AMMONIA-N			0.04			
CHLORIDE					14	
NITRITE/NITRATE-N			0.02 U		0.05 U	
SULFATE					270	
TOTAL ORGANIC CARBON					1.7	

Location 16MW02 will be used as an upgradient well for all water bearing zones.

APPENDIX H

DATA QUALITY REVIEW

APPENDIX H. DATA QUALITY REVIEW AND DATA REDUCTION METHODS

This appendix contains a description of the data review processes used to determine whether analytical laboratory data were of acceptable technical quality for use in decision making. The review began with data validation, which is a comparison of data quality indicators (DQIs) against prescribed acceptance criteria. The DQIs used are measures to assess the bias and precision of the analytical calibrations and sample analyses. The output of this review was a set of alphabetic flags such as ”U,” “J,” “R,” or combinations thereof, that may have been assigned to individual results based on the validation effort. These flags were used to infer the general quality of the data. The data validation was followed by a summary of quantitative data quality measures to provide the user with a more quantitative estimate of any bias or imprecision associated with the data. Also evaluated were the measures of data completeness, sensitivity, comparability and representativeness.

Sections H.1 and H.2 provide an overview of the data validation process, Section H.3 presents an evaluation of the data quality beyond data validation. Appendix G contains a printout of all qualified and unqualified data and the applicable qualifier flags.

H.1 DATA VALIDATION PROCESS

Data were generated for this RFI report in multiple rounds, Rounds 1, 2, and 3. Field analytical data and sampling location coordinates for Rounds 1 through 3 were reviewed both in the field and after completing the field event to assure data users that the results and sampling location coordinates were accurate. Calibration logs and QC check sample results were reviewed for accuracy. In addition, field data were reviewed for comparability among sampling locations and consistency with theoretical expectations. For example, low pH values would not be expected if alkalinity values were high. These evaluations were based, in part, on professional judgment. Well stabilization parameters were required to represent stable sampling conditions (manifested as reproducible measurements) prior to sample collection but were not required to compare well to field test kit results.

All of the TtNUS results from analytical laboratory samples (Rounds 1 through 3) were validated by TtNUS according to several specifications. Assignment of data qualification flags by TtNUS conformed to U.S. EPA Region 5 Standard Operating Procedures for Validation of Contract Laboratory Program Organic Data (U.S. EPA, 1993c); to Region 5 Standard Operating Procedures for Validation of Contract Laboratory Program Inorganic Data (U.S. EPA, 1993d); to the U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (U.S. EPA, 1994a); and to U.S. EPA Contract

Laboratory Program National Functional Guidelines for Inorganic Data Review (U.S. EPA, 1994b) to the greatest extent practicable for non-contract laboratory program data.

Data validation specifications require that various data qualifiers be assigned when a deficiency is detected or when a result is less than its detection limit. If no qualifier is assigned to a result that has been validated, the data user is assured that no technical deficiencies were identified during validation. The qualification flags used are defined below:

U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ – Indicates that the chemical was not detected; however, the detection limit (sample-specific detection limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

J – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

UR – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration non-compliances, and extremely low analyte recoveries).

R – Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

BU - Indicates that the associated organic chemical was detected in this sample as well as the associated laboratory method blank, but has been qualified as non-detected because the concentration was less than the blank level adjusted for uncertainties (i.e., the blank action level) per the validation guidelines.

BJ - Indicates that the associated organic chemical was detected in this sample as well as the associated method blank and rather than being considered a non-detect, is considered to be an estimate because

the concentration is in excess of the blank action level. The use of "B" qualifiers is a U.S. EPA Region 5-specific requirement.

> - Indicates that the true value is probably greater than the reported value. This “qualifier flag” is used to identify reported values that exceed the calibration range of field measurements but could not be re-analyzed for various reasons.

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with UR or R data validation qualifiers. These data are considered invalid and are not used for decision making purposes unless they are used in a qualitative way and the use is justified and documented. Minor problems are defined as issues resulting in the estimation of data, and qualification with U, J, B, BJ, BU, and UJ data validation qualifiers. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. It is noteworthy that a U qualifier does not necessarily indicate that a data deficiency exists because all non-detect values are flagged with the U qualifier regardless of whether a quality deficiency has been detected.

H.2 DATA VALIDATION OUTPUTS

After data were validated, a list was developed of non-conformities requiring data qualifier flags that were used to alert the data user to inaccurate or imprecise data. For situations in which several QC criteria were out of specification, the data validator made professional judgements and or comments on the validity of the overall data package. The reviewer then prepared a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications. The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Validators incorporated data qualifiers into the electronic database and submitted the information to the data management group. A complete printout of the TtNUS data with validation flags is presented in Appendix G. Pertinent quality estimates are summarized in a more quantitative format in the following section.

H.3 GENERAL DATA QUALITY REVIEW

DQIs are parameters that are monitored to help establish the quality of data generated during an investigation. Some of the DQIs are generated from analysis of field samples (e.g., field duplicates) and some are generated from the analysis of laboratory samples (e.g., laboratory duplicates). Individually,

field and laboratory DQIs provide measures of the performance of the respective investigative operations (field or laboratory). During data validation, individual QC results were evaluated. If individual QC results were acceptable, no validation flag was assigned to an analytical result, otherwise a flag indicating the type of QC deficiency was assigned to the result. The data quality review provided in this section, which was implemented after the data validation process was completed, is not designed to identify data that are acceptable or unacceptable according to data QC criteria. Instead, it is designed to provide an overall quantitative measure of analytical performance not provided by data validation. These quantitative evaluations are frequently analyte-specific. They reflect, for example, biases associated with the quantification of particular analytes in a particular matrix. Many of the summary tables referenced in the sections below reflect this and the data user must be aware that even chemicals in the same analytical fraction (e.g. VOCs) may exhibit different data quality. Taken together, the DQIs provide a measure of overall analytical performance.

At the same time that samples were collected at SWMU 16, samples were also collected at NSWC Crane SWMUs 12 and 13. Samples of similar matrix from all three SWMUs may have been grouped together for analysis. Consequently, the QC data may be common to samples from different SWMUs. This is a benefit when compiling accuracy and precision statistics because a more robust estimate of these characteristics is obtained when using larger data sets. Because data sets were combined, data quality may be presented and discussed below for the combined data sets. The titles of the data tables referenced in the text below identify which SWMUs are involved.

The data for the Cast High Explosives Fill/B146 were of generally acceptable quality. Comparability, Representativeness, and sensitivity, in particular, were typical of environmental investigations and do not indicate any particular problems although any samples that were not collected must be considered data voids relative to the sampling and analysis plan. Data quality exceptions are summarized briefly immediately below for each round of sampling. After the brief summary, a more detailed data quality analyses is presented.

Round 1

Dioxins and Furans – There was no significant bias exhibited in soil samples; aqueous samples were not analyzed for these analytes. In the soil field duplicate sample pair and the LCS/LCSD pair, 2,3,7,8-TCDF exhibited a fairly high degree of imprecision (approximately 104 relative percent difference), otherwise the precision appears to be normal with minor qualifications of dioxin and furan data for various reasons.

Explosives – Completeness goals were satisfied except that several soil and surface water samples could not be collected because refusal was encountered or no surface water was present at or near the selected sampling location. Picramic acid results for samples 16SS150002 and 16SS210002 were rejected. The picramic acid results were non-detected and were rejected because of low matrix spike recoveries. The low matrix spike recoveries are likely due to a difficult sample matrix and they indicate that picramic acid results are generally biased low. A slight to moderate low bias (average percent recovery = 59.2 for MS and MSD, and 88.4 for LCS) was detected in aqueous RDX concentrations. The low bias indicates that reported RDX concentrations are, on average, less than actual site concentrations for this sampling round. Results for other explosive compounds in aqueous and solid sample matrices were not biased significantly low and may be biased slightly high in some cases, though not significantly. Some uncertainty beyond the usual level of uncertainty has been indicated for the nine chemicals identified in Tables H-10 and H-11.

Herbicides – The hexachlorophene results exhibit a severe low bias (approximately 20 percent recoveries in MS and MSD) and the pentachlorophenol results exhibit a moderately low bias (approximately 37 percent recoveries in MS/MSD), bordering on severe, in solid samples. The results for these compounds exhibit a moderately low bias (recoveries ranging from 32 to 58 percent), at times approaching a severed low bias, in aqueous samples. Herbicides were not analyzed in Rounds 2 and 3.

Metals - The metals, overall, exhibit no bias to a slightly high bias, with an apparent but probably false indication of moderate high bias for calcium, chromium, titanium, and zinc (See Table H-8). Several soil and sediment RPD results exceeded the reference point of 50 percent, however, the laboratory precision was equal to or better than field duplicate precision, as expected. This indicates that the greater proportion of uncertainty is associated with natural sample heterogeneity. Nevertheless, several metals exhibited some high RPD values (e.g., greater than 100 percent) that indicate a relatively large degree of heterogeneity in the solid samples.

Miscellaneous Parameters (Ammonia, AVS, SEM, Cation Exchange Capacity, Nitrite/Nitrate and TOC) – The data are generally of acceptable quality although the ammonia nitrogen results exhibit a slight low bias and occasionally exhibit an uncertainty that is greater than expected.

PCBs – No significant biases were detected.

SVOCs – The compounds 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, 2,4-dichlorophenol, 2,6-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,6-dichlorophenol, 2-chlorophenol, 2,4-dimethylphenol, 2-methylphenol, 2-nitrophenol, 3&4-methylphenol, 3,3'-dichlorobenzidine, 4,6-dinitro-2-

methylphenol, 4-nitrophenol, 4-nitroquinoline-1-oxide, aramite, hexachlorocyclopentadiene, kepone, phenol, 1,4-phenylenediamine, and benzyl alcohol constitute all of the results rejected for the semivolatile analyses for Round 1. The majority of the results were rejected because several compounds (4-nitroquinoline-1-oxide, aramite, kepone, and 1,4-phenylenediamine) yield poor analytical responses. The remaining semivolatile results were rejected due to one of the following reasons: low acid surrogate recovery representative of phenolic compound recoveries, low matrix spike recovery, gross holding time exceedance, and low laboratory control sample recovery. The gross holding time exceedance and low laboratory control sample recovery are attributed to laboratory performance and the remaining reasons for data rejection can be attributed to a difficult sample matrix. In some cases, the rejected semivolatile data are for compounds (e.g., the benzidine, aramite, kepone, 1,4-phenylenediamine and benzyl alcohol) that are not expected to be associated with Cast High Explosives Fill/B146 operations and were detected infrequently or not detected at all and are clearly not site-related even though a low bias exists; therefore the impact on overall data quality is minimal. However, phenols appear to have been used at this site and the low recoveries for phenols may be significant. Overall, the semivolatile compounds, including PAHs, generally show a slightly low bias in solid matrices, with 2,4-dimethylphenol, 2,4-dinitrophenol, 3,3'-dichlorobenzidene and 4-chloroaniline exhibiting a moderate low bias and hexachlorocyclopentadiene exhibiting a severe low bias. In aqueous matrices 2,4-dinitrophenol exhibited a severe low bias and several other chlorobenzenes and phenols exhibited a moderate low bias (See Table H-9). In addition, a moderate degree of uncertainty is evident, presumably due to sample heterogeneity, solid sample matrices.

VOCs – The compounds acrolein, 2-butanone, acetone, acrylonitrile, and methacrylonitrile constitute all of the results rejected for the volatile analyses for Round 1. The data were rejected because these compounds yield poor analytical responses. This is a systematic problem that occurs for one or more of these compounds in the majority of the samples analyzed from the Mine Fill B and Cast High Explosives Fill/B146.

Round 2

Explosives – Completeness, precision, and accuracy were generally acceptable. Some aqueous samples could not be collected for lack of water at the sampling location. Some uncertainty beyond the usual level of uncertainty has been indicated for the nine chemicals identified in Tables H-10 and H-11. The energetic compounds of primary interest (i.e., RDX, 2, 4, 6-trinitrotoluene, and HMX) were not affected in any matrix. TNX, an RDX degradation product is affected by moderate imprecision in aqueous samples.

Dissolved Organic Gases - The results for ethane and ethene, and possibly other dissolved organic gases, should be viewed as having a relatively high degree of uncertainty, (e.g., and RPD of at least 50).

Metals - The metals, overall, exhibit no bias to a slightly high bias, with a moderate high bias for calcium, chromium, titanium, and zinc (See Table H-8). Several soil and sediment RPD results exceeded the reference point of 50 percent, however, the laboratory precision was equal to or better than field duplicate precision, as expected. This indicates that the greater proportion of uncertainty is associated with natural sample heterogeneity. Nevertheless, several metals exhibited some high RPD values (e.g., greater than 100 percent) that indicate a relatively large degree of heterogeneity in the solid samples.

Miscellaneous Parameters (Ammonia, Chloride, Nitrite/Nitrate, Sulfate, and TOC) – The data are generally of acceptable quality with a moderate low bias and moderate imprecision for ammonia results in aqueous samples.

VOCs – The compounds 2-butanone, acetone, acrolein, acrylonitrile, methacrylonitrile, and acetonitrile constitute all of the results rejected for the volatile analyses. The rejections were because these compounds yield poor analytical responses. This is a systematic problem that occurs for one or more of these compounds in the majority of the samples analyzed from the Mine Fill B and Cast High Explosives Fill/B146. These chemicals are reported along with the other VOC results even though they are not expected to be site-related contaminants. The primary site-related contaminants would be expected to be chlorinated volatile organic compounds.

Round 3

Explosives – Completeness, precision, and accuracy were generally acceptable. 4,4'-TN-AZOXY exhibited a low bias (approximately 30 to 40% recovery) in some QC samples and some uncertainty beyond the usual level of uncertainty is indicated for RDX in one groundwater duplicate pair (See Table H-10).

Metals - The metals, overall, exhibit no bias to a slightly high bias, with a moderate high bias for calcium, chromium, titanium, and zinc (See Table H-8). Several soil and sediment RPD results exceeded the reference point of 50 percent, however, the laboratory precision was equal to or better than field duplicate precision, as expected. This indicates that the greater proportion of uncertainty is associated with natural sample heterogeneity. Nevertheless, several metals exhibited some high RPD values (e.g., greater than 100 percent) that indicate a relatively large degree of heterogeneity in the solid samples.

Miscellaneous Parameters (Nitrite/Nitrate) – No results were rejected. Scheduled samples were collected when water was present at or near the designated sampling location and the data are generally of acceptable quality.

VOCs – All VOC compounds were rejected in sample 16SB560206 due to poor internal standard recovery. This difficulty was isolated to this sample and is not indicative of a systematic problem. The compounds acrolein, acrylonitrile, methacrylonitrile, and methyl iodide constitute all of the remaining results rejected for the volatile analyses. The rejections were because these compounds yield poor analytical responses. This is a systematic problem that occurs for one or more of these compounds in the majority of the samples analyzed from the Mine Fill B and Cast High Explosives Fill/B146. These chemicals are reported along with the other VOC results even though they are not expected to be site-related contaminants. The primary site-related contaminants are chlorinated volatile organic compounds.

Sample collection deviated somewhat from the proposed sampling strategy in Rounds 1 and 2 for solid and aqueous samples. Uncollected samples were generally not collected because surface water was not available at planned locations or refusal was encountered during soil boring advancement. Accordingly, the percent completeness for samples collected is less than 90 percent in several cases (compare sample collection ratios in Table H-1). There were no data rejections in these cases but the lack of data from the planned locations as well as locations where data have been rejected for quality reasons should be considered when interpreting the results of the investigation.

All samples appear to be representative of the intended environmental matrix. Lack of data where samples could not be collected or where data have been rejected, however, should be considered when evaluating representativeness of the areas or volumes of environmental media that were characterized. Inability to achieve target detection limits or RBTLs in several cases should also be considered (See Section H.3.2).

The various DQIs are discussed in detail below. In addition to the DQIs discussed below, temperature blanks that accompanied each cooler containing samples were used to assess whether the samples had been stored at the appropriate temperature during shipping. All temperature blanks were less than or equal to 4ºC, indicating no deficiencies with regard to shipping temperature.

Each section below addresses data quality for a particular DQI for samples of a given matrix (solid or aqueous) and analytical fraction (e.g., metals or VOCs).

H.3.1 Completeness

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on three different bases: samples collected, field measurements, and laboratory measurements.

- Sample collection completeness was a measure of the usable samples collected as compared to those intended to be collected.

- Field measurement completeness was a measure of the usable field measurements made relative to those intended to be made.

- Laboratory measurement completeness was a measure of the amount of usable, valid laboratory measurements per matrix obtained for each target analyte.

Usable, valid samples (or results) were those judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or additional data review. The total number of samples (or results) planned to be collected or generated are those listed in the Mine Cast High Explosives Fill/B-146 QAPP (TtNUS, 2003a) for Round 1, QAPP addendum Number 1 (TtNUS, 2003b) for Round 2), and QAPP addendum Number 2 for (Round 3). Completeness was determined using the following equation:

$$\%C = \frac{V}{T} \text{ x } 100$$

where	%C	=	percent completeness
	V	=	number of samples (or results) determined to be valid
	T	=	total number of planned samples (or results)

Discretionary samples and provisional wells were not included in the estimates of total planned samples.

H.3.1.1 Sample Collection Completeness

Round 1, Round 2, and Round 3

Table H-1 compares the samples collected to the samples proposed; discretionary samples are not included in the tallies. Sample completeness goals were met for all sample matrices in Rounds 1, 2, and 3 with the following exceptions. Sixteen soil samples in Round 1 and nine soil samples in Round 3 (See Table 2-4) were not collected due to encountering refusal in their respective soil borings. Dry conditions prevented the collection of four surface water samples in each of Rounds 1 and 2 (Table 2-4). Two sediment samples could not be collected from sumps during Round 1 because there was no sediment in the sumps. Three wells were dry during Round 3 sampling accounting for one uncollected groundwater sample that was scheduled for explosives analyses and two uncollected groundwater samples scheduled for volatiles and metals analyses. All instances showing seep samples that were not collected were caused by no seeps being detected during the sampling period. All Round 2 sediment samples were collected except where water was not present at or near the designated sampling location. Failing to collect particular samples is not considered to be a deficiency in field performance although failure to have obtained the desired samples must be considered when interpreting the data. One extra ground water sample was collected during Round 1 and two wells were resampled because the holding times for analyses scheduled on previously collected samples had expired. Unscheduled sample collections and samples that could not be collected in Rounds 1, 2, and 3 are discussed in the field report (Section 2.0 of the RFI report text) with explanations for the observed deviations from the QAPP.

H.3.1.2 Field Measurement Completeness

Round 1, Round 2, and Round 3

The percent completeness for field measurements, including natural attenuation parameter measurements, and well stabilization measurements was 100.

H.3.1.3 Laboratory Measurement Completeness

Under ideal conditions, the laboratory completeness objective would be 100 percent. However, samples can be rendered unusable during shipping and preparation (e.g., bottles broken or extracts accidentally destroyed) or analysis (e.g., loss of instrument sensitivity, strong matrix effects). Laboratory completeness objectives were 90 percent for each critical target analyte per sample matrix. It is possible for individual analytes to exhibit very low completeness values while achieving the overall completeness

goals on the basis of analytical fraction. This occurred in a few cases and is discussed in more detail below for the affected analytes and fractions.

Round 1, Round 2, and Round 3

Table H-2 presents the percent completeness among analytical fractions for solid samples and aqueous samples, Rounds 1 through 3. With one exception, the percent completeness goal (≥90 percent) was achieved for laboratory analytical data collected during Rounds 1 and 2. The exception was 83.3 percent completeness for herbicides in Round 1 sediment. The majority of data (87 percent) that were rejected in Rounds 1, 2, and 3 were rejected because of poor calibration sensitivities. Table H-3 lists all the rejected data and the reasons for the rejections. Immediately evident is that most rejections resulted from poor calibration performance and were limited to a small list of analytes in the VOC and SVOC fractions. The only data rejected in solid matrices were rejected for calibration noncompliances. However, the calibration noncompliances also occurred in all other matrices. This is an indication of the state of chemical analyses today using the selected analytical methods. The VOC and SVOC analytes that were rejected for calibration non-compliances (1,2-phenylenediamine, 1,4-phenylenediamine, 2-butanone, 4-nitroquinoline-1-oxide, 1,2-dibromo-3-chloropropane, iodomethane, acetone, acetonitrile, acrolein, acrylonitrile, aramite, kepone, and methacrylonitrile) are not particularly important to this investigation because they have low potential for being present at SWMU 16, or they are not very toxic or both. If they were more important to the investigation, a recommendation might be made to seek other chemical analysis methods for those compounds. For this investigation no such additional work is necessary.

The more significant rejections are those that were caused by a poor surrogate recovery noncompliance (Code = R), poor internal standard recovery noncompliance (Code = N), LCS/LCSD noncompliance (Code = E), or matrix spike noncompliance (Code = D). These are more significant because they affect potentially site-related compounds and indicate that the analytical methods are not quantitatively recovering the chemicals from the environmental matrices. All results (except acrolein in sample 16SB0600206) that were rejected for internal standard noncompliance were limited to sample 16SB560206 so this particular problem was not widespread. The remaining compounds (See Table H-3) are more commonly encountered environmental contaminants. Sixteen of these 20 analytes are phenols. The four remaining analytes are benzyl alcohol, 3,3'-dichlorobenzidine, hexachloprocyclopentadiene, and picramic acid. The ground water sample rejections are limited primarily to three samples (16GWT0601, 16GW0201, 16GWT0301), so that problem also is not widespread. There is no need to recollect or re-analyze samples although the rejected values are to be viewed as data voids when using the data.

H.3.2 Sensitivity

Tables H-4, H-5, H-6, and H-7 compare the observed minimum and maximum non-detect values during laboratory analyses to the target laboratory reporting limits contained in Table 1-4 of the Cast High Explosives Fill/B-146 QAPP (TtNUS, 2003a) for soils, sediments, ground water, and surface water, respectively. The data in Tables H-4, H-5, H-6, and H-7 represent data for SWMU 13 and SWMU 16 for Rounds 1, 2, and 3. The reason data were consolidated for SWMUs 13 and 16 is that the analytical methods, laboratories, and sensitivities were similar for those rounds.

At the outset of the project, it was known that the concentrations of several chemicals could not be measured at concentrations that were as low as the RBTLs; however, the analytical methods selected are standard methods used throughout the environmental industry. Development of methods with greater sensitivity was not practicable nor was it required for the chemicals of primary interest (e.g., explosives, PCBs, and chlorinated VOCs). Yellow (or gray, if printed in black and white) highlight in the tables indicates those parameters for which at least one non-detect value exceeded the RBTL. Although many analytical fractions had at least one such exceedance, most nondetected results were less than the target limits for critical parameters. The impact of these exceedances is discussed in appropriate sections of this report.

In some cases, elevated detection limits were incurred because select samples had to be diluted to obtain measurable concentrations of VOCs. This was especially true in Round 2 for a few ground water samples that had high concentrations of TCE. The high concentrations of TCE resulted in a need to dilute the samples to prevent contamination of laboratory purge equipment. In Appendix G, results of undiluted samples are presented for the same samples for concentrations that did not exceed calibration ranges and results of diluted samples are presented for concentrations that exceeded the calibration range.

To understand the impact of not having achieved RBTLs, it is important to understand the convention used for reporting non-detect values. Concentrations of organic analytes that were less than their MDLs were reported as the threshold value (not the MDL) followed by a "U" qualifier. The threshold values were generally less than typical laboratory reporting limits, but were typically greater than MDLs. This convention was used in response to the need to try to measure concentrations as low as the RBTLs. If a measured organic analyte concentration exceeded the MDL but was less than the reporting limit, the reported concentration was the measured concentration followed by a "J" qualifier. The "J" qualifier signified that the reported concentration had a high degree of uncertainty even though there was a high level of confidence that the analyte had been detected in the sample. Concentrations less than the TV for

inorganic chemicals were reported as the TV with a "U" qualifier. Inorganic chemical concentrations between the TV and RL were reported with no qualifier. Concentrations of organic and inorganic chemicals that exceeded reporting limits were not qualified unless a data quality deficiency was identified. These reporting conventions are summarized below:

Analyte Non-Detect Reporting

Measured Concentration	Reported Concentration	Qualifier*
<TV	TV (inorganics) TV (organics)	U
>TV and <RL	Measured concentration (organics)	J
>TV and <RL	Measured concentration (inorganics)	No qualifier
>RL	Measured concentration	No qualifier

Tables H-4 through H-7 show the nominal TVs and the minimum and maximum non-detect values for each analyte in particular matrices (one table per matrix). The nominal TVs represent TVs as estimated by the laboratory without any adjustments for sample-specific conditions such as moisture content or sample dilutions. Especially in cases where a dilution caused the maximum observed non-detect value to exceed the RBTL, the nominal TV may be less than the RBTL. For example, vinyl chloride had a nominal ground water TV of 0.3 µg/L, but the maximum observed non-detect value was 60 µg/L in Round 3 (Table H-6). The significant elevation of the TV was due to the dilution of at least one ground water sample in Round 3 that had a high concentration of at least one other target analyte.

The elevated detection limits that were incurred are viewed to be the consequence of uncontrollable, sample-specific factors and reflect normal laboratory performance. They did not prevent the use of the data for decision making.

H.3.3 Laboratory Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy measurements are designed to detect biases resulting from sample handling and analysis. This parameter is assessed by measuring spiked samples (e.g., MSs) or well-characterized samples of certified analyte concentrations (e.g., LCSs) and by measuring blanks.

Accuracy requirements for field measurements are typically ensured through control over the sample collection and handling and through routine instrument calibration. Field accuracies were monitored

through the use of blanks to detect cross-contamination and by monitoring adherence to procedures that prevent sample contamination or degradation. Source blanks were collected from analyte-free water and potable water sources to assess the water sources used for decontaminating sampling equipment. Equipment rinsate blanks were collected for this investigation to assess cross-contamination via sample collection equipment. These blanks were obtained under representative field conditions by collecting the rinse water generated by running analyte-free water through sample collection equipment after decontamination and before use. Rinsate blanks were obtained for each type of sampling equipment for each day that the sampling equipment was decontaminated. Where pre-cleaned, dedicated sampling equipment was used, one rinsate blank was collected as a “batch blank”. Rinsate blanks were analyzed for the same chemical constituents as the associated environmental samples.

Accuracy in the laboratory is measured through the comparison of a spiked sample or LCS result to a known or calculated value and is expressed as a percent recovery (%R). It was also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods. LCSs were used to assess the accuracy of laboratory operations with minimal sample matrix effects. MS and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. Spiking concentrations equaled or approximated the default concentrations detailed in the applicable sample preparation or analysis SOPs. LCS and MS analyses were performed at a frequency of one per 20 associated samples of like matrix as required by the Cast High Explosives Fill/B-146 QAPP (TtNUS, 2003a). Laboratory accuracy was assessed by comparing calculated %R values to accuracy control limits specified in the Cast High Explosives Fill/B-146 QAPP (TtNUS, 2003a).

Percent recovery is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where	%R	=	percent recovery
	Ss	=	result of spiked sample
	So	=	result of non-spiked sample
	S	=	concentration of spiked amount.

Absence of bias is represented as a recovery of 100 percent. Mean recovery values less than 100 percent indicate a low bias, and recovery values greater than 100 percent indicate a high bias. Because measurement uncertainty exists in all bias estimates, a bias is not considered to be significant

unless it falls outside the range of 100 percent ± 25 percent. The more extreme the bias value, the more significant the bias.

Accuracy data for Rounds 1, 2, and 3 are compiled in Tables H-8 and H-9. Unless otherwise specified, each percent R value cited in the discussions below refers to the mean percent R value. Only mean percent recoveries that fall outside the range of 100 percent ±25 percent are discussed below. Percent recoveries that are invalid due to concentrations greater than 4x the spike amount in the native sample have been removed from the mean percent recovery calculation. Data qualifiers assigned during data validation because of non-compliant bias indicators are presented in Appendix G.

Polychlorinated Dibenzodioxins (PCDD) and Polychlorinated Dibenzofurans (PCDF) in Soil, Round 1

The mean LCS, LCSD, MS, and MSD target compound percent recoveries ranged from 78.1 percent to 125.7 percent. No dioxins were measured in Rounds 2 and 3.

The 2,3,7,8-TCDF mean percent recovery (125.7 percent) was marginally outside the upper end of the 75 to 125 percent recovery range. This is considered to be insignificant and there is no significant bias for polychlorinated dibenzodioxins and polychlorinated dibenzofurans in soil.

Explosives in Soil and Sediment, Round 1

The mean LCS, MS, and MSD target compound percent recoveries ranged from 16.4 percent to 123.9 percent. The mean LCS, MS, and MSD recoveries for picramic acid 54.1, 16.4, and 17.6 percent respectively, show a severe low bias. This appears to be a systematic problem as all picramic acid recoveries were low.

Overall the recoveries were within the expected range except for picramic acid, which showed a severe low bias.

Explosives in Soil and Sediment, Round 2

The mean LCS, MS, and MSD target compound percent recoveries ranged from 69.0 percent to 110.0 percent. Although picramic acid exhibited low recoveries during Round 1, this compound was not viewed to be a significant contaminant and was not analyzed in Round 2. The mean LCS recovery for tetryl at 69.0 percent was the only mean less than 93 percent. Of the three LCS percent recoveries that make up the mean, only one, at 41.9 was less than 75 percent.

Overall the recoveries were within the expected range except for one tetryl LCS recovery. No bias is expected for the explosives in Round 2. Tetryl is generally unstable in an aqueous environment and would not be expected to persist in environmental samples unless large quantities were originally present. Therefore, poor recoveries of tetryl are not a concern.

Explosives in Ground Water and Surface Water, Round 1

The mean LCS, MS, and MSD target compound percent recoveries ranged from 58.7 percent to 129.6 percent. The mean MS and MSD recoveries for RDX (59.7 and 58.7 percent, respectively) show a moderately low bias. The mean LCS and MS recovery for picramic acid were slightly low and the mean LCS recovery for picric acid was slightly high. These recoveries are just outside the expected range and no significant bias is expected.

Except for RDX, which showed a moderately low bias, the other explosive compound recoveries were within the expected range. The RDX is a significant compound to this project because it is widely detected in ground water and is operationally related to site activities. All RDX data in surface and ground water should be viewed to be biased moderately low (e.g., perhaps by a factor of two), however, biases do change with concentration.

Explosives in Ground Water and Surface Water, Round 2

The mean LCS, MS, and MSD target compound percent recoveries ranged from 58.8 percent to 157.7 percent. The mean MS and MSD recoveries for 2,2',6,6'-tetranitro-4,4'-azoxytoluene 58.8 and 64.6 percent respectively, show a moderately low bias. The mean MSD for 2,4-diamino-6-nitrotoluene and mean MS for RDX were above expectations and a slight high bias can be expected.

Overall the recoveries were within the expected range except for 2,2',6,6'-tetranitro-4,4'-azoxytoluene which showed a slightly low bias and 2,4-diamino-6-nitrotoluene, which showed a slightly high bias.

The potential high RDX bias in Round 2 and the moderately low bias in Round 1 may cause Round 2 concentrations to appear greater than Round 1 concentrations when there is actually no difference. This characteristic should be considered when using the data.

Explosives in Ground Water and Surface Water, Round 3

The mean LCS, MS, and MSD target compound percent recoveries ranged from 30.0 percent to 123.7 percent yet nearly all recoveries were within the reference range of 75 to 125 percent. The mean LCS, MS, and MSD recoveries for 2,2',6,6'-tetranitro-4,4'-azoxytoluene (38.7, 31.0, and 30.0 percent respectively), show a moderate low bias approaching a severed low bias. The mean LCS, MS, and MSD recoveries for TNX were below expectations and a slight low bias can be expected. The mean LCS recovery (69.9%) for tetryl was also slightly below expectations. No bias is expected for tetryl because the mean MS and MSD recoveries were within the expected range.

Overall the recoveries were within the expected range except for 2,2',6,6'-tetranitro-4,4'-azoxytoluene which showed a moderately low bias and TNX, which showed a slightly low bias.

Herbicides in Soil and Sediment, Round 1

Mean MS and MSD target compound percent recoveries for hexachlorophene and pentachlorophenol were well below the expected range. The mean LCS percent recovery for hexachlorophene was 61.8 percent, which is slightly below expectations. The low MS and MSD recoveries (19.8 and 22.2 percent) for these compounds appear to be systematic because all mean MS and MSD recoveries were less than 75 percent (See Table H-8).

The hexachlorophene recoveries exhibit a severe low bias and the pentachlorophenol recoveries exhibit a moderately low bias. These compounds are not expected to be detected at Mine Fill B and Cast High Explosives Fill/B-146, so there should be minimal impact on decision making. Should these chemicals become important for decision making, however, the low bias must be considered.

Herbicides in Ground Water and Surface Water, Round 1

Mean LCS, MS, and MSD target compound percent recoveries for hexachlorophene and pentachlorophenol ranged from 30.6 to 57.7 percent and were below the reference range of 75 to 125 percent (See Table H-9). The low LCS, MS, and MSD recoveries for these compounds appear to be systematic because all recoveries were low.

The hexachlorophene and pentachlorophenol recoveries exhibit a moderately low bias. These compounds are not expected to be related to Cast High Explosives Fill/B-146 activities so there should be minimal impact on data quality. Should these chemicals become important for decision making, however, the low bias must be considered.

Semivolatile Organic Compounds in Soil and Sediment, Round 1

The majority of semivolatile compound mean LCS, MS, and MSD recoveries were within the expected range, with the exceptions of the MS and MSD recoveries for 3,3'-dichlorobenzidine, 4-chloroaniline, and hexachlorocyclopentadiene. These compounds typically exhibit poor analytical sensitivities and all MSs and MSDs exhibited moderate to low recoveries.

The semivolatile compounds generally show a slightly low bias, with 3,3'-dichlorobenzidene and 4-chloroaniline exhibiting a moderate low bias and hexachlorocyclopentadiene exhibiting a severe low bias.

Semivolatile Organic Compounds in Ground Water and Surface Water, Round 1

The majority of semivolatile compounds exhibit a slight to moderate low bias with respect to mean LCS, MS, and MSD percent recoveries range, with the exceptions of the LCS, MS, and MSD recoveries for 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol, 4-nitrophenol, and hexachlorocyclopentadiene. These compounds typically exhibit poor analytical sensitivities and all LCS, MS, and MSDs exhibited moderate to severe low recoveries.

Polycyclic Aromatic Hydrocarbons (PAHs) in Soil and Sediment, Round 2

Mean LCS, MS, and MSD target compound percent recoveries were slightly less than expected, indicating a slightly low bias for PAH data for Round 2.

Polycyclic Aromatic Hydrocarbons (PAHs) in Ground Water and Surface Water, Round 2

The mean LCS, MS, and MSD target compound percent recoveries ranged from 34.1 percent to 129.1 percent. The mean LCS, MS, and MSD recoveries for several PAHs were less than expected.

Overall, a moderately low bias exists for PAHs for ground water and surface water in Round 2.

Volatile Organic Compounds in Soil and Sediment, Round 1

The majority of volatile compound recoveries were within the mean LCS, MS, and MSD percent recovery reference range of 75% to 125% or were only slightly outside that range. The mean recoveries falling outside the 75 to 125 percent range are highlighted in Table H-8. The most notable recoveries falling into

this category because of a potential link to site activities and relatively high toxicity are 1,1,2,2-tetrachloroethane, tetrachloroethene, and vinyl chloride.

The volatile compounds, on average, show a slightly low bias, with the exception of carbon disulfide which exhibits a slight high bias.

Volatile Organic Compounds in Soil and Sediment, Round 2

The majority of volatile compounds were within the expected mean LCS, MS, and MSD percent recovery range of 75 to 125 percent and are generally higher than the Round 1 VOC recoveries. Several ketones (2-butanone, 2-hexanone, and 4-methyl-2-pentanone) had slightly low mean MS and MSD recoveries ranging from 55 percent to 63 percent. Ketones have an affinity for water which reduces their purging efficiency and this is likely cause for the slightly low recoveries. They also exhibit generally lower toxicities than other organic analytes such as chlorinated VOCs. Therefore, the slight low bias is of little importance.

The volatile compounds show a slightly low bias that should not impact the overall usability of the volatile compounds for Round 2 (See Table H-8).

Volatile Organic Compounds in Soil and Sediment, Round 3

The majority of volatile compounds were within the expected mean LCS, MS, and MSD percent recovery range of 75 to 125 percent and are generally higher than the Rounds 1 and 2 VOC recoveries. One ketone (2-hexanone) had slightly low mean MSD recovery of 73.6 percent in solid samples. Ketones have an affinity for water which reduces their purging efficiency and this may be the cause for the slightly low recovery. Ketones also exhibit generally lower toxicities than other organic analytes such as chlorinated VOCs. Therefore, the slight low bias is of little importance.

The volatile compounds bromodichloromethane, cis-1,3-dichloropropene, styrene, tetrachloroethene, and trans-1,3-dichloropropene also showed a slightly low bias (all between 70 and 75 percent) in the MSDs but the bias should not impact the overall usability of the volatile compounds for Round 3 (See Table H-8).

The percent recoveries for trichloroethene in the MS/MSD of samples 16SB970406, 16SB540205, and 16SB950406 were removed from the mean MS/MSD calculations because the concentration of trichloroethene present in the un-spiked sample was greater than the spiked concentration which caused

abnormal percent recoveries. This type of situation invalidates samples as a QC sample for the analyte(s) in question.

Volatile Organic Compounds in Ground Water, Rounds 1, 2, and 3

All volatile compounds were within the expected mean LCS, MS, and MSD percent recovery range, with the exceptions of bromomethane, chloromethane, and vinyl chloride, which had moderately low mean MS and MSD recoveries for Round 1 and bromomethane which had a slightly low mean MS recovery for Round 2.

The volatile compounds overall show no significant bias, with the exceptions of bromomethane, chloromethane, and vinyl chloride which exhibit a moderately low bias for Round 1 (See Table H-9).

Polychlorinated Biphenyls in Soil, Round 1

Mean LCS, MS, and MSD PCB percent recoveries were within the expected range with a slightly high but insignificant bias for Aroclor-1260 (mean recovery in MS and MSD = 143 percent).

Polychlorinated Biphenyls in Soil, Round 2

Mean LCS, MS, and MSD PCB percent recoveries were within the expected range with a moderately high bias for Aroclor-1016 (mean recovery in MS and MSD = 143 percent).

Polychlorinated Biphenyls in Soil, Round 3

Mean LCS PCB percent recoveries were within the expected range although a moderately high bias was evident for Aroclor-1016 (mean recovery in MS and MSD = 159.3 percent) and Aroclor-1260 (mean recovery in MS and MSD = 128.7 percent). These chemicals were not detected, which renders the high biases insignificant.

Metals in Soil and Sediment, Rounds 1, 2, and 3

The mean LCS percent recoveries across all Round 1 and 2 soil and sediment spikes for metals analyses ranged from 95 to 105 percent. This exceptionally narrow recovery range centered on the theoretically perfect value of 100 percent indicates that there is no systematic laboratory bias associated with the metals analysis process. The mean LCS percent recoveries across all Round 3 soil and sediment spikes for metals analyses ranged from 100.6 to 140.2 percent. The 140.2 percent recovery for potassium was

the only mean LCS recovery that exceeded the expected range of 75 to 125 percent. In general the percent mean percent recoveries in Round 3 were slightly higher than Rounds 1 and 2. This may cause Round 3 concentrations to appear slightly greater than Rounds 1 and 2 concentrations when there is actually no difference.

Whereas the LCS/LCSD recoveries were generally acceptable, the soil and sediment sample matrix recoveries show a moderate high bias with the mean MS recoveries for calcium, chromium, and titanium in Round 1, titanium and zinc in Round 2, and aluminum and manganese in Round 3, all greater than 150 percent. The metals with the highest MS recoveries are metals that typically have native sample concentrations approaching 4 times the spike amount, which falsely creates an apparent bias because of the heterogeneity typical of soil samples.

The low mean percent recovery for lead and negative mean percent recovery for zinc were caused by one of three MS samples (16SD0802) having high concentrations of lead and zinc which falsely created a low bias.

The metals, overall, exhibit no bias to a slightly high bias, with a moderate high bias for aluminum, calcium, chromium, manganese, titanium, and zinc for Rounds 1, 2, or 3 (See Table H-8). The moderate high bias appears to be a false indication caused by invalid QC samples wherein the amount of metal added to the unspiked samples did not increase the metal concentration enough to generate a detectable difference between the unspiked and spiked samples.

Metals in Ground Water and Surface Water, Rounds 2 and 3

The mean LCS percent recoveries across all Round 2 and 3 ground water and surface water spikes for metals analyses ranged from 90.8 to 108.8 percent. This exceptionally narrow recovery range centered on the theoretically perfect value of 100 percent indicates that there is no systematic laboratory bias associated with the metals analysis process.

The filtered ground water and surface water sample matrices (dissolved metal results) show a slightly low bias for all metals except calcium and sodium in Round 2 and show no significant bias in Round 3 with the exception of calcium. The low bias shown for calcium in Round 3 was caused by the MS of one sample (13GWT4801) with a low percent recovery. This data point was considered to be invalid because the concentration of calcium in the native sample approaches 4 times the spiked concentration. The removal of this invalid QC result would yield an acceptable mean percent recovery of calcium across all samples.

The total ground water and surface water sample matrix had one slightly high mean MS for sodium. The dissolved metal results exhibit an overall slightly low bias and the total metal results do not exhibit significant bias (See Table H-8).

Miscellaneous Parameters, Rounds 2 and 3

Mean LCS, MS, and MSD percent recoveries were within the expected range for all analysis except for a slightly low bias for ammonia nitrogen (mean recovery approximately = 67 percent in MS and MSD) in Round 2.

H.3.4 Laboratory Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions.

Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated. RPDs, typically expressed as percentages, are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference
V1, V2 = two results obtained by analyzing duplicate samples

The precision estimates obtained from duplicate field samples encompass the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, subsampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

Field duplicates for Cast High Explosives Fill/B146 soils and sediments were collected as a single sample that was sampled in duplicate for VOCs, then homogenized, split into two portions, and placed into

separate sample bottles for the non-VOC analyses. Each sample bottle was assigned a unique nomenclature so as to be “blind” to the laboratory. Field duplicates were collected during a single act of sampling and were analyzed for chemical constituents to measure the precision of the sampling and analysis program, as well as the natural sample heterogeneity.

Field duplicates were to be collected at a rate of one per 10 environmental samples for Round 1 and 1 per 20 environmental samples for Rounds 2 and 3. The number of duplicates collected was greater than these frequencies because the analytical suite is not identical for all samples. The number of duplicates collected corresponds to the number of samples collected for a particular analytical fraction. The number of duplicates per samples collected for all analytical fractions met the 10 percent frequency criterion specified in the Cast High Explosives Fill/B-146 QAPP (TtNUS, 2003a).

Laboratory precision QC samples [i.e., laboratory duplicates for inorganic chemicals and LCS/LCSD and matrix spike (MS) / matrix spike duplicate (MSD) samples for organic chemicals] were scheduled to be analyzed at a rate of one QC sample per 20 environmental samples. This 5 percent rate as specified in the Cast High Explosives Fill/B-146 QAPP (TtNUS, 2003a) was achieved for aqueous, soil, sediment, and seep samples.

Laboratory duplicates are usually analyzed during the metals and miscellaneous analyses as a check on the precision of the analyses. For organic compounds analyzed by chromatography, laboratory duplicates are commonly supplanted with MSDs because the organic compounds do not occur naturally in samples and precision can not be estimated from non-detect values.

During Rounds 1, through 3, 13 aqueous laboratory duplicates were analyzed and 8 soil laboratory duplicates were analyzed. Laboratory precision was assessed by comparing calculated RPD values to precision control limits specified in the Cast High Explosives Fill/B-146 QAPP (TtNUS, 2001b).

RPD values greater than 50 percent for solid matrices and 30 percent for aqueous matrices are occasionally observed. In addition, values of this magnitude are often small compared to the concentration variability observed across site samples. This characteristic is important because it indicates that the uncertainty associated with decision making is often most affected by the overall site data variability and not as much by the local variability at any one location. Nevertheless, Table H-10 and H-11 represent all exceedances of these reference points (aqueous 30% and solid 50%) for laboratory duplicates, field duplicates, LCS/LCSD, and MS/MSD RPDs. Field and laboratory precision values that did not exceed the reference points are not included in the discussions below. Unless otherwise specified,

RPD values cited in the discussions below refer to individual RPDs of a single pair of original and duplicate samples.

Explosives in Ground Water and Surface Water, Round 1, Round 2, and Round 3

RPDs for ten target compounds in four out of six MS/MSDs exceeded the 30 percent reference point (Table H-10). The RPDs ranged from 31.4 percent to 179.5 percent. The most severe exceedances are for 3,5-dinitroaniline and 4-nitrotoluene (in different samples, 13GWT3601 and 13SW1302). Most of the exceedances are associated with these two samples, which indicates that the large RPDs are specific to those samples. Otherwise, the data indicate few RPD values in excess of the 30 percent reference point.

One ground water and one surface water field duplicate RPD exceeded 50 percent for TNX (Table H-11). MNX exceeded the 30 percent reference point four times.

Given the number of RPD results generated for aqueous samples, there are relatively few exceedances of the 30 percent reference point for explosives and the data should be considered useful as reported, however, some uncertainty beyond the usual level of uncertainty has been indicated for the nine chemicals identified in Tables H-10 and H-11.

Semivolatiles in Ground Water and Surface Water, Round 1 and Round 2

RPDs for 12 different surrogate and target compounds in two out of five MS/MSDs exceeded the 30 percent reference point (Table H-10). All of the high RPDs in Round 1, except for hexachlorocyclopentidiene, are associated with phenolic compounds. The loss of phenols indicates that the laboratory may be occasionally reducing the volume of the sample extracts too aggressively. This does not appear to be a systemic problem as it only occurred in two sets of MS/MSDs. The existence of this problem indicates a moderate possibility for a greater than normal uncertainty with phenolic compounds in samples associated with Round 1. An RPD for pyrene (30.5) in a single surface water MS/MSD during Round 2 was in excess of the 30 percent reference point (Table H-11). The RPD of 30.5 barely exceeds the reference point and this exceedance is considered to be insignificant. In general, precision for SVOCs in aqueous samples for Rounds 1 and 2 was acceptable with an apparent degraded precision when analyzing phenolic compounds.

Semivolatiles in Soil and Sediment, Round 1 and Round 2

RPDs for 24 different target compounds in four out of seventeen MS/MSDs exceeded the 50 percent reference point (Table H-10). Several PAHs from sample 13SD050004 had RPDs of 200. Most of the

exceedances of 50% RPD occurred in this sample and one other sample. All others were generally within expectations. These exceedances were therefore evidently not widespread and do not indicate the existence of widespread precision problems. Instead, they indicate that precision is generally acceptable for soil sample SVOC analyses. The 3,3'-dichlorobenzidine RPD for sample 13SS040002 had an RPD of 200. This compound has a poor analytical response and only had a 12% recovery in the MS and a zero percent recovery in the MSD See Section H.3.4. This compound is not likely to be detected at the Cast High Explosives Fill/B-146 and should not affect data usability. The possibility for moderate uncertainty exists for the SVOC compounds listed on Table H-10.

Several PAHs and safrole had field duplicate RPDs in excess of the 50 percent reference point for sediment and surface soil samples in Round 1 and Round 2 (Table H-11). These RPDs indicate sample heterogeneity among sediment and surface soils. The possibility for moderate uncertainty exists for PAHs and safrole in sediments and surface soils.

Volatiles in Soil, Rounds 1, 2, and 3

No VOC compounds had RPDs in excess of the 50 percent reference point for Round 1. The absence of exceedances for soil samples indicate that VOC data are generally useful as reported with no unusual uncertainties for Round 1.

One VOC compound had a field duplicate RPD in excess of the 50 percent reference point for one soil sample in Round 2. One Round 2 VOC compound also had MS/MSD duplicate RPD in excess of the 50 percent reference point for one soil sample. The few exceedances of the 50% reference point for soils indicate that VOC data are generally useful as reported with no unusual uncertainties fro Round 2.

Six Round 3 VOC compounds had a field duplicate RPD in excess of the 50 percent reference point. The few exceedances of the 50% reference point for soils indicate that Round 3 VOC data are generally useful as reported with no unusual uncertainties. Three Round 3 RPD results for trichloroethene were omitted from this evaluation because the concentration trichloroethene present in the unspiked sample greatly exceeded the spiked concentration causing the RPDs to be severely skewed.

Dioxins and Furans in Soil, Round 1

An RPD for 2,3,7,8-TCDF in one MS/MSD exceeded the 50 percent reference point (Table H-10).
Several dioxins had field duplicate RPDs in excess of the 50 percent reference point (Table H-11).

The absence of MS/MSD exceedances indicates that the RPD reference value exceedances are associated with field rather than with laboratory duplicates. This may be a consequence of having very low dioxin concentrations or it could reflect the better mixing associated with laboratory rather than field duplicates. Thus, the exceedances are attributed either to the low observed dioxin concentrations or to greater heterogeneity in the field duplicates than the laboratory duplicates. Neither of these situations indicates a sampling or analytical deficiency. The level of uncertainty described here should be considered when using the dioxin data.

Metals in Soil and Sediment, Rounds 1, 2, and 3

Several Round 1 and Round 2 metals in multiple field duplicates and laboratory duplicates out of a total of 19 field and laboratory duplicates exceeded the 50 percent reference point (Table H-11). This is indicative of sample heterogeneity in sediment and soil samples. In general, the RPDs for the laboratory duplicates, performed on the same samples as field duplicates, are less than the RPDs for the field duplicates, this is to be expected. Based on these QC data the possibility for moderate uncertainty exists for metals in sediment and soil. Whether the uncertainty is significant depends on how the uncertainty affects decisions associated with, for example, evaluating the nature and extent of contamination and the evaluation of risks.

RPDs for 4 metals in one Round 3 soil field duplicate and two metals in one Round 3 laboratory duplicate exceeded the 50 percent reference point. RPDs for metals in the field duplicate in exceedance of the 50% criterion ranged from 51.7 percent to 154.5 percent and elevated RPDs for metals in the laboratory duplicate were 66.7 percent and 104.6 percent. The RPDs appear to reflect natural sample heterogeneity, based on the number of exceedances and the observed RPD values.

Metals in Ground Water and Surface Water, Rounds 1 and 2

Four metals in five out of twenty-seven field duplicates exceeded the 30 percent reference point (Table H-11). The range of RPDs is 53 to 127, this is higher than would be expected for aqueous samples because water samples are relatively homogenous. The possibility for high uncertainty exists occasionally for metals in surface water and ground water for Rounds 1 and 2. The high uncertainty may be caused by entrained solids in the samples.

Metals in Ground Water and Surface Water, Round 3

Eight metals (beryllium, cadmium, lead, selenium, silver, thallium, tin, and vanadium) in a total of 14 laboratory duplicates were detected in only one of the samples in a duplicate pair. This yielded RPDs of

200% but these values are not indicative of analytical performance because a valid RPD can not be computed with a single sample result. The 200 %RPD values are not shown in Table H-12. RPDs (ranging from 31.8 percent to 141.9 percent) for eleven metals in 10 field or laboratory duplicates exceeded the 30 percent reference point. Therefore, the relative uncertainty for these metals is not accurately represented by the tabulated RPDs and is not discussed further. It appears that some of the imprecision could be caused by suspended solids in the samples because all of the highest RPD values are associated with unfiltered metals concentrations. Therefore, precision is viewed to be generally acceptable for aqueous metals analyses with the potential for occasional high imprecision, caused in part by entrained solids.

Polychlorinated biphenyls in Soil, Round 1

An RPD for Aroclor-1248 in one out of six field duplicates exceeded the 50 percent reference point (Table H-11). This indicates sample heterogeneity in soil samples. Otherwise, RPD values were within expectations and there do not appear to be any unusual uncertainties associated with the PCB data.

Miscellaneous Parameters in Ground Water and Surface Water, Round 2

RPDs for ammonia nitrogen in three out of eleven MS/MSDs exceeded the 50 percent reference point (Table H-10). The RPDs ranged from 34 to 48 indicating that moderate uncertainty occasionally exists for ammonia nitrogen in water samples collected during Round 2.

An RPD for ammonia nitrogen in one of eight field duplicates exceeded the 50 percent reference point (Table H-11). The RPD (120.0) was higher than expected for an aqueous matrix and the possibility for occasionally high uncertainty exists for ammonia in surface waters.

Dissolved Gases in Ground Water, Round 2

RPDs for ethene and ethane in one field duplicate exceeded the 50 percent reference point (Table H-11). The RPDs (83, ethene and 96, ethane) were higher than expected for an aqueous matrix and the possibility for high uncertainty exists for ethene and ethane in ground water. Other dissolved organic gas concentrations may suffer from a relatively high degree of uncertainty that did not manifest itself because only one field duplicate sample was analyzed. In the absence of additional data, the results for ethane and ethene, and possibly other dissolved organic gases, should be viewed as having a relatively high degree of uncertainty, (e.g., and RPD of at least 50).

H.3.5 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and among sampling events). Comparability was achieved by using standardized sampling and analysis methods, as well as standardized data reporting formats. Comparability of field data was ensured by following the Cast High Explosives Fill/B-146 QAPP (TtNUS, 2003a) and related addenda (TtNUS, 2003b; TtNUS, 2004). Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the QA plan. No comparability problems were detected.

The laboratory analyzed various QC samples along with the environmental samples to allow data users to assess the quality of the data. Tables H-12 and H-13 show the rates of data qualification that resulted from application of the data validation process for aqueous and solid samples, respectively. The numerical qualification rates presented in the table represents the percentage of data qualified as indicated for the indicated reason. An example is the best way to explain how to interpret the table:

Parameter	Code	Validation Qualifier)						
		BJ	BU	J	R	U	UJ	UR
2-AMINO-4,6-DINITROTOLUENE	PU	0.0	0.0	33.3	0.0	0.0	0.0	0.0
	U	0.0	0.0	66.7	0.0	0.0	0.0	0.0

The 33.3 in the “J” Validation Qualifier column indicates that 33.3 percent of the J-qualified data for 2-amino-4,6-dinitrotoluene were qualified that way because of reasons “P” (Code = P) and “U” (Code = U) . The “P” definition at the bottom of the table indicates that the result(s) was near the detection limit and this proximity to the detection limit introduced additional uncertainty into the measured result(s). Reason “U” is defined at the bottom of the table to represent a Percent Difference between columns or detectors that exceeds 25 percent for positive results determined via gas or liquid chromatographic methods. Similarly, the 66.7 in the “J” column indicates that 66.7 percent of the J-qualified data were qualified that way because of reason “U”.

All other values in the table are to be interpreted in a similar manner. Quantitative summaries of accuracy and precision are provided in Sections H.3.3 and H.3.4. Inability to achieve target detection limits or RBTLs in several cases should also be considered (See Section H.3.2).

H.3.6 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at an individual sampling point and is contingent on a good design for the sampling program. For each environmental medium investigated, there were two general populations - site and background. The site population(s) is the portion of a medium potentially contaminated as a result of site operations. Sampling of the site population was designed to directly support the project objectives of determining the nature and extent of contamination and evaluating human and ecological risks. The background population is that portion of a medium that is similar to the site population but expected or known not to be contaminated through site operations. A background population is a point of reference for understanding whether or not site chemical concentrations represent site-related contamination. For mobile media (sediment, surface water and ground water) the term upgradient, rather than background, is generally used to refer to locations unaffected by site operations.

Data were collected from the locations specified in the Mine Fill B and Cast High Explosives Fill/B-146 QAPP with only minor modifications that reflect uncertainty in marking the locations in the field. The (Mine Fill B and Cast High Explosives Fill/B-146 QAPP and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. It is believed that all reported data are adequately representative of site conditions.

References for Appendix H

TtNUS, 2003a. Quality Assurance Project Plan for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/ B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19), RCRA Facility Investigation, Naval Surface Warfare Center Crane, Crane, Indiana, February.

TtNUS, 2003b. Quality Assurance Project Plan Addendum No. 1 for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/ B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19), RCRA Facility Investigation, Naval Surface Warfare Center Crane, Crane, Indiana, October.

TtNUS, 2004. Quality Assurance Project Plan Addendum No. 2 for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/ B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19), RCRA Facility Investigation, Naval Surface Warfare Center Crane, Crane, Indiana, June.

TABLE H-1

SAMPLES COLLECTED VERSUS SAMPLES PROPOSED IN THE QAPP, ROUNDS 1, 2, AND 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

Analytical Fraction	SOIL [2] (collected/ proposed)[4]	SD (collected/ proposed)[4]	GW (collected/ proposed)[4]	SW (collected/ proposed)[4]	SP[5] (collected/ proposed)[4]
SWMU 16 Round 1					
8015 Volatile Organic Compounds	43/43 (100%)	NA	11/10 (110%)	NA	NA
Acid Volatile Sulfides	NA	3/3 (100%)	NA	NA	NA
Simultaneously Extracted Metals	NA	3/3 (100%)	NA	NA	NA
Cation Exchange Capacity	13/16 (81%)	3/3 (100%)	NA	NA	NA
Dioxins and Furans	28/28 (100%)	NA	NA	NA	NA
Explosives	55/82 (67%)	9/11 (82%)	10/10 (100%)	3/7 (43%)	NA
Herbicides	66/82 (80%)	9/11 (82%)	10/10 (100%)	3/7 (43%)	NA
Total Metals	66/82 (80%)	9/11 (82%)	11/10 (110%)	3/7 (43%)	NA
Filtered Metals[3]	NA	NA	NA	3/7 (43%)	NA
Ammonia	NA	NA	10/0 (N/A)	3/0 (N/A)	NA
Nitrate/Nitrate	NA	NA	10/10 (100%)	3/7 (43%)	NA
Semivolatiles except PAHs	66/82 (80%)	9/11 (82%)	11/10 (110%)	3/7 (43%)	NA
8260 Volatile Organic Compounds	55/52 (106%)	NA	11/10 (110%)	NA	NA
Polycyclic Aromatic Hydrocarbons	66/82 (80%)	9/11 (82%)	10/10 (100%)	3/7 (43%)	NA
Polychlorinated Biphenyls	41/37 (111%)	NA	NA	NA	NA
Picrates	66/82 (80%)	9/11 (82%)	10/10 (100%)	3/7 (43%)	NA
Total Organic Carbon	13/16 (81%)	3/3 (100%)	NA	NA	NA

Analytical Fraction	SOIL [2] (collected/ proposed)[4]	SD (collected/ proposed)[4]	GW (collected/ proposed)[4]	SW (collected/ proposed)[4]	SP[5] (collected/ proposed)[4]
SWMU 16 Round 2					
Explosives	NA	10/10 (100%)	19/22 (86%)	8/10 (80%)	0/5 (0%)
Total Metals	5/5 (100%)	10/10 (100%)	19/22 (86%)	8/10 (80%)	0/5 (0%)
Filtered Metals[3]	NA	NA	5/5 (100%)	8/8 (100%)	0/5 (0%)
Ammonia	NA	NA	NA	NA	NA
Nitrate/Nitrate	NA	NA	16/22 (73%)	8/10 (80%)	0/5 (0%)
Volatile Organic Compounds	4/4 (100%)	11/11 (100%)	20/22 (91%)	11/14 (79%)	0/5 (0%)
Polycyclic Aromatic Hydrocarbons	NA	1/1 (100%)	NA	NA	NA
Polychlorinated Biphenyls	NA	NA	NA	NA	NA
Methane, Ethane, Ethene	NA	NA	7/13 (54%)	NA	NA
Sulfate and Chloride	NA	NA	16/22 (73%)	NA	NA
Total Organic Compounds	NA	NA	3/3 (100%)	NA	NA

TABLE H-1

SAMPLES COLLECTED VERSUS SAMPLES PROPOSED IN THE QAPP, ROUNDS 1, 2, AND 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

Analytical Fraction	SOIL [2] (collected/ proposed)[4]	SD (collected/ proposed)[4]	GW (collected/ proposed)[4]	SW (collected/ proposed)[4]	SP[5] (collected/ proposed)[4]
SWMU 16 Round 3					
Explosives	NA	NA	24/25 (96%)	4/4 (100%)	0/5 (0%)
Total Metals	10/10 (100%)	20/20 (100%)	4/6 (67%)	20/20 (100%)	0/5 (0%)
Filtered Metals[3]	NA	NA	NA	20/20 (100%)	NA
Nitrate/Nitrate	NA	NA	NA	4/4 (100%)	0/5 (0%)
Volatile Organic Compounds	94/101 (93.1%)	4/4 (100%)	23/25 (92%)	8/8 (100%)	0/5 (0%)

SD - Sediment samples
GW - Ground water samples
SW - Surface water samples
SP - Seep samples
NA - Not applicable

1 The completeness estimate for the composting operation was 100 percent for each fraction. Yellow or gray (if printed in black and white) highlight indicates that the number of samples collected is less than proposed; heavy outline indicates that the number of samples collected exceeds the number proposed. Reasons for not collecting particular samples are provided in Section 2.0.

2 Includes both surface and subsurface soil samples, some of which could not be collected because of encountering refusal. Neglecting refusal, the percentages that are shown as less than 90 percent in this table are greater than 90 percent.

3 Some aqueous samples were filtered to allow for determining whether or not the observed metals concentrations were associated with turbidity.

4 The total number of samples proposed does not include discretionary samples that were not collected.

5 All instances of seep samples not collected were caused by no seeps being available during the sampling event.

TABLE H-2
PERCENT COMPLETENESS FOR ANALYTICAL FRACTIONS, ROUNDS 1, 2, AND 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B 146) (1)
NSWC CRANE
CRANE, INDIANA

Analytical Fraction ROUND 1	Soil			Sediment		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
AVS	NA	NA	NA	3	0	100.0
SEM	NA	NA	NA	18	0	100.0
AVS/SEM	NA	NA	NA	3	0	100.0
CEC	13	0	100.0	3	0	100.0
M	1782	0	100.0	243	0	100.0
DIOX	700	0	100.0	NA	NA	NA
EXP	1056	2	99.8	144	0	100.0
HERB	132	0	100.0	18	0	100.0
SVOC	5808	163	97.2	792	25	96.8
VOC	2448	24	99.0	NA	NA	NA
PAH	1122	0	100.0	153	0	100.0
PCB	238	0	100.0	NA	NA	NA
PH	13	0	100.0	3	0	100.0
TOC	13	0	100.0	3	0	100.0

Analytical Fraction ROUND 1	Ground Water			Surface Water		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
M	297	0	100.0	372	0	100.0
EXP	160	0	100.0	48	1	97.9
HERB	20	0	100.0	6	1	83.3
SVOC	1056	79	92.5	264	14	94.7
VOC	561	50	91.1	NA	NA	NA
PAH	170	0	100.0	51	0	100.0
NH3	10	0	100.0	3	0	100.0
NITA	10	0	100.0	3	0	100.0
PH	13	0	100.0	2	0	100.0

TABLE H-2
PERCENT COMPLETENESS FOR ANALYTICAL FRACTIONS, ROUNDS 1, 2, AND 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B 146) (1)
NSWC CRANE
CRANE, INDIANA

Analytical Fraction ROUND 2	Soil			Sediment		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
EXP	NA	NA	NA	140	0	100.0
M	125	0	100.0	250	0	100.0
VOC	220	7	96.8	605	11	98.2
PAH	NA	NA	NA	17	0	100.0
PCB	NA	NA	NA	NA	NA	NA

Analytical Fraction ROUND 2	Ground Water			Surface Water		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
HERB	NA	NA	NA	NA	NA	NA
EXP	420	0	100.0	168	0	100.0
M	650	0	100.0	400	0	100.0
CL	17	0	100.0	NA	NA	NA
NTIA	17	0	100.0	8	0	100.0
VOC	1182	44	96.3	605	27	95.5
PAH	NA	NA	NA	NA	NA	NA
SO_4	17	0	100.0	NA	NA	NA
TOC	3	0	100.0	NA	NA	NA

TABLE H-2
PERCENT COMPLETENESS FOR ANALYTICAL FRACTIONS, ROUNDS 1, 2, AND 3
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B 146) (1)
NSWC CRANE
CRANE, INDIANA

Analytical Fraction ROUND 3	Soil			Sediment		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
EXP	NA	NA	NA	NA	NA	NA
FIELD	NA	NA	NA	NA	NA	NA
M	240	0	100.0	480	0	100.0
MF	NA	NA	NA	NA	NA	NA
MISC	NA	NA	NA	NA	NA	NA
OV	5334	192	96.4	220	4	98.2
	Ground Water			**Surface Water**		
Analytical Fraction ROUND 3	**Total Data Points**	**Rejected Data Points**	**% Completeness**	**Total Data Points**	**Rejected Data Points**	**% Completeness**
EXP	336	0	100.0	56	0	100.0
FIELD	136	0	100.0	120	0	100.0
M	120	0	100.0	480	0	100.0
MF	NA	NA	NA	480	0	100.0
MISC	NA	NA	NA	4	0	100.0
OV	1265	22	98.3	440	8	98.2

1. The completeness estimate for the composting operation was 100 percent for each fraction.

CEC - Cation Exchange Capacity
EXP - Explosives
HERB - Herbicides
M - Metals
SVOC - Semivolatile organic compounds, except PAHs
NH_3 - Ammonia
NITA - Nitrate/Nitrite
SEM - AVS/SEM
CL - Chloride
SO_4 - Sulfate
VOC - Volatile organic compounds
PCB - Polychlorinated biphenyls
PEST - Pesticides
PAH - Polynuclear aromatic hydrocarbons
TOC - Total organic carbon
AVS - AVS/SEM
OVG - Dissolved organic gases
AVS/SEM - Acid volatile sulfides/simultaneously extracted metals
DIOX - Dioxins and furans
NA - Not Analyzed

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
Round 1			
16SS0150002	EXP	PICRAMIC ACID	D
16SS0210002	EXP	PICRAMIC ACID	D
16SW0701	HERB	PENTACHLOROPHENOL	U
16SB0380203	SVOC	1,4-PHENYLENEDIAMINE	C
16SB0390203	SVOC	1,4-PHENYLENEDIAMINE	C
16SB0400506	SVOC	1,4-PHENYLENEDIAMINE	C
16SB0400608	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0130002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0190002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0200002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0210002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0220002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0230002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0250002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0270002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0280002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0290002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0300002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0350002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0380002	SVOC	1,4-PHENYLENEDIAMINE	C
16SS0390002	SVOC	1,4-PHENYLENEDIAMINE	C
16GW0201	SVOC	2,3,4,6-TETRACHLOROPHENOL	R
16GWT0601	SVOC	2,3,4,6-TETRACHLOROPHENOL	R
16GW0201	SVOC	2,4,5-TRICHLOROPHENOL	R
16GWT0601	SVOC	2,4,5-TRICHLOROPHENOL	R
16GW0201	SVOC	2,4,6-TRICHLOROPHENOL	R
16GWT0601	SVOC	2,4,6-TRICHLOROPHENOL	R
16GW0201	SVOC	2,4-DICHLOROPHENOL	R
16GWT0601	SVOC	2,4-DICHLOROPHENOL	R
16GW0201	SVOC	2,4-DIMETHYLPHENOL	R
16GWT0601	SVOC	2,4-DIMETHYLPHENOL	R
16GW0201	SVOC	2,4-DINITROPHENOL	ER
16GW0301	SVOC	2,4-DINITROPHENOL	E
16GW0501	SVOC	2,4-DINITROPHENOL	DE
16GWT0301	SVOC	2,4-DINITROPHENOL	E
16GWT0501	SVOC	2,4-DINITROPHENOL	E
16GWT0601	SVOC	2,4-DINITROPHENOL	ER
16SW0201	SVOC	2,4-DINITROPHENOL	D
16GW0201	SVOC	2,6-DICHLOROPHENOL	R
16GWT0601	SVOC	2,6-DICHLOROPHENOL	R
16GW0201	SVOC	2-CHLOROPHENOL	R
16GWT0601	SVOC	2-CHLOROPHENOL	R
16GW0201	SVOC	2-METHYLPHENOL	R
16GWT0601	SVOC	2-METHYLPHENOL	R

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16GW0201	SVOC	2-NITROPHENOL	R
16GWT0601	SVOC	2-NITROPHENOL	R
16GW0201	SVOC	3&4-METHYLPHENOL	R
16GWT0601	SVOC	3&4-METHYLPHENOL	R
16SS0150002	SVOC	3,3'-DICHLOROBENZIDINE	D
16GW0201	SVOC	4,6-DINITRO-2-METHYLPHENOL	R
16GW0501	SVOC	4,6-DINITRO-2-METHYLPHENOL	D
16GWT0601	SVOC	4,6-DINITRO-2-METHYLPHENOL	R
16SW0201	SVOC	4,6-DINITRO-2-METHYLPHENOL	D
16GW0201	SVOC	4-CHLORO-3-METHYLPHENOL	R
16GWT0601	SVOC	4-CHLORO-3-METHYLPHENOL	R
16GW0201	SVOC	4-NITROPHENOL	ER
16GW0301	SVOC	4-NITROPHENOL	E
16GW0501	SVOC	4-NITROPHENOL	E
16GWT0301	SVOC	4-NITROPHENOL	E
16GWT0501	SVOC	4-NITROPHENOL	E
16GWT0601	SVOC	4-NITROPHENOL	ER
16SW0201	SVOC	4-NITROPHENOL	D
16GW0101	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GW0201	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GW0202	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GW0301	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GW0401	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GW0501	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GWT0201	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GWT0301	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GWT0401	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GWT0501	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GWT0601	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GWT0602	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0010406	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0020406	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0110204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0120204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0130204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0170204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0180203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0190203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0220203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0230203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0240203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0250203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0260204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0270203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0280203	SVOC	4-NITROQUINOLINE-1-OXIDE	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SB0290203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0300203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0320204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0330204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0340203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0360203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0380203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0390203	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0400506	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0400608	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0410305	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SB0410507	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD020004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD030004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD040004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD050004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD060004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD080004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD090004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD100004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SD110004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0010002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0020002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0030002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0040002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0050002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0060002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0070002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0080002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0090002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0100002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0110002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0120002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0130002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0140002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0150002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0160002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0170002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0180002	SVOC	4-NITROQUINOLINE-1-OXIDE	CH
16SS0190002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0200002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0210002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0220002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0230002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0240002	SVOC	4-NITROQUINOLINE-1-OXIDE	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SS0250002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0260002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0270002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0280002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0290002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0300002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0310002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0320002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0330002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0340002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0350002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0360002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0370002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0380002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SS0390002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SW0101	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SW0201	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16SW0701	SVOC	4-NITROQUINOLINE-1-OXIDE	C
16GW0101	SVOC	ARAMITE	C
16GW0201	SVOC	ARAMITE	C
16GW0202	SVOC	ARAMITE	C
16GW0301	SVOC	ARAMITE	C
16GW0401	SVOC	ARAMITE	C
16GW0501	SVOC	ARAMITE	C
16GWT0201	SVOC	ARAMITE	C
16GWT0301	SVOC	ARAMITE	C
16GWT0401	SVOC	ARAMITE	C
16GWT0501	SVOC	ARAMITE	C
16GWT0601	SVOC	ARAMITE	C
16GWT0602	SVOC	ARAMITE	C
16SB0010406	SVOC	ARAMITE	C
16SB0020406	SVOC	ARAMITE	C
16SB0110204	SVOC	ARAMITE	C
16SB0120204	SVOC	ARAMITE	C
16SB0130204	SVOC	ARAMITE	C
16SB0170204	SVOC	ARAMITE	C
16SB0180203	SVOC	ARAMITE	C
16SB0190203	SVOC	ARAMITE	C
16SB0220203	SVOC	ARAMITE	C
16SB0230203	SVOC	ARAMITE	C
16SB0240203	SVOC	ARAMITE	C
16SB0250203	SVOC	ARAMITE	C
16SB0260204	SVOC	ARAMITE	C
16SB0270203	SVOC	ARAMITE	C
16SB0280203	SVOC	ARAMITE	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SB0290203	SVOC	ARAMITE	C
16SB0300203	SVOC	ARAMITE	C
16SB0320204	SVOC	ARAMITE	C
16SB0330204	SVOC	ARAMITE	C
16SB0340203	SVOC	ARAMITE	C
16SB0360203	SVOC	ARAMITE	C
16SB0410305	SVOC	ARAMITE	C
16SB0410507	SVOC	ARAMITE	C
16SD030004	SVOC	ARAMITE	C
16SD040004	SVOC	ARAMITE	C
16SD050004	SVOC	ARAMITE	C
16SD080004	SVOC	ARAMITE	C
16SD100004	SVOC	ARAMITE	C
16SD110004	SVOC	ARAMITE	C
16SS0010002	SVOC	ARAMITE	C
16SS0020002	SVOC	ARAMITE	C
16SS0030002	SVOC	ARAMITE	C
16SS0040002	SVOC	ARAMITE	C
16SS0050002	SVOC	ARAMITE	C
16SS0060002	SVOC	ARAMITE	C
16SS0070002	SVOC	ARAMITE	C
16SS0080002	SVOC	ARAMITE	C
16SS0090002	SVOC	ARAMITE	C
16SS0100002	SVOC	ARAMITE	C
16SS0110002	SVOC	ARAMITE	C
16SS0120002	SVOC	ARAMITE	C
16SS0140002	SVOC	ARAMITE	C
16SS0150002	SVOC	ARAMITE	C
16SS0160002	SVOC	ARAMITE	C
16SS0170002	SVOC	ARAMITE	C
16SS0180002	SVOC	ARAMITE	CH
16SS0240002	SVOC	ARAMITE	C
16SS0260002	SVOC	ARAMITE	C
16SS0310002	SVOC	ARAMITE	C
16SS0320002	SVOC	ARAMITE	C
16SS0330002	SVOC	ARAMITE	C
16SS0340002	SVOC	ARAMITE	C
16SS0360002	SVOC	ARAMITE	C
16SS0370002	SVOC	ARAMITE	C
16SW0101	SVOC	ARAMITE	C
16SW0201	SVOC	ARAMITE	C
16SW0701	SVOC	ARAMITE	C
16GW0201	SVOC	BENZYL ALCOHOL	R
16GW0201	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16GW0202	SVOC	HEXACHLOROCYCLOPENTADIENE	E

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16GW0301	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16GW0501	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16GWT0301	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16GWT0501	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16GWT0601	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16GWT0602	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16SD060004	SVOC	HEXACHLOROCYCLOPENTADIENE	D
16SS0150002	SVOC	HEXACHLOROCYCLOPENTADIENE	D
16SW0101	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16SW0201	SVOC	HEXACHLOROCYCLOPENTADIENE	DE
16SW0701	SVOC	HEXACHLOROCYCLOPENTADIENE	E
16GW0101	SVOC	KEPONE	C
16GW0202	SVOC	KEPONE	C
16GW0401	SVOC	KEPONE	C
16GW0501	SVOC	KEPONE	C
16GWT0201	SVOC	KEPONE	C
16GWT0401	SVOC	KEPONE	C
16GWT0602	SVOC	KEPONE	C
16SB0260204	SVOC	KEPONE	C
16SB0320204	SVOC	KEPONE	C
16SB0330204	SVOC	KEPONE	C
16SB0340203	SVOC	KEPONE	C
16SB0360203	SVOC	KEPONE	C
16SB0380203	SVOC	KEPONE	C
16SB0390203	SVOC	KEPONE	C
16SB0400506	SVOC	KEPONE	C
16SB0400608	SVOC	KEPONE	C
16SD020004	SVOC	KEPONE	C
16SD030004	SVOC	KEPONE	C
16SD040004	SVOC	KEPONE	C
16SD050004	SVOC	KEPONE	C
16SD060004	SVOC	KEPONE	C
16SD080004	SVOC	KEPONE	C
16SD090004	SVOC	KEPONE	C
16SD100004	SVOC	KEPONE	C
16SD110004	SVOC	KEPONE	C
16SS0130002	SVOC	KEPONE	C
16SS0180002	SVOC	KEPONE	CH
16SS0190002	SVOC	KEPONE	C
16SS0200002	SVOC	KEPONE	C
16SS0210002	SVOC	KEPONE	C
16SS0220002	SVOC	KEPONE	C
16SS0230002	SVOC	KEPONE	C
16SS0250002	SVOC	KEPONE	C
16SS0260002	SVOC	KEPONE	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SS0270002	SVOC	KEPONE	C
16SS0280002	SVOC	KEPONE	C
16SS0290002	SVOC	KEPONE	C
16SS0300002	SVOC	KEPONE	C
16SS0320002	SVOC	KEPONE	C
16SS0330002	SVOC	KEPONE	C
16SS0340002	SVOC	KEPONE	C
16SS0350002	SVOC	KEPONE	C
16SS0360002	SVOC	KEPONE	C
16SS0380002	SVOC	KEPONE	C
16SS0390002	SVOC	KEPONE	C
16SW0201	SVOC	KEPONE	C
16SW0701	SVOC	KEPONE	C
16GW0201	SVOC	PHENOL	R
16GWT0601	SVOC	PHENOL	R
16GW0101	VOC	2-BUTANONE	C
16GW0201	VOC	2-BUTANONE	C
16GW0301	VOC	2-BUTANONE	C
16GW0401	VOC	2-BUTANONE	C
16GW0501	VOC	2-BUTANONE	C
16GWT0101	VOC	2-BUTANONE	C
16GWT0201	VOC	2-BUTANONE	C
16GWT0301	VOC	2-BUTANONE	C
16GWT0401	VOC	2-BUTANONE	C
16GWT0501	VOC	2-BUTANONE	C
16GW0101	VOC	ACETONE	C
16GW0201	VOC	ACETONE	C
16GW0301	VOC	ACETONE	C
16GW0401	VOC	ACETONE	C
16GW0501	VOC	ACETONE	C
16GWT0201	VOC	ACETONE	C
16GWT0301	VOC	ACETONE	C
16GWT0401	VOC	ACETONE	C
16GWT0501	VOC	ACETONE	C
16GW0101	VOC	ACROLEIN	C
16GW0201	VOC	ACROLEIN	C
16GW0301	VOC	ACROLEIN	C
16GW0401	VOC	ACROLEIN	C
16GW0501	VOC	ACROLEIN	C
16GWT0101	VOC	ACROLEIN	C
16GWT0201	VOC	ACROLEIN	C
16GWT0301	VOC	ACROLEIN	C
16GWT0401	VOC	ACROLEIN	C
16GWT0501	VOC	ACROLEIN	C
16GWT0601	VOC	ACROLEIN	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SB0020406	VOC	ACROLEIN	C
16SB0360203	VOC	ACROLEIN	C
16SB0410305	VOC	ACROLEIN	C
16SB0410507	VOC	ACROLEIN	C
16SS0010002	VOC	ACROLEIN	C
16SS0020002	VOC	ACROLEIN	C
16SS0030002	VOC	ACROLEIN	C
16SS0040002	VOC	ACROLEIN	C
16SS0050002	VOC	ACROLEIN	C
16SS0060002	VOC	ACROLEIN	C
16SS0070002	VOC	ACROLEIN	C
16SS0080002	VOC	ACROLEIN	C
16SS0090002	VOC	ACROLEIN	C
16SS0100002	VOC	ACROLEIN	C
16SS0110002	VOC	ACROLEIN	C
16SS0140002	VOC	ACROLEIN	C
16SS0150002	VOC	ACROLEIN	C
16SS0160002	VOC	ACROLEIN	C
16SS0170002	VOC	ACROLEIN	C
16SS0260002	VOC	ACROLEIN	C
16SS0320002	VOC	ACROLEIN	C
16SS0330002	VOC	ACROLEIN	C
16SS0340002	VOC	ACROLEIN	C
16SS0360002	VOC	ACROLEIN	C
16GW0101	VOC	ACRYLONITRILE	C
16GW0201	VOC	ACRYLONITRILE	C
16GW0301	VOC	ACRYLONITRILE	C
16GW0401	VOC	ACRYLONITRILE	C
16GW0501	VOC	ACRYLONITRILE	C
16GWT0101	VOC	ACRYLONITRILE	C
16GWT0201	VOC	ACRYLONITRILE	C
16GWT0301	VOC	ACRYLONITRILE	C
16GWT0401	VOC	ACRYLONITRILE	C
16GWT0501	VOC	ACRYLONITRILE	C
16GW0101	VOC	METHACRYLONITRILE	C
16GW0201	VOC	METHACRYLONITRILE	C
16GW0301	VOC	METHACRYLONITRILE	C
16GW0401	VOC	METHACRYLONITRILE	C
16GW0501	VOC	METHACRYLONITRILE	C
16GWT0101	VOC	METHACRYLONITRILE	C
16GWT0201	VOC	METHACRYLONITRILE	C
16GWT0301	VOC	METHACRYLONITRILE	C
16GWT0401	VOC	METHACRYLONITRILE	C
16GWT0501	VOC	METHACRYLONITRILE	C

Round 2

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16GW0102	VOC	ACROLEIN	C
16GW0203	VOC	ACROLEIN	C
16GW0302	VOC	ACROLEIN	C
16GW0402	VOC	ACROLEIN	C
16GW0502	VOC	ACROLEIN	C
16GWT0102	VOC	ACROLEIN	C
16GWT0202	VOC	ACROLEIN	C
16GWT0302	VOC	ACROLEIN	C
16GWT0402	VOC	ACROLEIN	C
16GWT0502	VOC	2-BUTANONE	C
16GWT0502	VOC	ACETONE	C
16GWT0502	VOC	ACROLEIN	C
16GWT0502	VOC	ACRYLONITRILE	C
16GWT0502	VOC	METHACRYLONITRILE	C
16GWT0603	VOC	ACROLEIN	C
16GWT0801	VOC	ACROLEIN	C
16GWT0901	VOC	2-BUTANONE	C
16GWT0901	VOC	ACETONE	C
16GWT0901	VOC	ACROLEIN	C
16GWT0901	VOC	ACRYLONITRILE	C
16GWT0901	VOC	METHACRYLONITRILE	C
16GWT1001	VOC	2-BUTANONE	C
16GWT1001	VOC	ACETONE	C
16GWT1001	VOC	ACROLEIN	C
16GWT1001	VOC	ACRYLONITRILE	C
16GWT1001	VOC	METHACRYLONITRILE	C
16GWT1101	VOC	ACROLEIN	C
16GWT1201	VOC	2-BUTANONE	C
16GWT1201	VOC	ACETONE	C
16GWT1201	VOC	ACROLEIN	C
16GWT1201	VOC	ACRYLONITRILE	C
16GWT1201	VOC	METHACRYLONITRILE	C
16GWT1301	VOC	2-BUTANONE	C
16GWT1301	VOC	ACETONE	C
16GWT1301	VOC	ACROLEIN	C
16GWT1301	VOC	ACRYLONITRILE	C
16GWT1301	VOC	METHACRYLONITRILE	C
16GWT1501	VOC	ACROLEIN	C
16GWT1601	VOC	ACETONE	C
16GWT1601	VOC	ACROLEIN	C
16GWT1601	VOC	ACRYLONITRILE	C
16GWT1601	VOC	METHACRYLONITRILE	C
16GWT1701	VOC	ACROLEIN	C
16GWT1801	VOC	ACROLEIN	C
16SB0470405	VOC	ACROLEIN	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SB0470405	VOC	ACRYLONITRILE	C
16SB0480203	VOC	ACETONITRILE	C
16SB0480203	VOC	ACROLEIN	C
16SB0490405	VOC	ACROLEIN	C
16SB0490405	VOC	ACRYLONITRILE	C
16SB0500103	VOC	ACROLEIN	C
16SD120004	VOC	ACROLEIN	C
16SD130004	VOC	ACROLEIN	C
16SD140004	VOC	ACROLEIN	C
16SD150004	VOC	ACROLEIN	C
16SD160004	VOC	ACROLEIN	C
16SD170004	VOC	ACROLEIN	C
16SD180004	VOC	ACROLEIN	C
16SD190004	VOC	ACROLEIN	C
16SD200004	VOC	ACROLEIN	C
16SD210004	VOC	ACROLEIN	C
16SD220004	VOC	ACROLEIN	C
16SW0102	VOC	ACROLEIN	C
16SW0202	VOC	ACROLEIN	C
16SW0702	VOC	ACROLEIN	C
16SW1201	VOC	ACROLEIN	C
16SW1301	VOC	ACROLEIN	C
16SW1401	VOC	2-BUTANONE	C
16SW1401	VOC	ACETONE	C
16SW1401	VOC	ACROLEIN	C
16SW1401	VOC	ACRYLONITRILE	C
16SW1401	VOC	METHACRYLONITRILE	C
16SW1501	VOC	ACROLEIN	C
16SW1701	VOC	2-BUTANONE	C
16SW1701	VOC	ACETONE	C
16SW1701	VOC	ACROLEIN	C
16SW1701	VOC	ACRYLONITRILE	C
16SW1701	VOC	METHACRYLONITRILE	C
16SW1801	VOC	2-BUTANONE	C
16SW1801	VOC	ACETONE	C
16SW1801	VOC	ACROLEIN	C
16SW1801	VOC	ACRYLONITRILE	C
16SW1801	VOC	METHACRYLONITRILE	C
16SW2001	VOC	ACROLEIN	C
16SW2101	VOC	2-BUTANONE	C
16SW2101	VOC	ACETONE	C
16SW2101	VOC	ACROLEIN	C
16SW2101	VOC	ACRYLONITRILE	C
16SW2101	VOC	METHACRYLONITRILE	C
Round 3			

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SB0560206	VOC	1,1,1,2-TETRACHLOROETHANE	N
16SB0560206	VOC	1,1,1-TRICHLOROETHANE	N
16SB0560206	VOC	1,1,2,2-TETRACHLOROETHANE	N
16SB0560206	VOC	1,1-DICHLOROETHANE	N
16SB0560206	VOC	1,1-DICHLOROETHENE	N
16SB0560206	VOC	1,2,3-TRICHLOROPROPANE	N
16SB0560206	VOC	1,2-DIBROMO-3-CHLOROPROPANE	N
16SB0600609	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SB0610206	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SB0630206	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SB0630608	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SB0640206	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SB0640608	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SB0650206	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SB0650608	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SS0600102	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SS0630102	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SS0640102	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SS0650102	VOC	1,2-DIBROMO-3-CHLOROPROPANE	C
16SB0560206	VOC	1,2-DIBROMOETHANE	N
16SB0560206	VOC	1,2-DICHLOROETHANE	N
16SB0560206	VOC	1,2-DICHLOROPROPANE	N
16SB0560206	VOC	2-BUTANONE	N
16SB0600609	VOC	2-BUTANONE	C
16SB0610206	VOC	2-BUTANONE	C
16SB0630206	VOC	2-BUTANONE	C
16SB0630608	VOC	2-BUTANONE	C
16SB0640206	VOC	2-BUTANONE	C
16SB0640608	VOC	2-BUTANONE	C
16SB0650206	VOC	2-BUTANONE	C
16SB0650608	VOC	2-BUTANONE	C
16SS0600102	VOC	2-BUTANONE	C
16SS0630102	VOC	2-BUTANONE	C
16SS0640102	VOC	2-BUTANONE	C
16SS0650102	VOC	2-BUTANONE	C
16SB0560206	VOC	2-HEXANONE	N
16SB0560206	VOC	3-CHLOROPROPENE	N
16SB0560206	VOC	4-METHYL-2-PENTANONE	N
16SB0630608	VOC	ACETONE	C
16SS0630102	VOC	ACETONE	C
16SS0650102	VOC	ACETONE	C
16SB0510204	VOC	ACROLEIN	C
16SB0520205	VOC	ACROLEIN	C
16SB0530205	VOC	ACROLEIN	C
16SB0540205	VOC	ACROLEIN	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SB0550206	VOC	ACROLEIN	C
16SB0550607	VOC	ACROLEIN	C
16SB0560206	VOC	ACROLEIN	C
16SB0560608	VOC	ACROLEIN	C
16SB0570206	VOC	ACROLEIN	C
16SB0580206	VOC	ACROLEIN	C
16SB0580607	VOC	ACROLEIN	C
16SB0590206	VOC	ACROLEIN	C
16SB0590608	VOC	ACROLEIN	C
16SB0600206	VOC	ACROLEIN	CN
16SB0600609	VOC	ACROLEIN	C
16SB0610206	VOC	ACROLEIN	C
16SB0610607	VOC	ACROLEIN	C
16SB0620206	VOC	ACROLEIN	C
16SB0620607	VOC	ACROLEIN	C
16SB0630206	VOC	ACROLEIN	C
16SB0630608	VOC	ACROLEIN	C
16SB0640206	VOC	ACROLEIN	C
16SB0640608	VOC	ACROLEIN	C
16SB0650206	VOC	ACROLEIN	C
16SB0650608	VOC	ACROLEIN	C
16SB0660206	VOC	ACROLEIN	C
16SB0660608	VOC	ACROLEIN	C
16SB0670206	VOC	ACROLEIN	C
16SB0670609	VOC	ACROLEIN	C
16SB0680206	VOC	ACROLEIN	C
16SB0680609	VOC	ACROLEIN	C
16SB0690206	VOC	ACROLEIN	C
16SB0690607	VOC	ACROLEIN	C
16SB0700206	VOC	ACROLEIN	C
16SB0700607	VOC	ACROLEIN	C
16SB0710206	VOC	ACROLEIN	C
16SB0720206	VOC	ACROLEIN	C
16SB0720607	VOC	ACROLEIN	C
16SB0730204	VOC	ACROLEIN	C
16SB0740206	VOC	ACROLEIN	C
16SB0750203	VOC	ACROLEIN	C
16SB0760206	VOC	ACROLEIN	C
16SB0760607	VOC	ACROLEIN	C
16SB0770206	VOC	ACROLEIN	C
16SB0770610	VOC	ACROLEIN	C
16SB0780206	VOC	ACROLEIN	C
16SB0780609	VOC	ACROLEIN	C
16SB0900406	VOC	ACROLEIN	C
16SB0900608	VOC	ACROLEIN	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SB0910406	VOC	ACROLEIN	C
16SB0910609	VOC	ACROLEIN	C
16SB0920406	VOC	ACROLEIN	C
16SB0920608	VOC	ACROLEIN	C
16SB0930406	VOC	ACROLEIN	C
16SB0930608	VOC	ACROLEIN	C
16SB0940708	VOC	ACROLEIN	C
16SB0950406	VOC	ACROLEIN	C
16SB0950607	VOC	ACROLEIN	C
16SB0960406	VOC	ACROLEIN	C
16SB0960608	VOC	ACROLEIN	C
16SB0970406	VOC	ACROLEIN	C
16SB0970607	VOC	ACROLEIN	C
16SB0980206	VOC	ACROLEIN	C
16SB0980607	VOC	ACROLEIN	C
16SB0990206	VOC	ACROLEIN	C
16SB0990608	VOC	ACROLEIN	C
16SD2701	VOC	ACROLEIN	C
16SD2801	VOC	ACROLEIN	C
16SD2901	VOC	ACROLEIN	C
16SD3001	VOC	ACROLEIN	C
16SS0510102	VOC	ACROLEIN	C
16SS0520102	VOC	ACROLEIN	C
16SS0530102	VOC	ACROLEIN	C
16SS0540102	VOC	ACROLEIN	C
16SS0550102	VOC	ACROLEIN	C
16SS0560102	VOC	ACROLEIN	C
16SS0570102	VOC	ACROLEIN	C
16SS0580102	VOC	ACROLEIN	C
16SS0590102	VOC	ACROLEIN	C
16SS0600102	VOC	ACROLEIN	C
16SS0610102	VOC	ACROLEIN	C
16SS0620102	VOC	ACROLEIN	C
16SS0630102	VOC	ACROLEIN	C
16SS0640102	VOC	ACROLEIN	C
16SS0650102	VOC	ACROLEIN	C
16SS0660102	VOC	ACROLEIN	C
16SS0670102	VOC	ACROLEIN	C
16SS0680102	VOC	ACROLEIN	C
16SS0690102	VOC	ACROLEIN	C
16SS0700102	VOC	ACROLEIN	C
16SS0710102	VOC	ACROLEIN	C
16SS0720102	VOC	ACROLEIN	C
16SS0730102	VOC	ACROLEIN	C
16SS0740102	VOC	ACROLEIN	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SS0750102	VOC	ACROLEIN	C
16SS0760102	VOC	ACROLEIN	C
16SS0770102	VOC	ACROLEIN	C
16SS0780102	VOC	ACROLEIN	C
16SS0980102	VOC	ACROLEIN	C
16SS0990102	VOC	ACROLEIN	C
16GW0103	VOC	ACROLEIN	C
16GW0204	VOC	ACROLEIN	C
16GW0303	VOC	ACROLEIN	C
16GW0403	VOC	ACROLEIN	C
16GW0503	VOC	ACROLEIN	C
16GWT0103	VOC	ACROLEIN	C
16GWT0203	VOC	ACROLEIN	C
16GWT0303	VOC	ACROLEIN	C
16GWT0403	VOC	ACROLEIN	C
16GWT0503	VOC	ACROLEIN	C
16GWT0604	VOC	ACROLEIN	C
16GWT0902	VOC	ACROLEIN	C
16GWT1002	VOC	ACROLEIN	C
16GWT1102	VOC	ACROLEIN	C
16GWT1202	VOC	ACROLEIN	C
16GWT1302	VOC	ACROLEIN	C
16GWT1502	VOC	ACROLEIN	C
16GWT1602	VOC	ACROLEIN	C
16GWT1702	VOC	ACROLEIN	C
16GWT1802	VOC	ACROLEIN	C
16GWT1901	VOC	ACROLEIN	C
16GWT2001	VOC	ACROLEIN	C
16SW1202	VOC	ACROLEIN	C
16SW1302	VOC	ACROLEIN	C
16SW2401	VOC	ACROLEIN	C
16SW2601	VOC	ACROLEIN	C
16SW2701	VOC	ACROLEIN	C
16SW2801	VOC	ACROLEIN	C
16SW2901	VOC	ACROLEIN	C
16SW3001	VOC	ACROLEIN	C
16SB0560206	VOC	ACRYLONITRILE	N
16SB0600609	VOC	ACRYLONITRILE	C
16SB0610206	VOC	ACRYLONITRILE	C
16SB0630206	VOC	ACRYLONITRILE	C
16SB0630608	VOC	ACRYLONITRILE	C
16SB0640206	VOC	ACRYLONITRILE	C
16SB0640608	VOC	ACRYLONITRILE	C
16SB0650206	VOC	ACRYLONITRILE	C
16SB0650608	VOC	ACRYLONITRILE	C

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SS0600102	VOC	ACRYLONITRILE	C
16SS0630102	VOC	ACRYLONITRILE	C
16SS0640102	VOC	ACRYLONITRILE	C
16SS0650102	VOC	ACRYLONITRILE	C
16SB0560206	VOC	BENZENE	N
16SB0560206	VOC	BROMODICHLOROMETHANE	N
16SB0560206	VOC	BROMOFORM	N
16SB0560206	VOC	CARBON DISULFIDE	N
16SB0560206	VOC	CARBON TETRACHLORIDE	N
16SB0560206	VOC	CHLOROBENZENE	N
16SB0560206	VOC	CHLORODIBROMOMETHANE	N
16SB0560206	VOC	CHLOROETHANE	N
16SB0560206	VOC	CHLOROMETHANE	N
16SB0560206	VOC	CHLOROPRENE	N
16SB0560206	VOC	CIS-1,2-DICHLOROETHENE	N
16SB0560206	VOC	CIS-1,3-DICHLOROPROPENE	N
16SB0560206	VOC	DIBROMOMETHANE	N
16SB0560206	VOC	DICHLORODIFLUOROMETHANE	N
16SB0560206	VOC	ETHYL METHACRYLATE	N
16SB0560206	VOC	ETHYLBENZENE	N
16SB0560206	VOC	METHACRYLONITRILE	N
16SB0600609	VOC	METHACRYLONITRILE	C
16SB0610206	VOC	METHACRYLONITRILE	C
16SB0630206	VOC	METHACRYLONITRILE	C
16SB0630608	VOC	METHACRYLONITRILE	C
16SB0640206	VOC	METHACRYLONITRILE	C
16SB0640608	VOC	METHACRYLONITRILE	C
16SB0650206	VOC	METHACRYLONITRILE	C
16SB0650608	VOC	METHACRYLONITRILE	C
16SS0600102	VOC	METHACRYLONITRILE	C
16SS0630102	VOC	METHACRYLONITRILE	C
16SS0640102	VOC	METHACRYLONITRILE	C
16SS0650102	VOC	METHACRYLONITRILE	C
16SB0560206	VOC	METHYL IODIDE	N
16SS0770102	VOC	METHYL IODIDE	C
16SB0560206	VOC	METHYL METHACRYLATE	N
16SB0560206	VOC	METHYLENE CHLORIDE	N
16SB0560206	VOC	STYRENE	N
16SB0560206	VOC	TETRACHLOROETHENE	N
16SB0560206	VOC	TOLUENE	N
16SB0560206	VOC	TOTAL XYLENES	N
16SB0560206	VOC	TRANS-1,2-DICHLOROETHENE	N
16SB0560206	VOC	TRANS-1,3-DICHLOROPROPENE	N
16SB0560206	VOC	TRANS-1,4-DICHLORO-2-BUTENE	N
16SB0560206	VOC	TRICHLOROFLUOROMETHANE	N

TABLE H-3
REJECTED DATA FOR ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)

NSWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
16SB0560206	VOC	VINYL ACETATE	N

C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.) Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
H = Holding Time Exceedance
N = Internal standard non-compliance
R = Surrogates Recovery Noncompliance
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC

EXP = Explosives
HERB = Herbicides
SVOC = Semivolatile organic compounds
VOC = Volatile organice compounds

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration[2]**	**Maximum Non-detect Concentration**	**Laboratory TV**	**Laboratory RL**	**Risk-Based Target Level[3]**
Composting Operation		**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
EXP	1,3,5-TRINITROBENZENE	0.1	5	NA	NA	3.3
	1,3-DINITROBENZENE	0.0	7	NA	NA	6.5
	2,4,6-TRINITROTOLUENE	0.0	2.5	NA	NA	15
	2,4-DINITROTOLUENE	0.1	10	NA	NA	130
	2,6-DINITROTOLUENE	0.2	10	NA	NA	65
	2-AMINO-4,6-DINITROTOLUENE	0.0	10	NA	NA	1400
	2-NITROTOLUENE	0.1	5	NA	NA	650
	3-NITROTOLUENE	0.2	5	NA	NA	650
	4-AMINO-2,6-DINITROTOLUENE	0.0	54.3	NA	NA	65
	4-NITROTOLUENE	0.1	5	NA	NA	650
	BUTYL ETHER	0.0	5	NA	NA	--
	HMX	0.0	5	NA	NA	3300
	PETN	0.2	3.08	NA	NA	0.25
	RDX	0.0	5	NA	NA	4.0
	TETRYL	0.3	7	NA	NA	650
M	ARSENIC	10.3	25.9	NA	NA	0.32
	BARIUM	69.4	69.4	NA	NA	5300
	CADMIUM	0.0	1.3	NA	NA	38
	MERCURY	0.0	1	NA	NA	23
	SELENIUM	0.4	51.8	NA	NA	380
	SILVER	0.1	2.6	NA	NA	380
VOC		**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
	2-BUTANONE	0	616	NA	NA	7100000
	4-METHYL-2-PENTANONE	0	308	NA	NA	770000
	ACETONE	0	1230	NA	NA	2000000
	METHYLENE CHLORIDE	0	308	NA	NA	7800
	TOLUENE	0	308	NA	NA	790000
	TOTAL XYLENES	0	308	NA	NA	320000
PEST/PCB	AROCLOR-1242	39	7400	NA	NA	
	AROCLOR-1254	39	7400	NA	NA	
	AROCLOR-1260	39	7400	NA	NA	
Round 1		**ng/kg**	**ng/kg**	**ng/kg**	**ng/kg**	**ng/kg**
DIOX	1,2,3,4,6,7,8,9-OCDD	49.4	49.4	0.25	0.5	2800
	1,2,3,4,6,7,8,9-OCDF	0.1	3.4	0.25	0.5	2800
	1,2,3,4,6,7,8-HPCDD	1.5	1.5	0.25	0.5	28
	1,2,3,4,6,7,8-HPCDF	0.07	6.2	0.25	0.5	28
	1,2,3,4,7,8,9-HPCDF	0.08	1.5	0.25	0.5	28
	1,2,3,4,7,8-HXCDD	0.09	1.5	0.25	0.5	2.8
	1,2,3,4,7,8-HXCDF	0.05	1.2	0.25	0.5	2.8
	1,2,3,6,7,8-HXCDD	0.09	1.4	0.25	0.5	2.8
	1,2,3,6,7,8-HXCDF	0.04	0.8	0.25	0.5	2.8

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration[2]**	**Maximum Non-detect Concentration**	**Laboratory TV**	**Laboratory RL**	**Risk-Based Target Level[3]**
	1,2,3,7,8,9-HXCDD	0.1	2	0.25	0.5	2.8
	1,2,3,7,8,9-HXCDF	0.06	0.9	0.25	0.5	2.8
	1,2,3,7,8-PECDD	0.1	1.1	0.25	0.5	0.28
	1,2,3,7,8-PECDF	0.06	0.7	0.25	0.5	5.6
	2,3,4,6,7,8-HXCDF	0.05	0.8	0.25	0.5	2.8
	2,3,4,7,8-PECDF	0.07	0.66	0.25	0.5	0.56
	2,3,7,8-TCDD	0.07	1.2	0.25	0.5	0.28
	2,3,7,8-TCDF	0.05	0.5	0.25	0.5	2.8
	TOTAL HPCDD	3.3	3.3	--	--	--
	TOTAL HPCDF	0.08	1.9	--	--	--
	TOTAL HXCDD	0.1	2	--	--	--
	TOTAL HXCDF	0.05	0.51	--	--	--
	TOTAL PECDD	0.1	2.8	--	--	--
	TOTAL PECDF	0.07	0.87	--	--	--
	TOTAL TCDD	0.07	5.2	--	--	--
	TOTAL TCDF	0.05	7.9	--	--	--
EXP		**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
	1,3,5-TRINITROBENZENE	0.25	0.25	0.25	0.5	1800
	1,3-DINITROBENZENE	0.25	0.25	0.25	0.5	0.6547
	2,4,6-TRINITROTOLUENE	0.25	0.25	0.25	0.5	16
	2,4-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.00004
	2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.00003
	2-AMINO-4,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	4.7
	2-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	3-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	4-AMINO-2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	4.78
	4-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	HMX	0.25	0.25	0.25	0.5	3100
	NITROBENZENE	0.25	0.25	0.25	0.5	0.007
	PICRAMIC ACID	0.017	0.021	17	33	--
	PICRIC ACID	0.017	0.021	17	33	C
	RDX	0.25	0.25	0.25	0.5	4.4
EXP	TETRYL	0.25	0.25	0.25	0.5	780
HERB		**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
	HEXACHLOROPHENE	0.62	1.3	0.0067	0.017	0.19878
	PENTACHLOROPHENOL	0.46	0.66	0.00034	0.00068	0.001
M		**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
	ALUMINUM	3610	3610	3.4	25	76000
	ANTIMONY	0.14	3.6	0.01	0.5	0.1423
	BERYLLIUM	0.06	0.64	0.015	0.5	0.1
	CADMIUM	0.09	0.66	0.02	0.5	0.00222
	CALCIUM	58.7	380	1.98	100	--
	LEAD	7.9	15.7	0.01	0.5	0.05373

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration[2]**	**Maximum Non-detect Concentration**	**Laboratory TV**	**Laboratory RL**	**Risk-Based Target Level[3]**
	LITHIUM	2	6.3	0.055	2.5	1600
	MERCURY	0.002	0.021	0.002	0.02	0.073
	SELENIUM	0.02	0.54	0.02	0.5	0.02765
	SILVER	0.02	0.26	0.015	0.5	2
	SODIUM	12.7	84.9	2.32	50	--
	THALLIUM	0.03	0.26	0.02	0.5	0.04
	TIN	0.22	2.4	0.045	5	7.62
	ZINC	4.5	2510	0.16	5	6.62
MISC	TOTAL ORGANIC CARBON	1000	1000	--	--	--
		ug/kg	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
SVOC	1,2,4,5-TETRACHLOROBENZENE	69	150	67	333	2020
	1,2,4-TRICHLOROBENZENE	69	150	67	333	300
	1,2-DICHLOROBENZENE	69	150	67	333	900
	1,3-DICHLOROBENZENE	69	150	67	333	130
	1,4-DICHLOROBENZENE	69	150	67	130	100
	1,4-NAPHTHOQUINONE	69	150	67	333	44
	1,4-PHENYLENEDIAMINE	69	150	67	333	12000000
	1-NAPHTHYLAMINE	69	150	67	333	670
	2,2'-OXYBIS(1-CHLOROPROPANE)	69	150	67	200	--
	2,3,4,6-TETRACHLOROPHENOL	69	150	67	333	198.78
	2,4,5-TRICHLOROPHENOL	69	150	67	333	14000
	2,4,6-TRICHLOROPHENOL	69	150	67	200	8
	2,4-DICHLOROPHENOL	69	150	67	333	50
	2,4-DIMETHYLPHENOL	69	150	67	333	10
	2,4-DINITROPHENOL	69	150	67	670	10
	2,6-DICHLOROPHENOL	69	150	67	333	1170
	2-ACETYLAMINOFLUORENE	69	150	67	333	596.34
	2-CHLORONAPHTHALENE	69	150	67	130	12.18
	2-CHLOROPHENOL	69	150	67	200	200
	2-METHYLNAPHTHALENE	3.4	4.9	3.3	6.7	700
	2-METHYLPHENOL	69	150	67	333	800
	2-NAPHTHYLAMINE	69	150	67	333	--
	2-NITROANILINE	69	150	67	130	3500
	2-NITROPHENOL	69	150	67	333	1600
	2-PICOLINE	69	150	67	333	9900
	3&4-METHYLPHENOL	69	150	67	333	310000
	3,3'-DICHLOROBENZIDINE	69	150	67	333	0.3
	3,3'-DIMETHYLBENZIDINE	69	150	67	333	53
SVOC	3-METHYLCHOLANTHRENE	69	150	67	333	77.94
	3-NITROANILINE	69	150	67	333	3500
	4,6-DINITRO-2-METHYLPHENOL	69	150	67	333	144.08
	4-AMINOBIPHENYL	69	150	67	333	--
	4-BROMOPHENYL PHENYL ETHER	69	150	67	130	1500
	4-CHLORO-3-METHYLPHENOL	69	150	67	333	7950

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	4-CHLOROANILINE	69	150	67	333	30
	4-CHLOROPHENYL PHENYL ETHER	69	150	67	333	--
	4-NITROANILINE	69	150	67	333	3500
	4-NITROPHENOL	69	150	67	333	5120
	4-NITROQUINOLINE-1-OXIDE	69	150	67	333	--
	5-NITRO-O-TOLUIDINE	69	150	67	333	15000
	7,12-DIMETHYLBENZ(A)ANTHRACENE	69	150	67	333	16300
	A,A-DIMETHYLPHENETHYLAMINE	69	150	67	670	61000
	ACENAPHTHENE	3.5	4.9	3.3	6.7	29000
	ACENAPHTHYLENE	3.5	4.9	3.3	6.7	130000
	ACETOPHENONE	69	150	67	333	490
	ANILINE	69	150	67	333	56.78
	ANTHRACENE	3.5	4.9	3.3	6.7	51000
	ARAMITE	69	150	67	333	19000
	BENZO(A)ANTHRACENE	3.5	4.9	3.3	6.7	80
	BENZO(A)PYRENE	3.5	4.9	3.3	6.7	62
	BENZO(B)FLUORANTHENE	3.5	4.3	3.3	6.7	200
	BENZO(G,H,I)PERYLENE	3.5	4.9	3.3	6.7	119000
	BENZO(K)FLUORANTHENE	3.5	4.3	3.3	6.7	2000
	BENZYL ALCOHOL	69	150	67	333	65800
	BIS(2-CHLOROETHOXY)METHANE	69	150	67	333	302.09
	BIS(2-CHLOROETHYL)ETHER	69	150	67	130	0.02
	BIS(2-ETHYLHEXYL)PHTHALATE	69	1000	67	130	925.94
	BUTYL BENZYL PHTHALATE	69	150	67	333	238.89
	CHLOROBENZILATE	69	150	67	333	1800
	CHRYSENE	3.5	4.3	3.3	6.7	4730
	DIALLATE	69	150	67	333	452.14
	DIBENZO(A,H)ANTHRACENE	3.5	4.9	3.3	6.7	62
	DIBENZOFURAN	69	99	67	333	290000
	DIETHYL PHTHALATE	69	150	67	130	23000
	DIMETHYL PHTHALATE	69	150	67	333	734000
	DI-N-BUTYL PHTHALATE	69	150	67	333	149.79
	DI-N-OCTYL PHTHALATE	69	150	67	333	709000
	DIPHENYLAMINE	69	150	67	333	1010
	ETHYL METHANE SULFONATE	69	150	67	333	--
	FLUORANTHENE	3.5	4.3	3.3	6.7	122000
	FLUORENE	3.5	4.9	3.3	6.7	28000
	HEXACHLOROBENZENE	69	150	67	130	100
	HEXACHLOROBUTADIENE	69	150	67	67	39.76
	HEXACHLOROCYCLOPENTADIENE	69	150	67	130	755.37
	HEXACHLOROETHANE	69	150	67	130	20
	HEXACHLOROPROPENE	69	150	67	333	20000
	INDENO(1,2,3-CD)PYRENE	3.5	4.9	3.3	6.7	620

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
SVOC	ISODRIN	69	150	67	333	3.32
	ISOPHORONE	69	150	67	333	30
	ISOSAFROLE	69	150	67	333	9940
	KEPONE	69	150	67	333	27
	METHAPYRILENE	69	150	67	333	2780
	METHYL METHANE SULFONATE	69	150	67	333	315.49
	NAPHTHALENE	3.4	4.9	3.3	6.7	99.39
	N-NITROSODIETHYLAMINE	69	150	67	333	3.2
	N-NITROSODIMETHYLAMINE	69	150	67	333	0.0321
	N-NITROSO-DI-N-BUTYLAMINE	69	150	67	333	24
	N-NITROSO-DI-N-PROPYLAMINE	69	150	67	130	0.002
	N-NITROSOMETHYLETHYLAMINE	69	150	67	333	1.66
	N-NITROSOMORPHOLINE	69	150	67	333	70.57
	N-NITROSOPIPERIDINE	69	150	67	333	6.65
	N-NITROSOPYRROLIDINE	69	150	67	333	12.58
	O,O,O-TRIETHYL PHOSPHOROTHIOATE	69	150	67	333	58250
	O-TOLUIDINE	69	150	67	333	2000
	P-(DIMETHYLAMINO)AZOBENZENE	69	150	67	333	--
	PENTACHLOROBENZENE	69	150	67	333	496.95
	PENTACHLOROETHANE	69	150	67	333	10700
	PENTACHLORONITROBENZENE	69	150	67	333	1900
	PHENACETIN	69	150	67	333	11700
	PHENANTHRENE	3.5	4.3	3.3	6.7	45700
	PHENOL	69	150	67	333	5000
	PRONAMIDE	69	150	67	333	13.6
	PYRENE	3.5	4.3	3.3	6.7	78500
	PYRIDINE	69	150	67	333	1030
	SAFROLE	69	150	67	333	403.98
VOC	1,1,1,2-TETRACHLOROETHANE	1	1.4	1	3	50
	1,1,1-TRICHLOROETHANE	1	1.4	1	3	100
	1,1,2,2-TETRACHLOROETHANE	1	1.4	1	3	0.2
	1,1,2-TRICHLOROETHANE	1	1.4	1	3	0.9
	1,1-DICHLOROETHANE	1	1.4	1	3	1000
	1,1-DICHLOROETHENE	1	1.4	1	3	3
	1,2,3-TRICHLOROPROPANE	1	1.4	1	3	1.4
	1,2-DIBROMO-3-CHLOROPROPANE	1	1.4	1	3	35.18
	1,2-DIBROMOETHANE	1	1.4	1	3	6.9
	1,2-DICHLOROETHANE	1	1.4	1	3	1
	1,2-DICHLOROPROPANE	1	1.4	1	3	1
	1,4-DIOXANE	100	140	100	200	2050
	2-BUTANONE	1	1.4	1	15	10000
	2-HEXANONE	1	1.4	1	15	12600
	3-CHLOROPROPENE	1	1.4	1	10	3000000
	4-METHYL-2-PENTANONE	1	1.4	1	15	443000

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	ACETONE	1	8	1	15	800
	ACETONITRILE	41	56	40	80	1370
	ACROLEIN	1	1.4	1	50	0.23
	ACRYLONITRILE	1	1.4	1	10	210
	BENZENE	1	1.4	1	3	2
VOC	BROMODICHLOROMETHANE	1	1.4	1	3	30
	BROMOFORM	1	1.4	1	3	40
	BROMOMETHANE	1	1.4	1	3	10
	CARBON DISULFIDE	1	1.4	1	3	94.12
	CARBON TETRACHLORIDE	1	1.4	1	3	3
	CHLOROBENZENE	1	1.4	1	3	70
	CHLORODIBROMOMETHANE	1	1.4	1	3	20
	CHLOROETHANE	1	1.4	1	3	3000
	CHLOROFORM	1	1.4	1	3	30
	CHLOROMETHANE	1	1.4	1	3	1200
	CHLOROPRENE	1	1.4	1	3	3600
	CIS-1,2-DICHLOROETHENE	1	1.4	1	3	20
	CIS-1,3-DICHLOROPROPENE	1	1.4	1	3	0.2
	DIBROMOMETHANE	1	1.4	1	3	67000
	DICHLORODIFLUOROMETHANE	1	1.4	1	3	39500
	ETHYL METHACRYLATE	1	1.4	1	3	30000
	ETHYLBENZENE	1	1.4	1	3	700
	ISOBUTANOL	41	56	40	80	20800
	METHACRYLONITRILE	1	1.4	1	3	57.05
	METHYL IODIDE	1	1.4	1	3	--
	METHYL METHACRYLATE	1	1.4	1	30	984000
	METHYLENE CHLORIDE	1	13	1	3	1
	PROPIONITRILE	41	56	40	80	49.83
	STYRENE	1	1.4	1	3	200
	TETRACHLOROETHENE	1	1.4	1	3	3
	TOLUENE	1	1.4	1	3	600
	TOTAL XYLENES	1	1.4	1	10	9000
	TRANS-1,2-DICHLOROETHENE	1	1.4	1	3	30
	TRANS-1,3-DICHLOROPROPENE	1	1.4	1	3	0.2
	TRANS-1,4-DICHLORO-2-BUTENE	1	1.4	1	10	7.9
	TRICHLOROETHENE	1	1.4	1	3	3
	TRICHLOROFLUOROMETHANE	1	1.3	1	3	16400
	VINYL ACETATE	1	1.4	1	30	2300
	VINYL CHLORIDE	1	1.4	1	3	0.7
PEST/PCB	AROCLOR-1016	18	25	17	33	679.71
	AROCLOR-1221	35	50	34	67	220
	AROCLOR-1232	18	25	17	33	220
	AROCLOR-1242	18	25	17	33	220
	AROCLOR-1248	18	22	17	33	220

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration[2]**	**Maximum Non-detect Concentration**	**Laboratory TV**	**Laboratory RL**	**Risk-Based Target Level[3]**
	AROCLOR-1254	18	25	17	33	220
	AROCLOR-1260	18	25	17	33	220
Round 2						
M	BERYLLIUM	0.63	0.87	0.015	0.5	32
	CADMIUM	0.47	1	0.02	0.5	0.38
	SELENIUM	0.37	0.82	0.02	0.5	0.26
	SILVER	0.06	0.16	0.015	0.5	1.6
	SODIUM	30.5	53	2.3185	50	NA
	THALLIUM	0.24	0.32	0.02	0.5	0.04
	TIN	0.82	0.92	0.045	5	47000
VOC	1,1,1,2-TETRACHLOROETHANE	0.814	1.18	1	3	7.1
	1,1,1-TRICHLOROETHANE	0.814	1.18	1	3	97
	1,1,2,2-TETRACHLOROETHANE	0.814	1.18	1	3	0.17
	1,1,2-TRICHLOROETHANE	0.814	1.18	1	3	0.91
	1,1-DICHLOROETHANE	0.814	1.18	1	3	1000
	1,1-DICHLOROETHENE	0.814	1.18	1	3	2.9
	1,2,3-TRICHLOROPROPANE	0.814	1.18	1	3	0.0037
	1,2-DIBROMO-3-CHLOROPROPANE	0.814	1.18	1	3	0.092
	1,2-DIBROMOETHANE	0.814	1.18	1	3	0.029
	1,2-DICHLOROETHANE	0.814	1.18	1	3	1.2
	1,2-DICHLOROPROPANE	0.814	1.18	1	3	1.5
	1,4-DIOXANE	106	145	0.1	200	1.7
	2-BUTANONE	0.814	1.18	1	10	4400
	2-HEXANONE	0.814	1.18	1	10	NA
	3-CHLOROPROPENE	0.814	1.18	1	10	1800
	4-METHYL-2-PENTANONE	0.814	1.18	1	10	620
	ACETONE	0.978	1.18	1	10	730
	ACETONITRILE	42.4	58	40	80	420000
	ACROLEIN	0.814	1.18	1	10	0.23
	ACRYLONITRILE	0.814	101	1	10	0.032
	BENZENE	0.814	1.18	1	3	1.7
	BROMODICHLOROMETHANE	0.814	1.18	1	3	32
	BROMOFORM	0.814	1.18	1	3	38
	BROMOMETHANE	0.814	1.18	1	3	12
	CARBON DISULFIDE	0.814	1.18	1	3	1500
	CARBON TETRACHLORIDE	0.814	1.18	1	3	3.3
	CHLOROBENZENE	0.814	1.18	1	3	65
	CHLORODIBROMOMETHANE	0.814	1.18	1	3	32
	CHLOROETHANE	0.814	1.18	1	3	330
	CHLOROFORM	0.814	1.18	1	3	29
	CHLOROMETHANE	0.814	1.18	1	3	2
	CHLOROPRENE	0.814	1.18	1	10	560
	CIS-1,2-DICHLOROETHENE	0.814	1.12	1	3	20
	CIS-1,3-DICHLOROPROPENE	0.814	1.18	1	3	0.3

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration[2]**	**Maximum Non-detect Concentration**	**Laboratory TV**	**Laboratory RL**	**Risk-Based Target Level[3]**
	DIBROMOMETHANE	0.814	1.18	1	3	77
	ETHYL METHACRYLATE	0.814	1.18	1	10	810
	ETHYLBENZENE	0.814	1.18	1	3	670
	ISOBUTANOL	42.4	58	40	80	2300
	METHACRYLONITRILE	0.814	1.18	1	10	1
	METHYL IODIDE	0.814	1.18	1	10	NA
	METHYL METHACRYLATE	0.814	1.18	1	10	12000
	METHYLENE CHLORIDE	14	28	1	3	1.2
	PROPIONITRILE	42.4	58	40	80	NA
	STYRENE	0.814	1.18	1	3	180
	TETRACHLOROETHENE	0.814	1.18	1	3	2.9
	TOLUENE	0.814	1.18	1	3	590
	TRANS-1,2-DICHLOROETHENE	0.814	1.18	1	3	34
	TRANS-1,3-DICHLOROPROPENE	0.814	1.18	1	3	0.3
	TRANS-1,4-DICHLORO-2-BUTENE	0.814	1.18	1	10	NA
VOC	TRICHLOROFLUOROMETHANE	0.814	1.18	1	3	8000
	VINYL ACETATE	0.814	1.18	1	10	2300
	VINYL CHLORIDE	0.814	1.18	1	3	0.67
PEST/PCB	AROCLOR-1016	17	21	17	33	2.8
	AROCLOR-1221	17	21	17	33	220
	AROCLOR-1232	17	21	17	33	220
	AROCLOR-1242	17	21	17	33	2.8
	AROCLOR-1248	17	17	17	33	220
	AROCLOR-1254	17	21	17	33	17
	AROCLOR-1260	17	21	17	33	25
Round 3		**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
M	ANTIMONY	0.34	0.96	3.4	25	76000
	BERYLLIUM	0.34	1	0.015	0.5	0.1
	CADMIUM	0.13	0.75	0.02	0.5	0.00222
	CALCIUM	35.6	35.6	1.98	100	--
	SELENIUM	0.24	0.7	0.02	0.5	0.02765
	SILVER	0.045	0.22	0.015	0.5	2
	SODIUM	29.5	68.6	2.32	50	--
	THALLIUM	0.19	0.5	0.02	0.5	0.04
	TIN	0.35	1.2	0.045	5	7.62
		ug/kg	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
VOC	1,1,1,2-TETRACHLOROETHANE	0.869	1.48	1	3	50
	1,1,1-TRICHLOROETHANE	0.869	1.48	1	3	100
	1,1,2,2-TETRACHLOROETHANE	0.869	1.48	1	3	0.2
	1,1,2-TRICHLOROETHANE	0.869	1.48	1	3	0.9
	1,1-DICHLOROETHANE	0.869	1.48	1	3	1000
	1,1-DICHLOROETHENE	0.869	1.48	1	3	3
	1,2,3-TRICHLOROPROPANE	0.869	1.48	1	3	1.4
	1,2-DIBROMO-3-CHLOROPROPANE	0.869	1.48	1	3	35.18

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	1,2-DIBROMOETHANE	0.869	1.48	1	3	6.9
	1,2-DICHLOROETHANE	0.869	1.48	1	3	1
	1,2-DICHLOROPROPANE	0.869	1.48	1	3	1
	1,4-DIOXANE	87.3	174	100	200	2050
	2-BUTANONE	0.869	1.48	1	15	10000
	2-HEXANONE	0.869	1.48	1	15	12600
	3-CHLOROPROPENE	0.869	1.48	1	10	3000000
	4-METHYL-2-PENTANONE	0.869	1.48	1	15	443000
	ACETONE	0.869	24	1	15	800
	ACETONITRILE	34.9	69.5	40	80	1370
	ACROLEIN	0.869	1.48	1	50	0.23
	ACRYLONITRILE	0.869	1.48	1	10	210
	BENZENE	0.869	1.48	1	3	2
	BROMODICHLOROMETHANE	0.869	1.48	1	3	30
	BROMOFORM	0.869	1.48	1	3	40
	BROMOMETHANE	0.869	1.48	1	3	10
	CARBON DISULFIDE	0.869	1.48	1	3	94.12
	CARBON TETRACHLORIDE	0.869	1.48	1	3	3
	CHLOROBENZENE	0.869	1.48	1	3	70
	CHLORODIBROMOMETHANE	0.869	1.48	1	3	20
	CHLOROETHANE	0.869	1.48	1	3	3000
	CHLOROFORM	0.869	1.48	1	3	30
	CHLOROMETHANE	0.869	1.48	1	3	1200
	CHLOROPRENE	0.869	1.48	1	3	3600
	CIS-1,2-DICHLOROETHENE	0.869	1.48	1	3	20
	CIS-1,3-DICHLOROPROPENE	0.869	1.48	1	3	0.2
	DIBROMOMETHANE	0.869	1.48	1	3	67000
	DICHLORODIFLUOROMETHANE	0.893	1.45	1	3	39500
	ETHYL METHACRYLATE	0.869	1.48	1	3	30000
	ETHYLBENZENE	0.869	1.48	1	3	700
	ISOBUTANOL	34.9	69.5	40	80	20800
	METHACRYLONITRILE	0.869	1.48	1	3	57.05
	METHYL IODIDE	0.869	1.48	1	3	--
	METHYL METHACRYLATE	0.869	1.48	1	30	984000
	METHYLENE CHLORIDE	0.869	16	1	3	1
	PROPIONITRILE	34.9	69.5	40	80	49.83
	STYRENE	0.869	1.48	1	3	200
	TETRACHLOROETHENE	0.869	1.48	1	3	3
	TOLUENE	0.869	1.48	1	3	600
	TOTAL XYLENES	0.869	1.48	1	10	9000
	TRANS-1,2-DICHLOROETHENE	0.869	1.48	1	3	30
	TRANS-1,3-DICHLOROPROPENE	0.869	1.48	1	3	0.2
	TRANS-1,4-DICHLORO-2-BUTENE	0.869	1.48	1	10	7.9
	TRICHLOROETHENE	0.893	1.35	1	3	3

TABLE H- 4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs,
COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B 146)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration(2)**	**Maximum Non-detect Concentration**	**Laboratory TV**	**Laboratory RL**	**Risk-Based Target Level(3)**
	TRICHLOROFLUOROMETHANE	0.869	1.45	1	3	16400
	VINYL ACETATE	0.869	1.48	1	30	2300
	VINYL CHLORIDE	0.869	1.48	1	3	0.7

DIOX - Dioxins and furans
EXP - Explosives
HERB - Herbicides
M - Metals
MISC - Miscellanous
NA - Not available for the composting operation.
SVOC - Semivolatile organic compounds
VOC - Volatile organic compounds
PEST - Pesticides
PCB- Polychlorinated biphenyls
RL - Reporting limit (comparable to quantitation limit)
TV - Analytical Threshold value (method detection limit adjusted for estimated sample matrix effects)
-- - Not applicable

MG/KG = milligrams per kilogram
NG/KG = nanogrms per kilogram
UG/KG = micrograms per kilogram

1 Yellow or gray highlight indicates that the value exceeds the risk-based target level. Analytes that did not exhibit any concentrations less than detection limits are not shown.
2 Some non-det values were reported as "0". The xero-values were replaced with the next lowest nondetect value.
3 RFI Round 1 through 3 RBTL is th e lowest of all risk-based target levels listed in the QAPP. Composting data RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference). Dioxin RBTLs from the QAPP we incorrect; correct values are shown,

TABLE H- 5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration**	**Maximum Non-detect Concentration**	**Laboratory TV (1)**	**Laboratory RL (2)**	**Risk-Based Target Level(2)**
Composting Operation						
NA	NA	NA	NA	NA	NA	NA
Round 1						
		mg/kg	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
AVS/SEM	CADMIUM	0.001	0.002	0.02	0.5	0.4
	LEAD	0.006	0.006	0.01	0.5	31
	MERCURY	0.00003	0.00004	0.002	0.02	0.1
	ZINC	0.031	0.426	0.16	5	120
EXP	1,3,5-TRINITROBENZENE	0.25	0.25	0.25	0.5	1800
	1,3-DINITROBENZENE	0.25	0.25	0.25 (3)	0.5	0.000924
	2,4,6-TRINITROTOLUENE	0.25	0.25	0.25	0.5	16
	2,4-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.00004
	2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.00003
	2-AMINO-4,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	4.7
	2-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	3-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	4-AMINO-2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	4.7
	4-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	HMX	0.25	0.25	0.25	0.5	3100
	NITROBENZENE	0.25	0.25	0.25	0.5	0.007
	PICRAMIC ACID	0.019	0.029	17	33	--
	PICRIC ACID	0.019	0.029	17	33	--
	RDX	0.25	0.25	0.25	0.5	4.4
	TETRYL	0.25	0.25	0.25	0.5	780
		ug/kg	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
HERB	HEXACHLOROPHENE	0.00071	0.0011	0.0067	0.017	18
	PENTACHLOROPHENOL	0.00055	0.0006	0.00034	0.00068	0.001
		mg/kg	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
M	ANTIMONY	0.13	0.74	0.01	0.5	0.3
	ARSENIC	0.53	0.53	0.015	0.5	5.9
	BERYLLIUM	0.18	0.52	0.015	0.5	0.1
	CADMIUM	0.17	0.45	0.02	0.5	0.4
	MERCURY	0.01	0.044	0.002	0.02	0.1
	SELENIUM	0.02	0.33	0.02	0.5	0.3
	SILVER	0.02	0.54	0.015	0.5	0.5
	SODIUM	11.7	126	2.32	50	--
	THALLIUM	0.05	0.34	0.02	0.5	0.04
	TIN	0.31	0.64	0.045	5	47000
	ZINC	33.4	386	0.16	5	120
MISC	TOTAL ORGANIC CARBON	1000	1000	--	--	--
SVOC		**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
	1,2,4,5-TETRACHLOROBENZENE	79	120	67	333	18000
	1,2,4-TRICHLOROBENZENE	79	120	67	333	300
	1,2-DICHLOROBENZENE	79	120	67	333	231.32
	1,3-DICHLOROBENZENE	79	120	67	333	130
SVOC	1,4-DICHLOROBENZENE	79	120	67	130	100
	1,4-NAPHTHOQUINONE	79	120	67	333	44

TABLE H- 5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	1,4-PHENYLENEDIAMINE	79	120	67	333	12000000
	1-NAPHTHYLAMINE	79	120	67	333	670
	2,2'-OXYBIS(1-CHLOROPROPANE)	79	120	67	200	--
	2,3,4,6-TETRACHLOROPHENOL	79	120	67	333	1510
	2,4,5-TRICHLOROPHENOL	79	120	67	333	85.56
	2,4,6-TRICHLOROPHENOL	79	120	67	200	8
	2,4-DICHLOROPHENOL	79	120	67	333	50
	2,4-DIMETHYLPHENOL	79	120	67	333	304.53
	2,4-DINITROPHENOL	79	120	67	670	1.33
	2,6-DICHLOROPHENOL	79	120	67	333	3.94
	2-ACETYLAMINOFLUORENE	79	120	67	333	15.32
	2-CHLORONAPHTHALENE	79	120	67	130	417.23
	2-CHLOROPHENOL	79	120	67	200	11.7
	2-METHYLNAPHTHALENE	3.9	5.8	3.3	6.7	20.2
	2-METHYLPHENOL	79	120	67	333	0.826
	2-NAPHTHYLAMINE	79	120	67	333	--
	2-NITROANILINE	79	120	67	130	0.222
	2-NITROPHENOL	79	120	67	333	7.77
	2-PICOLINE	79	120	67	333	753.05
	3&4-METHYLPHENOL	79	120	67	333	28220
	3,3'-DICHLOROBENZIDINE	79	120	67	333	0.3
	3,3'-DIMETHYLBENZIDINE	79	120	67	333	53
	3-METHYLCHOLANTHRENE	79	120	67	333	8190000
	3-NITROANILINE	79	120	67	333	3500
	4,6-DINITRO-2-METHYLPHENOL	79	120	67	333	10.38
	4-AMINOBIPHENYL	79	120	67	333	--
	4-BROMOPHENYL PHENYL ETHER	79	120	67	130	1550
	4-CHLORO-3-METHYLPHENOL	79	120	67	333	388.18
	4-CHLOROANILINE	79	120	67	333	30
	4-CHLOROPHENYL PHENYL ETHER	79	120	67	333	--
	4-NITROANILINE	79	120	67	333	3500
	4-NITROPHENOL	79	120	67	333	7.78
	4-NITROQUINOLINE-1-OXIDE	79	120	67	333	--
	5-NITRO-O-TOLUIDINE	79	120	67	333	15000
	7,12-DIMETHYLBENZ(A)ANTHRACENE	79	120	67	333	66400
	A,A-DIMETHYLPHENETHYLAMINE	79	120	67	670	61000
	ACENAPHTHENE	3.9	5.9	3.3	6.7	6.71
	ACENAPHTHYLENE	3.9	5.8	3.3	6.7	5.87
	ACETOPHENONE	79	120	67	333	246
	ANILINE	79	120	67	333	0.0338
	ANTHRACENE	3.9	4.4	3.3	6.7	46.9
	ARAMITE	79	120	67	333	0.00111
	BENZO(A)ANTHRACENE	4.3	4.4	3.3	6.7	31.7
	BENZO(A)PYRENE	3.9	4.4	3.3	6.7	31.9
	BENZO(B)FLUORANTHENE	3.9	4.4	3.3	6.7	200
	BENZO(G,H,I)PERYLENE	4.3	4.4	3.3	6.7	170
	BENZO(K)FLUORANTHENE	3.9	4.4	3.3	6.7	240

TABLE H- 5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
SVOC	BENZYL ALCOHOL	79	120	67	333	33.94
	BIS(2-CHLOROETHOXY)METHANE	79	120	67	333	349.71
	BIS(2-CHLOROETHYL)ETHER	79	120	67	130	0.02
	BIS(2-ETHYLHEXYL)PHTHALATE	83	1000	67	130	182
	BUTYL BENZYL PHTHALATE	79	120	67	333	4190
	CHLOROBENZILATE	79	120	67	333	860.29
	CHRYSENE	4.4	4.4	3.3	6.7	57.1
	DIALLATE	79	120	67	333	1.51
	DIBENZO(A,H)ANTHRACENE	3.9	5.9	3.3	6.7	6.22
	DIBENZOFURAN	79	120	67	333	1520
	DIETHYL PHTHALATE	79	120	67	130	8.04
	DIMETHYL PHTHALATE	79	120	67	333	24.95
	DI-N-BUTYL PHTHALATE	79	120	67	333	110.5
	DI-N-OCTYL PHTHALATE	79	120	67	333	40600
	DIPHENYLAMINE	79	120	67	333	34.6
	ETHYL METHANE SULFONATE	79	120	67	333	--
	FLUORENE	3.9	5.9	3.3	6.7	21.2
	HEXACHLOROBENZENE	79	120	67	130	20
	HEXACHLOROBUTADIENE	79	120	67	67	100
	HEXACHLOROCYCLOPENTADIENE	79	120	67	130	900.74
	HEXACHLOROETHANE	79	120	67	130	20
	HEXACHLOROPROPENE	79	120	67	333	0.2
	INDENO(1,2,3-CD)PYRENE	4.1	4.4	3.3	6.7	200
	ISODRIN	79	120	67	333	55.16
	ISOPHORONE	79	120	67	333	30
	ISOSAFROLE	79	120	67	333	4.12
	KEPONE	79	120	67	333	3.31
	METHAPYRILENE	79	120	67	333	0.0144
	METHYL METHANE SULFONATE	79	120	67	333	0.00474
	NAPHTHALENE	4.1	5.9	3.3	6.7	34.6
	N-NITROSODIETHYLAMINE	79	120	67	333	3.2
	N-NITROSODIMETHYLAMINE	79	120	67	333	0.00275
	N-NITROSO-DI-N-BUTYLAMINE	79	120	67	333	24
	N-NITROSO-DI-N-PROPYLAMINE	79	120	67	130	0.002
	N-NITROSOMETHYLETHYLAMINE	79	120	67	333	0.00485
	N-NITROSOMORPHOLINE	79	120	67	333	0.0037
	N-NITROSOPIPERIDINE	79	120	67	333	0.0226
	N-NITROSOPYRROLIDINE	79	120	67	333	0.000908
	O,O,O-TRIETHYL PHOSPHOROTHIOATE	79	120	67	333	58250
	O-TOLUIDINE	79	120	67	333	2000
	P-(DIMETHYLAMINO)AZOBENZENE	79	120	67	333	--
	PENTACHLOROBENZENE	79	120	67	333	1260
	PENTACHLOROETHANE	79	120	67	333	689.18
	PENTACHLORONITROBENZENE	79	120	67	333	1900
	PHENACETIN	79	120	67	333	2.25
	PHENANTHRENE	4.3	4.3	3.3	6.7	41.9
	PHENOL	79	120	67	333	27.26

TABLE H- 5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration**	**Maximum Non-detect Concentration**	**Laboratory TV (1)**	**Laboratory RL (2)**	**Risk-Based Target Level(2)**
	PRONAMIDE	79	120	67	333	1.6
	PYRIDINE	79	120	67	333	106.17
SVOC	SAFROLE	79	120	67	333	164.86
Round 2		**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
EXP	1,3,5-TRINITROBENZENE	0.25	0.25	0.25	0.5	0.000121
	1,3-DINITROBENZENE	0.25	0.25	0.25	0.5	0.000924
	2,4,6-TRINITROTOLUENE	0.25	0.25	0.25	0.5	--
	2,4-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.07513
	2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.02062
	2-AMINO-4,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	--
	2-NITROTOLUENE	0.25	0.25	0.25	0.5	--
	3-NITROTOLUENE	0.25	0.25	0.25	0.5	--
	4-AMINO-2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	--
	4-NITROTOLUENE	0.25	0.25	0.25	0.5	--
	HMX	0.25	0.25	0.25	0.5	--
	NITROBENZENE	0.25	0.25	0.25	0.5	0.4876
	RDX	0.25	0.25	0.25	0.5	--
	TETRYL	0.25	0.25	0.25	0.5	--
M	SILVER	0.01	0.8	0.015	0.5	0.5
	SODIUM	9.8	34.1	2.3185	50	--
	THALLIUM	0.08	0.28	0.02	0.5	0.05692
	TIN	0.17	1.8	0.045	5	7.62
		ug/kg	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
VOC	1,1,1,2-TETRACHLOROETHANE	1	1.58	1	3	10.89
	1,1,1-TRICHLOROETHANE	1	1.58	1	3	246.85
	1,1,2,2-TETRACHLOROETHANE	1	1.58	1	3	29.08
	1,1,2-TRICHLOROETHANE	1	1.58	1	3	673.51
	1,1-DICHLOROETHANE	1	1.58	1	3	0.575
	1,1-DICHLOROETHENE	1	1.58	1	3	23.27
	1,2,3-TRICHLOROPROPANE	1	1.58	1	3	8.35
	1,2-DIBROMO-3-CHLOROPROPANE	1	1.58	1	3	19.98
	1,2-DIBROMOETHANE	1	1.58	1	3	12.37
	1,2-DICHLOROETHANE	1	1.58	1	3	54.18
	1,2-DICHLOROPROPANE	1	1.58	1	3	351.61
	1,4-DIOXANE	0.158	137	0.1	200	0.00543
	2-BUTANONE	1	1.58	1	10	136.96
	2-HEXANONE	1	1.58	1	10	1010
	3-CHLOROPROPENE	1	1.58	1	10	0.266
	4-METHYL-2-PENTANONE	1	1.58	1	10	544.37
	ACETONE	1.1	1.3	1	10	453.37
	ACETONITRILE	45.1	63.1	40	80	139.05
	ACROLEIN	1	1.58	1	10	0.0144
	ACRYLONITRILE	1	1.58	1	10	0.0157
	BENZENE	1	1.58	1	3	141.57
	BROMODICHLOROMETHANE	1	1.58	1	3	1.13
	BROMOFORM	1	1.58	1	3	996.27

TABLE H- 5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	BROMOMETHANE	1	1.58	1	3	235.16
	CARBON DISULFIDE	1	1.58	1	3	94.12
	CARBON TETRACHLORIDE	1	1.58	1	3	35.73
	CHLOROBENZENE	1	1.58	1	3	61.94
VOC	CHLORODIBROMOMETHANE	1	1.58	1	3	1.13
	CHLOROETHANE	1	1.58	1	3	58600
	CHLOROFORM	1	1.58	1	3	27
	CHLOROMETHANE	1	1.58	1	3	0.0785
	CHLOROPRENE	1	1.58	1	10	1.06
	CIS-1,2-DICHLOROETHENE	1	1.58	1	3	208.94
	CIS-1,3-DICHLOROPROPENE	1	1.58	1	3	2.96
	DIBROMOMETHANE	1	1.58	1	3	0.0859
	DICHLORODIFLUOROMETHANE	1.1	1.58	1	3	1.33
	ETHYL METHACRYLATE	1	1.58	1	10	0.602
	ETHYLBENZENE	1	1.58	1	3	0.1
	ISOBUTANOL	45.1	63.1	40	80	3350
	METHACRYLONITRILE	1	1.58	1	10	0.0297
	METHYL IODIDE	1	1.58	1	10	0.305
	METHYL METHACRYLATE	1	1.58	1	10	167.56
	METHYLENE CHLORIDE	1	6	1	3	1260
	PROPIONITRILE	45.1	63.1	40	80	49.83
	STYRENE	1	1.58	1	3	444.96
	TETRACHLOROETHENE	1	1.58	1	3	195.83
	TOLUENE	1	1.58	1	3	5450
	TOTAL XYLENES	1	1.58	1	3	1880
	TRANS-1,2-DICHLOROETHENE	1	1.58	1	3	208.94
	TRANS-1,3-DICHLOROPROPENE	1	1.58	1	3	2.96
	TRANS-1,4-DICHLORO-2-BUTENE	1	1.58	1	10	1.82
	TRICHLOROETHENE	1	1.58	1	3	179.56
	TRICHLOROFLUOROMETHANE	1	1.58	1	3	3.07
	VINYL ACETATE	1	1.58	1	10	12.95
	VINYL CHLORIDE	1	1.58	1	3	2
PAH	2-METHYLNAPHTHALENE	4.4	4.6	3.3	6.7	20.2
	ACENAPHTHENE	4.3	4.6	3.3	6.7	6.71
	ACENAPHTHYLENE	4.3	4.6	3.3	6.7	5.87
	ANTHRACENE	4.3	4.6	3.3	6.7	46.9
	BENZO(A)PYRENE	4.6	4.6	3.3	6.7	31.9
	BENZO(B)FLUORANTHENE	4.6	4.6	3.3	6.7	10400
	BENZO(G,H,I)PERYLENE	4.6	4.6	3.3	6.7	170
	BENZO(K)FLUORANTHENE	4.6	4.6	3.3	6.7	240
	CHRYSENE	4.6	4.6	3.3	6.7	57.1
	DIBENZO(A,H)ANTHRACENE	4.3	4.6	3.3	6.7	6.22
	FLUORANTHENE	4.6	4.6	3.3	6.7	111.3
	FLUORENE	4.3	4.6	3.3	6.7	21.2
	INDENO(1,2,3-CD)PYRENE	4.6	4.6	3.3	6.7	200
	NAPHTHALENE	4.3	4.6	3.3	6.7	34.6

TABLE H- 5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration**	**Maximum Non-detect Concentration**	**Laboratory TV (1)**	**Laboratory RL (2)**	**Risk-Based Target Level(2)**
	PHENANTHRENE	4.6	4.6	3.3	6.7	41.9
	PYRENE	4.6	4.6	3.3	6.7	53
Round 3						
M	ANTIMONY	0.42	0.74	0.01	0.5	0.3
	BERYLLIUM	0.4	1.4	0.015	0.5	0.1
	CADMIUM	0.33	0.47	0.02	0.5	0.4
	MERCURY	0.03	0.056	0.002	0.02	0.1
	SELENIUM	0.17	0.57	0.02	0.5	0.3
	SILVER	0.045	0.53	0.015	0.5	0.5
	SODIUM	28.5	65.3	2.32	50	--
	THALLIUM	0.09	0.35	0.02	0.5	0.04
	TIN	0.33	1.1	0.045	5	47000
	ZINC	270	270	0.16	5	120
		ug/kg	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
VOC	1,1,1,2-TETRACHLOROETHANE	0.948	1.49	1	3	10.89
	1,1,1-TRICHLOROETHANE	0.948	1.49	1	3	246.85
	1,1,2,2-TETRACHLOROETHANE	0.948	1.49	1	3	29.08
	1,1,2-TRICHLOROETHANE	0.948	1.49	1	3	673.51
	1,1-DICHLOROETHANE	0.948	1.49	1	3	0.575
	1,1-DICHLOROETHENE	0.948	1.49	1	3	23.27
	1,2,3-TRICHLOROPROPANE	0.948	1.49	1	3	8.35
	1,2-DIBROMO-3-CHLOROPROPANE	0.948	1.49	1	3	19.98
	1,2-DIBROMOETHANE	0.948	1.49	1	3	12.37
	1,2-DICHLOROETHANE	0.948	1.49	1	3	54.18
	1,2-DICHLOROPROPANE	0.948	1.49	1	3	351.61
	1,4-DIOXANE	94.8	165	0.1	200	0.00543
	2-BUTANONE	0.948	1.49	1	10	136.96
	2-HEXANONE	0.948	1.49	1	10	1010
	3-CHLOROPROPENE	0.948	1.49	1	10	0.266
	4-METHYL-2-PENTANONE	0.948	1.49	1	10	544.37
	ACETONE	0.975	10	1	10	453.37
	ACETONITRILE	37.9	66	40	80	139.05
	ACROLEIN	0.948	1.49	1	10	0.0144
	ACRYLONITRILE	0.948	1.49	1	10	0.0157
	BENZENE	0.948	1.49	1	3	141.57
	BROMODICHLOROMETHANE	0.948	1.49	1	3	1.13
	BROMOFORM	0.948	1.49	1	3	996.27
	BROMOMETHANE	0.948	1.49	1	3	235.16
	CARBON DISULFIDE	0.948	1.49	1	3	94.12
	CARBON TETRACHLORIDE	0.948	1.49	1	3	35.73
	CHLOROBENZENE	0.948	1.49	1	3	61.94
	CHLORODIBROMOMETHANE	0.948	1.49	1	3	1.13
	CHLOROETHANE	0.948	1.49	1	3	58600
	CHLOROFORM	0.948	1.49	1	3	27
	CHLOROMETHANE	0.948	1.49	1	3	0.0785
	CHLOROPRENE	0.948	1.49	1	10	1.06
	CIS-1,2-DICHLOROETHENE	0.948	1.49	1	3	208.94

TABLE H- 5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	**Parameter**	**Minimum Non-detect Concentration**	**Maximum Non-detect Concentration**	**Laboratory TV (1)**	**Laboratory RL(2)**	**Risk-Based Target Level(2)**
	CIS-1,3-DICHLOROPROPENE	0.948	1.49	1	3	2.96
	DIBROMOMETHANE	0.948	1.49	1	3	0.0859
	DICHLORODIFLUOROMETHANE	0.948	1.4	1	3	1.33
	ETHYL METHACRYLATE	0.948	1.49	1	10	0.602
	ETHYLBENZENE	0.948	1.49	1	3	0.1
	ISOBUTANOL	37.9	66	40	80	3350
	METHACRYLONITRILE	0.948	1.49	1	10	0.0297
	METHYL IODIDE	0.948	1.49	1	10	0.305
	METHYL METHACRYLATE	0.948	1.49	1	10	167.56
	METHYLENE CHLORIDE	0.948	6	1	3	1260
	PROPIONITRILE	37.9	66	40	80	49.83
	STYRENE	0.948	1.49	1	3	444.96
	TETRACHLOROETHENE	0.948	1.49	1	3	195.83
	TOLUENE	0.948	1.49	1	3	5450
	TOTAL XYLENES	0.948	1.49	1	3	1880
	TRANS-1,2-DICHLOROETHENE	0.948	1.49	1	3	208.94
	TRANS-1,3-DICHLOROPROPENE	0.948	1.49	1	3	2.96
	TRANS-1,4-DICHLORO-2-BUTENE	0.948	1.49	1	10	1.82
	TRICHLOROETHENE	0.948	1.49	1	3	179.56
	TRICHLOROFLUOROMETHANE	0.948	1.49	1	3	3.07
	VINYL ACETATE	0.948	1.49	1	10	12.95
	VINYL CHLORIDE	0.948	1.49	1	3	2

AVS/SEM = Acid volatile sulfides/simultaneously extracted metals
EXP - Explosives
HERB - Herbicides
M - Metals
MISC - Miscellanous
PAH - Polycyclic aromatic hydrocarbons
SVOA - Semivolatile organic compounds
VOC - Volatile organic compounds

MG/KG = milligrams per kilogram
UG/KG = micrograms per kilogram
UMO/G = micromoles per gram

1 Yellow or gray highlight indicates that the value exceeds the risk-based target level. Analytes that did not exhibit any concentrations less than detection limits are not shown.
2 RFI Round 1 through 3 RBTL is th e lowest of all risk-based target levels listed in the QAPP. Composting data RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference).

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
Composting Operation						
NA	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Round 1						
EXP		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
	1,3,5-TRINITROBENZENE	0.08	0.65	0.35	0.65	1100
	1,3-DINITROBENZENE	0.08	0.65	0.35	0.65	2.36
	2,4,6-TRINITROTOLUENE	0.08	0.65	0.35	0.65	2.2
	2,4-DINITROTOLUENE	0.08	0.65	0.35	0.65	1.3
	2,6-DINITROTOLUENE	0.08	0.65	0.35	0.65	1.3
	2-AMINO-4,6-DINITROTOLUENE	0.08	0.65	0.35	0.65	2.2
	2-NITROTOLUENE	0.08	0.65	0.35	0.65	61
	3-NITROTOLUENE	0.08	0.65	0.35	0.65	61
	4-AMINO-2,6-DINITROTOLUENE	0.08	0.65	0.35	0.65	-- (4)
	4-NITROTOLUENE	0.08	0.65	0.35	0.65	61
	HMX	0.135	0.65	0.35	0.65	1800
	NITROBENZENE	0.08	0.65	0.35	0.65	3.4
	PICRAMIC ACID	0.39	0.39	0.5	1	--
	PICRIC ACID	0.39	0.39	0.5	1	--
	RDX	0.13	0.6	0.35	0.61	0.61
	TETRYL	0.08	0.65	0.35	0.65	360
HERB	HEXACHLOROPHENE	0.025	0.025	0.01	0.02	0.228
	PENTACHLOROPHENOL	0.013	0.013	0.01	0.02	0.56
M	ALUMINUM	47.3	60.6	6.8	50	50
	ANTIMONY	0.03	2.4	0.02	1	6
	ARSENIC	0.07	0.66	0.03	1	0.045
	BERYLLIUM	0.03	1.6	0.03	1	4
	CADMIUM	0.05	1.9	0.04	1	0.66
	CALCIUM	2580	2580	3.96	200	--
	CHROMIUM	0.02	0.82	0.02	1	11
	COPPER	0.06	1.1	0.06	2	5
	IRON	24.7	117	2.22	50	300
	LEAD	0.03	2	0.02	1	1.3
	LITHIUM	0.72	0.72	0.11	5	730
	MANGANESE	56.3	57.6	0.04	5	50
	MERCURY	0.02	0.2	0.02	0.2	0.0013
	POTASSIUM	3390	3390	4.33	100	--
	SELENIUM	0.05	1.1	0.04	1	5
	SILVER	0.04	1.2	0.03	1	1
	THALLIUM	0.04	1.3	0.04	1	0.56
	TIN	0.03	1.3	0.09	10	73
	TITANIUM	1.9	2.1	0.06	5	--
	VANADIUM	0.05	0.72	0.05	2	19
MF	ANTIMONY	0.03	0.36	0.02	1	6
	ARSENIC	0.36	0.51	0.03	1	0.045
	BERYLLIUM	0.05	1.1	0.03	1	4
	CADMIUM	0.13	1	0.04	1	0.66
MF	CHROMIUM	0.2	0.81	0.02	1	11
	COPPER	0.63	0.63	0.06	2	5
	LEAD	0.21	0.91	0.02	1	1.3
	MERCURY	0.02	0.2	0.02	0.2	0.0013
	SELENIUM	0.19	0.33	0.04	1	5
	SILVER	0.04	0.53	0.03	1	1
	THALLIUM	0.04	1.2	0.04	1	0.56

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	TIN	0.03	0.34	0.09	10	73
	TITANIUM	2.8	2.8	0.06	5	--
	VANADIUM	0.05	0.8	0.05	2	19
		mg/L	**mg/L**	**mg/L**	**mg/L**	**mg/L**
MISC	AMMONIA-N	0.01	0.01	0.01	0.02	--
	NITRITE/NITRATE-N	0.02	0.02	0.025	0.05	--
		ug/L	**ug/L**	**ug/L**	**ug/L**	**ug/L**
SVOC	1,2,4,5-TETRACHLOROBENZENE	1	1	1	5	11
	1,2,4-TRICHLOROBENZENE	1	1	1	5	69.2
	1,2-DICHLOROBENZENE	1	1	1	5	11
	1,3-DICHLOROBENZENE	1	1	1	5	5.5
	1,4-DICHLOROBENZENE	1	1	1	2	0.5
	1,4-NAPHTHOQUINONE	1	1	1	5	0.044
	1,4-PHENYLENEDIAMINE	1	1	1	5	6900
	1-NAPHTHYLAMINE	1	1	1	5	0.67
	2,2'-OXYBIS(1-CHLOROPROPANE)	1	1	1	3	--
	2,3,4,6-TETRACHLOROPHENOL	1	1	1	5	14.06
	2,4,5-TRICHLOROPHENOL	1	1	1	5	3600
	2,4,6-TRICHLOROPHENOL	1	1	1	3	2
	2,4-DICHLOROPHENOL	1	1	1	5	18
	2,4-DIMETHYLPHENOL	1	1	1	5	100.17
	2,4-DINITROPHENOL	1	1	1	10	4.07
	2,6-DICHLOROPHENOL	1	1	1	5	--
	2-ACETYLAMINOFLUORENE	1	1	1	5	534.97
	2-CHLORONAPHTHALENE	1	1	1	2	0.396
	2-CHLOROPHENOL	1	1	1	3	8.8
	2-METHYLNAPHTHALENE	0.05	0.05	0.05	0.1	6.2
	2-METHYLPHENOL	1	1	1	5	1800
	2-NAPHTHYLAMINE	1	1	1	10	--
	2-NITROANILINE	1	1	1	2	2.1
	2-NITROPHENOL	1	1	1	5	13.5
	2-PICOLINE	1	1	1	5	3790
	3&4-METHYLPHENOL	1	1	1	5	180
	3,3'-DICHLOROBENZIDINE	1	1	1	5	0.15
	3,3'-DIMETHYLBENZIDINE	1	1	1	5	0.0073
	3-METHYLCHOLANTHRENE	1	1	1	5	0.0891
	3-NITROANILINE	1	1	1	5	2.1
	4,6-DINITRO-2-METHYLPHENOL	1	1	1	5	2.3
	4-AMINOBIPHENYL	1	1	1	5	--
	4-BROMOPHENYL PHENYL ETHER	1	1	1	2	1.5
	4-CHLORO-3-METHYLPHENOL	1	1	1	5	34.79
	4-CHLOROANILINE	1	1	1	5	150
SVOC	4-CHLOROPHENYL PHENYL ETHER	1	1	1	5	--
	4-NITROANILINE	1	1	1	5	2.1
	4-NITROPHENOL	1	1	1	5	35
	4-NITROQUINOLINE-1-OXIDE	1	1	1	5	--
	5-NITRO-O-TOLUIDINE	1	1	1	5	2
	7,12-DIMETHYLBENZ(A)ANTHRACENE	1	1	1	5	0.548
	A,A-DIMETHYLPHENETHYLAMINE	1	1	1	10	36
	ACENAPHTHENE	0.05	0.05	0.05	0.1	9.9
	ACENAPHTHYLENE	0.05	0.05	0.05	0.1	370
	ACETOPHENONE	1	1	1	5	0.042
	ANILINE	1	1	1	5	0.44

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	ANTHRACENE	0.05	0.05	0.05	0.1	0.029
	ARAMITE	1	1	1	5	2.7
	BENZO(A)ANTHRACENE	0.05	0.05	0.05	0.1	0.092
	BENZO(A)PYRENE	0.05	0.05	0.05	0.1	0.0092
	BENZO(B)FLUORANTHENE	0.05	0.05	0.05	0.1	0.092
	BENZO(G,H,I)PERYLENE	0.05	0.05	0.05	0.1	7.64
	BENZO(K)FLUORANTHENE	0.05	0.05	0.05	0.1	0.0056
	BENZYL ALCOHOL	1	1	1	5	281.24
	BIS(2-CHLOROETHOXY)METHANE	1	1	1	5	6400
	BIS(2-CHLOROETHYL)ETHER	1	1	1	2	0.0098
	BIS(2-ETHYLHEXYL)PHTHALATE	1	1	1	1	2.1
	BUTYL BENZYL PHTHALATE	1	1	1	5	49
	CHLOROBENZILATE	1	1	1	5	0.25
	CHRYSENE	0.05	0.05	0.05	0.1	0.033
	DIALLATE	1	1	1	5	1.1
	DIBENZO(A,H)ANTHRACENE	0.05	0.05	0.05	0.1	0.0016
	DIBENZOFURAN	1	1	1	5	20
	DIETHYL PHTHALATE	1	1	1	2	3
	DIMETHYL PHTHALATE	1	1	1	5	73
	DI-N-BUTYL PHTHALATE	1	1	1	2	3
	DI-N-OCTYL PHTHALATE	1	1	1	5	20
	DIPHENYLAMINE	1	1	1	5	412.51
	ETHYL METHANE SULFONATE	1	1	1	5	--
	FLUORANTHENE	0.05	0.05	0.05	0.1	8.1
	FLUORENE	0.05	0.05	0.05	0.1	3.9
	HEXACHLOROBENZENE	1	1	1	2	0.00024
	HEXACHLOROBUTADIENE	1	1	1	1	0.223
	HEXACHLOROCYCLOPENTADIENE	1	1	1	2	50
	HEXACHLOROETHANE	1	1	1	2	4.8
	HEXACHLOROPROPENE	1	1	1	5	20
	INDENO(1,2,3-CD)PYRENE	0.05	0.05	0.05	0.1	0.022
	ISODRIN	1	1	1	5	0.0309
	ISOPHORONE	1	1	1	5	71
	ISOSAFROLE	1	1	1	5	--
	KEPONE	1	1	1	5	0.0037
	METHAPYRILENE	1	1	1	5	--
	METHYL METHANE SULFONATE	1	1	1	5	--
	NAPHTHALENE	0.05	0.05	0.05	0.1	6.2
SVOC	N-NITROSODIETHYLAMINE	1	1	1	5	0.00045
	N-NITROSODIMETHYLAMINE	1	1	1	5	0.0013
	N-NITROSO-DI-N-BUTYLAMINE	1	1	1	5	0.002
	N-NITROSO-DI-N-PROPYLAMINE	1	1	1	2	0.0096
	N-NITROSOMETHYLETHYLAMINE	1	1	1	5	0.0031
	N-NITROSOMORPHOLINE	1	1	1	5	--
	N-NITROSOPIPERIDINE	1	1	1	5	--
	N-NITROSOPYRROLIDINE	1	1	1	5	0.032
	O,O,O-TRIETHYL PHOSPHOROTHIOATE	1	1	1	5	58.25
	O-TOLUIDINE	1	1	1	5	0.28
	P-(DIMETHYLAMINO)AZOBENZENE	1	1	1	5	--
	PENTACHLOROBENZENE	1	1	1	5	0.47
	PENTACHLOROETHANE	1	1	1	5	56.42
	PENTACHLORONITROBENZENE	1	1	1	5	0.26
	PHENACETIN	1	1	1	5	6.3

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	PHENANTHRENE	0.05	0.05	0.05	0.1	2.1
	PHENOL	1	1	1	5	100
	PRONAMIDE	1	1	1	5	160
	PYRENE	0.05	0.05	0.05	0.1	0.3
	PYRIDINE	1	1	1	5	36
	SAFROLE	1	1	1	5	40
VOC	1,1,1,2-TETRACHLOROETHANE	0.3	0.3	0.3	0.5	0.43
	1,1,1-TRICHLOROETHANE	0.3	0.3	0.3	1	88
	1,1,2,2-TETRACHLOROETHANE	0.3	0.3	0.3	0.5	0.055
	1,1,2-TRICHLOROETHANE	0.3	0.3	0.3	0.5	0.2
	1,1-DICHLOROETHANE	0.3	0.3	0.3	1	47
	1,1-DICHLOROETHENE	0.3	0.3	0.3	0.5	0.046
	1,2,3-TRICHLOROPROPANE	0.3	0.3	0.3	1	0.0016
	1,2-DIBROMO-3-CHLOROPROPANE	0.3	0.3	0.3	1	0.048
	1,2-DIBROMOETHANE	0.3	0.3	0.3	0.5	0.00076
	1,2-DICHLOROETHANE	0.3	0.3	0.3	0.5	0.12
	1,2-DICHLOROPROPANE	0.3	0.3	0.3	0.5	0.16
	1,4-DIOXANE	50	50	50	100	6.1
	2-BUTANONE	0.5	0.5	0.5	5	1900
	2-HEXANONE	0.5	0.5	0.5	5	1500
	3-CHLOROPROPENE	0.5	0.5	0.5	10	1800
	4-METHYL-2-PENTANONE	0.5	0.5	0.5	5	160
	ACETONE	0.5	10	0.5	5	610
	ACETONITRILE	20	20	20	40	79
	ACROLEIN	0.5	0.5	0.5	10	0.042
	ACRYLONITRILE	0.5	0.5	0.5	5	0.039
	BENZENE	0.3	0.3	0.3	0.5	0.35
	BROMODICHLOROMETHANE	0.3	0.3	0.3	0.5	0.18
	BROMOFORM	0.3	0.3	0.3	1	8.5
	BROMOMETHANE	0.3	0.3	0.3	1	8.7
	CARBON DISULFIDE	0.3	0.3	0.3	1	84.1
	CARBON TETRACHLORIDE	0.3	0.3	0.3	0.3	0.17
	CHLOROBENZENE	0.3	0.3	0.3	1	10
	CHLORODIBROMOMETHANE	0.3	0.3	0.3	1	0.13
VOC	CHLOROETHANE	0.5	0.5	0.5	1	4.6
	CHLOROFORM	0.3	0.3	0.3	0.3	0.16
	CHLOROMETHANE	0.3	0.3	0.3	1	1.5
	CHLOROPRENE	0.5	0.5	0.5	10	14
	CIS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	61
	CIS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	0.3	--
	DIBROMOMETHANE	0.3	0.3	0.3	1	61
	DICHLORODIFLUOROMETHANE	0.3	0.3	0.3	1	390
	ETHYL METHACRYLATE	0.5	0.5	0.5	10	550
	ETHYLBENZENE	0.3	0.3	0.3	1	17.2
	ISOBUTANOL	20	20	20	40	1800
	METHACRYLONITRILE	0.3	0.3	0.3	1	1
	METHYL IODIDE	0.5	0.5	0.5	10	--
	METHYL METHACRYLATE	0.5	0.5	0.5	10	1400
	METHYLENE CHLORIDE	0.3	0.3	0.3	1	4.3
	PROPIONITRILE	20	20	20	40	6080
	STYRENE	0.3	0.3	0.3	1	56
	TETRACHLOROETHENE	0.3	0.3	0.3	1	1.1
	TOLUENE	0.3	0.3	0.3	1	253

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	TOTAL XYLENES	0.3	0.3	0.3	1	117
	TRANS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	100
	TRANS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	0.5	0.4
	TRANS-1,4-DICHLORO-2-BUTENE	0.5	0.5	0.5	10	--
	TRICHLOROETHENE	0.3	0.3	0.3	1	1.6
	TRICHLOROFLUOROMETHANE	0.3	0.3	0.3	1	1300
	VINYL ACETATE	0.5	0.5	0.5	10	248.03
	VINYL CHLORIDE	0.3	0.3	0.3	0.5	0.02

Round 2		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
EXP	1,3,5-TRINITROBENZENE	0.039	0.301	0.25	0.5	1100
	1,3-DINITROBENZENE	0.039	0.301	0.25	0.5	2.36
	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUE	0.47	0.602	0.65	1	--
	2,4,6-TRINITROTOLUENE	0.039	0.301	0.25	0.5	2.2
	2,4-DIAMINO-6-NITROTOLUENE	0.236	0.301	0.25	0.5	2.2
	2,4-DINITROTOLUENE	0.039	0.301	0.25	0.5	73
	2,6-DIAMINO-4-NITROTOLUENE	0.236	0.301	0.25	0.5	2.2
	2,6-DINITROTOLUENE	0.039	0.301	0.25	0.5	36
	2-AMINO-4,6-DINITROTOLUENE	0.039	0.301	0.25	0.5	--
	2-NITROTOLUENE	0.039	0.301	0.25	0.5	61
	3,5-DINITROANILINE	0.236	0.301	0.25	0.5	--
	3-NITROTOLUENE	0.039	0.301	0.25	0.5	61
	4-AMINO-2,6-DINITROTOLUENE	0.039	0.301	0.25	0.5	--
	4-NITROTOLUENE	0.039	0.301	0.25	0.5	61
	DNX	0.236	0.301	0.25	0.5	--
	HMX	0.236	0.278	0.25	0.5	1800
	MNX	0.236	0.291	0.25	0.5	--
	NITROBENZENE	0.039	0.301	0.25	0.5	3.4
	RDX	0.236	0.278	0.25	0.5	0.61
	TETRYL	0.039	0.301	0.25	0.5	360
EXP	TNX	0.236	0.301	0.25	0.5	--
		mg/L	**mg/L**	**mg/L**	**mg/L**	**mg/L**
M	ALUMINUM	8.3	332	6.8	50	50
	ANTIMONY	0.02	1.8	0.02	1	6
	ARSENIC	0.07	1.9	0.03	1	0.045
	BERYLLIUM	0.03	2.7	0.03	1	4
	CADMIUM	0.04	1.5	0.04	1	0.66
	CALCIUM	19700	106000	3.96	100	--
	CHROMIUM	0.17	1.4	0.02	1	42
	COBALT	0.36	14.8	0.02	1	5
	COPPER	0.07	1.6	0.06	2	5
	IRON	38.2	440	2.22	50	300
	LEAD	0.04	2.5	0.02	1	1.3
	MANGANESE	48.3	566	0.04	5	50
	MERCURY	0.007	0.03	0.02	0.2	0.0013
	NICKEL	1.4	1.4	0.06	1	29
	SELENIUM	0.04	2.2	0.04	1	5
	SILVER	0.03	1.3	0.03	1	1
	THALLIUM	0.04	2.3	0.04	1	0.56
	TIN	0.1	2.6	0.09	10	73
	TITANIUM	0.07	4.5	0.06	5	--
	VANADIUM	0.06	1.7	0.05	2	19
	ZINC	2.8	6.8	0.32	10	58.9

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
MF	ALUMINUM	18.3	164	6.8	50	50
	ANTIMONY	0.02	1.5	0.02	1	6
	ARSENIC	0.12	1.5	0.03	1	0.045
	BERYLLIUM	0.03	1.5	0.03	1	4
	CADMIUM	0.04	0.78	0.04	1	0.66
	CHROMIUM	0.13	0.98	0.02	1	42
	COBALT	0.11	1.5	0.02	1	5
	COPPER	0.35	1.8	0.06	2	5
	IRON	25.4	1140	2.22	50	300
	LEAD	0.04	1.4	0.02	1	1.3
	MAGNESIUM	140	140	2	100	--
	MANGANESE	3.7	30.9	0.04	5	50
	MERCURY	0.007	0.03	0.02	0.2	0.0013
	NICKEL	0.48	1.6	0.06	1	29
	POTASSIUM	151	151	4.325	100	--
	SELENIUM	0.04	2.4	0.04	1	5
	SILVER	0.03	0.27	0.03	1	1
	THALLIUM	0.04	0.84	0.04	1	0.56
	TIN	0.1	0.69	0.09	10	73
	TITANIUM	0.42	3.8	0.06	5	--
	VANADIUM	0.06	0.68	0.05	2	19
	ZINC	1.7	1.7	0.32	10	58.9
MISC	AMMONIA-N	0.005	0.01	0.01	0.02	--
	CHLORIDE	2	17	0.5	1	--
	NITRITE/NITRATE-N	0.025	0.05	0.025	0.05	--
	SULFATE	180	210	0.5	1	--
MISC	TOTAL ORGANIC CARBON	0.5	0.5	--	--	--
		ug/L	**ug/L**	**ug/L**	**ug/L**	**ug/L**
VOC	1,1,1,2-TETRACHLOROETHANE	0.3	30	0.3	1	0.43
	1,1,1-TRICHLOROETHANE	0.3	30	0.3	1	88
	1,1,2,2-TETRACHLOROETHANE	0.3	30	0.3	1	0.055
	1,1,2-TRICHLOROETHANE	0.3	0.3	0.3	1	0.2
	1,1-DICHLOROETHANE	0.3	30	0.3	1	47
	1,1-DICHLOROETHENE	0.3	30	0.3	1	7
	1,2,3-TRICHLOROPROPANE	0.3	30	0.3	1	0.0056
	1,2-DIBROMO-3-CHLOROPROPANE	0.3	30	0.3	1	0.048
	1,2-DIBROMOETHANE	0.3	30	0.3	1	0.00076
	1,2-DICHLOROETHANE	0.3	30	0.3	1	0.12
	1,2-DICHLOROPROPANE	0.3	30	0.3	1	0.16
	1,4-DIOXANE	50	50	50	100	6.1
	2-BUTANONE	0.5	50	0.5	5	1900
	2-HEXANONE	0.5	50	0.5	5	1710
	3-CHLOROPROPENE	0.5	50	0.5	5	1800
	4-METHYL-2-PENTANONE	0.5	50	0.5	5	160
	ACETONE	0.5	50	0.5	5	610
	ACETONITRILE	20	20	20	40	100
	ACROLEIN	0.5	50	0.5	5	0.042
	ACRYLONITRILE	0.5	50	0.5	5	0.039
	BENZENE	0.3	30	0.3	1	0.34
	BROMODICHLOROMETHANE	0.3	30	0.3	1	0.18
	BROMOFORM	0.3	30	0.3	1	8.5
	BROMOMETHANE	0.3	30	0.3	1	8.7
	CARBON DISULFIDE	0.3	30	0.3	1	84.1

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	CARBON TETRACHLORIDE	0.3	30	0.3	1	0.17
	CHLOROBENZENE	0.3	30	0.3	1	10
	CHLORODIBROMOMETHANE	0.3	30	0.3	1	0.18
	CHLOROETHANE	0.5	50	0.5	1	4.6
	CHLOROFORM	0.3	30	0.3	1	6.2
	CHLOROMETHANE	0.3	30	0.3	1	1.5
	CHLOROPRENE	0.3	50	0.5	5	14
	CIS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	61
	CIS-1,3-DICHLOROPROPENE	0.3	30	0.3	1	0.4
	DIBROMOMETHANE	0.3	30	0.3	1	61
	DICHLORODIFLUOROMETHANE	0.3	30	0.3	1	390
	ETHYL METHACRYLATE	0.5	50	0.5	5	550
	ETHYLBENZENE	0.3	30	0.3	1	2.9
	ISOBUTANOL	20	20	20	40	1800
	METHACRYLONITRILE	0.3	30	0.3	5	1
	METHYL IODIDE	0.5	50	0.5	5	--
	METHYL METHACRYLATE	0.5	50	0.5	5	1400
	METHYLENE CHLORIDE	0.3	0.3	0.3	1	4.3
	PROPIONITRILE	20	20	20	40	6080
	STYRENE	0.3	30	0.3	1	56
	TETRACHLOROETHENE	0.3	30	0.3	1	0.66
	TOLUENE	0.3	30	0.3	1	253
VOC	TOTAL XYLENES	0.3	30	0.3	1	117
	TRANS-1,2-DICHLOROETHENE	0.3	30	0.3	1	100
	TRANS-1,3-DICHLOROPROPENE	0.3	30	0.3	1	0.4
	TRANS-1,4-DICHLORO-2-BUTENE	0.5	50	0.5	5	--
	TRICHLOROETHENE	0.3	0.3	0.3	1	0.028
	TRICHLOROFLUOROMETHANE	0.3	30	0.3	1	1300
	VINYL ACETATE	0.5	50	0.5	5	248.03
	VINYL CHLORIDE	0.3	30	0.3	1	0.02
Round 3		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
EXP	1,3,5-TRINITROBENZENE	0.24	2.71	0.25	0.5	1100
	1,3-DINITROBENZENE	0.24	2.71	0.25	0.5	2.36
	2,4,6-TRINITROTOLUENE	0.24	2.71	0.25	0.5	2.2
	2,4-DINITROTOLUENE	0.24	2.71	0.25	0.5	73
	2,6-DINITROTOLUENE	0.24	2.71	0.25	0.5	36
	2-AMINO-4,6-DINITROTOLUENE	0.24	2.71	0.25	0.5	--
	2-NITROTOLUENE	0.24	2.71	0.25	0.5	61
	3-NITROTOLUENE	0.24	2.71	0.25	0.5	61
	4-AMINO-2,6-DINITROTOLUENE	0.24	2.71	0.25	0.5	--
	4-NITROTOLUENE	0.24	2.71	0.25	0.5	61
	HMX	0.24	2.71	0.25	0.5	1800
	NITROBENZENE	0.24	2.71	0.25	0.5	3.4
	RDX	0.24	2.71	0.25	0.5	0.61
	TETRYL	0.24	2.71	0.25	0.5	360
		mg/L	**mg/L**	**mg/L**	**mg/L**	**mg/L**
M	ALUMINUM	8.35	8.35	6.8	50	50
	ANTIMONY	0.09	1.7	0.02	1	6
	ARSENIC	0.13	0.53	0.03	1	0.045
	BERYLLIUM	0.02	0.56	0.03	1	4
	CADMIUM	0.039	0.36	0.04	1	0.66
	CHROMIUM	0.69	1.3	0.02	1	42
	COPPER	0.24	0.56	0.06	2	5

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	IRON	17.8	73.5	2.22	50	300
	LEAD	0.069	0.3	0.02	1	1.3
	MERCURY	0.03	0.052	0.02	0.2	0.0013
	SELENIUM	0.094	0.19	0.04	1	5
	SILVER	0.028	0.38	0.03	1	1
	THALLIUM	0.043	0.26	0.04	1	0.56
	TIN	0.06	0.39	0.09	10	73
	VANADIUM	1.14	1.14	0.05	2	19
	ZINC	2.7	4.8	0.32	10	58.9
VOC		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
	1,1,1,2-TETRACHLOROETHANE	0.3	60	0.3	1	0.43
	1,1,1-TRICHLOROETHANE	0.3	60	0.3	1	88
	1,1,2,2-TETRACHLOROETHANE	0.3	60	0.3	1	0.055
	1,1,2-TRICHLOROETHANE	0.3	60	0.3	1	0.2
	1,1-DICHLOROETHANE	0.3	60	0.3	1	47
	1,1-DICHLOROETHENE	0.3	60	0.3	1	7
	1,2,3-TRICHLOROPROPANE	0.3	60	0.3	1	0.0056
	1,2-DIBROMO-3-CHLOROPROPANE	0.3	60	0.3	1	0.048
	1,2-DIBROMOETHANE	0.3	60	0.3	1	0.00076
	1,2-DICHLOROETHANE	0.3	60	0.3	1	0.12
	1,2-DICHLOROPROPANE	0.3	60	0.3	1	0.16
	1,4-DIOXANE	50	50	50	100	6.1
	2-BUTANONE	0.5	100	0.5	5	1900
	2-HEXANONE	0.5	100	0.5	5	1710
	3-CHLOROPROPENE	0.5	100	0.5	5	1800
	4-METHYL-2-PENTANONE	0.5	100	0.5	5	160
	ACETONE	0.5	100	0.5	5	610
	ACETONITRILE	20	20	20	40	100
	ACROLEIN	0.5	100	0.5	5	0.042
	ACRYLONITRILE	0.5	100	0.5	5	0.039
	BENZENE	0.3	60	0.3	1	0.34
	BROMODICHLOROMETHANE	0.3	60	0.3	1	0.18
	BROMOFORM	0.3	60	0.3	1	8.5
	BROMOMETHANE	0.3	60	0.3	1	8.7
	CARBON DISULFIDE	0.3	60	0.3	1	84.1
	CARBON TETRACHLORIDE	0.3	60	0.3	1	0.17
	CHLOROBENZENE	0.3	60	0.3	1	10
	CHLORODIBROMOMETHANE	0.3	60	0.3	1	0.18
	CHLOROETHANE	0.5	100	0.5	1	4.6
	CHLOROFORM	0.3	60	0.3	1	6.2
	CHLOROMETHANE	0.3	60	0.3	1	1.5
	CHLOROPRENE	0.5	100	0.5	5	14
	CIS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	61
	CIS-1,3-DICHLOROPROPENE	0.3	60	0.3	1	0.4
	DIBROMOMETHANE	0.3	60	0.3	1	61
	DICHLORODIFLUOROMETHANE	0.3	60	0.3	1	390
	ETHYL METHACRYLATE	0.5	100	0.5	5	550
	ETHYLBENZENE	0.3	60	0.3	1	2.9
	ISOBUTANOL	20	20	20	40	1800
	METHACRYLONITRILE	0.3	60	0.3	5	1
	METHYL IODIDE	0.5	100	0.5	5	--
	METHYL METHACRYLATE	0.5	100	0.5	5	1400
	METHYLENE CHLORIDE	0.3	60	0.3	1	4.3

TABLE H- 6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1)	Laboratory RL (2)	Risk-Based Target Level(2)
	PROPIONITRILE	20	20	20	40	6080
	STYRENE	0.3	60	0.3	1	56
	TETRACHLOROETHENE	0.3	60	0.3	1	0.66
	TOLUENE	0.3	60	0.3	1	253
	TOTAL XYLENES	0.3	60	0.3	1	117
	TRANS-1,2-DICHLOROETHENE	0.3	60	0.3	1	100
	TRANS-1,3-DICHLOROPROPENE	0.3	60	0.3	1	0.4
	TRANS-1,4-DICHLORO-2-BUTENE	0.5	100	0.5	5	--
	TRICHLOROETHENE	0.3	0.3	0.3	1	0.028
	TRICHLOROFLUOROMETHANE	0.3	60	0.3	1	1300
	VINYL ACETATE	0.5	100	0.5	5	248.03
	VINYL CHLORIDE	0.3	60	0.3	1	0.02

EXP - Explosives
HERB - Herbicides
M - Metals
MF - Metals filtered
MISC - Miscellanous
SVOC - Semivolatile organic compounds
VOC - Volatile organic compounds
FIELD - Field parameters

1 Yellow or gray highlight indicates that the value exceeds the risk-based target level. Analytes that did not exhibit any concentrations less than detection limits are not shown.
2 RFI Round 1 through 3 RBTL is th e lowest of all risk-based target levels listed in the QAPP. Composting data RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference).

MG/L = milligrams per Liter
UG/L = micrograms per Liter

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
Composting Operation						
NA	NA	NA	NA	NA	NA	NA
Round 1						
EXP	1,3,5-TRINITROBENZENE	0.21	0.8	0.25	0.5	1800
	1,3-DINITROBENZENE	0.21	0.8	0.25	0.5	0.6547
	2,4,6-TRINITROTOLUENE	0.21	0.8	0.25	0.5	16
	2,4-DINITROTOLUENE	0.21	0.8	0.25	0.5	0.00004
	2,6-DINITROTOLUENE	0.21	0.8	0.25	0.5	0.00003
	2-AMINO-4,6-DINITROTOLUENE	0.21	0.8	0.25	0.5	4.7
	2-NITROTOLUENE	0.21	0.8	0.25	0.5	370
	3-NITROTOLUENE	0.21	0.8	0.25	0.5	370
	4-AMINO-2,6-DINITROTOLUENE	0.265	0.8	0.25	0.5	4.78
	4-NITROTOLUENE	0.21	0.8	0.25	0.5	370
	HMX	0.265	0.65	0.25	0.5	3100
	NITROBENZENE	0.21	0.8	0.25	0.5	0.007
	PICRAMIC ACID	0.39	0.39	17	33	--
	PICRIC ACID	0.39	0.39	17	33	--
	RDX	0.25	0.6	0.25	0.5	4.4
	TETRYL	0.21	0.8	0.25	0.5	610
HERB	HEXACHLOROPHENE	0.025	0.025	0.85	1.7	0.19878
	PENTACHLOROPHENOL	0.013	0.013	0.45	0.9	0.001
M	ALUMINUM	7.6	82.4	3.4	25	76000
	ANTIMONY	0.04	2.9	0.01	0.5	0.1423
	ARSENIC	0.38	0.98	0.015	0.5	0.39
	BERYLLIUM	0.03	0.49	0.015	0.5	0.1
	CADMIUM	0.05	0.56	0.02	0.5	0.00222
	CHROMIUM	0.25	1	0.01	0.5	0.4
	COBALT	0.05	0.78	0.01	0.5	0.14033
	IRON	77.1	194	1.11	25	23000
	LEAD	0.15	1.2	0.01	0.5	0.05373
	LITHIUM	0.91	2.2	0.02	0.1	1600
	MERCURY	0.02	0.2	0.002	0.1	0.073
	NICKEL	0.61	0.61	0.03	0.5	7
	SELENIUM	0.1	1.4	0.02	0.5	0.02765
	SILVER	0.04	1	0.015	0.5	2
	THALLIUM	0.04	0.35	0.02	0.5	0.04
	TIN	0.03	0.67	0.045	5	7.62
	TITANIUM	0.24	0.24	0.03	2.5	--
	VANADIUM	0.05	0.39	0.025	1	1.59
	ZINC	3.2	3.2	0.16	5	6.62
MF	ALUMINUM	22.3	49.4	3.4	25	--
	ANTIMONY	0.13	2.8	0.01	0.5	--
	ARSENIC	0.15	0.73	0.015	0.5	--

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
	BERYLLIUM	0.03	0.28	0.015	0.5	0.1
	CADMIUM	0.05	0.41	0.02	0.5	0.00222
MF	CHROMIUM	0.21	0.89	0.01	0.5	--
	COBALT	0.15	0.71	0.01	0.5	0.14033
	COPPER	1	1.3	0.03	1	2.96
	IRON	14.9	42.5	1.11	25	23000
	LEAD	0.08	1.9	0.01	0.5	0.05373
	LITHIUM	0.37	1.8	0.02	0.1	1600
	MANGANESE	2.8	2.9	0.02	2.5	1800
	MERCURY	0.02	0.2	0.002	0.1	0.073
	NICKEL	0.5	0.85	0.03	0.5	7
	SELENIUM	0.08	1.4	0.02	0.5	0.02765
	SILVER	0.04	0.71	0.015	0.5	2
	THALLIUM	0.04	0.33	0.02	0.5	--
	TIN	0.03	0.38	0.045	5	7.62
	TITANIUM	1.1	1.3	0.03	2.5	--
	VANADIUM	0.23	0.76	0.025	1	1.59
	ZINC	3.8	5.7	0.16	5	6.62
MISC	AMMONIA-N	0.01	0.01	0.01	0.02	--
	NITRITE/NITRATE-N	0.02	0.02	0.025	0.05	--
SVOC	1,2,4,5-TETRACHLOROBENZENE	1	1	1	5	2.02
	1,2,4-TRICHLOROBENZENE	1	1	1	5	0.3
	1,2-DICHLOROBENZENE	1	1	1	5	0.9
	1,3-DICHLOROBENZENE	1	1	1	5	0.13
	1,4-DICHLOROBENZENE	1	1	1	2	0.1
	1,4-NAPHTHOQUINONE	1	1	1	5	--
	1,4-PHENYLENEDIAMINE	1	1	1	5	12000
	1-NAPHTHYLAMINE	1	1	1	5	--
	2,2'-OXYBIS(1-CHLOROPROPANE)	1	1	1	3	--
	2,3,4,6-TETRACHLOROPHENOL	1	1	1	5	0.19878
	2,4,5-TRICHLOROPHENOL	1	1	1	5	14
	2,4,6-TRICHLOROPHENOL	1	1	1	3	0.008
	2,4-DICHLOROPHENOL	1	1	1	5	0.05
	2,4-DIMETHYLPHENOL	1	1	1	5	0.01
	2,4-DINITROPHENOL	1	1	1	10	0.01
	2,6-DICHLOROPHENOL	1	1	1	5	1.17
	2-ACETYLAMINOFLUORENE	1	1	1	5	0.59634
	2-CHLORONAPHTHALENE	1	1	1	2	0.01218
	2-CHLOROPHENOL	1	1	1	3	0.2
	2-METHYLNAPHTHALENE	0.05	0.05	0.05	0.1	--
	2-METHYLPHENOL	1	1	1	5	0.8
	2-NAPHTHYLAMINE	1	1	1	10	--
	2-NITROANILINE	1	1	1	2	3.5
	2-NITROPHENOL	1	1	1	5	1.6

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
	2-PICOLINE	1	1	1	5	9.9
	3&4-METHYLPHENOL	1	1	1	5	--
	3,3'-DICHLOROBENZIDINE	1	1	1	5	0.0003
	3,3'-DIMETHYLBENZIDINE	1	1	1	5	0.053
	3-METHYLCHOLANTHRENE	1	1	1	5	0.07794
	3-NITROANILINE	1	1	1	5	3.5
	4,6-DINITRO-2-METHYLPHENOL	1	1	1	5	0.14408
SVOC	4-AMINOBIPHENYL	1	1	1	5	--
	4-BROMOPHENYL PHENYL ETHER	1	1	1	2	--
	4-CHLORO-3-METHYLPHENOL	1	1	1	5	7.95
	4-CHLOROANILINE	1	1	1	5	0.03
	4-CHLOROPHENYL PHENYL ETHER	1	1	1	5	--
	4-NITROANILINE	1	1	1	5	3.5
	4-NITROPHENOL	1	1	1	5	5.12
	4-NITROQUINOLINE-1-OXIDE	1	1	1	5	--
	5-NITRO-O-TOLUIDINE	1	1	1	5	15
	7,12-DIMETHYLBENZ(A)ANTHRACENE	1	1	1	5	16.3
	A,A-DIMETHYLPHENETHYLAMINE	1	1	1	10	--
	ACENAPHTHENE	0.05	0.05	0.05	0.1	--
	ACENAPHTHYLENE	0.05	0.2	0.05	0.1	130
	ACETOPHENONE	1	1	1	5	0.49
	ANILINE	1	1	1	5	0.05678
	ANTHRACENE	0.05	0.05	0.05	0.1	--
	ARAMITE	1	1	1	5	19
	BENZO(A)ANTHRACENE	0.05	0.05	0.05	0.1	--
	BENZO(A)PYRENE	0.05	0.2	0.05	0.1	--
	BENZO(B)FLUORANTHENE	0.05	0.2	0.05	0.1	0.2
	BENZO(G,H,I)PERYLENE	0.05	0.2	0.05	0.1	--
	BENZO(K)FLUORANTHENE	0.05	0.2	0.05	0.1	--
	BENZYL ALCOHOL	1	1	1	5	65.8
	BIS(2-CHLOROETHOXY)METHANE	1	1	1	5	0.30209
	BIS(2-CHLOROETHYL)ETHER	1	1	1	2	0.00002
	BIS(2-ETHYLHEXYL)PHTHALATE	1	14	1	1	0.92594
	BUTYL BENZYL PHTHALATE	1	1	1	5	0.23889
	CHLOROBENZILATE	1	1	1	5	1.8
	CHRYSENE	0.05	0.05	0.05	0.1	4.73
	DIALLATE	1	1	1	5	0.45214
	DIBENZO(A,H)ANTHRACENE	0.05	0.2	0.05	0.1	--
	DIBENZOFURAN	1	1	1	5	290
	DIETHYL PHTHALATE	1	1	1	2	23
	DIMETHYL PHTHALATE	1	1	1	5	734
	DI-N-BUTYL PHTHALATE	1	1	1	2	0.14979
	DI-N-OCTYL PHTHALATE	1	1	1	5	709
	DIPHENYLAMINE	1	1	1	5	--

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
	ETHYL METHANE SULFONATE	1	1	1	5	--
	FLUORANTHENE	0.05	0.05	0.05	0.1	--
	FLUORENE	0.05	0.05	0.05	0.1	--
	HEXACHLOROBENZENE	1	1	1	2	0.1
	HEXACHLOROBUTADIENE	1	1	1	1	0.03976
	HEXACHLOROCYCLOPENTADIENE	1	1	1	2	0.75537
	HEXACHLOROETHANE	1	1	1	2	0.02
	HEXACHLOROPROPENE	1	1	1	5	--
	INDENO(1,2,3-CD)PYRENE	0.05	0.2	0.05	0.1	--
	ISODRIN	1	1	1	5	0.00332
	ISOPHORONE	1	1	1	5	0.03
	ISOSAFROLE	1	1	1	5	9.94
SVOC	KEPONE	1	1	1	5	0.027
	METHAPYRILENE	1	1	1	5	2.78
	METHYL METHANE SULFONATE	1	1	1	5	0.31549
	NAPHTHALENE	0.05	0.05	0.05	0.1	--
	N-NITROSODIETHYLAMINE	1	1	1	5	0.0032
	N-NITROSODIMETHYLAMINE	1	1	1	5	0.0000321
	N-NITROSO-DI-N-BUTYLAMINE	1	1	1	5	--
	N-NITROSO-DI-N-PROPYLAMINE	1	1	1	2	--
	N-NITROSOMETHYLETHYLAMINE	1	1	1	5	0.00166
	N-NITROSOMORPHOLINE	1	1	1	5	0.07057
	N-NITROSOPIPERIDINE	1	1	1	5	0.00665
	N-NITROSOPYRROLIDINE	1	1	1	5	0.01258
	O,O,O-TRIETHYL PHOSPHOROTHIOAT	1	1	1	5	--
	O-TOLUIDINE	1	1	1	5	2
	P-(DIMETHYLAMINO)AZOBENZENE	1	1	1	5	--
	PENTACHLOROBENZENE	1	1	1	5	0.49695
	PENTACHLOROETHANE	1	1	1	5	10.7
	PENTACHLORONITROBENZENE	1	1	1	5	1.9
	PHENACETIN	1	1	1	5	11.7
	PHENANTHRENE	0.05	0.05	0.05	0.1	45.7
	PHENOL	1	1	1	5	5
	PRONAMIDE	1	1	1	5	0.0136
	PYRENE	0.05	0.05	0.05	0.1	--
	PYRIDINE	1	1	1	5	1.03
	SAFROLE	1	1	1	5	0.40398
Round 2						
EXP	1,3,5-TRINITROBENZENE	0.24	0.287	0.25	0.5	1100
	1,3-DINITROBENZENE	0.24	0.287	0.25	0.5	2.36
	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLU	0.47	0.575	0.65	1	--
	2,4,6-TRINITROTOLUENE	0.24	0.287	0.25	0.5	2.2
	2,4-DIAMINO-6-NITROTOLUENE	0.24	0.287	0.25	0.5	2.2
	2,4-DINITROTOLUENE	0.24	0.287	0.25	0.5	73

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
	2,6-DIAMINO-4-NITROTOLUENE	0.24	0.287	0.25	0.5	NA
	2,6-DINITROTOLUENE	0.24	0.287	0.25	0.5	36
	2-AMINO-4,6-DINITROTOLUENE	0.24	0.27	0.25	0.5	--
	2-NITROTOLUENE	0.24	0.287	0.25	0.5	61
	3,5-DINITROANILINE	0.24	0.287	0.25	0.5	NA
	3-NITROTOLUENE	0.24	0.287	0.25	0.5	61
	4-AMINO-2,6-DINITROTOLUENE	0.24	0.27	0.25	0.5	--
	4-NITROTOLUENE	0.24	0.287	0.25	0.5	61
	DNX	0.24	0.27	0.25	0.5	NA
	HMX	0.24	0.27	0.25	0.5	1800
	MNX	0.24	0.27	0.25	0.5	--
	NITROBENZENE	0.24	0.287	0.25	0.5	3.4
	RDX	0.24	0.27	0.25	0.5	0.61
	TETRYL	0.24	0.287	0.25	0.5	360
	TNX	0.24	0.27	0.25	0.5	--
M	ALUMINUM	30.6	106	6.8	50	50
	ANTIMONY	0.02	0.63	0.02	1	6
M	ARSENIC	0.11	0.57	0.03	1	0.045
	BERYLLIUM	0.03	0.72	0.03	1	4
	CADMIUM	0.04	0.4	0.04	1	0.66
	CHROMIUM	0.19	1.6	0.02	1	42
	COBALT	0.07	0.52	0.02	1	5
	COPPER	0.38	1.7	0.06	2	5
	IRON	15	162	2.22	50	300
	LEAD	0.07	1.6	0.02	1	1.3
	MAGNESIUM	8750	14200	2	100	--
	MANGANESE	2	10	0.04	5	50
	MERCURY	0.007	0.02	0.02	0.2	0.0013
	NICKEL	0.61	1.3	0.06	1	29
	SELENIUM	0.04	0.62	0.04	1	5
	SILVER	0.03	0.33	0.03	1	1
	THALLIUM	0.04	0.41	0.04	1	0.56
	TIN	0.1	0.4	0.09	10	73
	TITANIUM	0.52	0.73	0.06	5	--
	VANADIUM	0.11	1.6	0.05	2	19
	ZINC	2.1	14	0.32	10	58.9
MF	ALUMINUM	7.6	54.4	6.8	50	50
	ANTIMONY	0.06	0.71	0.02	1	6
	ARSENIC	0.07	0.42	0.03	1	0.045
	BERYLLIUM	0.03	0.22	0.03	1	4
	CADMIUM	0.04	0.3	0.04	1	0.66
	CHROMIUM	0.13	1.5	0.02	1	42
	COBALT	0.11	0.52	0.02	1	5
	COPPER	0.26	0.93	0.06	2	5

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
	IRON	5.7	123	2.22	50	300
	LEAD	0.02	0.38	0.02	1	1.3
	MAGNESIUM	13700	13700	2	100	--
	MANGANESE	2.1	10.7	0.04	5	50
	MERCURY	0.007	0.02	0.02	0.2	0.0013
	NICKEL	0.55	1.4	0.06	1	29
	SELENIUM	0.04	0.46	0.04	1	5
	SILVER	0.03	0.07	0.03	1	1
	THALLIUM	0.04	0.1	0.04	1	0.56
	TIN	0.1	0.59	0.09	10	73
	TITANIUM	0.1	1.1	0.06	5	--
	VANADIUM	0.06	0.4	0.05	2	19
	ZINC	1.7	16	0.32	10	58.9
MISC	AMMONIA-N	0.005	0.01	0.01	0.02	--
	NITRITE/NITRATE-N	0.025	0.13	0.025	0.05	--
VOC	1,1,1,2-TETRACHLOROETHANE	0.3	0.3	0.3	1	0.43
	1,1,1-TRICHLOROETHANE	0.3	0.3	0.3	1	88
	1,1,2,2-TETRACHLOROETHANE	0.3	0.3	0.3	1	0.055
	1,1,2-TRICHLOROETHANE	0.3	0.3	0.3	1	0.2
	1,1-DICHLOROETHANE	0.3	0.3	0.3	1	47
	1,1-DICHLOROETHENE	0.3	0.3	0.3	1	7
	1,2,3-TRICHLOROPROPANE	0.3	0.3	0.3	1	0.0056
VOC	1,2-DIBROMO-3-CHLOROPROPANE	0.3	0.3	0.3	1	0.048
	1,2-DIBROMOETHANE	0.3	0.3	0.3	1	0.00076
	1,2-DICHLOROETHANE	0.3	0.3	0.3	1	0.12
	1,2-DICHLOROPROPANE	0.3	0.3	0.3	1	0.16
	1,4-DIOXANE	50	50	50	100	6.1
	2-BUTANONE	0.5	0.5	0.5	5	1900
	2-HEXANONE	0.5	0.5	0.5	5	1710
	3-CHLOROPROPENE	0.5	0.5	0.5	5	14
	4-METHYL-2-PENTANONE	0.5	0.5	0.5	5	160
	ACETONE	0.5	0.5	0.5	5	610
	ACETONITRILE	20	20	20	40	100
	ACROLEIN	0.5	0.5	0.5	5	0.042
	ACRYLONITRILE	0.5	0.5	0.5	5	0.039
	BENZENE	0.3	0.3	0.3	1	0.34
	BROMODICHLOROMETHANE	0.3	0.3	0.3	1	0.18
	BROMOFORM	0.3	0.3	0.3	1	8.5
	BROMOMETHANE	0.3	0.3	0.3	1	8.7
	CARBON DISULFIDE	0.3	0.3	0.3	1	84.1
	CARBON TETRACHLORIDE	0.3	0.3	0.3	1	0.17
	CHLOROBENZENE	0.3	0.3	0.3	1	10
	CHLORODIBROMOMETHANE	0.3	0.3	0.3	1	0.18
	CHLOROETHANE	0.5	0.5	0.5	1	4.6

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
	CHLOROFORM	0.3	0.3	0.3	1	6.2
	CHLOROMETHANE	0.3	0.3	0.3	1	1.5
	CHLOROPRENE	0.5	0.5	0.5	5	14
	CIS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	61
	CIS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	1	0.4
	DIBROMOMETHANE	0.3	0.3	0.3	1	61
	DICHLORODIFLUOROMETHANE	0.3	0.3	0.3	1	390
	ETHYL METHACRYLATE	0.5	0.5	0.5	5	550
	ETHYLBENZENE	0.3	0.3	0.3	1	2.9
	ISOBUTANOL	20	20	20	40	1800
	METHACRYLONITRILE	0.3	0.3	0.3	5	1
	METHYL IODIDE	0.5	0.5	0.5	5	--
	METHYL METHACRYLATE	0.5	0.5	0.5	5	1400
	METHYLENE CHLORIDE	0.3	0.3	0.3	1	4.3
	PROPIONITRILE	20	20	20	40	6080
	STYRENE	0.3	0.3	0.3	1	56
	TETRACHLOROETHENE	0.3	0.3	0.3	1	0.66
	TOLUENE	0.3	0.3	0.3	1	253
	TOTAL XYLENES	0.3	0.3	0.3	1	117
	TRANS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	100
	TRANS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	1	0.4
	TRANS-1,4-DICHLORO-2-BUTENE	0.5	0.5	0.5	5	--
	TRICHLOROETHENE	0.3	0.3	0.3	1	0.028
	TRICHLOROFLUOROMETHANE	0.3	0.3	0.3	1	1300
	VINYL ACETATE	0.5	0.5	0.5	5	248.03
	VINYL CHLORIDE	0.3	0.3	0.3	1	0.02
PAH	2-METHYLNAPHTHALENE	0.048	0.049	0.05	0.1	6.2
PAH	ACENAPHTHENE	0.048	0.049	0.05	0.1	9.9
	ACENAPHTHYLENE	0.048	0.049	0.05	0.1	370
	ANTHRACENE	0.048	0.049	0.05	0.1	0.029
	BENZO(A)ANTHRACENE	0.049	0.049	0.05	0.1	0.092
	BENZO(A)PYRENE	0.049	0.049	0.05	0.1	0.0092
	BENZO(B)FLUORANTHENE	0.049	0.049	0.05	0.1	0.092
	BENZO(G,H,I)PERYLENE	0.049	0.049	0.05	0.1	7.64
	BENZO(K)FLUORANTHENE	0.049	0.049	0.05	0.1	0.0056
	CHRYSENE	0.049	0.049	0.05	0.1	0.033
	DIBENZO(A,H)ANTHRACENE	0.048	0.049	0.05	0.1	0.0016
	FLUORANTHENE	0.049	0.049	0.05	0.1	8.1
	FLUORENE	0.048	0.049	0.05	0.1	3.9
	INDENO(1,2,3-CD)PYRENE	0.049	0.049	0.05	0.1	0.022
	NAPHTHALENE	0.048	0.049	0.05	0.1	6.2
	PHENANTHRENE	0.049	0.049	0.05	0.1	2.1
	PYRENE	0.049	0.049	0.05	0.1	0.3

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV [1], (ug/L)	Laboratory RL [2], (ug/L)	Risk-Based Target Level[2], (ug/L)
Round 3						
EXP	1,3,5-TRINITROBENZENE	0.24	0.255	0.25	0.5	1100
	1,3-DINITROBENZENE	0.24	0.255	0.25	0.5	2.36
	2,4,6-TRINITROTOLUENE	0.24	0.255	0.25	0.5	2.2
	2,4-DINITROTOLUENE	0.24	0.255	0.25	0.5	73
	2,6-DINITROTOLUENE	0.24	0.255	0.25	0.5	36
	2-AMINO-4,6-DINITROTOLUENE	0.25	0.255	0.25	0.5	--
	2-NITROTOLUENE	0.24	0.255	0.25	0.5	61
	3-NITROTOLUENE	0.24	0.255	0.25	0.5	61
	4-AMINO-2,6-DINITROTOLUENE	0.25	0.255	0.25	0.5	--
	4-NITROTOLUENE	0.24	0.255	0.25	0.5	61
	HMX	0.25	0.255	0.25	0.5	1800
	NITROBENZENE	0.24	0.255	0.25	0.5	3.4
	RDX	0.25	0.255	0.25	0.5	0.61
	TETRYL	0.24	0.255	0.25	0.5	360
M	ALUMINUM	48.7	128	6.8	50	50
	ANTIMONY	0.085	2.7	0.02	1	6
	ARSENIC	0.09	0.34	0.03	1	0.045
	BERYLLIUM	0.02	0.18	0.03	1	4
	CADMIUM	0.039	0.2	0.04	1	0.66
	CHROMIUM	0.34	1.3	0.02	1	42
	COBALT	0.1	0.29	0.02	1	5
	IRON	77.8	114	2.22	50	300
	LEAD	0.11	0.31	0.02	1	1.3
	MANGANESE	3	5.8	0.04	5	50
	MERCURY	0.03	0.032	0.02	0.2	0.0013
	NICKEL	0.94	1.6	0.06	1	29
	SELENIUM	0.094	0.57	0.04	1	5
	SILVER	0.028	0.3	0.03	1	1
	SODIUM	1070	1540	0.04	1	0.56
	THALLIUM	0.043	0.2	0.09	10	73
	TIN	0.048	0.52	0.06	5	--
	VANADIUM	1.14	1.14	0.05	2	19
	ZINC	4.2	4.2	0.32	10	58.9
MF	ALUMINUM	8.35	71.1	6.8	50	50
	ANTIMONY	0.085	3.4	0.02	1	6
	ARSENIC	0.047	0.4	0.03	1	0.045
	BERYLLIUM	0.02	0.09	0.03	1	4
	CADMIUM	0.039	0.1	0.04	1	0.66
	CHROMIUM	0.28	0.7	0.02	1	42
	COBALT	0.088	0.09	0.02	1	5
	IRON	7.8	131	2.22	50	300
	LEAD	0.1	0.19	0.02	1	1.3
	MANGANESE	0.82	1.7	0.04	5	50

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
	MERCURY	0.03	0.03	0.02	0.2	0.0013
	NICKEL	1.2	1.4	0.06	1	29
	SELENIUM	0.094	0.4	0.04	1	5
	SILVER	0.028	0.16	0.03	1	1
	SODIUM	1060	1480			
	THALLIUM	0.043	0.08	0.04	1	0.56
	TIN	0.048	0.32	0.09	10	73
	VANADIUM	1.14	1.14	0.05	2	19
	ZINC	6	197	0.32	10	58.9
MISC	NITRITE/NITRATE-N	0.025	0.025	0.025	0.05	--
VOC	1,1,1,2-TETRACHLOROETHANE	0.3	0.3	0.3	1	0.43
	1,1,1-TRICHLOROETHANE	0.3	0.3	0.3	1	88
	1,1,2,2-TETRACHLOROETHANE	0.3	0.3	0.3	1	0.055
	1,1,2-TRICHLOROETHANE	0.3	0.3	0.3	1	0.2
	1,1-DICHLOROETHANE	0.3	0.3	0.3	1	47
	1,1-DICHLOROETHENE	0.3	0.3	0.3	1	7
	1,2,3-TRICHLOROPROPANE	0.3	0.3	0.3	1	0.0056
	1,2-DIBROMO-3-CHLOROPROPANE	0.3	0.3	0.3	1	0.048
	1,2-DIBROMOETHANE	0.3	0.3	0.3	1	0.00076
	1,2-DICHLOROETHANE	0.3	0.3	0.3	1	0.12
	1,2-DICHLOROPROPANE	0.3	0.3	0.3	1	0.16
	1,4-DIOXANE	50	50	50	100	6.1
	2-BUTANONE	0.5	0.5	0.5	5	1900
	2-HEXANONE	0.5	0.5	0.5	5	1710
	3-CHLOROPROPENE	0.5	0.5	0.5	5	14
	4-METHYL-2-PENTANONE	0.5	0.5	0.5	5	160
	ACETONE	0.5	0.5	0.5	5	610
	ACETONITRILE	20	20	20	40	100
	ACROLEIN	0.5	0.5	0.5	5	0.042
	ACRYLONITRILE	0.5	0.5	0.5	5	0.039
	BENZENE	0.3	0.3	0.3	1	0.34
	BROMODICHLOROMETHANE	0.3	0.3	0.3	1	0.18
	BROMOFORM	0.3	0.3	0.3	1	8.5
	BROMOMETHANE	0.3	0.3	0.3	1	8.7
	CARBON DISULFIDE	0.3	0.3	0.3	1	84.1
	CARBON TETRACHLORIDE	0.3	0.3	0.3	1	0.17
	CHLOROBENZENE	0.3	0.3	0.3	1	10
	CHLORODIBROMOMETHANE	0.3	0.3	0.3	1	0.18
	CHLOROETHANE	0.5	0.5	0.5	1	4.6
	CHLOROFORM	0.3	0.3	0.3	1	6.2
	CHLOROMETHANE	0.3	0.3	0.3	1	1.5
	CHLOROPRENE	0.5	0.5	0.5	5	14
	CIS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	61
	CIS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	1	0.4

TABLE H- 7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)(1)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV (1), (ug/L)	Laboratory RL (2), (ug/L)	Risk-Based Target Level(2), (ug/L)
	DIBROMOMETHANE	0.3	0.3	0.3	1	61
	DICHLORODIFLUOROMETHANE	0.3	0.3	0.3	1	390
	ETHYL METHACRYLATE	0.5	0.5	0.5	5	550
	ETHYLBENZENE	0.3	0.3	0.3	1	2.9
	ISOBUTANOL	20	20	20	40	1800
	METHACRYLONITRILE	0.3	0.3	0.3	5	1
	METHYL IODIDE	0.5	0.5	0.5	5	--
	METHYL METHACRYLATE	0.5	0.5	0.5	5	1400
	METHYLENE CHLORIDE	0.3	0.3	0.3	1	4.3
	PROPIONITRILE	20	20	20	40	6080
	STYRENE	0.3	0.3	0.3	1	56
	TETRACHLOROETHENE	0.3	0.3	0.3	1	0.66
	TOLUENE	0.3	0.3	0.3	1	253
	TOTAL XYLENES	0.3	0.3	0.3	1	117
	TRANS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	100
	TRANS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	1	0.4
	TRANS-1,4-DICHLORO-2-BUTENE	0.5	0.5	0.5	5	--
	TRICHLOROETHENE	0.3	0.3	0.3	1	0.028
	TRICHLOROFLUOROMETHANE	0.3	0.3	0.3	1	1300
	VINYL ACETATE	0.5	0.5	0.5	5	248.03
	VINYL CHLORIDE	0.3	0.3	0.3	1	0.02

EXP - Explosives
HERB - Herbicides
M - Metals
MF - Metals filtered
MISC - Miscellanous
PAH - Polynuclear aromatic hydrocarbons
SVOC - Semivolatile organic compounds
VOC - Volatile organic compounds

MG/L = milligrams per Liter
UG/L = micrograms per Liter

1 Yellow or gray highlight indicates that the value exceeds the risk-based target level. Analytes that did not exhibit any concentrations less than detection limits are not shown.
2 RFI Round 1 through 3 RBTL is th e lowest of all risk-based target levels listed in the QAPP. Composting data RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference).

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
Composting Operation[1]					
NA	NA	NA	NA	NA	NA
Round 1					
DIOX	1,2,3,4,6,7,8,9-OCDD	101.7	103.1	78.1	103.0
	1,2,3,4,6,7,8,9-OCDF	98.5	100.6	100.2	98.7
	1,2,3,4,6,7,8-HpCDD	93.1	94.0	92.9	97.3
	1,2,3,4,6,7,8-HpCDF	98.7	100.8	102.7	106.3
	1,2,3,4,7,8,9-HpCDF	90.8	85.6	88.5	107.4
	1,2,3,4,7,8-HxCDD	101.4	102.4	103.4	104.5
	1,2,3,4,7,8-HxCDF	99.0	98.5	105.7	99.5
	1,2,3,6,7,8-HxCDD	95.3	95.8	98.3	96.5
	1,2,3,6,7,8-HxCDF	97.9	98.8	101.7	102.5
	1,2,3,7,8,9-HxCDD	104.9	101.1	106.5	108.0
	1,2,3,7,8,9-HxCDF	96.4	94.7	113.5	110.7
	1,2,3,7,8-PeCDD	94.1	96.6	97.6	100.8
	1,2,3,7,8-PeCDF	81.9	84.0	86.0	84.6
	2,3,4,6,7,8-HxCDF	90.0	95.4	105.0	97.3
	2,3,4,7,8-PeCDF	107.8	112.6	108.0	110.0
	2,3,7,8-TCDD	99.5	101.5	99.6	99.9
	2,3,7,8-TCDF	97.7	97.4	125.7	86.1
EXP	1,3,5-TRINITROBENZENE	114.3	--	113.8	114.5
	1,3-DINITROBENZENE	119.0	--	117.2	118.8
	2,4,6-TRINITROTOLUENE	115.8	--	114.7	115.8
	2,4-DINITROTOLUENE	114.7	--	113.5	115.2
	2,6-DINITROTOLUENE	116.8	--	115.0	117.0
	2-AMINO-4,6-DINITROTOLUENE	116.8	--	115.0	116.3
	2-NITROTOLUENE	118.3	--	117.5	118.0
	3-NITROTOLUENE	116.9	--	116.2	116.8
	4-AMINO-2,6-DINITROTOLUENE	116.1	--	112.5	114.7
	4-NITROTOLUENE	117.6	--	116.7	117.7
	HMX	116.8	--	114.7	117.0
	NITROBENZENE	123.9	--	122.3	123.2
	PICRAMIC ACID	54.1	--	16.4	17.6
	PICRIC ACID	116.6	--	87.2	87.6
	RDX	114.4	--	106.8	109.5
	TETRYL	97.7	--	100.0	99.8
HERB	HEXACHLOROPHENE	61.8	--	19.8	22.2
	PENTACHLOROPHENOL	83.3	--	37.5	37.0
M	ALUMINUM	94.9	--	--	--
	ANTIMONY	101.5	--	93.2	--
	ARSENIC	95.7	--	89.5	--
	BARIUM	100.0	--	--	--
	BERYLLIUM	100.3	--	91.3	--

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	CADMIUM	96.3	--	119.3	--
	CALCIUM	96.6	--	339.3	--
	CHROMIUM	96.0	--	157.7	--
	COBALT	97.0	--	82.5	--
	COPPER	99.3	--	63.4	--
	IRON	101.9	--	--	--
	LEAD	94.7	--	--	--
	LITHIUM	100.1	--	143.2	--
	MAGNESIUM	96.6	--	118.9	--
	MANGANESE	99.9	--	--	--
	MERCURY	99.2	--	105.6	--
	NICKEL	99.0	--	121.0	--
	POTASSIUM	93.9	--	137.8	--
	SELENIUM	104.6	--	82.4	--
	SILVER	97.4	--	92.3	--
	SODIUM	96.3	--	85.2	--
	STRONTIUM	96.9	--	130.0	--
	THALLIUM	96.3	--	91.5	--
	TIN	99.8	--	94.1	--
	TITANIUM	97.7	--	172.2	--
	VANADIUM	95.9	--	149.7	--
	ZINC	101.1	--	124.7	--
SVOC	1,2,4-TRICHLOROBENZENE	83.5	--	74.3	73.1
	1,2-DICHLOROBENZENE	79.3	--	66.8	64.8
	1,3-DICHLOROBENZENE	78.0	--	63.1	59.9
	1,4-DICHLOROBENZENE	80.3	--	63.5	60.3
	2,4,5-TRICHLOROPHENOL	93.0	--	89.1	86.5
	2,4,6-TRICHLOROPHENOL	84.3	--	83.4	81.4
	2,4-DICHLOROPHENOL	90.2	--	89.6	84.5
	2,4-DIMETHYLPHENOL	76.4	--	64.6	60.9
	2,4-DINITROPHENOL	46.4	--	70.8	65.8
	2-CHLORONAPHTHALENE	72.8	--	69.6	67.6
	2-CHLOROPHENOL	88.1	--	84.3	80.1
	2-METHYLNAPHTHALENE	71.2	--	64.7	57.6
	2-METHYLPHENOL	86.5	--	81.1	76.8
	2-NITROANILINE	86.9	--	90.6	88.9
	2-NITROPHENOL	93.0	--	90.5	86.5
	3,3'-DICHLOROBENZIDINE	60.0	--	29.4	28.5
	3,4-METHYLPHENOL	87.5	--	81.0	74.0
	3-NITROANILINE	78.0	--	63.4	59.3
	4,6-DINITRO-2-METHYLPHENOL	73.0	--	74.9	73.9
	4-BROMOPHENYL-PHENYLETHE	86.1	--	82.8	80.3
	4-CHLORO-3-METHYLPHENOL	82.3	--	85.0	82.9

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	4-CHLOROANILINE	64.5	--	44.6	40.3
	4-CHLOROPHENYL-PHENYLETH	90.3	--	89.0	86.4
	4-NITROANILINE	86.3	--	74.3	69.1
SVOC	4-NITROPHENOL	80.2	--	82.4	80.8
	ACENAPHTHENE	70.8	--	64.7	57.9
	ACENAPHTHYLENE	67.7	--	65.4	58.7
	ANTHRACENE	68.7	--	65.6	55.6
	BENZO[A]ANTHRACENE	77.7	--	72.9	58.1
	BENZO[A]PYRENE	72.3	--	66.1	55.3
	BENZO[B]FLUORANTHENE	80.5	--	75.0	58.9
	BENZO[G,H,I]PERYLENE	69.0	--	63.6	49.1
	BENZO[K]FLUORANTHENE	70.9	--	72.0	58.9
	BENZYL ALCOHOL	88.3	--	90.3	86.8
	BIS(2-CHLOROETHOXY)METHAN	70.3	--	69.3	65.6
	BIS(2-CHLOROETHYL)ETHER	77.8	--	71.4	67.9
	BIS(2-CHLOROISOPROPYL)ETHE	89.9	--	86.0	84.0
	BIS(2-ETHYLHEXYL)PHTHALATE	89.2	--	94.6	89.0
	BUTYLBENZYLPHTHALATE	76.1	--	87.4	84.1
	CHRYSENE	79.1	--	71.6	59.1
	DIBENZO[A,H]ANTHRACENE	65.4	--	60.7	58.1
	DIBENZOFURAN	92.9	--	89.8	86.5
	DIETHYLPHTHALATE	90.9	--	89.0	86.6
	DIMETHYLPHTHALATE	85.3	--	85.0	82.6
	DI-N-BUTYLPHTHALATE	84.9	--	85.8	81.5
	DI-N-OCTYLPHTHALATE	77.9	--	92.1	92.0
	DIPHENYLAMINE	77.7	--	70.0	66.0
	FLUORANTHENE	77.9	--	69.9	59.7
	FLUORENE	70.8	--	67.0	61.0
	HEXACHLOROBENZENE	86.8	--	82.6	80.5
	HEXACHLOROBUTADIENE	86.0	--	73.4	68.8
	HEXACHLOROCYCLOPENTADIE	59.3	--	19.0	15.0
	HEXACHLOROETHANE	73.9	--	59.0	55.8
	INDENO[1,2,3-CD]PYRENE	69.2	--	65.7	51.1
	ISOPHORONE	81.6	--	81.3	77.9
	NAPHTHALENE	64.8	--	51.7	46.4
	N-NITROSODIMETHYLAMINE	75.1	--	64.0	65.3
	N-NITROSO-DI-N-PROPYLAMINE	84.8	--	85.9	81.6
	PHENANTHRENE	77.5	--	73.3	65.3
	PHENOL	85.0	--	79.5	77.9
	PYRENE	82.6	--	115.0	77.7
VOC	1,1,1-TRICHLOROETHANE	--	--	75.0	75.0
	1,1,2,2-TETRACHLOROETHANE	--	--	61.5	57.5
	1,1,2-TRICHLOROETHANE	--	--	72.5	67.5

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
VOC	1,1-DICHLOROETHANE	--	--	71.5	69.5
	1,1-DICHLOROETHENE	85.9	--	81.5	83.5
	1,2-DICHLOROETHANE	--	--	75.5	70.5
	1,2-DICHLOROPROPANE	--	--	71.5	69.5
	1,4-DIOXANE	89.0	--	83.5	84.0
	2-BUTANONE	--	--	56.0	51.0
	2-HEXANONE	--	--	48.0	53.5
	4-METHYL-2-PENTANONE	--	--	53.5	54.0
	ACETONE	--	--	66.0	56.5
	ACETONITRILE	91.0	--	79.0	85.0
	BENZENE	90.5	--	74.0	70.5
	BROMODICHLOROMETHANE	--	--	74.5	71.5
	BROMOFORM	--	--	72.0	66.5
	BROMOMETHANE	--	--	60.5	66.5
	CARBON DISULFIDE	--	--	129.0	130.0
	CARBON TETRACHLORIDE	--	--	73.0	74.5
	CHLOROBENZENE	85.5	--	68.0	66.5
	CHLOROETHANE	--	--	89.5	89.0
	CHLOROFORM	--	--	73.5	70.5
	CHLOROMETHANE	--	--	55.0	56.5
	CIS-1,2-DICHLOROETHENE	--	--	73.5	73.5
	CIS-1,3-DICHLOROPROPENE	--	--	67.0	64.0
	DIBROMOCHLOROMETHANE	--	--	73.5	69.5
	ETHYLBENZENE	--	--	69.5	70.5
	ISOBUTYL ALCOHOL	100.0	--	75.0	88.5
	METHYLENE CHLORIDE	--	--	69.0	71.0
	PROPIONITRILE	104.3	--	83.5	93.5
	STYRENE	--	--	64.0	64.0
	TETRACHLOROETHENE	--	--	67.5	66.5
	TOLUENE	87.1	--	71.5	67.5
	TRANS-1,2-DICHLOROETHENE	--	--	75.0	77.0
	TRANS-1,3-DICHLOROPROPENE	--	--	62.5	59.5
	TRICHLOROETHENE	82.4	--	74.0	70.5
	VINYL CHLORIDE	--	--	61.5	62.0
PCB	AROCLOR-1016	97.2	--	113.5	117.0
	AROCLOR-1260	101.0	--	150.0	153.0
WET	CADMIUM	101.0	--	--	--
	COPPER	105.0	--	--	--
	LEAD	99.5	--	--	--
	MERCURY	85.0	--	--	--
	NICKEL	103.0	--	--	--
	SULFIDE	87.5	--	--	--

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	TOTAL ORGANIC CARBON	109.6	--	124.7	113.3
	ZINC	125.0	--		
Round 2					
EXP	1,3,5-TRINITROBENZENE	98.3	--	107.5	105.0
	1,3-DINITROBENZENE	101.7	--	110.0	105.0
	2,4,6-TRINITROTOLUENE	101.7	--	107.5	102.5
	2,4-DINITROTOLUENE	96.7	--	102.5	100.0
	2,6-DINITROTOLUENE	96.7	--	105.0	100.0
	2-AMINO-4,6-DINITROTOLUENE	96.7	--	105.0	100.0
	2-NITROTOLUENE	91.7	--	102.5	97.5
EXP	3-NITROTOLUENE	91.7	--	100.0	95.0
	4-AMINO-2,6-DINITROTOLUENE	103.3	--	102.5	100.0
	4-NITROTOLUENE	95.0	--	102.5	100.0
	HMX	100.0	--	105.0	100.0
	NITROBENZENE	98.3	--	107.5	105.0
	RDX	101.7	--	102.5	100.0
	TETRYL	69.0	--	97.5	92.5
M	ALUMINUM	100.0	--	--	--
	ANTIMONY	94.6	--	84.5	--
	ARSENIC	97.1	--	92.2	--
	BARIUM	99.8	--	--	--
	BERYLLIUM	96.1	--	98.7	--
	CADMIUM	97.5	--	97.9	--
M	CALCIUM	98.0	--	85.1	--
	CHROMIUM	100.5	--	106.3	--
	COBALT	96.6	--	126.8	--
	COPPER	98.9	--	93.7	--
	IRON	98.6	--	--	--
	LEAD	96.9	--	147.0	--
	MAGNESIUM	97.5	--	92.9	--
	MANGANESE	95.5	--	--	--
	MERCURY	99.8	--	101.7	--
	NICKEL	98.2	--	104.8	--
	POTASSIUM	101.4	--	144.0	--
	SELENIUM	94.3	--	86.4	--
	SILVER	95.2	--	93.2	--
	SODIUM	98.0	--	96.1	--
	THALLIUM	98.1	--	97.1	--
	TIN	94.0	--	82.8	--
	TITANIUM	98.5	--	484.9	--
	VANADIUM	98.9	--	126.0	--
	ZINC	97.6	--	170.4	--

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
VOC	1,1,1,2-TETRACHLOROETHANE	98.6	--	90.5	92.1
	1,1,1-TRICHLOROETHANE	102.7	--	99.2	96.5
	1,1,2,2-TETRACHLOROETHANE	100.4	--	78.0	79.0
	1,1,2-TRICHLOROETHANE	94.7	--	80.7	83.3
	1,1-DICHLOROETHANE	102.0	--	99.3	95.7
	1,1-DICHLOROETHENE	96.9	--	87.8	87.6
	1,2,3-TRICHLOROPROPANE	84.7	--	68.3	68.2
	1,2-DIBROMO-3-CHLOROPROPA	105.4	--	64.0	68.5
	1,2-DIBROMOETHANE	97.7	--	77.2	79.7
	1,2-DICHLOROETHANE	97.0	--	81.6	82.3
	1,2-DICHLOROPROPANE	94.1	--	88.6	84.3
	1,4-DIOXANE	79.2	--	76.3	81.4
	2-BUTANONE	90.7	--	54.9	57.7
	2-HEXANONE	98.4	--	58.4	65.8
VOC	4-METHYL-2-PENTANONE	92.7	--	62.1	62.7
	ACETONE	99.7	--	68.1	60.5
	ACETONITRILE	78.5	--	69.6	70.1
	BENZENE	94.9	--	88.1	88.1
	BROMODICHLOROMETHANE	95.1	--	85.1	79.8
	BROMOFORM	103.1	--	80.2	83.8
	BROMOMETHANE	80.7	--	65.7	66.1
	CARBON DISULFIDE	95.7	--	82.2	89.8
	CARBON TETRACHLORIDE	102.7	--	97.2	90.6
	CHLOROBENZENE	97.1	--	86.4	89.1
	CHLORODIBROMOMETHANE	96.7	--	88.6	91.3
	CHLOROETHANE	111.7	--	87.4	80.3
	CHLOROFORM	99.7	--	98.7	93.1
	CHLOROMETHANE	86.6	--	83.9	81.9
	CIS-1,2-DICHLOROETHENE	97.4	--	95.8	92.5
	CIS-1,3-DICHLOROPROPENE	99.7	--	79.7	79.9
	DIBROMOMETHANE	99.4	--	85.4	80.4
	DICHLORODIFLUOROMETHANE	95.7	--	58.7	69.0
	ETHYLBENZENE	94.4	--	85.8	88.8
	ISOBUTANOL	83.6	--	62.8	63.8
	METHYLENE CHLORIDE	104.7	--	100.8	83.3
	PROPIONITRILE	85.5	--	66.9	68.4
	STYRENE	94.6	--	83.8	87.4
	TETRACHLOROETHENE	97.0	--	77.9	81.3
	TOLUENE	94.9	--	86.8	92.0
	TOTAL XYLENES	97.6	--	88.7	88.7
	TRANS-1,2-DICHLOROETHENE	95.7	--	89.8	88.0
	TRANS-1,3-DICHLOROPROPENE	101.6	--	77.7	83.8
	TRICHLOROETHENE	94.6	--	81.0	117.6

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	TRICHLOROFLUOROMETHANE	94.7	--	77.1	74.6
	VINYL CHLORIDE	97.3	--	90.9	90.9
PAH	2-METHYLNAPHTHALENE	63.2	--	58.1	68.2
	ACENAPHTHENE	65.6	--	62.2	67.7
	ACENAPHTHYLENE	65.6	--	62.2	65.8
	ANTHRACENE	63.2	--	69.5	68.2
	BENZO(A)ANTHRACENE	75.2	--	74.9	69.9
	BENZO(A)PYRENE	67.4	--	71.8	68.2
	BENZO(B)FLUORANTHENE	71.6	--	76.3	75.9
	BENZO(G,H,I)PERYLENE	63.2	--	64.9	66.4
	BENZO(K)FLUORANTHENE	63.2	--	74.2	74.6
	CHRYSENE	77.6	--	77.6	76.3
	DIBENZO(A,H)ANTHRACENE	63.2	--	74.9	68.5
	FLUORANTHENE	73.4	--	80.4	75.8
	FLUORENE	66.8	--	67.2	69.5
	INDENO(1,2,3-CD)PYRENE	65.6	--	66.3	67.6
	NAPHTHALENE	70.4	--	59.0	64.0
PEST/PCB	PHENANTHRENE	69.8	--	65.0	70.0
	PYRENE	82.5	--	76.3	85.4
	AROCLOR-1016	104.0	--	142.5	143.0
	AROCLOR-1260	108.0	--	110.5	109.5
Round 3					
M	ALUMINUM	109.2	--	188.8	--
	ANTIMONY	106.8	--	102.8	--
	ARSENIC	106.0	--	89.5	--
	BARIUM	108.6	--	123.0	--
	BERYLLIUM	101.6	--	98.6	--
	CADMIUM	105.6	--	98.9	--
	CALCIUM	107.1	--	88.7	--
	CHROMIUM	109.6	--	85.1	--
	COBALT	108.0	--	84.2	--
	COPPER	110.4	--	85.9	--
	IRON	103.9	--	114.6	--
	LEAD	108.6	--	60.2	--
	MAGNESIUM	108.2	--	90.6	--
	MANGANESE	109.8	--	185.0	--
	MERCURY	100.6	--	107.2	--
	NICKEL	111.0	--	93.3	--
	POTASSIUM	140.2	--	93.2	--
	SELENIUM	104.6	--	90.7	--
	SILVER	101.8	--	95.0	--
	SODIUM	108.9	--	90.9	--
	THALLIUM	106.2	--	102.5	--

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	TIN	109.0	--	99.9	--
	VANADIUM	107.0	--	92.8	--
	ZINC	115.2	--	-27.6	--
OV	1,1,1,2-TETRACHLOROETHANE	105.5	--	84.9	80.0
	1,1,1-TRICHLOROETHANE	103.2	--	95.4	88.3
	1,1,2,2-TETRACHLOROETHANE	106.3	--	81.9	82.9
	1,1,2-TRICHLOROETHANE	102.3	--	80.5	80.0
	1,1-DICHLOROETHANE	102.7	--	91.6	86.0
	1,1-DICHLOROETHENE	99.6	--	89.9	83.0
	1,2,3-TRICHLOROPROPANE	98.8	--	78.5	78.9
	1,2-DIBROMO-3-CHLOROPROPA	105.2	--	75.4	75.1
	1,2-DIBROMOETHANE	113.9	--	84.9	85.1
	1,2-DICHLOROETHANE	101.7	--	86.0	82.8
	1,2-DICHLOROPROPANE	97.6	--	82.8	79.0
	1,4-DIOXANE	97.7	--	84.0	95.0
	2-BUTANONE	108.7	--	80.8	82.0
	2-HEXANONE	110.9	--	76.9	73.6
	4-METHYL-2-PENTANONE	104.3	--	80.6	78.1
	ACETONE	117.9	--	87.5	110.4
	ACETONITRILE	86.9	--	80.4	78.7
	BENZENE	96.2	--	84.3	78.3
	BROMODICHLOROMETHANE	89.2	--	75.4	72.0
	BROMOFORM	114.0	--	85.1	84.5
	BROMOMETHANE	82.4	--	85.5	79.8
	CARBON DISULFIDE	110.5	--	91.5	84.1
	CARBON TETRACHLORIDE	103.9	--	93.3	85.6
	CHLOROBENZENE	103.9	--	80.8	75.8
	CHLORODIBROMOMETHANE	107.6	--	83.0	80.9
	CHLOROETHANE	91.1	--	89.4	87.6
	CHLOROFORM	101.2	--	90.5	81.8
	CHLOROMETHANE	89.5	--	87.3	83.0
	CIS-1,2-DICHLOROETHENE	97.3	--	84.0	79.0
	CIS-1,3-DICHLOROPROPENE	101.6	--	78.5	72.8
	DIBROMOMETHANE	104.7	--	85.1	84.9
	DICHLORODIFLUOROMETHANE	105.6	--	108.1	97.1
	ETHYLBENZENE	104.2	--	84.0	77.1
	ISOBUTANOL	89.7	--	81.7	83.0
	METHYLENE CHLORIDE	95.5	--	79.8	78.0
	PROPIONITRILE	91.5	--	78.4	78.6
	STYRENE	107.1	--	77.4	72.5
	TETRACHLOROETHENE	94.9	--	78.6	70.4
	TOLUENE	102.4	--	84.0	77.6
	TOTAL XYLENES	107.0	--	83.5	77.3

TABLE H- 8

SOLID MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	TRANS-1,2-DICHLOROETHENE	98.2	--	85.5	80.6
	TRANS-1,3-DICHLOROPROPENE	103.9	--	78.0	73.1
	TRICHLOROETHENE	97.6	--	88.0	82.6
	TRICHLOROFLUOROMETHANE	92.3	--	89.9	82.1
	VINYL CHLORIDE	98.0	--	95.5	88.0
PEST/PCB	AROCLOR-1016	100.0	--	163.3	155.3
	AROCLOR-1260	102.0	--	127.7	129.7

DIOX - Dioxins and furans
EXP - Energetics
HERB - Herbicides
LCS - Laboratory control sample
LCSD - Laboratory control sample duplicate
M - Metals
MS - Matrix spike
MSD - Matrix spike duplicate
PEST/PCB - Pesticides and polychlorinated biphenyls
RPD - Relative percent difference (See QAPP for calculation method)
SVOC- Semivolatile organic compound
VOC - Volatile organic compound
WET - Wet chemistry parameters
NA - Not applicable

1 Percent recovery information was not available for chemical parameters.
2 RFI Round 1 through 3 RBTL is th e lowest of all risk-based target levels listed in the QAPP. Composting
RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference).

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
Composting Operation[1]					
NA	NA	NA	NA	NA	NA
Round 1					
DIOX	1,2,3,4,6,7,8,9-OCDD	108.0	111.0	--	--
	1,2,3,4,6,7,8,9-OCDF	104.5	110.5	--	--
	1,2,3,4,6,7,8-HpCDD	92.9	100.7	--	--
	1,2,3,4,6,7,8-HpCDF	94.8	104.7	--	--
	1,2,3,4,7,8,9-HpCDF	103.1	97.0	--	--
	1,2,3,4,7,8-HxCDD	98.9	107.5	--	--
	1,2,3,4,7,8-HxCDF	94.9	107.0	--	--
	1,2,3,6,7,8-HxCDD	93.7	102.0	--	--
	1,2,3,6,7,8-HxCDF	102.0	106.5	--	--
	1,2,3,7,8,9-HxCDD	97.0	100.2	--	--
	1,2,3,7,8,9-HxCDF	94.6	103.2	--	--
	1,2,3,7,8-PeCDD	99.6	103.0	--	--
	1,2,3,7,8-PeCDF	89.6	96.2	--	--
	2,3,4,6,7,8-HxCDF	96.7	98.0	--	--
	2,3,4,7,8-PeCDF	111.0	123.0	--	--
	2,3,7,8-TCDD	102.2	107.5	--	--
	2,3,7,8-TCDF	94.1	98.4	--	--
EXP	1,3,5-TRINITROBENZENE	91.1	--	89.7	90.7
	1,3-DINITROBENZENE	92.7	--	90.7	91.3
	2,4,6-TRINITROTOLUENE	97.1	--	94.7	95.0
	2,4-DINITROTOLUENE	93.4	--	90.0	90.7
	2,6-DINITROTOLUENE	95.9	--	92.7	93.3
	2-AMINO-4,6-DINITROTOLUENE	94.1	--	92.0	92.7
	2-NITROTOLUENE	95.3	--	92.7	92.3
	3-NITROTOLUENE	94.6	--	92.0	92.0
	4-AMINO-2,6-DINITROTOLUENE	93.3	--	91.0	91.7
	4-NITROTOLUENE	94.9	--	92.7	92.7
	HMX	92.7	--	77.3	75.0
	NITROBENZENE	93.6	--	91.7	90.7
	PICRAMIC ACID	72.4	--	73.5	86.0
	PICRIC ACID	129.6	--	108.0	110.5
	RDX	88.4	--	59.7	58.7
	TETRYL	84.6	--	82.7	83.3
HERB	HEXACHLOROPHENE	42.0	--	30.6	32.2
	PENTACHLOROPHENOL	57.7	--	45.0	46.8
M	ALUMINUM	93.3	--	98.5	--
	ANTIMONY	96.3	--	97.5	--
	ARSENIC	94.6	--	96.7	--
	BARIUM	97.2	--	98.8	--
	BERYLLIUM	94.4	--	99.4	--
	CADMIUM	95.2	--	95.1	--
M	CALCIUM	93.2	--	99.3	--
	CHROMIUM	95.3	--	97.3	--

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	COBALT	96.1	--	96.5	--
	COPPER	97.9	--	96.7	--
	IRON	98.9	--	97.7	--
	LEAD	93.4	--	94.0	--
	LITHIUM	94.6	--	97.8	--
	MAGNESIUM	96.0	--	97.2	--
	MANGANESE	97.2	--	102.2	--
	MERCURY	100.5	--	101.4	--
	NICKEL	97.6	--	97.0	--
	POTASSIUM	93.1	--	93.0	--
	SELENIUM	99.1	--	98.9	--
	SILVER	96.8	--	93.5	--
	SODIUM	94.3	--	98.3	--
	STRONTIUM	95.0	--	97.8	--
	THALLIUM	92.7	--	93.6	--
	TIN	96.4	--	96.6	--
	TITANIUM	94.8	--	95.8	--
	VANADIUM	94.1	--	96.8	--
	ZINC	94.8	--	115.7	--
SVOC	1,2,4-TRICHLOROBENZENE	60.8	--	49.0	45.0
	1,2-DICHLOROBENZENE	55.8	--	47.3	43.3
	1,3-DICHLOROBENZENE	53.5	--	45.0	41.0
	1,4-DICHLOROBENZENE	54.9	--	47.0	43.0
	2,4,5-TRICHLOROPHENOL	79.0	--	65.0	65.3
	2,4,6-TRICHLOROPHENOL	64.8	--	51.0	46.7
	2,4-DICHLOROPHENOL	80.0	--	63.7	65.0
	2,4-DIMETHYLPHENOL	88.0	--	86.0	89.3
	2,4-DINITROPHENOL	26.3	--	19.0	16.3
	2-CHLORONAPHTHALENE	70.9	--	59.7	60.3
	2-CHLOROPHENOL	67.5	--	63.7	62.3
	2-METHYLNAPHTHALENE	63.2	--	46.0	47.0
	2-METHYLPHENOL	86.0	--	84.3	86.0
	2-NITROANILINE	95.0	--	89.7	93.3
	2-NITROPHENOL	78.0	--	64.0	47.7
	3,3'-DICHLOROBENZIDINE	63.5	--	67.3	72.3
	3,4-METHYLPHENOL	87.0	--	81.0	86.3
	3-NITROANILINE	91.5	--	91.3	93.0
	4,6-DINITRO-2-METHYLPHENOL	44.8	--	30.3	21.7
	4-BROMOPHENYL-PHENYLETHER	95.5	--	89.7	91.3
	4-CHLORO-3-METHYLPHENOL	83.0	--	72.7	86.0
	4-CHLOROANILINE	83.5	--	96.3	100.3

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
SVOC	4-CHLOROPHENYL-PHENYLETHER	96.0	--	86.0	84.3
	4-NITROANILINE	89.5	--	79.3	82.7
	4-NITROPHENOL	43.4	--	37.0	26.3
	ACENAPHTHENE	69.8	--	58.0	58.0
	ACENAPHTHYLENE	71.2	--	59.5	59.0
	ANTHRACENE	66.4	--	64.0	63.0
	BENZO[A]ANTHRACENE	80.8	--	81.0	79.5
	BENZO[A]PYRENE	72.7	--	72.5	73.5
	BENZO[B]FLUORANTHENE	87.4	--	92.0	87.5
	BENZO[G,H,I]PERYLENE	76.9	--	54.0	57.5
	BENZO[K]FLUORANTHENE	82.2	--	78.5	83.5
	BENZYL ALCOHOL	90.5	--	89.7	95.0
	BIS(2-CHLOROETHOXY)METHANE	74.5	--	72.7	70.7
	BIS(2-CHLOROETHYL)ETHER	81.0	--	72.7	74.3
	BIS(2-CHLOROISOPROPYL)ETHER	90.5	--	93.3	93.0
	BIS(2-ETHYLHEXYL)PHTHALATE	111.5	--	107.3	100.0
	BUTYLBENZYLPHTHALATE	85.0	--	88.0	89.7
	CHRYSENE	89.0	--	83.0	86.5
	DIBENZO[A,H]ANTHRACENE	74.3	--	57.0	57.5
	DIBENZOFURAN	97.5	--	87.7	87.7
	DIETHYLPHTHALATE	97.0	--	89.7	89.7
	DIMETHYLPHTHALATE	96.5	--	88.0	89.7
	DI-N-BUTYLPHTHALATE	91.0	--	88.0	89.7
	DI-N-OCTYLPHTHALATE	89.5	--	95.0	96.3
	DIPHENYLAMINE	80.5	--	72.3	75.7
	FLUORANTHENE	82.4	--	83.0	82.5
	FLUORENE	72.8	--	64.0	66.5
	HEXACHLOROBENZENE	94.5	--	86.0	87.7
	HEXACHLOROBUTADIENE	56.8	--	45.3	39.0
	HEXACHLOROCYCLOPENTADIENE	6.4	--	4.7	9.0
	HEXACHLOROETHANE	46.8	--	40.0	35.7
	INDENO[1,2,3-CD]PYRENE	79.0	--	60.0	61.5
	ISOPHORONE	79.5	--	96.3	96.3
	NAPHTHALENE	58.2	--	43.0	43.5
	N-NITROSODIMETHYLAMINE	74.0	--	71.0	72.7
	N-NITROSO-DI-N-PROPYLAMINE	90.0	--	84.7	91.7
	PHENANTHRENE	80.8	--	77.5	76.0
	PHENOL	68.5	--	64.0	67.3
	PYRENE	91.6	--	87.5	87.5
VOC	1,1,1-TRICHLOROETHANE	--	--	100.0	100.0
	1,1,2,2-TETRACHLOROETHANE	--	--	90.0	93.0
	1,1,2-TRICHLOROETHANE	--	--	88.0	83.0
	1,1-DICHLOROETHANE	--	--	97.0	97.0
	1,1-DICHLOROETHENE	102.8	--	95.0	99.0
	1,2-DICHLOROETHANE	--	--	93.0	93.0
	1,2-DICHLOROPROPANE	--	--	98.0	97.0

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
VOC	1,4-DIOXANE	87.2	--	88.0	88.0
	2-BUTANONE	--	--	120.0	120.0
	2-HEXANONE	--	--	110.0	100.0
	4-METHYL-2-PENTANONE	--	--	110.0	110.0
	ACETONE	--	--	95.0	94.0
	ACETONITRILE	88.2	--	90.0	86.0
	BENZENE	103.2	--	97.0	98.0
	BROMODICHLOROMETHANE	--	--	96.0	96.0
	BROMOFORM	--	--	97.0	91.0
	BROMOMETHANE	--	--	53.0	52.0
	CARBON DISULFIDE	--	--	120.0	120.0
	CARBON TETRACHLORIDE	--	--	110.0	110.0
	CHLOROBENZENE	96.2	--	96.0	91.0
	CHLOROETHANE	--	--	79.0	77.0
	CHLOROFORM	--	--	99.0	99.0
	CHLOROMETHANE	--	--	51.0	50.0
	CIS-1,2-DICHLOROETHENE	--	--	99.0	100.0
	CIS-1,3-DICHLOROPROPENE	--	--	94.0	93.0
	DIBROMOCHLOROMETHANE	--	--	93.0	95.0
	ETHYLBENZENE	--	--	98.0	95.0
	ISOBUTYL ALCOHOL	98.3	--	98.0	89.0
	METHYLENE CHLORIDE	--	--	92.0	98.0
	PROPIONITRILE	99.5	--	94.0	90.0
	STYRENE	--	--	92.0	93.0
	TETRACHLOROETHENE	--	--	100.0	95.0
	TOLUENE	92.0	--	90.0	88.0
	TRANS-1,2-DICHLOROETHENE	--	--	94.0	96.0
	TRANS-1,3-DICHLOROPROPENE	--	--	82.0	76.0
	TRICHLOROETHENE	98.2	--	97.0	96.0
	VINYL CHLORIDE	--	--	60.0	59.0
PCB	AROCLOR-1016	90.0	--	--	--
	AROCLOR-1260	87.0	--	--	--
MISC	AMMONIA AS N (EPA 350.1)	103.8	--	89.8	89.3
	NITRATE/NITRITE (EPA 353.2)	104.7	--	99.5	97.5
Round 2					
EXP	1,3,5-TRINITROBENZENE	96.6	--	95.4	88.3
	1,3-DINITROBENZENE	97.0	--	94.4	87.3
	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUEN	--	--	58.8	64.6
	2,4,6-TRINITROTOLUENE	96.6	--	87.1	73.3
	2,4-DIAMINO-6-NITROTOLUENE	118.3	--	120.3	141.5
	2,4-DINITROTOLUENE	87.4	--	85.7	80.0
	2,6-DIAMINO-4-NITROTOLUENE	107.2	--	96.7	104.9
	2,6-DINITROTOLUENE	90.3	--	86.8	80.4
	2-AMINO-4,6-DINITROTOLUENE	97.0	--	102.9	94.5
	2-NITROTOLUENE	82.3	--	78.5	74.4
	3,5-DINITROANILINE	--	--	112.1	96.8

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
EXP	3-NITROTOLUENE	79.9	--	76.0	71.0
	4-AMINO-2,6-DINITROTOLUENE	99.0	--	107.7	94.4
	4-NITROTOLUENE	83.2	--	80.6	75.8
	DNX	--	--	87.1	89.4
	HMX	94.6	--	96.8	77.6
	MNX	--	--	108.2	112.8
	NITROBENZENE	93.8	--	92.1	86.3
	RDX	102.9	--	157.7	81.7
	TETRYL	91.2	--	90.3	83.3
	TNX	--	--	92.7	105.0
M	ALUMINUM	100.5	--	104.9	--
	ANTIMONY	96.4	--	98.6	--
	ARSENIC	97.9	--	100.4	--
	BARIUM	97.3	--	120.8	--
	BERYLLIUM	96.0	--	97.1	--
	CADMIUM	96.6	--	97.0	--
	CALCIUM	100.2	--	97.2	--
	CHROMIUM	100.3	--	100.7	--
	COBALT	96.8	--	94.4	--
	COPPER	98.6	--	96.2	--
	IRON	99.6	--	100.5	--
	LEAD	96.4	--	95.3	--
	MAGNESIUM	99.1	--	111.5	--
	MANGANESE	99.0	--	101.2	--
	MERCURY	97.1	--	103.6	--
	NICKEL	98.2	--	97.2	--
	POTASSIUM	102.9	--	104.5	--
	SELENIUM	99.1	--	104.2	--
	SILVER	91.2	--	88.9	--
	SODIUM	98.5	--	128.5	--
	THALLIUM	98.4	--	96.8	--
	TIN	96.8	--	96.2	--
	TITANIUM	98.8	--	100.3	--
	VANADIUM	98.9	--	101.0	--
	ZINC	96.9	--	100.5	--
MF	ALUMINUM	--	--	74.3	--
	ANTIMONY	--	--	73.4	--
	ARSENIC	--	--	74.0	--
	BARIUM	--	--	74.2	--
	BERYLLIUM	--	--	71.6	--
	CADMIUM	--	--	72.4	--
	CALCIUM	--	--	97.7	--
	CHROMIUM	--	--	74.3	--
	COBALT	--	--	70.7	--
	COPPER	--	--	72.6	--
	IRON	--	--	71.7	--

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	LEAD	--	--	74.2	--
	MAGNESIUM	--	--	71.4	--
	MANGANESE	--	--	56.8	--
	NICKEL	--	--	71.4	--
	POTASSIUM	--	--	76.4	--
	SELENIUM	--	--	73.3	--
	SILVER	--	--	66.9	--
	SODIUM	--	--	97.4	--
	THALLIUM	--	--	73.9	--
	TIN	--	--	73.4	--
	TITANIUM	--	--	74.3	--
	VANADIUM	--	--	74.4	--
	ZINC	--	--	70.7	--
MISC	AMMONIA-N	105.1	--	64.3	70.8
	CHLORIDE	98.9	--	96.8	97.6
	NITRITE/NITRATE-N	101.5	--	88.0	86.7
	SULFATE	100.5	--	95.4	94.2
	TOTAL ORGANIC CARBON	100.7	--	84.3	86.3
VOC	1,1,1,2-TETRACHLOROETHANE	95.1	--	103.0	97.5
	1,1,1-TRICHLOROETHANE	105.4	--	117.0	110.0
	1,1,2,2-TETRACHLOROETHANE	91.4	--	85.5	83.0
	1,1,2-TRICHLOROETHANE	95.4	--	93.8	93.1
	1,1-DICHLOROETHANE	105.9	--	109.0	106.8
	1,1-DICHLOROETHENE	103.9	--	110.0	108.5
	1,2,3-TRICHLOROPROPANE	85.4	--	74.8	74.8
	1,2-DIBROMO-3-CHLOROPROPANE	106.4	--	84.4	87.3
	1,2-DIBROMOETHANE	95.5	--	94.5	90.2
	1,2-DICHLOROETHANE	97.3	--	101.0	98.8
	1,2-DICHLOROPROPANE	98.4	--	99.0	98.2
	1,4-DIOXANE	88.0	--	90.0	93.7
	2-BUTANONE	98.4	--	80.3	87.1
	2-HEXANONE	106.1	--	78.4	79.9
	4-METHYL-2-PENTANONE	99.8	--	85.7	86.0
	ACETONE	104.3	--	77.0	76.8
	ACETONITRILE	87.0	--	86.3	87.0
	BENZENE	98.1	--	103.8	99.0
	BROMODICHLOROMETHANE	94.5	--	97.2	96.6
	BROMOFORM	102.8	--	99.5	99.3
	BROMOMETHANE	76.1	--	68.3	75.4
	CARBON DISULFIDE	94.2	--	121.0	115.0
	CARBON TETRACHLORIDE	103.9	--	116.0	107.3
	CHLOROBENZENE	97.2	--	98.0	102.0
	CHLORODIBROMOMETHANE	99.5	--	105.0	95.9
	CHLOROETHANE	96.9	--	98.4	98.0
	CHLOROFORM	102.4	--	108.6	106.0
	CHLOROMETHANE	92.8	--	87.3	87.0

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
VOC	CIS-1,2-DICHLOROETHENE	102.1	--	106.5	105.7
	CIS-1,3-DICHLOROPROPENE	101.4	--	97.0	96.3
	DIBROMOMETHANE	102.3	--	104.7	102.7
	DICHLORODIFLUOROMETHANE	84.5	--	89.8	86.9
	ETHYLBENZENE	95.8	--	102.0	96.0
	ISOBUTANOL	93.9	--	92.7	94.7
	METHYLENE CHLORIDE	106.8	--	110.8	104.6
	PROPIONITRILE	90.7	--	92.0	95.3
	STYRENE	97.6	--	104.0	98.0
	TETRACHLOROETHENE	96.9	--	102.0	102.0
	TOLUENE	96.1	--	103.0	98.0
	TOTAL XYLENES	98.6	--	100.0	96.5
	TRANS-1,2-DICHLOROETHENE	99.8	--	106.3	103.3
	TRANS-1,3-DICHLOROPROPENE	97.8	--	89.3	91.3
	TRICHLOROETHENE	98.7	--	103.8	101.0
	TRICHLOROFLUOROMETHANE	103.5	--	118.0	117.0
	VINYL CHLORIDE	96.7	--	98.3	96.3
OVG	ETHANE	100.0	100.3	--	--
	ETHENE	100.0	101.0	--	--
	METHANE	100.5	101.0	--	--
PAH	2-METHYLNAPHTHALENE	54.0	--	56.6	62.4
	ACENAPHTHENE	65.0	--	59.1	62.4
	ACENAPHTHYLENE	64.0	--	62.4	73.3
	ANTHRACENE	55.9	--	38.3	34.1
	BENZO(A)ANTHRACENE	78.2	--	83.3	69.9
	BENZO(A)PYRENE	45.0	--	74.1	55.0
	BENZO(B)FLUORANTHENE	81.8	--	99.1	73.3
	BENZO(G,H,I)PERYLENE	73.2	--	75.8	56.6
	BENZO(K)FLUORANTHENE	83.5	--	83.3	69.1
	CHRYSENE	84.0	--	100.8	82.4
	DIBENZO(A,H)ANTHRACENE	73.2	--	60.0	50.0
	FLUORANTHENE	78.2	--	154.1	123.3
	FLUORENE	73.2	--	71.6	80.8
	INDENO(1,2,3-CD)PYRENE	75.9	--	77.4	57.4
	NAPHTHALENE	58.1	--	62.4	71.6
	PHENANTHRENE	76.8	--	109.0	97.4
	PYRENE	80.0	--	129.1	94.9
PCB	AROCLOR-1016	93.9	--	--	--
	AROCLOR-1260	108.0	--	--	--
Round 3					
EXP	1,3,5-TRINITROBENZENE	99.7	--	95.6	96.0
	1,3-DINITROBENZENE	101.9	--	96.1	96.9
	2,4,6-TRINITROTOLUENE	96.8	--	90.4	91.3
	2,4-DIAMINO-6-NITROTOLUENE	104.7	--	107.0	109.0
	2,4-DINITROTOLUENE	93.1	--	86.7	87.4
	2,6-DIAMINO-4-NITROTOLUENE	123.7	--	112.0	102.0

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	2,6-DINITROTOLUENE	98.2	--	91.4	92.4
	2-AMINO-4,6-DINITROTOLUENE	91.9	--	88.3	89.3
	2-NITROTOLUENE	86.8	--	79.7	79.9
	3,5-DINITROANILINE	101.7	--	111.0	111.0
	3-NITROTOLUENE	85.8	--	77.7	77.3
	4,4'-TN-AZOXY	38.7	--	31.0	30.0
	4-AMINO-2,6-DINITROTOLUENE	102.2	--	99.0	99.9
	4-NITROTOLUENE	90.8	--	83.6	83.7
	DNX	82.3	--	84.0	83.0
	HMX	99.9	--	101.3	99.4
	MNX	93.7	--	93.0	97.0
	NITROBENZENE	99.0	--	92.4	92.8
	RDX	105.3	--	112.0	101.0
	TETRYL	69.9	--	76.6	77.9
	TNX	68.3	--	67.0	73.0
M	ALUMINUM	105.1	--	101.7	--
	ANTIMONY	98.0	--	94.9	--
	ARSENIC	96.2	--	99.6	--
	BARIUM	104.5	--	107.0	--
	BERYLLIUM	101.5	--	107.4	--
	CADMIUM	97.4	--	99.3	--
	CALCIUM	103.5	--	53.6	--
	CHROMIUM	102.2	--	102.5	--
	COBALT	103.6	--	107.0	--
	COPPER	105.1	--	108.8	--
	IRON	104.0	--	105.5	--
	LEAD	102.4	--	101.2	--
	MAGNESIUM	105.2	--	97.7	--
	MANGANESE	100.0	--	91.8	--
	MERCURY	99.2	--	99.0	--
	NICKEL	108.8	--	107.2	--
	POTASSIUM	103.7	--	99.6	--
	SELENIUM	90.8	--	93.2	--
	SILVER	99.9	--	101.6	--
	SODIUM	108.8	--	76.7	--
	THALLIUM	101.1	--	112.6	--
	TIN	103.7	--	96.7	--
	VANADIUM	102.9	--	104.8	--
	ZINC	96.5	--	93.0	--
MF	ALUMINUM	--	--	97.4	--
	ANTIMONY	--	--	103.4	--
	ARSENIC	--	--	95.5	--
	BARIUM	--	--	94.3	--
	BERYLLIUM	--	--	105.2	--
	CADMIUM	--	--	93.9	--
	CALCIUM	--	--	101.5	--

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	CHROMIUM	--	--	104.1	--
	COBALT	--	--	107.6	--
	COPPER	--	--	111.9	--
	IRON	--	--	105.5	--
	LEAD	--	--	104.1	--
	MAGNESIUM	--	--	105.2	--
	MANGANESE	--	--	103.1	--
	MERCURY	--	--	104.0	--
	NICKEL	--	--	101.5	--
	POTASSIUM	--	--	96.6	--
	SELENIUM	--	--	90.1	--
	SILVER	--	--	97.8	--
	SODIUM	--	--	124.9	--
	THALLIUM	--	--	111.2	--
	TIN	--	--	108.9	--
	VANADIUM	--	--	105.0	--
	ZINC	--	--	99.0	--
MISC	NITRITE/NITRATE-N	99.0	--	90.7	91.0
OV	1,1,1,2-TETRACHLOROETHANE	93.7	--	99.8	99.3
	1,1,1-TRICHLOROETHANE	103.1	--	110.8	109.8
	1,1,2,2-TETRACHLOROETHANE	95.3	--	103.3	102.5
	1,1,2-TRICHLOROETHANE	90.7	--	94.5	94.5
	1,1-DICHLOROETHANE	97.6	--	104.5	103.5
	1,1-DICHLOROETHENE	96.8	--	102.8	103.0
	1,2,3-TRICHLOROPROPANE	92.4	--	97.3	97.3
	1,2-DIBROMO-3-CHLOROPROPANE	102.4	--	98.0	101.0
	1,2-DIBROMOETHANE	95.6	--	100.3	99.3
	1,2-DICHLOROETHANE	95.1	--	106.5	104.0
	1,2-DICHLOROPROPANE	92.8	--	97.8	96.5
	1,4-DIOXANE	94.4	--	101.3	104.7
	2-BUTANONE	89.1	--	93.3	101.3
	2-HEXANONE	92.1	--	94.5	103.8
	4-METHYL-2-PENTANONE	88.9	--	94.0	103.0
	ACETONE	101.6	--	113.3	127.5
	ACETONITRILE	94.2	--	94.0	92.3
	BENZENE	91.9	--	97.5	96.3
	BROMODICHLOROMETHANE	86.5	--	92.8	91.8
	BROMOFORM	103.2	--	104.8	104.3
	BROMOMETHANE	109.5	--	113.8	105.8
	CARBON DISULFIDE	87.3	--	101.3	97.5
	CARBON TETRACHLORIDE	102.0	--	110.8	110.0
	CHLOROBENZENE	92.8	--	97.8	97.5
	CHLORODIBROMOMETHANE	98.7	--	103.0	101.8
	CHLOROETHANE	100.1	--	104.8	102.0
	CHLOROFORM	96.5	--	105.3	96.8
	CHLOROMETHANE	97.5	--	99.3	99.0

TABLE H- 9

AQUEOUS MATRIX MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	CIS-1,2-DICHLOROETHENE	93.1	--	97.0	91.5
	CIS-1,3-DICHLOROPROPENE	98.7	--	97.8	100.5
	DIBROMOMETHANE	100.4	--	106.8	106.0
	DICHLORODIFLUOROMETHANE	120.1	--	119.5	102.0
	ETHYLBENZENE	93.7	--	98.5	98.5
	ISOBUTANOL	96.7	--	97.4	97.3
	METHYLENE CHLORIDE	96.1	--	103.3	100.8
	PROPIONITRILE	96.8	--	98.0	95.1
	STYRENE	95.5	--	101.3	99.5
	TETRACHLOROETHENE	89.1	--	88.5	89.0
	TOLUENE	90.7	--	96.0	95.5
	TOTAL XYLENES	96.8	--	101.0	101.5
	TRANS-1,2-DICHLOROETHENE	93.7	--	97.8	96.8
	TRANS-1,3-DICHLOROPROPENE	95.5	--	94.5	93.5
	TRICHLOROETHENE	93.7	--	98.8	95.5
	TRICHLOROFLUOROMETHANE	104.1	--	111.8	108.3
	VINYL CHLORIDE	101.7	--	104.0	99.0
PEST/PCB	AROCLOR-1016	95.0	--	--	--
	AROCLOR-1260	104.0	--	--	--

1 Percent recovery information was not available for chemical parameters.

DIOX - Dioxins and furans
EXP - Energetics
HERB - Herbicides
LCS - Laboratory control sample
LCSD - Laboratory control sample duplicate
M - Metals
MISC - Miscellaneous parameters
MF - Metals filtered
MS - Matrix spike
MSD - Matrix spike duplicate
OVG - Organic Gases
PCB - Polychlorinated biphenyls
PEST/PCB - Pesticides and polychlorinated biphenyls
RPD - Relative percent difference (See QAPP for calculation method)
SVOC - Semivolatile organic compound
VOC - Volatile organic compound
NA - Not applicable

TABLE H-10

RELATIVE PERCENT DIFFERENCES EXCEEDING REFERENCE POINTS FOR LCSs AND MSs
ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B-146) (1)
NSWC CRANE
CRANE, INDIANA

Round and Matrix	Analyte Type	Analyte	Sample	MS/MSD RPD > 50%
Round 1 Soil and Sediment				
DIOX	TRG	2,3,7,8-TCDF	13SB040204	103.9
SVOC	TRG	2,4-DIMETHYLPHENOL	16SS0260002	77.4
	TRG	2-METHYLPHENOL	16SS0260002	52.8
	TRG	3,3'-DICHLOROBENZIDINE	13SS040002	200.0
	TRG	3,4-METHYLPHENOL	16SS0260002	56.1
	TRG	3-NITROANILINE	13SS040002	82.8
	TRG	4-CHLOROANILINE	13SS040002	80.0
	TRG	4-CHLOROANILINE	16SS0260002	54.2
	TRG	4-NITROANILINE	13SS040002	76.2
	TRG	HEXACHLOROCYCLOPENTADIENE	16SS0260002	95.1
	TRG	HEXACHLOROETHANE	16SS0260002	52.8
	TRG	ACENAPHTHENE	13SD050004	66.7
	TRG	ANTHRACENE	13SD050004	200.0
	TRG	BENZO[A]ANTHRACENE	13SD050004	200.0
	TRG	BENZO[A]PYRENE	13SD050004	200.0
	TRG	BENZO[B]FLUORANTHENE	13SD050004	200.0
	TRG	BENZO[B]FLUORANTHENE	16SD060004	50.3
	TRG	BENZO[G,H,I]PERYLENE	13SD050004	200.0
	TRG	BENZO[K]FLUORANTHENE	13SD050004	200.0
	TRG	CHRYSENE	13SD050004	200.0
	TRG	DIBENZO[A,H]ANTHRACENE	13SD050004	62.7
	TRG	FLUORANTHENE	13SD050004	200.0
	TRG	INDENO[1,2,3-CD]PYRENE	13SD050004	200.0
	TRG	PHENANTHRENE	13SD050004	200.0
	TRG	PYRENE	13SD050004	200.0
	Analyte Type	**Analyte**	**Sample**	**MS/MSD RPD > 30%**
Round 1 Aqueous Sampes				
SVOC	SUR	2,4,6-TRIBROMOPHENOL	16GW0501	51.7
	TRG	2,4,5-TRICHLOROPHENOL	16GW0501	81.3
	TRG	2,4,6-TRICHLOROPHENOL	16SW0201	40.0
	TRG	2,4,6-TRICHLOROPHENOL	16GW0501	52.4
	TRG	2,4-DICHLOROPHENOL	16GW0501	68.9
	TRG	2,4-DINITROPHENOL	16SW0201	200.0
	TRG	2,4-DINITROPHENOL	16GW0501	200.0
	TRG	2-CHLOROPHENOL	16GW0501	35.3
	TRG	2-NITROPHENOL	16SW0201	94.6
	TRG	2-NITROPHENOL	16GW0501	114.8
	TRG	4,6-DINITRO-2-METHYLPHENOL	16SW0201	200.0
	TRG	4,6-DINITRO-2-METHYLPHENOL	16GW0501	200.0
	TRG	4-CHLORO-3-METHYLPHENOL	16GW0501	51.9

TABLE H-10

RELATIVE PERCENT DIFFERENCES EXCEEDING REFERENCE POINTS FOR LCSs AND MSs
ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B-146) (1)
NSWC CRANE
CRANE, INDIANA

Round and Matrix	Analyte Type	Analyte	Sample	MS/MSD RPD > 50%
	TRG	4-NITROPHENOL	16SW0201	134.5
	TRG	4-NITROPHENOL	16GW0501	133.3
	TRG	HEXACHLOROCYCLOPENTADIENE	16GW0501	63.4
	TRG	PHENOL	16GW0501	33.3
	Analyte Type	**Analyte**	**Sample**	**MS/MSD RPD > 50%**
Round 2 Soil Samples				
VOC	TRG	DICHLORODIFLUOROMETHANE	16SB0480203	200.0

	Analyte Type	Analyte	Sample	MS/MSD RPD > 30%
Round 2 Aqueous Samples				
Explosives	TRG	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	13GWT3601	36.4
	TRG	2,4-DIAMINO-6-NITROTOLUENE	13GWT3601	36.6
	TRG	2,4-DIAMINO-6-NITROTOLUENE	13SW1302	39.5
	TRG	2,6-DIAMINO-4-NITROTOLUENE	13GWT3601	33.8
	TRG	2,6-DINITROTOLUENE	13GWT2102	31.4
	TRG	2-AMINO-4,6-DINITROTOLUENE	13SW1302	38.5
	TRG	3,5-DINITROANILINE	13GWT3601	33.6
	TRG	3,5-DINITROANILINE	13SW1302	179.5
	TRG	4-AMINO-2,6-DINITROTOLUENE	13SW1302	53.6
	TRG	4-NITROTOLUENE	13GWT2102	141.9
	TRG	MNX	13GWT0102	64.0
	TRG	MNX	13GWT2102	45.9
	TRG	MNX	13GWT3601	37.8
	TRG	MNX	13SW1302	33.7
	TRG	TNX	13GWT3601	40.0
	TRG	TNX	13SW1302	34.4
Miscellaneous	TRG	AMMONIA-N	13GWT0102	48.0
	TRG	AMMONIA-N	13SW1102	34.1
	TRG	AMMONIA-N	13SW1302	47.0
SVOC	TRG	PYRENE	13SW3201	30.5

Round 3 Soil Samples	Analyte Type	Analyte	Sample	MS/MSD RPD > 50%
VOC	TRG	1,4-DIOXANE	16SB0950406	58.0
VOC	TRG	2-HEXANONE	16SD3001	70.0
VOC	TRG	ACETONE	16SB0670206	57.0
VOC	TRG	ACETONE	16SD3001	80.0
VOC	TRG	CHLOROETHANE	16SB0950406DL	56.0
VOC	TRG	CIS-1,3-DICHLOROPROPENE	16SD3001	58.0

TABLE H-10

RELATIVE PERCENT DIFFERENCES EXCEEDING REFERENCE POINTS FOR LCSs AND MSs
ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B-146) (1)
NSWC CRANE
CRANE, INDIANA

Round and Matrix	Analyte Type	Analyte	Sample	MS/MSD RPD > 50%
Round 3 Aqueous Samples	**Analyte Type**	**Analyte**	**Sample**	**MS/MSD RPD > 30%**
EXP	TRG	RDX	16GWT1002	48.0

DIOX = Dioxins and furans
HERB = Herbicide
LCS = Laboratory Control Sample
MS = Matrix spike
MSD = Matrix spike duplicate
RPD = Relative percent difference (See QAPP for calculation method)
SUR = Surrogates
SVOC = Semivoatile organic compound
TRG = Target compounds
VOC = Volatile organic compound

1 Inorganic and organic parameter precision for LCS/LCSD and MS/MSD pairs that exceed reference points.
The reference points are: 30% (aqueous matrix) and 50% (solid matrix). A limited number of LCS/LCSD pairs exceed the reference points for the Composting Operation only; see Section 3.3.4 of text for tallies.
All field QC blanks are omitted from this tally.
All Soil and Water LCS RPDs were less than 50%.

TABLE H-11

RPDs EXCEEDING REFERENCE POINTS FOR LAB AND FIELD DUPLICATES
ROUNDS 1, 2, AND 3
SWMU 13- (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B-146) (1)
NSWC CRANE
CRANE, INDIANA

			SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%	
Fraction	**Sample**	**Parameter**	**FDUP**	**LDUP (2)**	**FDUP**	**LDUP (2)**	**LDUP (2)**	**FDUP**	**LDUP (2)**	**FDUP**
Round 1										
AVS/SEM	13SD050004	COPPER	84.8	--	--	--	--	--	--	NA
		LEAD	146.9	--	--	--	--	--	--	NA
		NICKEL	92.1	--	--	--	--	--	--	NA
	16SD060004	CADMIUM	53.3	--	--	--	--	--	--	NA
DIOX	13SS040002	TOTAL HXCDD	--	--	71.6	--	--	--	--	NA
		TOTAL HXCDF	--	--	52.8	--	--	--	--	NA
	13SS090002	2,3,7,8-TCDF	--	--	103.4	--	--	--	--	NA
		TOTAL PECDF	--	--	67.2	--	--	--	--	NA
METALS (Total)	13SD050004	CALCIUM	194.9	17.8	--	--	--	--	--	NA
		CHROMIUM	66.7	13.0	--	--	--	--	--	NA
		LEAD	138.9	22.6	--	--	--	--	--	NA
		MAGNESIUM	156.8	9.0	--	--	--	--	--	NA
		STRONTIUM	182.7	11.8	--	--	--	--	--	NA
METALS (Total)	13SD050004	ZINC	59.0	62.5	--	--	--	--	--	NA
	16SB0130204	LITHIUM	--	--	--	60.2	--	--	--	NA
	16SB0230203	ALUMINUM	--	--	55.5	--	--	--	--	NA
		ARSENIC	--	--	68.9	--	--	--	--	NA
		CHROMIUM	--	--	59.7	--	--	--	--	NA
		COBALT	--	--	50.0	--	--	--	--	NA
		IRON	--	--	54.4	--	--	--	--	NA
		LEAD	--	--	58.4	--	--	--	--	NA
		MAGNESIUM	--	--	52.8	--	--	--	--	NA
		MANGANESE	--	--	83.5	--	--	--	--	NA
		NICKEL	--	--	51.9	--	--	--	--	NA
		TITANIUM	--	--	61.2	--	--	--	--	NA
		VANADIUM	--	--	55.5	--	--	--	--	NA
		ZINC	--	--	50.2	--	--	--	--	NA
	16SB0260204	COBALT	--	--	47.7	59.4	--	--	--	NA
		MANGANESE	--	--	58.1	54.9	--	--	--	NA
		TIN	--	--	30.1	116.4	--	--	--	NA
	16SB0400608	MANGANESE	--	--	63.7	--	--	--	--	NA
		MERCURY	--	--	79.1	--	--	--	--	NA
		STRONTIUM	--	--	50.2	--	--	--	--	NA
		TITANIUM	--	--	54.5	--	--	--	--	NA
	16SD060004	ANTIMONY	189.3	42.2	--	--	--	--	--	NA
		ARSENIC	40.0	57.5	--	--	--	--	--	NA
		BARIUM	129.9	81.2	--	--	--	--	--	NA
		CADMIUM	125.0	97.5	--	--	--	--	--	NA
		CALCIUM	123.5	32.2	--	--	--	--	--	NA
		CHROMIUM	59.4	20.0	--	--	--	--	--	NA
		COPPER	161.5	138.0	--	--	--	--	--	NA
		LEAD	143.3	45.6	--	--	--	--	--	NA
		MAGNESIUM	50.8	38.2	--	--	--	--	--	NA
		MANGANESE	141.9	24.0	--	--	--	--	--	NA
		MERCURY	--	92.6	--	--	--	--	--	NA
		NICKEL	60.9	62.5	--	--	--	--	--	NA
		STRONTIUM	127.5	41.5	--	--	--	--	--	NA
		TIN	178.1	15.3	--	--	--	--	--	NA
		TITANIUM	74.7	81.4	--	--	--	--	--	NA
		ZINC	161.2	86.6	--	--	--	--	--	NA
	16SD110004	BARIUM	69.0	--	--	--	--	--	--	NA
		MANGANESE	50.2	--	--	--	--	--	--	NA

TABLE H-11

RPDs EXCEEDING REFERENCE POINTS FOR LAB AND FIELD DUPLICATES
ROUNDS 1, 2, AND 3
SWMU 13- (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B-146) (1)
NSWC CRANE
CRANE, INDIANA

			SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%	
Fraction	**Sample**	**Parameter**	**FDUP**	**LDUP (2)**	**FDUP**	**LDUP (2)**	**LDUP (2)**	**FDUP**	**LDUP (2)**	**FDUP**
	16SS0090002	ARSENIC	--	--	69.4	--	--	--	--	NA
		BARIUM	--	--	68.5	--	--	--	--	NA
		CALCIUM	--	--	67.4	--	--	--	--	NA
		COPPER	--	--	77.4	--	--	--	--	NA
		MAGNESIUM	--	--	89.1	--	--	--	--	NA
		MANGANESE	--	--	95.0	--	--	--	--	NA
		STRONTIUM	--	--	64.3	--	--	--	--	NA
		ZINC	--	--	82.1	--	--	--	--	NA
METALS (Total)	16SS0120002	ANTIMONY	--	--	--	77.7	--	--	--	NA
		CADMIUM	--	--	--	93.2	--	--	--	NA
		COPPER	--	--	--	104.9	--	--	--	NA
		LEAD	--	--	--	136.8	--	--	--	NA
		ZINC	--	--	--	108.3	--	--	--	NA
	16SS0150002	ANTIMONY	--	--	--	99.8	--	--	--	NA
		LEAD	--	--	--	51.5	--	--	--	NA
		MERCURY	--	--	--	110.8	--	--	--	NA
	16SS0170002	BARIUM	--	--	89.9	--	--	--	--	NA
		CALCIUM	--	--	72.5	--	--	--	--	NA
		COBALT	--	--	86.2	--	--	--	--	NA
		COPPER	--	--	55.3	--	--	--	--	NA
		LEAD	--	--	133.7	--	--	--	--	NA
		MAGNESIUM	--	--	80.8	--	--	--	--	NA
		MANGANESE	--	--	77.0	--	--	--	--	NA
		NICKEL	--	--	78.1	--	--	--	--	NA
	16SS0210002	ANTIMONY	--	--	--	162.0	--	--	--	NA
		CALCIUM	--	--	--	59.3	--	--	--	NA
		COPPER	--	--	--	103.7	--	--	--	NA
	16SS0230002	ALUMINUM	--	--	68.4	--	--	--	--	NA
		ARSENIC	--	--	72.7	--	--	--	--	NA
		BARIUM	--	--	62.1	--	--	--	--	NA
		CHROMIUM	--	--	69.1	--	--	--	--	NA
		COPPER	--	--	58.9	--	--	--	--	NA
		IRON	--	--	75.4	--	--	--	--	NA
		LEAD	--	--	76.1	--	--	--	--	NA
		MAGNESIUM	--	--	62.9	--	--	--	--	NA
		MANGANESE	--	--	98.5	--	--	--	--	NA
		STRONTIUM	--	--	141.6	--	--	--	--	NA
		TITANIUM	--	--	119.8	--	--	--	--	NA
		VANADIUM	--	--	57.3	--	--	--	--	NA
		ZINC	--	--	154.1	--	--	--	--	NA
	16SS0260002	BARIUM	--	--	10.4	50.2	--	--	--	NA
		CALCIUM	--	--	132.9	9.4	--	--	--	NA
		COBALT	--	--	10.0	110.4	--	--	--	NA
		MAGNESIUM	--	--	106.4	0.4	--	--	--	NA
		MANGANESE	--	--	24.6	119.2	--	--	--	NA
	16SW0701	TITANIUM	--	--	--	--	--	81.4	--	NA
MISC	13SD050004	TOTAL ORGANIC CARBON	142.3	--	--	--	--	--	--	NA
	13SW1001	AMMONIA-N	--	--	--	--	--	120.0	--	NA
	16SD060004	CATION EXCHANGE CAPACIT	99.6	--	--	--	--	--	--	NA
SVOC	13SS040002	BENZO(G,H,I)PERYLENE	--	--	56.0	--	--	--	--	NA
	13SS090002	BENZO(A)ANTHRACENE	--	--	184.6	--	--	--	--	NA
		BENZO(A)PYRENE	--	--	173.5	--	--	--	--	NA
		BENZO(B)FLUORANTHENE	--	--	168.8	--	--	--	--	NA

TABLE H-11

RPDs EXCEEDING REFERENCE POINTS FOR LAB AND FIELD DUPLICATES
ROUNDS 1, 2, AND 3
SWMU 13- (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B-146) (1)
NSWC CRANE
CRANE, INDIANA

			SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%	
Fraction	**Sample**	**Parameter**	**FDUP**	**LDUP (2)**	**FDUP**	**LDUP (2)**	**LDUP (2)**	**FDUP**	**LDUP (2)**	**FDUP**
		BENZO(G,H,I)PERYLENE	--	--	171.7	--	--	--	--	NA
		BENZO(K)FLUORANTHENE	--	--	158.5	--	--	--	--	NA
SVOC	13SS090002	CHRYSENE	--	--	173.8	--	--	--	--	NA
		DIBENZO(A,H)ANTHRACENE	--	--	170.4	--	--	--	--	NA
		FLUORANTHENE	--	--	195.0	--	--	--	--	NA
		INDENO(1,2,3-CD)PYRENE	--	--	170.9	--	--	--	--	NA
		PHENANTHRENE	--	--	196.8	--	--	--	--	NA
		PYRENE	--	--	195.7	--	--	--	--	NA
	16SD060004	CHRYSENE	52.6	--	--	--	--	--	--	NA
	16SD110004	BENZO(A)ANTHRACENE	50.6	--	--	--	--	--	--	NA
		BENZO(G,H,I)PERYLENE	54.3	--	--	--	--	--	--	NA
		BENZO(K)FLUORANTHENE	71.3	--	--	--	--	--	--	NA
		INDENO(1,2,3-CD)PYRENE	63.1	--	--	--	--	--	--	NA
	16SS0090002	BENZO(A)ANTHRACENE	--	--	54.5	--	--	--	--	NA
		BENZO(B)FLUORANTHENE	--	--	70.3	--	--	--	--	NA
		FLUORANTHENE	--	--	61.2	--	--	--	--	NA
	16SS0230002	SAFROLE	--	--	90.9	--	--	--	--	NA
PCB	13SS040002	AROCLOR-1248	--	--	101.1	--	--	--	--	NA
Round 2										
METALS (Total)	13SD290004	CHROMIUM	72.5	--	--	--	--	--	--	--
	16SD170004	CALCIUM	73.5	--	--	--	--	--	--	--
	16SD170004	TITANIUM	79.1	--	--	--	--	--	--	--
	16SD170004	ZINC	90.5	--	--	--	--	--	--	--
	16SD170004	ARSENIC	90.9	--	--	--	--	--	--	--
	16SS0450002	ANTIMONY	--	--	95.2	--	--	--	--	--
	16SS0450002	LEAD	--	--	59.2	--	--	--	--	--
VOC	16SB0500103	TOTAL XYLENES	--	--	66.7	--	--	--	--	--
PCB	13SB210204	AROCLOR-1248	--	--	96.3	--	--	--	--	--
SVOC	13SD320004	BENZO(K)FLUORANTHENE	57.1	--	--	--	--	--	--	--
EXP	13GWT0903	TNX	--	--	--	--	--	--	--	88.5
	13SW1401	TNX	--	--	--	--	--	55.8	--	--
METALS(Total)	13GWT0802	IRON	--	--	--	--	--	53.5	--	53.5
	13GWT3601	TITANIUM	--	--	--	--	--	--	--	126.3
	13SW1401-F	TITANIUM	--	--	--	--	--	54.8	--	--
	13SW2501-F	ZINC	--	--	--	--	--	73.3	--	--
MISC	13SW1302	AMMONIA-N	--	--	--	--	--	120.0	--	--
OVG	16GWT1201	ETHENE	--	--	--	--	--	--	--	83.0
	16GWT1201	ETHANE	--	--	--	--	--	--	--	96.0
Round 3										
METALS	13GWT0503-F	IRON	--	--	--	--	--	--	38.9	--
	13GWT2503	ANTIMONY	--	--	--	--	--	--	43.3	--
	13GWT2503	SILVER	--	--	--	--	--	--	32.6	--
	13GWT2503	THALLIUM	--	--	--	--	--	--	39.8	--
	13GWT4801	ALUMINUM	--	--	--	--	--	--	141.9	--
	13GWT4801	ANTIMONY	--	--	--	--	--	--	43.9	--
	13SD3102	CALCIUM	154.5	--	--	--	--	--	--	--
	13SD3102	CHROMIUM	51.7	--	--	--	--	--	--	--
	13SD3102	IRON	53.7	--	--	--	--	--	--	--
	13SD3102	MAGNESIUM	109.3	--	--	--	--	--	--	--
	13SW2802-F	ALUMINUM	--	--	--	--	--	35.2	--	--
	13SW2802-F	CHROMIUM	--	--	--	--	--	39.5	--	--

TABLE H-11

RPDs EXCEEDING REFERENCE POINTS FOR LAB AND FIELD DUPLICATES
ROUNDS 1, 2, AND 3
SWMU 13- (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B-146) (1)
NSWC CRANE
CRANE, INDIANA

			SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%	
Fraction	**Sample**	**Parameter**	**FDUP**	**LDUP (2)**	**FDUP**	**LDUP (2)**	**LDUP (2)**	**FDUP**	**LDUP (2)**	**FDUP**
	13SW2802-F	IRON	--	--	--	--	--	63.3	--	--
	16GWT1901	ANTIMONY	--	--	--	--	--	--	92.0	--
	16GWT1901	LEAD	--	--	--	--	--	--	75.0	--
	16GWT1901	TIN	--	--	--	--	--	--	38.0	--
	16SS0850002	SILVER	--	--	--	104.6	--	--	--	--
	16SS0850002	SODIUM	--	--	--	66.7	--	--	--	--
	16SW1901	CADMIUM	--	--	--	--	55.8	--	--	--
	16SW1901-F	ALUMINUM	--	--	--	--	41.8	--	--	--
	16SW1901-F	ARSENIC	--	--	--	--	31.8	--	--	--
	16SW2501	ALUMINUM	--	--	--	--	71.4	--	--	--
	16SW2501	LEAD	--	--	--	--	102.5	--	--	--
	16SW2501-F	ANTIMONY	--	--	--	--	55.4	--	--	--
	16SW2501-F	TIN	--	--	--	--	46.9	--	--	--
	16SW2901	SILVER	--	--	--	--	55.1	--	--	--

AVS/SEM = Acid volatiel sulfides/simultaneously extracted metals
DIOX = Dioxins and furans
FDUP = Field duplicate
LDUP = Laboratory duplicate
M = Metals
MISC = Miscellaneous parameters
NR = Not reported electronically
VOC = Volatile Orgnaic Compound
OVG = Organic Gases
PEST/PCB = Pesticides and polychlorinated biphenyls
RPD = Relative percent difference (See QAPP for calculation method)
SVOC = Semivoatile organic compound

1 Inorganic and organic parameter precision for field and laboratory duplicates that exceed at least one of the reference points. The reference points are: 30% for aqueous matrix; 50% for solid matrix.
RPDs for trip blanks, rinsate blanks, source water blanks, and non-detects are omitted from this tally.
Only samples that have both the original and duplicate results > 5X detection limit are included.
2 Laboratory duplicates are not analyzed for organic or miscellanous parameters.

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
ROUND 1									
EXP	2-AMINO-4,6-DINITROTOLUENE	PU	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		U	0.0	0.0	66.7	0.0	0.0	0.0	0.0
	4-AMINO-2,6-DINITROTOLUENE	PU	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		U	0.0	0.0	66.7	0.0	0.0	0.0	0.0
	HMX	U	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	PICRAMIC ACID	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
HERB	HEXACHLOROPHENE	D	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	PENTACHLOROPHENOL	CU	0.0	0.0	66.7	0.0	0.0	0.0	0.0
		D	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		U	0.0	0.0	0.0	100.0	0.0	0.0	0.0
M	ALUMINUM	A	0.0	0.0	50.0	0.0	100.0	0.0	0.0
		AI	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		P	0.0	0.0	25.0	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	ARSENIC	A	0.0	0.0	90.9	0.0	100.0	0.0	0.0
		AP	0.0	0.0	9.1	0.0	0.0	0.0	0.0
	BARIUM	A	0.0	0.0	37.5	0.0	0.0	0.0	0.0
		AI	0.0	0.0	62.5	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	CADMIUM	A	0.0	0.0	50.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		K	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	CALCIUM	A	0.0	0.0	93.8	0.0	0.0	0.0	0.0
		AI	0.0	0.0	6.3	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	0.0	50.0	0.0	100.0	0.0	0.0
		AKP	0.0	0.0	16.7	0.0	0.0	0.0	0.0
		AP	0.0	0.0	33.3	0.0	0.0	0.0	0.0
	COBALT	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	COPPER	A	0.0	0.0	50.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	IRON	A	0.0	0.0	92.3	0.0	100.0	0.0	0.0
		AF	0.0	0.0	7.7	0.0	0.0	0.0	0.0
	LEAD	A	0.0	0.0	28.6	0.0	100.0	0.0	0.0
		AK	0.0	0.0	42.9	0.0	0.0	0.0	0.0
		AP	0.0	0.0	28.6	0.0	0.0	0.0	0.0
	LITHIUM	A	0.0	0.0	72.7	0.0	100.0	0.0	0.0
		AK	0.0	0.0	27.3	0.0	0.0	0.0	0.0
	MAGNESIUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	87.5	0.0	0.0	0.0	0.0
		AP	0.0	0.0	12.5	0.0	0.0	0.0	0.0
	NICKEL	A	0.0	0.0	80.0	0.0	100.0	0.0	0.0
		AI	0.0	0.0	6.7	0.0	0.0	0.0	0.0
		AP	0.0	0.0	13.3	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	0.0	93.3	0.0	100.0	0.0	0.0
		AI	0.0	0.0	6.7	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	SILVER	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	STRONTIUM	A	0.0	0.0	93.8	0.0	0.0	0.0	0.0
		AI	0.0	0.0	6.3	0.0	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TITANIUM	A	0.0	0.0	13.3	0.0	100.0	0.0	0.0
		AP	0.0	0.0	86.7	0.0	0.0	0.0	0.0
	VANADIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ZINC	A	0.0	0.0	6.7	0.0	100.0	0.0	0.0
		AI	0.0	0.0	26.7	0.0	0.0	0.0	0.0
		AIK	0.0	0.0	26.7	0.0	0.0	0.0	0.0
		AK	0.0	0.0	20.0	0.0	0.0	0.0	0.0
		I	0.0	0.0	6.7	0.0	0.0	0.0	0.0
		IK	0.0	0.0	6.7	0.0	0.0	0.0	0.0
		IKP	0.0	0.0	6.7	0.0	0.0	0.0	0.0
MF	ALUMINUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	ARSENIC	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	BARIUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	CADMIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	CALCIUM	A	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		AI	0.0	0.0	75.0	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		AI	0.0	0.0	75.0	0.0	0.0	0.0	0.0
	COBALT	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	COPPER	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	IRON	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	LEAD	A	0.0	0.0	33.3	0.0	100.0	0.0	0.0
		AK	0.0	0.0	66.7	0.0	0.0	0.0	0.0
	LITHIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	MAGNESIUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	NICKEL	A	0.0	0.0	50.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		AI	0.0	0.0	75.0	0.0	0.0	0.0	0.0
	STRONTIUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TITANIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	100.0	0.0	0.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	VANADIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	ZINC	A	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		AK	0.0	0.0	50.0	0.0	0.0	0.0	0.0
MISC	AMMONIA-N	G	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	NITRITE/NITRATE-N	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
SVOC	1,4-NAPHTHOQUINONE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	1,4-PHENYLENEDIAMINE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	2,3,4,6-TETRACHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2,4,5-TRICHLOROPHENOL	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2,4,6-TRICHLOROPHENOL	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2,4-DICHLOROPHENOL	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2,4-DIMETHYLPHENOL	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2,4-DINITROPHENOL	D	0.0	0.0	0.0	0.0	0.0	0.0	12.5
		DE	0.0	0.0	0.0	0.0	0.0	0.0	12.5
		E	0.0	0.0	0.0	0.0	0.0	100.0	50.0
		ER	0.0	0.0	0.0	0.0	0.0	0.0	25.0
	2,6-DICHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2-ACETYLAMINOFLUORENE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	2-CHLORONAPHTHALENE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	2-CHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2-METHYLNAPHTHALENE	R	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	2-METHYLPHENOL	R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2-NITROPHENOL	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	3&4-METHYLPHENOL	R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	4,6-DINITRO-2-METHYLPHENOL	D	0.0	0.0	0.0	0.0	0.0	0.0	50.0
		E	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		R	0.0	0.0	0.0	0.0	0.0	0.0	50.0
	4-CHLORO-3-METHYLPHENOL	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	4-NITROPHENOL	D	0.0	0.0	0.0	0.0	0.0	0.0	12.5
		E	0.0	0.0	0.0	0.0	0.0	0.0	62.5
		ER	0.0	0.0	0.0	0.0	0.0	0.0	25.0
	4-NITROQUINOLINE-1-OXIDE	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	A,A-DIMETHYLPHENETHYLAMINE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ACENAPHTHENE	E	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	ACENAPHTHYLENE	R	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ANILINE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ANTHRACENE	PR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ARAMITE	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	BENZO(A)ANTHRACENE	NP	0.0	0.0	100.0	0.0	0.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	BENZO(A)PYRENE	NR	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	BENZO(B)FLUORANTHENE	NR	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	BENZO(G,H,I)PERYLENE	NR	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	BENZO(K)FLUORANTHENE	NR	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	BENZYL ALCOHOL	R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	BIS(2-ETHYLHEXYL)PHTHALATE	A	100.0	100.0	0.0	0.0	0.0	0.0	0.0
	CHRYSENE	NR	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		P	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	DIBENZO(A,H)ANTHRACENE	NR	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	DIETHYL PHTHALATE	AP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	FLUORANTHENE	R	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	FLUORENE	P	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	HEXACHLOROCYCLOPENTADIENE	DE	0.0	0.0	0.0	0.0	0.0	0.0	7.7
		E	0.0	0.0	0.0	0.0	0.0	0.0	92.3
	INDENO(1,2,3-CD)PYRENE	NR	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	KEPONE	C	0.0	0.0	0.0	0.0	0.0	100.0	100.0
	METHAPYRILENE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	NAPHTHALENE	R	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	N-NITROSODIMETHYLAMINE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	PHENANTHRENE	R	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	PHENOL	R	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	PYRENE	NR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
SVOC	1,1,1-TRICHLOROETHANE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	1,1,2,2-TETRACHLOROETHANE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	1,1,2-TRICHLOROETHANE	NR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	1,1-DICHLOROETHENE	R	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	1,2-DIBROMO-3-CHLOROPROPANE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	1,2-DIBROMOETHANE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	1,2-DICHLOROPROPANE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	1,4-DIOXANE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	2-BUTANONE	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	2-HEXANONE	C	0.0	0.0	0.0	0.0	0.0	50.0	0.0
		CN	0.0	0.0	0.0	0.0	0.0	50.0	0.0
	4-METHYL-2-PENTANONE	NPR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ACETONE	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		CP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ACETONITRILE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ACROLEIN	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	ACRYLONITRILE	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	BENZENE	NR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	BROMODICHLOROMETHANE	NR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	BROMOFORM	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	BROMOMETHANE	C	0.0	0.0	0.0	0.0	0.0	50.0	0.0
		D	0.0	0.0	0.0	0.0	0.0	50.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	CARBON DISULFIDE	PR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CARBON TETRACHLORIDE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	CHLOROBENZENE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	CHLORODIBROMOMETHANE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	CHLOROFORM	R	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CHLOROMETHANE	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	CIS-1,2-DICHLOROETHENE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CIS-1,3-DICHLOROPROPENE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ETHYLBENZENE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ISOBUTANOL	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	METHACRYLONITRILE	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	METHYL IODIDE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	PROPIONITRILE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	STYRENE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	TETRACHLOROETHENE	NR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	TOLUENE	NR	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	TOTAL XYLENES	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	TRANS-1,2-DICHLOROETHENE	R	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	TRANS-1,3-DICHLOROPROPENE	N	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	TRICHLOROETHENE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	VINYL CHLORIDE	P	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	50.0	0.0	0.0	0.0	0.0
ROUND 2									
EXP	1,3,5-TRINITROBENZENE	E	NA	NA	0.0	NA	0.0	80.0	0.0
		R	NA	NA	0.0	NA	0.0	20.0	0.0
	1,3-DINITROBENZENE	R	NA	NA	0.0	NA	0.0	100.0	0.0
	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLU	R	NA	NA	0.0	NA	0.0	100.0	0.0
	2,4,6-TRINITROTOLUENE	E	NA	NA	0.0	NA	0.0	80.0	0.0
		R	NA	NA	0.0	NA	0.0	20.0	0.0
	2,4-DIAMINO-6-NITROTOLUENE	R	NA	NA	0.0	NA	0.0	100.0	0.0
		U	NA	NA	100.0	NA	0.0	0.0	0.0
	2,4-DINITROTOLUENE	E	NA	NA	0.0	NA	0.0	80.0	0.0
		R	NA	NA	0.0	NA	0.0	20.0	0.0
	2,6-DIAMINO-4-NITROTOLUENE	R	NA	NA	0.0	NA	0.0	100.0	0.0
	2,6-DINITROTOLUENE	E	NA	NA	0.0	NA	0.0	80.0	0.0
		R	NA	NA	0.0	NA	0.0	20.0	0.0
	2-AMINO-4,6-DINITROTOLUENE	E	NA	NA	0.0	NA	0.0	50.0	0.0
		EPU	NA	NA	25.0	NA	0.0	0.0	0.0
		EU	NA	NA	50.0	NA	0.0	0.0	0.0
		P	NA	NA	25.0	NA	0.0	0.0	0.0
		R	NA	NA	0.0	NA	0.0	50.0	0.0
	2-NITROTOLUENE	E	NA	NA	0.0	NA	0.0	80.0	0.0
		R	NA	NA	0.0	NA	0.0	20.0	0.0
	3,5-DINITROANILINE	C	NA	NA	0.0	NA	0.0	75.0	0.0
		R	NA	NA	0.0	NA	0.0	25.0	0.0
	3-NITROTOLUENE	C	NA	NA	0.0	NA	0.0	16.7	0.0
		E	NA	NA	0.0	NA	0.0	66.7	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
		R	NA	NA	0.0	NA	0.0	16.7	0.0
	4-AMINO-2,6-DINITROTOLUENE	R	NA	NA	0.0	NA	0.0	100.0	0.0
		U	NA	NA	100.0	NA	0.0	0.0	0.0
	4-NITROTOLUENE	E	NA	NA	0.0	NA	0.0	80.0	0.0
		R	NA	NA	0.0	NA	0.0	20.0	0.0
	DNX	R	NA	NA	0.0	NA	0.0	100.0	0.0
		U	NA	NA	100.0	NA	0.0	0.0	0.0
	HMX	E	NA	NA	0.0	NA	0.0	33.3	0.0
		G	NA	NA	0.0	NA	0.0	33.3	0.0
		GU	NA	NA	16.7	NA	0.0	0.0	0.0
		P	NA	NA	16.7	NA	0.0	0.0	0.0
		PU	NA	NA	16.7	NA	0.0	0.0	0.0
		R	NA	NA	0.0	NA	0.0	33.3	0.0
		U	NA	NA	50.0	NA	0.0	0.0	0.0
	MNX	P	NA	NA	100.0	NA	0.0	0.0	0.0
		R	NA	NA	0.0	NA	0.0	100.0	0.0
	NITROBENZENE	R	NA	NA	0.0	NA	0.0	100.0	0.0
	RDX	R	NA	NA	0.0	NA	0.0	100.0	0.0
		U	NA	NA	100.0	NA	0.0	0.0	0.0
	TETRYL	R	NA	NA	0.0	NA	0.0	100.0	0.0
	TNX	R	NA	NA	0.0	NA	0.0	100.0	0.0
M	ALUMINUM	A	NA	NA	84.0	NA	100.0	0.0	0.0
		AD	NA	NA	4.0	NA	0.0	0.0	0.0
		AG	NA	NA	12.0	NA	0.0	0.0	0.0
	ANTIMONY	A	NA	NA	100.0	NA	100.0	0.0	0.0
	ARSENIC	A	NA	NA	80.0	NA	100.0	0.0	0.0
		AP	NA	NA	20.0	NA	0.0	0.0	0.0
	BARIUM	A	NA	NA	93.5	NA	0.0	0.0	0.0
		AK	NA	NA	6.5	NA	0.0	0.0	0.0
	BERYLLIUM	A	NA	NA	100.0	NA	100.0	0.0	0.0
	CADMIUM	A	NA	NA	100.0	NA	100.0	0.0	0.0
	CALCIUM	A	NA	NA	96.6	NA	100.0	0.0	0.0
		AI	NA	NA	3.4	NA	0.0	0.0	0.0
	CHROMIUM	A	NA	NA	90.9	NA	100.0	0.0	0.0
		AP	NA	NA	9.1	NA	0.0	0.0	0.0
	COBALT	A	NA	NA	87.5	NA	100.0	0.0	0.0
		AI	NA	NA	8.3	NA	0.0	0.0	0.0
		AP	NA	NA	4.2	NA	0.0	0.0	0.0
	COPPER	A	NA	NA	100.0	NA	100.0	0.0	0.0
	IRON	A	NA	NA	96.3	NA	100.0	0.0	0.0
		AI	NA	NA	3.7	NA	0.0	0.0	0.0
	LEAD	A	NA	NA	100.0	NA	100.0	0.0	0.0
	MAGNESIUM	A	NA	NA	100.0	NA	0.0	0.0	0.0
	MANGANESE	A	NA	NA	86.2	NA	100.0	0.0	0.0
		AI	NA	NA	10.3	NA	0.0	0.0	0.0
		AK	NA	NA	3.4	NA	0.0	0.0	0.0
	MERCURY	P	NA	NA	100.0	NA	0.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	NICKEL	A	NA	NA	100.0	NA	100.0	0.0	0.0
	POTASSIUM	A	NA	NA	100.0	NA	0.0	0.0	0.0
	SELENIUM	A	NA	NA	100.0	NA	100.0	0.0	0.0
	SILVER	A	NA	NA	0.0	NA	100.0	0.0	0.0
	SODIUM	A	NA	NA	67.7	NA	0.0	0.0	0.0
		AI	NA	NA	32.3	NA	0.0	0.0	0.0
	THALLIUM	A	NA	NA	0.0	NA	100.0	0.0	0.0
	TIN	A	NA	NA	0.0	NA	100.0	0.0	0.0
		AP	NA	NA	100.0	NA	0.0	0.0	0.0
	TITANIUM	A	NA	NA	52.9	NA	100.0	0.0	0.0
		AGI	NA	NA	17.6	NA	0.0	0.0	0.0
		AP	NA	NA	23.5	NA	0.0	0.0	0.0
		I	NA	NA	5.9	NA	0.0	0.0	0.0
	VANADIUM	A	NA	NA	50.0	NA	100.0	0.0	0.0
		AP	NA	NA	50.0	NA	0.0	0.0	0.0
	ZINC	A	NA	NA	0.0	NA	100.0	0.0	0.0
		AI	NA	NA	18.2	NA	0.0	0.0	0.0
		AIK	NA	NA	13.6	NA	0.0	0.0	0.0
		AK	NA	NA	18.2	NA	0.0	0.0	0.0
		I	NA	NA	4.5	NA	0.0	0.0	0.0
		IK	NA	NA	9.1	NA	0.0	0.0	0.0
		JK	NA	NA	4.5	NA	0.0	0.0	0.0
		K	NA	NA	27.3	NA	0.0	0.0	0.0
		KP	NA	NA	4.5	NA	0.0	0.0	0.0
MF	ALUMINUM	A	NA	NA	83.3	NA	100.0	0.0	0.0
		AD	NA	NA	16.7	NA	0.0	0.0	0.0
	ANTIMONY	A	NA	NA	50.0	NA	100.0	0.0	0.0
		AI	NA	NA	50.0	NA	0.0	0.0	0.0
	ARSENIC	A	NA	NA	100.0	NA	100.0	0.0	0.0
	BARIUM	A	NA	NA	93.3	NA	0.0	0.0	0.0
		AK	NA	NA	6.7	NA	0.0	0.0	0.0
	BERYLLIUM	A	NA	NA	100.0	NA	100.0	0.0	0.0
	CADMIUM	A	NA	NA	100.0	NA	100.0	0.0	0.0
	CALCIUM	A	NA	NA	93.3	NA	0.0	0.0	0.0
		AI	NA	NA	6.7	NA	0.0	0.0	0.0
	CHROMIUM	A	NA	NA	0.0	NA	100.0	0.0	0.0
		AP	NA	NA	100.0	NA	0.0	0.0	0.0
	COBALT	A	NA	NA	83.3	NA	100.0	0.0	0.0
		AI	NA	NA	16.7	NA	0.0	0.0	0.0
	COPPER	A	NA	NA	100.0	NA	100.0	0.0	0.0
	IRON	A	NA	NA	100.0	NA	100.0	0.0	0.0
	LEAD	A	NA	NA	100.0	NA	100.0	0.0	0.0
	MAGNESIUM	A	NA	NA	100.0	NA	0.0	0.0	0.0
	MANGANESE	A	NA	NA	71.4	NA	100.0	0.0	0.0
		AK	NA	NA	28.6	NA	0.0	0.0	0.0
	MERCURY	P	NA	NA	100.0	NA	0.0	0.0	0.0
	NICKEL	A	NA	NA	77.8	NA	100.0	0.0	0.0
		AI	NA	NA	22.2	NA	0.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	POTASSIUM	A	NA	NA	100.0	NA	0.0	0.0	0.0
	SELENIUM	A	NA	NA	100.0	NA	100.0	0.0	0.0
	SILVER	A	NA	NA	0.0	NA	100.0	0.0	0.0
	SODIUM	A	NA	NA	100.0	NA	0.0	0.0	0.0
	THALLIUM	A	NA	NA	0.0	NA	100.0	0.0	0.0
	TIN	A	NA	NA	0.0	NA	100.0	0.0	0.0
	TITANIUM	A	NA	NA	14.3	NA	100.0	0.0	0.0
		AP	NA	NA	71.4	NA	0.0	0.0	0.0
		P	NA	NA	14.3	NA	0.0	0.0	0.0
	VANADIUM	A	NA	NA	0.0	NA	100.0	0.0	0.0
		P	NA	NA	100.0	NA	0.0	0.0	0.0
	ZINC	A	NA	NA	10.0	NA	100.0	0.0	0.0
		AK	NA	NA	30.0	NA	0.0	0.0	0.0
		K	NA	NA	30.0	NA	0.0	0.0	0.0
		KP	NA	NA	30.0	NA	0.0	0.0	0.0
MISC	CHLORIDE	A	NA	NA	100.0	NA	100.0	0.0	0.0
	NITRITE/NITRATE-N	D	NA	NA	100.0	NA	0.0	0.0	0.0
		H	NA	NA	0.0	NA	0.0	100.0	0.0
	SULFATE	A	NA	NA	100.0	NA	100.0	0.0	0.0
SVOC	1,1,2,2-TETRACHLOROETHANE	N	NA	NA	100.0	NA	0.0	0.0	0.0
	1,1,2-TRICHLOROETHANE	L	NA	NA	50.0	NA	0.0	0.0	0.0
		P	NA	NA	50.0	NA	0.0	0.0	0.0
	1,2,3-TRICHLOROPROPANE	N	NA	NA	0.0	NA	0.0	100.0	0.0
	1,2-DIBROMO-3-CHLOROPROPANE	C	NA	NA	0.0	NA	0.0	93.3	0.0
		CN	NA	NA	0.0	NA	0.0	6.7	0.0
	2-BUTANONE	C	NA	NA	0.0	NA	0.0	100.0	100.0
	2-HEXANONE	C	NA	NA	100.0	NA	0.0	100.0	0.0
	ACETONE	C	NA	NA	16.7	NA	0.0	100.0	100.0
		CP	NA	NA	83.3	NA	0.0	0.0	0.0
	ACROLEIN	C	NA	NA	0.0	NA	0.0	0.0	100.0
	ACRYLONITRILE	C	NA	NA	0.0	NA	0.0	0.0	100.0
	BENZENE	P	NA	NA	100.0	NA	0.0	0.0	0.0
	BROMOMETHANE	C	NA	NA	0.0	NA	0.0	73.3	0.0
		CD	NA	NA	0.0	NA	0.0	6.7	0.0
		CE	NA	NA	0.0	NA	0.0	20.0	0.0
	CARBON DISULFIDE	C	NA	NA	0.0	NA	0.0	100.0	0.0
		P	NA	NA	100.0	NA	0.0	0.0	0.0
	CARBON TETRACHLORIDE	P	NA	NA	100.0	NA	0.0	0.0	0.0
	CHLOROFORM	P	NA	NA	100.0	NA	0.0	0.0	0.0
	CIS-1,2-DICHLOROETHENE	P	NA	NA	100.0	NA	0.0	0.0	0.0
	DICHLORODIFLUOROMETHANE	C	NA	NA	0.0	NA	0.0	100.0	0.0
	ETHANE	G	NA	NA	100.0	NA	0.0	0.0	0.0
	ETHENE	G	NA	NA	100.0	NA	0.0	0.0	0.0
	METHACRYLONITRILE	C	NA	NA	0.0	NA	0.0	100.0	100.0
	METHYL IODIDE	C	NA	NA	0.0	NA	0.0	100.0	0.0
	METHYL METHACRYLATE	C	NA	NA	0.0	NA	0.0	100.0	0.0
	METHYLENE CHLORIDE	C	NA	NA	0.0	NA	0.0	100.0	0.0
		CP	NA	NA	50.0	NA	0.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
		P	NA	NA	50.0	NA	0.0	0.0	0.0
	PROPIONITRILE	PU	NA	NA	100.0	NA	0.0	0.0	0.0
	TETRACHLOROETHENE	P	NA	NA	100.0	NA	0.0	0.0	0.0
	TOLUENE	P	NA	NA	100.0	NA	0.0	0.0	0.0
	TRICHLOROETHENE	P	NA	NA	100.0	NA	0.0	0.0	0.0
	TRICHLOROFLUOROMETHANE	C	NA	NA	0.0	NA	0.0	100.0	0.0
	VINYL ACETATE	C	NA	NA	0.0	NA	0.0	100.0	0.0
	VINYL CHLORIDE	P	NA	NA	100.0	NA	0.0	0.0	0.0
ROUND 3									
EXP	2-AMINO-4,6-DINITROTOLUENE	PU	0.0	0.0	66.7	0.0	0.0	0.0	0.0
		U	0.0	0.0	33.3	0.0	0.0	0.0	0.0
	3-NITROTOLUENE	U	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	4-AMINO-2,6-DINITROTOLUENE	U	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	HMX	P	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		U	0.0	0.0	66.7	0.0	0.0	0.0	0.0
	TETRYL	E	0.0	0.0	0.0	0.0	0.0	100.0	0.0
M	ALUMINUM	A	0.0	0.0	30.4	0.0	100.0	0.0	0.0
		AI	0.0	0.0	34.8	0.0	0.0	0.0	0.0
		I	0.0	0.0	34.8	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	12.5	0.0	100.0	0.0	0.0
		AI	0.0	0.0	62.5	0.0	0.0	0.0	0.0
		AK	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		K	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ARSENIC	A	0.0	0.0	22.2	0.0	100.0	0.0	0.0
		AP	0.0	0.0	77.8	0.0	0.0	0.0	0.0
	BARIUM	A	0.0	0.0	63.0	0.0	0.0	0.0	0.0
		ADI	0.0	0.0	29.6	0.0	0.0	0.0	0.0
		AI	0.0	0.0	7.4	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	7.1	0.0	100.0	0.0	0.0
		CP	0.0	0.0	92.9	0.0	0.0	0.0	0.0
	CADMIUM	A	0.0	0.0	14.3	0.0	100.0	0.0	0.0
		P	0.0	0.0	85.7	0.0	0.0	0.0	0.0
	CALCIUM	A	0.0	0.0	77.8	0.0	0.0	0.0	0.0
		AI	0.0	0.0	22.2	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	COBALT	A	0.0	0.0	20.0	0.0	100.0	0.0	0.0
		AIP	0.0	0.0	32.0	0.0	0.0	0.0	0.0
		D	0.0	0.0	12.0	0.0	0.0	0.0	0.0
		DP	0.0	0.0	20.0	0.0	0.0	0.0	0.0
		P	0.0	0.0	16.0	0.0	0.0	0.0	0.0
	COPPER	A	0.0	0.0	77.3	0.0	100.0	0.0	0.0
		AP	0.0	0.0	9.1	0.0	0.0	0.0	0.0
		P	0.0	0.0	13.6	0.0	0.0	0.0	0.0
	IRON	A	0.0	0.0	10.5	0.0	100.0	0.0	0.0
		AD	0.0	0.0	42.1	0.0	0.0	0.0	0.0
		AI	0.0	0.0	42.1	0.0	0.0	0.0	0.0
		P	0.0	0.0	5.3	0.0	0.0	0.0	0.0
	LEAD	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	MAGNESIUM	A	0.0	0.0	68.4	0.0	0.0	0.0	0.0
		AI	0.0	0.0	10.5	0.0	0.0	0.0	0.0
		I	0.0	0.0	21.1	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	62.5	0.0	100.0	0.0	0.0
		K	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		P	0.0	0.0	12.5	0.0	0.0	0.0	0.0
	MERCURY	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	NICKEL	A	0.0	0.0	27.8	0.0	100.0	0.0	0.0
		I	0.0	0.0	44.4	0.0	0.0	0.0	0.0
		K	0.0	0.0	27.8	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	0.0	47.4	0.0	0.0	0.0	0.0
		AI	0.0	0.0	10.5	0.0	0.0	0.0	0.0
		I	0.0	0.0	42.1	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	0.0	68.2	0.0	100.0	0.0	0.0
		AI	0.0	0.0	31.8	0.0	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		CDP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	VANADIUM	I	0.0	0.0	55.6	0.0	0.0	0.0	0.0
		IP	0.0	0.0	11.1	0.0	0.0	0.0	0.0
		P	0.0	0.0	33.3	0.0	0.0	0.0	0.0
	ZINC	A	0.0	0.0	70.8	0.0	100.0	0.0	0.0
		AI	0.0	0.0	4.2	0.0	0.0	0.0	0.0
		AIK	0.0	0.0	8.3	0.0	0.0	0.0	0.0
		AKP	0.0	0.0	16.7	0.0	0.0	0.0	0.0
MF	ALUMINUM	A	0.0	0.0	33.3	0.0	100.0	0.0	0.0
		P	0.0	0.0	66.7	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	50.0	0.0	100.0	0.0	0.0
		AK	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		K	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ARSENIC	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	BARIUM	A	0.0	0.0	61.9	0.0	0.0	0.0	0.0
		AI	0.0	0.0	38.1	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		CP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CADMIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CALCIUM	A	0.0	0.0	85.7	0.0	0.0	0.0	0.0
		AD	0.0	0.0	14.3	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	COBALT	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	57.1	0.0	0.0	0.0	0.0
		P	0.0	0.0	42.9	0.0	0.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	COPPER	A	0.0	0.0	38.1	0.0	0.0	0.0	0.0
		AI	0.0	0.0	38.1	0.0	0.0	0.0	0.0
		AP	0.0	0.0	9.5	0.0	0.0	0.0	0.0
		P	0.0	0.0	14.3	0.0	0.0	0.0	0.0
	IRON	A	0.0	0.0	90.9	0.0	100.0	0.0	0.0
		P	0.0	0.0	9.1	0.0	0.0	0.0	0.0
	LEAD	A	0.0	0.0	43.8	0.0	100.0	0.0	0.0
		AP	0.0	0.0	6.3	0.0	0.0	0.0	0.0
		CDP	0.0	0.0	6.3	0.0	0.0	0.0	0.0
		D	0.0	0.0	37.5	0.0	0.0	0.0	0.0
		DP	0.0	0.0	6.3	0.0	0.0	0.0	0.0
	MAGNESIUM	A	0.0	0.0	55.6	0.0	0.0	0.0	0.0
		I	0.0	0.0	44.4	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		CKP	0.0	0.0	27.3	0.0	0.0	0.0	0.0
		I	0.0	0.0	27.3	0.0	0.0	0.0	0.0
		KP	0.0	0.0	9.1	0.0	0.0	0.0	0.0
		P	0.0	0.0	36.4	0.0	0.0	0.0	0.0
	NICKEL	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		I	0.0	0.0	53.8	0.0	0.0	0.0	0.0
		IP	0.0	0.0	7.7	0.0	0.0	0.0	0.0
		K	0.0	0.0	30.8	0.0	0.0	0.0	0.0
		KP	0.0	0.0	7.7	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	ZINC	A	0.0	0.0	52.6	0.0	100.0	0.0	0.0
		AI	0.0	0.0	36.8	0.0	0.0	0.0	0.0
		AKP	0.0	0.0	10.5	0.0	0.0	0.0	0.0
VOC	1,2,3-TRICHLOROPROPANE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	1,2-DICHLOROETHANE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	2-HEXANONE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ACETONE	A	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		AP	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		B	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		CP	0.0	0.0	25.0	0.0	0.0	0.0	0.0
	ACROLEIN	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	CHLOROFORM	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CHLOROMETHANE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	CIS-1,2-DICHLOROETHENE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	DICHLORODIFLUOROMETHANE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ETHYLBENZENE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	METHYLENE CHLORIDE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	TOLUENE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0

TABLE H-12

QUALIFICATION RATES FOR AQUEOUS SAMPLES, ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	TRANS-1,4-DICHLORO-2-BUTENE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	TRICHLOROETHENE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	TRICHLOROFLUOROMETHANE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	VINYL CHLORIDE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
N = Internal Standard Noncompliance
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography, interferences, etc.)
R = Surrogates Recovery Noncompliance
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC

BJ = Associated blank was contaminated and result was classified as non-detect
BU = Associated blank was contaminated and result was classified as non-detect
J = Result is estimated
R = Result was rejected and is not usable
U = Analyte was not detected at the indicated detection limit
UJ = Analyte was not detected at the indicated detection limit and result is estimated
UR = Result is not usable and was reported as not detected

EXP = Explosives
M = Metals, total
MF = Metals, dissolved
MISC = Miscellaneous parameters
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
ROUND 1								
AVS/SEM	CADMIUM	G	0.0	0.0	100.0	0.0	0.0	0.0
	ZINC	AE	0.0	0.0	100.0	0.0	0.0	0.0
DIOX	1,2,3,4,6,7,8,9-OCDD	A	0.0	0.0	0.0	100.0	0.0	0.0
		C	0.0	0.0	57.1	0.0	0.0	0.0
		N01	0.0	0.0	42.9	0.0	0.0	0.0
	1,2,3,4,6,7,8,9-OCDF	C	0.0	0.0	0.0	0.0	75.0	0.0
		N01	0.0	0.0	0.0	0.0	25.0	0.0
		N01P	0.0	0.0	16.7	0.0	0.0	0.0
		P	0.0	0.0	83.3	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,4,6,7,8-HPCDD	N01	0.0	0.0	20.0	0.0	0.0	0.0
		P	0.0	0.0	80.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,4,6,7,8-HPCDF	N01	0.0	0.0	0.0	0.0	100.0	0.0
		N01P	0.0	0.0	10.0	0.0	0.0	0.0
		P	0.0	0.0	90.0	0.0	0.0	0.0
		QW	0.0	0.0	0.0	14.3	0.0	0.0
		W	0.0	0.0	0.0	85.7	0.0	0.0
	1,2,3,4,7,8,9-HPCDF	E	0.0	0.0	0.0	0.0	50.0	0.0
		N01	0.0	0.0	0.0	0.0	50.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,4,7,8-HXCDD	N01	0.0	0.0	16.7	0.0	0.0	0.0
		P	0.0	0.0	83.3	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,4,7,8-HXCDF	N01P	0.0	0.0	11.1	0.0	0.0	0.0
		P	0.0	0.0	88.9	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,6,7,8-HXCDD	P	0.0	0.0	100.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,6,7,8-HXCDF	N01	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,7,8,9-HXCDD	N01P	0.0	0.0	6.7	0.0	0.0	0.0
		P	0.0	0.0	93.3	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,7,8,9-HXCDF	N01	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	1,2,3,7,8-PECDD	N01	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	1,2,3,7,8-PECDF	N01	0.0	0.0	0.0	0.0	100.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	2,3,4,6,7,8-HXCDF	P	0.0	0.0	100.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	2,3,4,7,8-PECDF	N01	0.0	0.0	0.0	0.0	100.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	2,3,7,8-TCDD	N01	0.0	0.0	0.0	0.0	100.0	0.0
	2,3,7,8-TCDF	N01	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	100.0	0.0	0.0
	TOTAL HPCDD	N01	0.0	0.0	25.0	0.0	0.0	0.0
		W	0.0	0.0	75.0	100.0	0.0	0.0
	TOTAL HPCDF	N01	0.0	0.0	14.3	0.0	100.0	0.0
		QW	0.0	0.0	0.0	16.7	0.0	0.0
		W	0.0	0.0	85.7	83.3	0.0	0.0
	TOTAL HXCDD	N01W	0.0	0.0	7.7	0.0	0.0	0.0
		W	0.0	0.0	92.3	100.0	0.0	0.0
	TOTAL HXCDF	N01W	0.0	0.0	11.1	0.0	0.0	0.0
		Q	0.0	0.0	11.1	0.0	0.0	0.0
		QW	0.0	0.0	22.2	0.0	0.0	0.0
		W	0.0	0.0	55.6	100.0	0.0	0.0
	TOTAL PECDD	N01	0.0	0.0	0.0	0.0	100.0	0.0
		W	0.0	0.0	100.0	100.0	0.0	0.0
	TOTAL PECDF	N01	0.0	0.0	0.0	0.0	100.0	0.0
		Q	0.0	0.0	25.0	0.0	0.0	0.0
		QW	0.0	0.0	62.5	50.0	0.0	0.0
		W	0.0	0.0	12.5	50.0	0.0	0.0
	TOTAL TCDD	N01	0.0	0.0	0.0	0.0	100.0	0.0
	TOTAL TCDF	N01	0.0	0.0	0.0	0.0	100.0	0.0
		Q	0.0	0.0	20.0	0.0	0.0	0.0
		QW	0.0	0.0	60.0	42.9	0.0	0.0
		W	0.0	0.0	20.0	57.1	0.0	0.0
EXP	1,3,5-TRINITROBENZENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	1,3-DINITROBENZENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,4,6-TRINITROTOLUENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,4-DINITROTOLUENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,6-DINITROTOLUENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	2-AMINO-4,6-DINITROTOLUENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	2-NITROTOLUENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	3-NITROTOLUENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-AMINO-2,6-DINITROTOLUENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-NITROTOLUENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	HMX	H	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	NITROBENZENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	PICRAMIC ACID	D	0.0	0.0	0.0	0.0	100.0	100.0
	PICRIC ACID	C	0.0	0.0	0.0	0.0	100.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	RDX	H	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	TETRYL	H	0.0	0.0	0.0	0.0	100.0	0.0
HERB	HEXACHLOROPHENE	CU	0.0	0.0	66.7	0.0	0.0	0.0
		U	0.0	0.0	33.3	0.0	0.0	0.0
	PENTACHLOROPHENOL	C	0.0	0.0	11.1	0.0	0.0	0.0
		U	0.0	0.0	88.9	0.0	0.0	0.0
M	ALUMINUM	A	0.0	0.0	10.1	100.0	0.0	0.0
		ACD	0.0	0.0	1.3	0.0	0.0	0.0
		ACG	0.0	0.0	2.5	0.0	0.0	0.0
		AD	0.0	0.0	36.7	0.0	0.0	0.0
		ADG	0.0	0.0	2.5	0.0	0.0	0.0
		AG	0.0	0.0	22.8	0.0	0.0	0.0
		AI	0.0	0.0	24.1	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	35.5	100.0	0.0	0.0
		ADF	0.0	0.0	9.7	0.0	0.0	0.0
		ADFG	0.0	0.0	3.2	0.0	0.0	0.0
		AF	0.0	0.0	38.7	0.0	0.0	0.0
		AFG	0.0	0.0	6.5	0.0	0.0	0.0
		AFP	0.0	0.0	3.2	0.0	0.0	0.0
		AP	0.0	0.0	3.2	0.0	0.0	0.0
	ARSENIC	A	0.0	0.0	66.7	0.0	0.0	0.0
		AF	0.0	0.0	4.8	0.0	0.0	0.0
		AG	0.0	0.0	27.4	0.0	0.0	0.0
		AGP	0.0	0.0	1.2	0.0	0.0	0.0
	BARIUM	A	0.0	0.0	23.8	0.0	0.0	0.0
		AD	0.0	0.0	14.3	0.0	0.0	0.0
		ADG	0.0	0.0	2.4	0.0	0.0	0.0
		AF	0.0	0.0	31.0	0.0	0.0	0.0
		AFG	0.0	0.0	28.6	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	58.3	100.0	0.0	0.0
		ACD	0.0	0.0	2.1	0.0	0.0	0.0
		AD	0.0	0.0	6.3	0.0	0.0	0.0
		ADP	0.0	0.0	4.2	0.0	0.0	0.0
		AP	0.0	0.0	29.2	0.0	0.0	0.0
	CADMIUM	A	0.0	0.0	45.9	100.0	0.0	0.0
		ADF	0.0	0.0	5.4	0.0	0.0	0.0
		ADFG	0.0	0.0	5.4	0.0	0.0	0.0
		AF	0.0	0.0	13.5	0.0	0.0	0.0
		AG	0.0	0.0	2.7	0.0	0.0	0.0
		AP	0.0	0.0	27.0	0.0	0.0	0.0
	CALCIUM	A	0.0	0.0	19.2	100.0	0.0	0.0
		ADF	0.0	0.0	19.2	0.0	0.0	0.0
		ADFG	0.0	0.0	1.3	0.0	0.0	0.0
		ADG	0.0	0.0	25.6	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
		ADI	0.0	0.0	24.4	0.0	0.0	0.0
		AG	0.0	0.0	10.3	0.0	0.0	0.0
	CHROMIUM	A	0.0	0.0	32.1	0.0	0.0	0.0
		AD	0.0	0.0	39.3	0.0	0.0	0.0
		ADG	0.0	0.0	4.8	0.0	0.0	0.0
		AG	0.0	0.0	23.8	0.0	0.0	0.0
	COBALT	A	0.0	0.0	59.5	0.0	0.0	0.0
		ADF	0.0	0.0	7.1	0.0	0.0	0.0
		ADG	0.0	0.0	23.8	0.0	0.0	0.0
		AF	0.0	0.0	7.1	0.0	0.0	0.0
		AG	0.0	0.0	2.4	0.0	0.0	0.0
	COPPER	A	0.0	0.0	23.8	0.0	0.0	0.0
		ADF	0.0	0.0	6.0	0.0	0.0	0.0
		ADFK	0.0	0.0	17.9	0.0	0.0	0.0
		AF	0.0	0.0	23.8	0.0	0.0	0.0
		AFG	0.0	0.0	4.8	0.0	0.0	0.0
		AG	0.0	0.0	10.7	0.0	0.0	0.0
		AGK	0.0	0.0	13.1	0.0	0.0	0.0
	IRON	A	0.0	0.0	67.9	0.0	0.0	0.0
		AF	0.0	0.0	6.0	0.0	0.0	0.0
		AG	0.0	0.0	26.2	0.0	0.0	0.0
	LEAD	A	0.0	0.0	13.6	100.0	0.0	0.0
		AF	0.0	0.0	46.9	0.0	0.0	0.0
		AFG	0.0	0.0	32.1	0.0	0.0	0.0
		AI	0.0	0.0	6.2	0.0	0.0	0.0
		AK	0.0	0.0	1.2	0.0	0.0	0.0
	LITHIUM	A	0.0	0.0	1.4	100.0	0.0	0.0
		AD	0.0	0.0	25.0	0.0	0.0	0.0
		ADFI	0.0	0.0	1.4	0.0	0.0	0.0
		ADP	0.0	0.0	1.4	0.0	0.0	0.0
		AIK	0.0	0.0	27.8	0.0	0.0	0.0
		AK	0.0	0.0	37.5	0.0	0.0	0.0
		DI	0.0	0.0	5.6	0.0	0.0	0.0
	MAGNESIUM	A	0.0	0.0	36.9	0.0	0.0	0.0
		ADF	0.0	0.0	2.4	0.0	0.0	0.0
		ADFG	0.0	0.0	2.4	0.0	0.0	0.0
		AG	0.0	0.0	56.0	0.0	0.0	0.0
		AGK	0.0	0.0	1.2	0.0	0.0	0.0
		AI	0.0	0.0	1.2	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	8.3	0.0	0.0	0.0
		AF	0.0	0.0	7.1	0.0	0.0	0.0
		AFG	0.0	0.0	7.1	0.0	0.0	0.0
		AG	0.0	0.0	66.7	0.0	0.0	0.0
		AGK	0.0	0.0	9.5	0.0	0.0	0.0
		AI	0.0	0.0	1.2	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	MERCURY	A	0.0	0.0	40.0	100.0	0.0	0.0
		AG	0.0	0.0	14.5	0.0	0.0	0.0
		AP	0.0	0.0	25.5	0.0	0.0	0.0
		F	0.0	0.0	3.6	0.0	0.0	0.0
		FG	0.0	0.0	1.8	0.0	0.0	0.0
		FGP	0.0	0.0	1.8	0.0	0.0	0.0
		P	0.0	0.0	12.7	0.0	0.0	0.0
	NICKEL	A	0.0	0.0	67.9	0.0	0.0	0.0
		ADF	0.0	0.0	1.2	0.0	0.0	0.0
		ADFGI	0.0	0.0	2.4	0.0	0.0	0.0
		ADFI	0.0	0.0	2.4	0.0	0.0	0.0
		AG	0.0	0.0	26.2	0.0	0.0	0.0
	POTASSIUM	A	0.0	0.0	32.1	0.0	0.0	0.0
		AD	0.0	0.0	44.0	0.0	0.0	0.0
		AI	0.0	0.0	23.8	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	33.3	100.0	0.0	0.0
		AP	0.0	0.0	66.7	0.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	66.7	0.0	0.0	0.0
		P	0.0	0.0	33.3	0.0	0.0	0.0
	SODIUM	A	0.0	0.0	100.0	100.0	0.0	0.0
	STRONTIUM	A	0.0	0.0	29.8	0.0	0.0	0.0
		AD	0.0	0.0	9.5	0.0	0.0	0.0
		ADF	0.0	0.0	25.0	0.0	0.0	0.0
		ADK	0.0	0.0	4.8	0.0	0.0	0.0
		AF	0.0	0.0	2.4	0.0	0.0	0.0
		AFG	0.0	0.0	2.4	0.0	0.0	0.0
		AG	0.0	0.0	26.2	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	50.0	0.0	0.0	0.0
		P	0.0	0.0	50.0	0.0	0.0	0.0
	TIN	A	0.0	0.0	8.3	100.0	0.0	0.0
		ADGP	0.0	0.0	8.3	0.0	0.0	0.0
		ADP	0.0	0.0	8.3	0.0	0.0	0.0
		AF	0.0	0.0	4.2	0.0	0.0	0.0
		AP	0.0	0.0	70.8	0.0	0.0	0.0
	TITANIUM	A	0.0	0.0	22.6	0.0	0.0	0.0
		AD	0.0	0.0	22.6	0.0	0.0	0.0
		ADFGI	0.0	0.0	2.4	0.0	0.0	0.0
		ADFI	0.0	0.0	3.6	0.0	0.0	0.0
		ADGI	0.0	0.0	23.8	0.0	0.0	0.0
		AG	0.0	0.0	23.8	0.0	0.0	0.0
		AP	0.0	0.0	1.2	0.0	0.0	0.0
	VANADIUM	AD	0.0	0.0	73.8	0.0	0.0	0.0
		ADG	0.0	0.0	26.2	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	ZINC	A	0.0	0.0	6.6	100.0	0.0	0.0
		ADF	0.0	0.0	11.5	0.0	0.0	0.0
		AFG	0.0	0.0	14.8	0.0	0.0	0.0
		AFGI	0.0	0.0	21.3	0.0	0.0	0.0
		AFGIK	0.0	0.0	14.8	0.0	0.0	0.0
		AFGK	0.0	0.0	14.8	0.0	0.0	0.0
		AFI	0.0	0.0	6.6	0.0	0.0	0.0
		AFIK	0.0	0.0	1.6	0.0	0.0	0.0
		AK	0.0	0.0	8.2	0.0	0.0	0.0
MISC	CATION EXCHANGE CAPACITY	G	0.0	0.0	100.0	0.0	0.0	0.0
	TOTAL ORGANIC CARBON	D	0.0	0.0	100.0	0.0	0.0	0.0
SVOC	1,2,4,5-TETRACHLOROBENZENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	1,2,4-TRICHLOROBENZENE	D	0.0	0.0	0.0	0.0	66.7	0.0
		H	0.0	0.0	0.0	0.0	33.3	0.0
	1,2-DICHLOROBENZENE	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	1,3-DICHLOROBENZENE	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	1,4-DICHLOROBENZENE	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	1,4-NAPHTHOQUINONE	H	0.0	0.0	0.0	0.0	100.0	0.0
	1,4-PHENYLENEDIAMINE	C	0.0	0.0	0.0	0.0	98.4	100.0
		CH	0.0	0.0	0.0	0.0	1.6	0.0
	1-NAPHTHYLAMINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,2'-OXYBIS(1-CHLOROPROPANE)	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,3,4,6-TETRACHLOROPHENOL	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,4,5-TRICHLOROPHENOL	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,4,6-TRICHLOROPHENOL	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,4-DICHLOROPHENOL	H	0.0	0.0	0.0	0.0	100.0	0.0
	2,4-DIMETHYLPHENOL	D	0.0	0.0	0.0	0.0	66.7	0.0
		H	0.0	0.0	0.0	0.0	33.3	0.0
	2,4-DINITROPHENOL	C	0.0	0.0	0.0	0.0	93.3	0.0
		H	0.0	0.0	0.0	0.0	6.7	0.0
	2,6-DICHLOROPHENOL	H	0.0	0.0	0.0	0.0	100.0	0.0
	2-ACETYLAMINOFLUORENE	C	0.0	0.0	0.0	0.0	83.3	0.0
		H	0.0	0.0	0.0	0.0	16.7	0.0
	2-CHLORONAPHTHALENE	C	0.0	0.0	0.0	0.0	87.5	0.0
		H	0.0	0.0	0.0	0.0	12.5	0.0
	2-CHLOROPHENOL	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	2-METHYLNAPHTHALENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	2-METHYLPHENOL	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	2-NAPHTHYLAMINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	2-NITROANILINE	H	0.0	0.0	0.0	0.0	100.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	2-NITROPHENOL	H	0.0	0.0	0.0	0.0	100.0	0.0
	2-PICOLINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	3&4-METHYLPHENOL	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	3,3'-DICHLOROBENZIDINE	C	0.0	0.0	0.0	0.0	85.7	0.0
		D	0.0	0.0	0.0	0.0	0.0	100.0
		H	0.0	0.0	0.0	0.0	14.3	0.0
	3,3'-DIMETHYLBENZIDINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	3-METHYLCHOLANTHRENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	3-NITROANILINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	4,6-DINITRO-2-METHYLPHENOL	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-AMINOBIPHENYL	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-BROMOPHENYL PHENYL ETHER	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-CHLORO-3-METHYLPHENOL	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	4-CHLOROANILINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-CHLOROPHENYL PHENYL ETHER	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-NITROANILINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-NITROPHENOL	H	0.0	0.0	0.0	0.0	100.0	0.0
	4-NITROQUINOLINE-1-OXIDE	C	0.0	0.0	0.0	0.0	0.0	98.8
		CH	0.0	0.0	0.0	0.0	0.0	1.2
	5-NITRO-O-TOLUIDINE	C	0.0	0.0	0.0	0.0	90.9	0.0
		H	0.0	0.0	0.0	0.0	9.1	0.0
	7,12-DIMETHYLBENZ(A)ANTHRACENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	A,A-DIMETHYLPHENETHYLAMINE	A	0.0	0.0	0.0	0.0	1.4	0.0
		C	0.0	0.0	0.0	0.0	97.1	0.0
		CH	0.0	0.0	0.0	0.0	1.4	0.0
	ACENAPHTHENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	ACENAPHTHYLENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	ACETOPHENONE	H	0.0	0.0	0.0	0.0	100.0	0.0
	ANILINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	ANTHRACENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	ARAMITE	C	0.0	0.0	0.0	0.0	0.0	98.3
		CH	0.0	0.0	0.0	0.0	0.0	1.7
	BENZO(A)ANTHRACENE	G	0.0	0.0	29.4	0.0	66.7	0.0
		GN	0.0	0.0	5.9	0.0	0.0	0.0
		N	0.0	0.0	5.9	0.0	33.3	0.0
		P	0.0	0.0	58.8	0.0	0.0	0.0
	BENZO(A)PYRENE	G	0.0	0.0	15.4	0.0	50.0	0.0
		N	0.0	0.0	15.4	0.0	50.0	0.0
		P	0.0	0.0	69.2	0.0	0.0	0.0
	BENZO(B)FLUORANTHENE	C	0.0	0.0	21.4	0.0	63.6	0.0
		CG	0.0	0.0	7.1	0.0	9.1	0.0
		G	0.0	0.0	21.4	0.0	9.1	0.0
		N	0.0	0.0	14.3	0.0	18.2	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
		P	0.0	0.0	35.7	0.0	0.0	0.0
	BENZO(G,H,I)PERYLENE	G	0.0	0.0	7.1	0.0	50.0	0.0
		GN	0.0	0.0	14.3	0.0	0.0	0.0
		N	0.0	0.0	7.1	0.0	50.0	0.0
		P	0.0	0.0	71.4	0.0	0.0	0.0
	BENZO(K)FLUORANTHENE	G	0.0	0.0	16.7	0.0	50.0	0.0
		GN	0.0	0.0	16.7	0.0	0.0	0.0
		N	0.0	0.0	0.0	0.0	50.0	0.0
		P	0.0	0.0	66.7	0.0	0.0	0.0
	BENZYL ALCOHOL	C	0.0	0.0	0.0	0.0	93.3	0.0
		H	0.0	0.0	0.0	0.0	6.7	0.0
	BIS(2-CHLOROETHOXY)METHANE	H	0.0	0.0	0.0	0.0	100.0	0.0
	BIS(2-CHLOROETHYL)ETHER	H	0.0	0.0	0.0	0.0	100.0	0.0
	BIS(2-ETHYLHEXYL)PHTHALATE	A	100.0	100.0	0.0	100.0	0.0	0.0
		H	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	BUTYL BENZYL PHTHALATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	CHLOROBENZILATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	CHRYSENE	G	0.0	0.0	7.7	0.0	50.0	0.0
		N	0.0	0.0	15.4	0.0	50.0	0.0
		P	0.0	0.0	76.9	0.0	0.0	0.0
	DIALLATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	DIBENZO(A,H)ANTHRACENE	N	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	DIBENZOFURAN	H	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	DIETHYL PHTHALATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	DIMETHYL PHTHALATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	DI-N-BUTYL PHTHALATE	H	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	DI-N-OCTYL PHTHALATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	DIPHENYLAMINE	G	0.0	0.0	33.3	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
		P	0.0	0.0	66.7	0.0	0.0	0.0
	ETHYL METHANE SULFONATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	FLUORANTHENE	G	0.0	0.0	20.0	0.0	100.0	0.0
		P	0.0	0.0	80.0	0.0	0.0	0.0
	FLUORENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	HEXACHLOROBENZENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	HEXACHLOROBUTADIENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	HEXACHLOROCYCLOPENTADIENE	C	0.0	0.0	0.0	0.0	88.0	0.0
		CD	0.0	0.0	0.0	0.0	4.0	0.0
		D	0.0	0.0	0.0	0.0	4.0	100.0
		H	0.0	0.0	0.0	0.0	4.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	HEXACHLOROETHANE	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	HEXACHLOROPROPENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	INDENO(1,2,3-CD)PYRENE	GN	0.0	0.0	16.7	0.0	0.0	0.0
		N	0.0	0.0	8.3	0.0	100.0	0.0
		P	0.0	0.0	75.0	0.0	0.0	0.0
	ISODRIN	H	0.0	0.0	0.0	0.0	100.0	0.0
	ISOPHORONE	H	0.0	0.0	0.0	0.0	100.0	0.0
	ISOSAFROLE	H	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	KEPONE	C	0.0	0.0	0.0	0.0	100.0	97.7
		CH	0.0	0.0	0.0	0.0	0.0	2.3
	METHAPYRILENE	C	0.0	0.0	0.0	0.0	95.5	0.0
		H	0.0	0.0	0.0	0.0	4.5	0.0
	METHYL METHANE SULFONATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	NAPHTHALENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	N-NITROSODIETHYLAMINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	N-NITROSODIMETHYLAMINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	N-NITROSO-DI-N-BUTYLAMINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	N-NITROSO-DI-N-PROPYLAMINE	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	N-NITROSOMETHYLETHYLAMINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	N-NITROSOMORPHOLINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	N-NITROSOPIPERIDINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	N-NITROSOPYRROLIDINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	O,O,O-TRIETHYL PHOSPHOROTHIOATE	H	0.0	0.0	0.0	0.0	100.0	0.0
	O-TOLUIDINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	P-(DIMETHYLAMINO)AZOBENZENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	PENTACHLOROBENZENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	PENTACHLOROETHANE	H	0.0	0.0	0.0	0.0	100.0	0.0
	PENTACHLORONITROBENZENE	H	0.0	0.0	0.0	0.0	100.0	0.0
	PHENACETIN	H	0.0	0.0	0.0	0.0	100.0	0.0
	PHENANTHRENE	G	0.0	0.0	12.5	0.0	100.0	0.0
		P	0.0	0.0	87.5	0.0	0.0	0.0
	PHENOL	D	0.0	0.0	0.0	0.0	50.0	0.0
		H	0.0	0.0	0.0	0.0	50.0	0.0
	PRONAMIDE	H	0.0	0.0	0.0	0.0	100.0	0.0
	PYRENE	G	0.0	0.0	6.7	0.0	100.0	0.0
		N	0.0	0.0	13.3	0.0	0.0	0.0
		NP	0.0	0.0	6.7	0.0	0.0	0.0
		P	0.0	0.0	73.3	0.0	0.0	0.0
	PYRIDINE	H	0.0	0.0	0.0	0.0	100.0	0.0
	SAFROLE	G	0.0	0.0	66.7	0.0	0.0	0.0
		H	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	33.3	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[(1)]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
VOC	1,1,2,2-TETRACHLOROETHANE	D	0.0	0.0	0.0	0.0	100.0	0.0
	1,1,2-TRICHLOROETHANE	D	0.0	0.0	0.0	0.0	100.0	0.0
	1,4-DIOXANE	D	0.0	0.0	0.0	0.0	100.0	0.0
	2-BUTANONE	D	0.0	0.0	0.0	0.0	100.0	0.0
	2-HEXANONE	D	0.0	0.0	0.0	0.0	100.0	0.0
	4-METHYL-2-PENTANONE	D	0.0	0.0	0.0	0.0	100.0	0.0
	ACETONE	A	0.0	100.0	0.0	0.0	0.0	0.0
		C	0.0	0.0	40.0	0.0	95.1	0.0
		CD	0.0	0.0	0.0	0.0	4.9	0.0
		CP	0.0	0.0	60.0	0.0	0.0	0.0
	ACROLEIN	C	0.0	0.0	0.0	0.0	0.0	100.0
	ACRYLONITRILE	C	0.0	0.0	0.0	0.0	100.0	0.0
	BROMODICHLOROMETHANE	D	0.0	0.0	0.0	0.0	100.0	0.0
	BROMOFORM	D	0.0	0.0	0.0	0.0	100.0	0.0
	BROMOMETHANE	C	0.0	0.0	0.0	0.0	100.0	0.0
	CARBON DISULFIDE	C	0.0	0.0	0.0	0.0	100.0	0.0
	CHLOROBENZENE	D	0.0	0.0	0.0	0.0	100.0	0.0
	CHLORODIBROMOMETHANE	D	0.0	0.0	0.0	0.0	100.0	0.0
	CHLOROETHANE	D	0.0	0.0	0.0	0.0	100.0	0.0
	CHLOROMETHANE	D	0.0	0.0	0.0	0.0	100.0	0.0
	CIS-1,2-DICHLOROETHENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	CIS-1,3-DICHLOROPROPENE	D	0.0	0.0	0.0	0.0	100.0	0.0
	DICHLORODIFLUOROMETHANE	C	0.0	0.0	100.0	0.0	100.0	0.0
	ISOBUTANOL	C	0.0	0.0	0.0	0.0	100.0	0.0
	METHYL IODIDE	C	0.0	0.0	0.0	0.0	100.0	0.0
	METHYLENE CHLORIDE	A	0.0	100.0	0.0	100.0	0.0	0.0
		C	0.0	0.0	0.0	0.0	100.0	0.0
	STYRENE	D	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	TOLUENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	TRANS-1,2-DICHLOROETHENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	TRANS-1,3-DICHLOROPROPENE	D	0.0	0.0	0.0	0.0	100.0	0.0
	TRICHLOROETHENE	P	0.0	0.0	100.0	0.0	0.0	0.0
	TRICHLOROFLUOROMETHANE	P	0.0	0.0	100.0	0.0	0.0	0.0
	VINYL ACETATE	C	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
ROUND 2								
EXP	2,6-DINITROTOLUENE	U	NA	0.0	100.0	0.0	0.0	0.0
M	ALUMINUM	A	NA	0.0	100.0	0.0	0.0	0.0
	ANTIMONY	A	NA	0.0	66.7	0.0	0.0	0.0
		AG	NA	0.0	33.3	0.0	0.0	0.0
	ARSENIC	A	NA	0.0	33.3	0.0	0.0	0.0
		AGI	NA	0.0	11.1	0.0	0.0	0.0
		AI	NA	0.0	55.6	0.0	0.0	0.0
	BARIUM	A	NA	0.0	100.0	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	BERYLLIUM	A	NA	0.0	100.0	100.0	0.0	0.0
	CADMIUM	A	NA	0.0	69.2	100.0	0.0	0.0
		AP	NA	0.0	30.8	0.0	0.0	0.0
	CALCIUM	A	NA	0.0	33.3	0.0	0.0	0.0
		ADFGI	NA	0.0	11.1	0.0	0.0	0.0
		ADFI	NA	0.0	50.0	0.0	0.0	0.0
		AI	NA	0.0	5.6	0.0	0.0	0.0
	CHROMIUM	ADFI	NA	0.0	5.6	0.0	0.0	0.0
		AI	NA	0.0	94.4	0.0	0.0	0.0
	COBALT	ADI	NA	0.0	61.1	0.0	0.0	0.0
		AI	NA	0.0	38.9	0.0	0.0	0.0
	COPPER	AI	NA	0.0	100.0	0.0	0.0	0.0
	IRON	A	NA	0.0	100.0	0.0	0.0	0.0
	LEAD	AD	NA	0.0	66.7	0.0	0.0	0.0
		ADG	NA	0.0	33.3	0.0	0.0	0.0
	MAGNESIUM	A	NA	0.0	33.3	0.0	0.0	0.0
		AI	NA	0.0	66.7	0.0	0.0	0.0
	MANGANESE	A	NA	0.0	100.0	0.0	0.0	0.0
	MERCURY	P	NA	0.0	100.0	0.0	0.0	0.0
	NICKEL	A	NA	0.0	5.6	0.0	0.0	0.0
		AI	NA	0.0	94.4	0.0	0.0	0.0
	POTASSIUM	AD	NA	0.0	38.9	0.0	0.0	0.0
		ADI	NA	0.0	61.1	0.0	0.0	0.0
	SELENIUM	A	NA	0.0	91.7	100.0	0.0	0.0
		AP	NA	0.0	8.3	0.0	0.0	0.0
	SILVER	A	NA	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	NA	0.0	0.0	100.0	0.0	0.0
		AG	NA	0.0	20.0	0.0	0.0	0.0
		AP	NA	0.0	80.0	0.0	0.0	0.0
	THALLIUM	A	NA	0.0	0.0	100.0	0.0	0.0
		AP	NA	0.0	100.0	0.0	0.0	0.0
	TIN	A	NA	0.0	0.0	100.0	0.0	0.0
		AP	NA	0.0	66.7	0.0	0.0	0.0
		P	NA	0.0	33.3	0.0	0.0	0.0
	TITANIUM	A	NA	0.0	33.3	0.0	0.0	0.0
		ADFI	NA	0.0	5.6	0.0	0.0	0.0
		ADGI	NA	0.0	11.1	0.0	0.0	0.0
		ADI	NA	0.0	50.0	0.0	0.0	0.0
	VANADIUM	ADFI	NA	0.0	5.6	0.0	0.0	0.0
		AI	NA	0.0	94.4	0.0	0.0	0.0
	ZINC	A	NA	0.0	5.6	0.0	0.0	0.0
		ADGKI	NA	0.0	11.1	0.0	0.0	0.0
		ADI	NA	0.0	16.7	0.0	0.0	0.0
		ADKI	NA	0.0	33.3	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
		AF	NA	0.0	27.8	0.0	0.0	0.0
		AFK	NA	0.0	5.6	0.0	0.0	0.0
SVOC	BENZO(A)ANTHRACENE	P	NA	0.0	100.0	0.0	0.0	0.0
VOC	1,1,1-TRICHLOROETHANE	N	NA	0.0	0.0	0.0	100.0	0.0
	1,1,2,2-TETRACHLOROETHANE	N	NA	0.0	0.0	0.0	100.0	0.0
	1,1-DICHLOROETHANE	N	NA	0.0	0.0	0.0	100.0	0.0
	1,1-DICHLOROETHENE	N	NA	0.0	0.0	0.0	100.0	0.0
	1,2,3-TRICHLOROPROPANE	D	NA	0.0	0.0	0.0	66.7	0.0
		N	NA	0.0	0.0	0.0	33.3	0.0
	1,2-DIBROMO-3-CHLOROPROPANE	C	NA	0.0	0.0	0.0	25.0	0.0
		D	NA	0.0	0.0	0.0	50.0	0.0
		N	NA	0.0	0.0	0.0	25.0	0.0
	1,2-DICHLOROETHANE	N	NA	0.0	0.0	0.0	100.0	0.0
	1,2-DICHLOROPROPANE	N	NA	0.0	0.0	0.0	100.0	0.0
	1,4-DIOXANE	D	NA	0.0	0.0	0.0	100.0	0.0
	2-BUTANONE	N	NA	0.0	0.0	0.0	100.0	0.0
	3-CHLOROPROPENE	N	NA	0.0	0.0	0.0	100.0	0.0
	4-METHYL-2-PENTANONE	N	NA	0.0	0.0	0.0	100.0	0.0
	ACETONE	C	NA	0.0	10.0	0.0	80.0	0.0
		CN	NA	0.0	0.0	0.0	20.0	0.0
		CP	NA	0.0	10.0	0.0	0.0	0.0
		P	NA	0.0	80.0	0.0	0.0	0.0
	ACETONITRILE	C	NA	0.0	0.0	0.0	0.0	100.0
	ACROLEIN	C	NA	0.0	0.0	0.0	0.0	100.0
	ACRYLONITRILE	C	NA	0.0	0.0	0.0	0.0	100.0
	BENZENE	N	NA	0.0	0.0	0.0	100.0	0.0
	BROMODICHLOROMETHANE	N	NA	0.0	0.0	0.0	100.0	0.0
	BROMOMETHANE	C	NA	0.0	0.0	0.0	75.0	0.0
		CN	NA	0.0	0.0	0.0	25.0	0.0
	CARBON DISULFIDE	N	NA	0.0	0.0	0.0	100.0	0.0
	CARBON TETRACHLORIDE	N	NA	0.0	0.0	0.0	100.0	0.0
	CHLOROETHANE	N	NA	0.0	0.0	0.0	100.0	0.0
	CHLOROFORM	N	NA	0.0	0.0	0.0	100.0	0.0
	CHLOROMETHANE	N	NA	0.0	0.0	0.0	100.0	0.0
	CHLOROPRENE	N	NA	0.0	0.0	0.0	100.0	0.0
	CIS-1,2-DICHLOROETHENE	N	NA	0.0	0.0	0.0	100.0	0.0
		P	NA	0.0	100.0	0.0	0.0	0.0
	CIS-1,3-DICHLOROPROPENE	N	NA	0.0	0.0	0.0	100.0	0.0
	DICHLORODIFLUOROMETHANE	D	NA	0.0	33.3	0.0	100.0	0.0
		E	NA	0.0	33.3	0.0	0.0	0.0
		N	NA	0.0	33.3	0.0	0.0	0.0
	METHACRYLONITRILE	N	NA	0.0	0.0	0.0	100.0	0.0
	METHYL IODIDE	C	NA	0.0	0.0	0.0	94.4	0.0
		CN	NA	0.0	0.0	0.0	5.6	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[(1)]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	METHYLENE CHLORIDE	A	NA	100.0	0.0	100.0	0.0	0.0
		C	NA	0.0	0.0	0.0	100.0	0.0
	TOTAL XYLENES	P	NA	0.0	100.0	0.0	0.0	0.0
	TRANS-1,2-DICHLOROETHENE	N	NA	0.0	0.0	0.0	100.0	0.0
		P	NA	0.0	100.0	0.0	0.0	0.0
	TRANS-1,4-DICHLORO-2-BUTENE	N	NA	0.0	0.0	0.0	100.0	0.0
	TRICHLOROETHENE	CP	NA	0.0	33.3	0.0	0.0	0.0
		D	NA	0.0	33.3	0.0	0.0	0.0
		P	NA	0.0	33.3	0.0	0.0	0.0
	TRICHLOROFLUOROMETHANE	N	NA	0.0	0.0	0.0	100.0	0.0
	VINYL ACETATE	N	NA	0.0	0.0	0.0	100.0	0.0
	VINYL CHLORIDE	N	NA	0.0	0.0	0.0	100.0	0.0
ROUND 3								
M	ALUMINUM	A	0.0	0.0	100.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	100.0	100.0	0.0	0.0
	ARSENIC	A	0.0	0.0	65.6	0.0	0.0	0.0
		AF	0.0	0.0	34.4	0.0	0.0	0.0
	BARIUM	A	0.0	0.0	34.4	0.0	0.0	0.0
		AI	0.0	0.0	31.3	0.0	0.0	0.0
		D	0.0	0.0	34.4	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	90.9	100.0	0.0	0.0
		AI	0.0	0.0	9.1	0.0	0.0	0.0
	CADMIUM	A	0.0	0.0	100.0	100.0	0.0	0.0
	CALCIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
		AF	0.0	0.0	35.5	0.0	0.0	0.0
		AI	0.0	0.0	64.5	0.0	0.0	0.0
	CHROMIUM	AI	0.0	0.0	100.0	0.0	0.0	0.0
	COBALT	ADI	0.0	0.0	34.4	0.0	0.0	0.0
		AI	0.0	0.0	65.6	0.0	0.0	0.0
	COPPER	A	0.0	0.0	100.0	0.0	0.0	0.0
	IRON	A	0.0	0.0	65.6	0.0	0.0	0.0
		AGI	0.0	0.0	34.4	0.0	0.0	0.0
	LEAD	A	0.0	0.0	50.0	0.0	0.0	0.0
		AD	0.0	0.0	31.3	0.0	0.0	0.0
		AK	0.0	0.0	18.8	0.0	0.0	0.0
	MAGNESIUM	AI	0.0	0.0	100.0	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	65.6	0.0	0.0	0.0
		AFI	0.0	0.0	34.4	0.0	0.0	0.0
	MERCURY	A	0.0	0.0	0.0	100.0	0.0	0.0
		AD	0.0	0.0	6.3	0.0	0.0	0.0
		ADP	0.0	0.0	6.3	0.0	0.0	0.0
		P	0.0	0.0	87.5	0.0	0.0	0.0
	NICKEL	A	0.0	0.0	65.6	0.0	0.0	0.0
		AI	0.0	0.0	34.4	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
	POTASSIUM	ADI	0.0	0.0	31.3	0.0	0.0	0.0
		AEI	0.0	0.0	34.4	0.0	0.0	0.0
		AI	0.0	0.0	34.4	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	100.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	100.0	100.0	0.0	0.0
	SODIUM	A	0.0	0.0	20.0	100.0	0.0	0.0
		AI	0.0	0.0	80.0	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	50.0	100.0	0.0	0.0
		AP	0.0	0.0	50.0	0.0	0.0	0.0
	VANADIUM	AI	0.0	0.0	100.0	0.0	0.0	0.0
	ZINC	A	0.0	0.0	0.0	100.0	0.0	0.0
		AF	0.0	0.0	47.6	0.0	0.0	0.0
		DI	0.0	0.0	52.4	0.0	0.0	0.0
VOC	1,1,1,2-TETRACHLOROETHANE	D	0.0	0.0	0.0	0.0	25.0	0.0
		N	0.0	0.0	0.0	0.0	75.0	100.0
	1,1,1-TRICHLOROETHANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	1,1,2,2-TETRACHLOROETHANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	1,1,2-TRICHLOROETHANE	N	0.0	0.0	100.0	0.0	100.0	0.0
	1,1-DICHLOROETHANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	1,1-DICHLOROETHENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	1,2,3-TRICHLOROPROPANE	D	0.0	0.0	0.0	0.0	20.0	0.0
		N	0.0	0.0	0.0	0.0	80.0	100.0
	1,2-DIBROMO-3-CHLOROPROPANE	C	0.0	0.0	0.0	0.0	16.7	92.3
		D	0.0	0.0	0.0	0.0	16.7	0.0
		N	0.0	0.0	0.0	0.0	66.7	7.7
	1,2-DIBROMOETHANE	C	0.0	0.0	0.0	0.0	73.3	0.0
		D	0.0	0.0	0.0	0.0	6.7	0.0
		N	0.0	0.0	0.0	0.0	20.0	100.0
	1,2-DICHLOROETHANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	1,2-DICHLOROPROPANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	1,4-DIOXANE	D	0.0	0.0	0.0	0.0	20.0	0.0
		N	0.0	0.0	0.0	0.0	40.0	0.0
		R	0.0	0.0	0.0	0.0	40.0	0.0
	2-BUTANONE	C	0.0	0.0	0.0	0.0	0.0	92.3
		N	0.0	0.0	0.0	0.0	100.0	7.7
		NP	0.0	0.0	12.5	0.0	0.0	0.0
		P	0.0	0.0	87.5	0.0	0.0	0.0
	2-HEXANONE	N	0.0	0.0	0.0	0.0	100.0	100.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	3-CHLOROPROPENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	4-METHYL-2-PENTANONE	N	0.0	0.0	0.0	0.0	100.0	100.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	ACETONE	A	100.0	100.0	12.5	100.0	0.0	0.0
		AEN	0.0	0.0	6.3	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
		AN	0.0	0.0	6.3	0.0	0.0	0.0
		AP	0.0	0.0	43.8	0.0	0.0	0.0
		C	0.0	0.0	0.0	0.0	0.0	100.0
		CE	0.0	0.0	6.3	0.0	0.0	0.0
		P	0.0	0.0	18.8	0.0	0.0	0.0
		PE	0.0	0.0	6.3	0.0	0.0	0.0
	ACETONITRILE	C	0.0	0.0	0.0	0.0	76.5	0.0
		N	0.0	0.0	0.0	0.0	11.8	0.0
		R	0.0	0.0	0.0	0.0	11.8	0.0
	ACROLEIN	C	0.0	0.0	0.0	0.0	0.0	99.1
		CN	0.0	0.0	0.0	0.0	0.0	0.9
	ACRYLONITRILE	C	0.0	0.0	0.0	0.0	0.0	92.3
		N	0.0	0.0	0.0	0.0	100.0	7.7
	BENZENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	BROMODICHLOROMETHANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	BROMOFORM	N	0.0	0.0	0.0	0.0	100.0	100.0
	BROMOMETHANE	C	0.0	0.0	0.0	0.0	34.5	0.0
		CE	0.0	0.0	0.0	0.0	55.2	0.0
		CEN	0.0	0.0	100.0	0.0	0.0	0.0
		EN	0.0	0.0	0.0	0.0	3.4	0.0
		N	0.0	0.0	0.0	0.0	6.9	0.0
	CARBON DISULFIDE	EP	0.0	0.0	50.0	0.0	0.0	0.0
		N	0.0	0.0	0.0	0.0	100.0	100.0
		P	0.0	0.0	50.0	0.0	0.0	0.0
	CARBON TETRACHLORIDE	N	0.0	0.0	0.0	0.0	100.0	100.0
	CHLOROBENZENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	CHLORODIBROMOMETHANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	CHLOROETHANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	CHLOROFORM	D	0.0	0.0	25.0	0.0	0.0	0.0
		N	0.0	0.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	50.0	0.0	0.0	0.0
		RP	0.0	0.0	25.0	0.0	0.0	0.0
	CHLOROMETHANE	N	0.0	0.0	0.0	0.0	100.0	100.0
	CHLOROPRENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	CIS-1,2-DICHLOROETHENE	G	0.0	0.0	16.7	0.0	0.0	0.0
		N	0.0	0.0	8.3	0.0	100.0	100.0
		P	0.0	0.0	75.0	0.0	0.0	0.0
	CIS-1,3-DICHLOROPROPENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	DIBROMOMETHANE	D	0.0	0.0	0.0	0.0	25.0	0.0
		N	0.0	0.0	0.0	0.0	75.0	100.0
	DICHLORODIFLUOROMETHANE	C	0.0	0.0	23.1	0.0	100.0	0.0
		CG	0.0	0.0	2.6	0.0	0.0	0.0
		CP	0.0	0.0	7.7	0.0	0.0	0.0
		G	0.0	0.0	7.7	0.0	0.0	0.0
		N	0.0	0.0	7.7	0.0	0.0	100.0

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[(1)]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**
		P	0.0	0.0	51.3	0.0	0.0	0.0
	ETHYL METHACRYLATE	N	0.0	0.0	0.0	0.0	100.0	100.0
	ETHYLBENZENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	ISOBUTANOL	N	0.0	0.0	0.0	0.0	50.0	0.0
		R	0.0	0.0	0.0	0.0	50.0	0.0
	METHACRYLONITRILE	C	0.0	0.0	0.0	0.0	0.0	92.3
		N	0.0	0.0	0.0	0.0	100.0	7.7
	METHYL IODIDE	C	0.0	0.0	0.0	0.0	50.0	50.0
		N	0.0	0.0	0.0	0.0	50.0	50.0
	METHYL METHACRYLATE	N	0.0	0.0	0.0	0.0	100.0	100.0
	METHYLENE CHLORIDE	A	0.0	100.0	0.0	100.0	0.0	0.0
		ACN	0.0	0.0	100.0	0.0	0.0	0.0
		C	0.0	0.0	0.0	0.0	98.4	0.0
		CN	0.0	0.0	0.0	0.0	1.6	0.0
		N	0.0	0.0	0.0	0.0	0.0	100.0
	PROPIONITRILE	N	0.0	0.0	0.0	0.0	50.0	0.0
		R	0.0	0.0	0.0	0.0	50.0	0.0
	STYRENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	TETRACHLOROETHENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	TOLUENE	N	0.0	0.0	0.0	0.0	100.0	100.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	TOTAL XYLENES	N	0.0	0.0	0.0	0.0	100.0	100.0
	TRANS-1,2-DICHLOROETHENE	N	0.0	0.0	0.0	0.0	100.0	100.0
		P	0.0	0.0	100.0	0.0	0.0	0.0
	TRANS-1,3-DICHLOROPROPENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	TRANS-1,4-DICHLORO-2-BUTENE	N	0.0	0.0	0.0	0.0	100.0	100.0
	TRICHLOROETHENE	G	0.0	0.0	19.0	0.0	0.0	0.0
		L	0.0	0.0	4.8	0.0	0.0	0.0
		LN	0.0	0.0	4.8	0.0	0.0	0.0
		N	0.0	0.0	4.8	0.0	100.0	0.0
		P	0.0	0.0	66.7	0.0	0.0	0.0
	TRICHLOROFLUOROMETHANE	N	0.0	0.0	0.0	0.0	0.0	100.0
		NP	0.0	0.0	20.0	0.0	0.0	0.0
		P	0.0	0.0	70.0	0.0	0.0	0.0
		PN	0.0	0.0	10.0	0.0	0.0	0.0
	VINYL ACETATE	N	0.0	0.0	0.0	0.0	100.0	100.0
	VINYL CHLORIDE	N	0.0	0.0	0.0	0.0	100.0	0.0

A = Lab Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance

TABLE H-13

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**U**	**UJ**	**UR**

I = ICP Serial Dilution Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance, Dioxins
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography, interferences, etc.)
R = Surrogates Recovery Noncompliance
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
W = EMPC result
BJ = Associated blank was contaminated; anlayte was detected and reported result is an estimate
BU = Associated blank was contaminated and result was classified as non-detect
J = Result is estimated
U = Analyte was not detected at the indicated detection limit
UJ = Analyte was not detected at the indicated detection limit and result is estimated
UR = Result is not usable and was reported as not detected
DIOX = Dioxins and furans
EXP = Explosives
HERB = Herbicides
M = Metals, total
MISC = Miscellaneous parameters
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds
PEST/PCB = Pesticides/polychlorinated biphenyls

APPENDIX I

SUPPORTING INFORMATION FOR THE HEALTH RISK ASSESSMENT

I.1 RAGS Part D Tables
I.2 Sample Calculations
I.3 Lead Modeling Results
I.4 Building 146 Indoor Air Evaluation
I.5 Background Analysis

APPENDIX I.1

RAGS-PART D TABLES

RAGS Part D Table 1

Selection Of Exposure Pathways

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	SWMU 16	Maintenance Worker	Adult	Ingestion Dermal	Quant Quant	Maintenance workers may contact surface soil during normal work activities.
				Occupational Worker	Adult	Ingestion Dermal	Quant Quant	Occupational workers may contact surface soil during normal work activities.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 16 is not limited by any physical restraint. Adolescent trespassers may be exposed to surface soil while at the site.
		Air	SWMU 16	Maintenance Worker	Adult	Inhalation	Quant	Maintenance workers may be exposed to fugitive dust and volatile emissions during work activities.
				Occupational Worker	Adult	Inhalation	Quant	Occupational workers may be exposed to fugitive dust and volatile emissions during work activities.
				Trespassers	Adolescents	Inhalation	Quant	Although access to the base is controlled, once inside the base, access to the SWMU 16 is not limited by any physical restraint.
	Subsurface Soil	Subsurface Soil	SWMU 16	Maintenance Worker	Adult	Ingestion Dermal	None None	Maintenance workers are not expected to be exposed to subsurface soil.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to subsurface soil.
				Trespassers	Adolescents	Ingestion Dermal	None None	Trespassers are not exposed to subsurface soil.
		Air	SWMU 16	Maintenance Worker	Adult	Inhalation	None	Maintenance workers are not expected to be exposed to subsurface soil.
				Occupational Worker	Adult	Inhalation	None	Occupational workers are not expected to be exposed to subsurface soil.
				Trespassers	Adolescents	Inhalation	None	Trespassers are not exposed to subsurface soil.
	Groundwater	Groundwater	All Aquifers	Maintenance Workers	Adult	Ingestion Dermal	None None	Maintenance workers are not expected to have contact with groundwater.
				Occupational Worker	Adult	Ingestion Dermal	Quant Quant	Occupational workers may be exposed to groundwater if groundwater was used as a potable water source.
				Trespassers	Adolescents	Ingestion Dermal	None None	Adolescent trespassers are not expected to be exposed to groundwater.
		Air	All Aquifers	Maintenance Workers	Adult	Inhalation	None	Maintenance workers are not expected to be exposed to COPCs that have volatilized from groundwater.
				Occupational Worker	Adult	Inhalation	None	Occupational workers are not expected to be exposed to COPCs that have volatilized from groundwater.
				Trespassers	Adolescents	Inhalation	None	Adolescent trespassers are not expected to be exposed to groundwater.
			Vapor Intrusion	Occupational Worker	Adult	Inhalation	Quant	Occupational workes may be exposed to COPCs that have volatilized from groundwater and migrated through building foundations into indoor air

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Water	Surface Water	Gullies and Turkey Creek	Maintenance Workers	Adult	Ingestion Dermal	None Quant	Maintenance workers are not expected to ingest surface water. Maintenance workers may have dermal contact with surface water.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to surface water.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 16 is not limited by any physical restraint. Adolescent trespassers may be exposed to surface water while at the site.
	Sediment	Sediment	Gullies and Turkey Creek	Maintenance Workers	Adult	Ingestion Dermal	Quant Quant	Maintenance workers may contact sediment.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to sediment.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 16 is not limited by any physical restraint. Adolescent trespassers may be exposed to sediment while at the site.
Future	Surface Soil	Surface Soil	SWMU 16	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with surface soil during excavation activities.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions.
		Air	SWMU 16	Construction Workers	Adult	Inhalation	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Recreational Users	Child	Inhalation	Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Inhalation	Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
	Subsurface Soil	Subsurface Soil	SWMU 16	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Recreational Users	Child	Ingestion Dermal	None None	Recreational users are not expected to be exposed to subsurface soil.
					Adult	Ingestion Dermal	None None	Recreational users are not expected to be exposed to subsurface soil.
				Residents	Child	Ingestion Dermal	None None	Future residents are not expected to be exposed to subsurface soil.
					Adult	Ingestion Dermal	None None	Future residents are not expected to be exposed to subsurface soil.

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Subsurface Soil	Air	SWMU 16	Construction Workers	Adult	Inhalation	None	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Recreational Users	Child	Inhalation	None	Recreational workers are not expected to be exposed to subsurface soil.
					Adult	Inhalation	None	Recreational workers are not expected to be exposed to subsurface soil.
		Air	SWMU 16	Residents	Child	Inhalation	None	Future residents are not expected to be exposed to subsurface soil.
					Adult	Inhalation	None	Future residents are not expected to be exposed to subsurface soil.
	Groundwater	Groundwater	All Aquifers	Construction Workers	Adult	Ingestion Dermal	None Quant	Construction workers are not expected to ingest groundwater. Construction workers may have dermal contact with ground water during excavation activities.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	Recreational users may be exposed to groundwater if groundwater was used as a potable water source.
					Adult	Ingestion Dermal	Quant Quant	Recreational users may be exposed to groundwater if groundwater was used as a potable water source.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
		Air	All Aquifers	Construction Workers	Adult	Inhalation	Quant	Construction workers may be exposed to COPCs that have volatilized from groundwater during excavation activities.
				Recreational Users	Child	Inhalation	None	Recreational users are not expected to be exposed to COPCs that have volatilized from groundwater.
					Adult	Inhalation	None	Recreational users are not expected to be exposed to COPCs that have volatilized from groundwater.
				Residents	Child	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
			Vapor Intrusion	Residents	Child	Inhalation	Quant	Child Residents may be exposed to COPCs that have volatilized from groundwater and migrated through building foundations into indoor air.
					Adult	Inhalation	Quant	Adult Residents may be exposed to COPCs that have volatilized from groundwater and migrated through building foundations into indoor air.
	Surface Water	Surface Water	Gullies and Turkey Creek	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not expected to be exposed to surface water.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Sediment	Sediment	Gullies and Turkey Creek	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not expected to be exposed to sediment.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.

Notes:
Quant - Quantitative.
Qual - Qualitative.

RAGS Part D Table 2

Occurrence, Distribution And Selection Of Chemicals Of Potential Concern

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OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

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TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
SWMU 16	Dioxins/Furans														
	3268-87-9	1,2,3,4,6,7,8,9-OCDD	79.1	11500	ng/kg	16SS0330002	27/28	49.4	11500	NA	39000 C[8]	NA	NA	No	BSL
	39001-02-0	1,2,3,4,6,7,8,9-OCDF	0.62 J	20.1	ng/kg	16SS0130002	9/28	0.2 - 2.6	20.1	NA	39000 C[8]	NA	NA	No	BSL
	35822-46-9	1,2,3,4,6,7,8-HPCDD	1.1 J	151	ng/kg	16SS0060002	27/28	1.5	151	NA	390 C[8]	NA	NA	No	BSL
	67562-39-4	1,2,3,4,6,7,8-HPCDF	0.33 J	8	ng/kg	16SS0130002	10/28	0.07 - 6.2	8	NA	390 C[8]	NA	NA	No	BSL
	55673-89-7	1,2,3,4,7,8,9-HPCDF	1.8 J	1.8 J	ng/kg	16SS0130002	1/28	0.08 - 1.2	1.8	NA	390 C[8]	NA	NA	No	BSL
	39227-28-6	1,2,3,4,7,8-HXCDD	0.2 J	1.5 J	ng/kg	16SS0270002	6/28	0.1 - 0.82	1.5	NA	39 C[8]	NA	NA	No	BSL
	70648-26-9	1,2,3,4,7,8-HXCDF	0.17 J	0.98 J	ng/kg	16SS0130002	9/28	0.05 - 0.44	0.98	NA	39 C[8]	NA	NA	No	BSL
	57653-85-7	1,2,3,6,7,8-HXCDD	0.27 J	2.5 J	ng/kg	16SS0270002	8/28	0.09 - 0.92	2.5	NA	39 C[8]	NA	NA	No	BSL
	57117-44-9	1,2,3,6,7,8-HXCDF	0.24 J	0.64 J	ng/kg	16SS0130002	4/28	0.04 - 0.4	0.64	NA	39 C[8]	NA	NA	No	BSL
	19408-74-3	1,2,3,7,8,9-HXCDD	0.47 J	4.7 J	ng/kg	16SS0270002	14/28	0.1 - 1.1	4.7	NA	39 C[8]	NA	NA	No	BSL
	72918-21-9	1,2,3,7,8,9-HXCDF	0.25 J	0.81 J	ng/kg	16SS0160002	3/28	0.06 - 0.5	0.81	NA	39 C[8]	NA	NA	No	BSL
	40321-76-4	1,2,3,7,8-PECDD	0.14 J	1.5 J	ng/kg	16SS0320002	3/28	0.1 - 0.8	1.5	NA	3.9 C[8]	NA	NA	No	BSL
	60851-34-5	2,3,4,6,7,8-HXCDF	0.12 J	0.75 J	ng/kg	16SS0270002	5/28	0.05 - 0.4	0.75	NA	39 C[8]	NA	NA	No	BSL
	51207-31-9	2,3,7,8-TCDF	0.51 J	0.75 J	ng/kg	16SS0270002	2/28	0.05 - 0.4	0.75	NA	39 C[8]	NA	NA	No	BSL
		2,3,7,8-TCDD TEQs	0.000079	3.30	ng/kg	16SS0270002	28/28	---	3.30	NA	3.9 C	NA	NA	No	BSL
	37871-00-4	TOTAL HPCDD	2.3	302	ng/kg	16SS0270002	27/28	3.3	302	NA	NA	NA	NA	No	NTX
	38998-75-3	TOTAL HPCDF	0.48 J	27.5 J	ng/kg	16SS0130002	12/28	0.08 - 1.4	27.5	NA	NA	NA	NA	No	NTX
	34465-46-8	TOTAL HXCDD	1.6	45.9	ng/kg	16SS0270002	20/28	0.1 - 2	45.9	NA	NA	NA	NA	No	NTX
	55684-94-1	TOTAL HXCDF	0.17	11.7 J	ng/kg	16SS0270002	15/28	0.05 - 0.51	11.7	NA	NA	NA	NA	No	NTX
	36088-22-9	TOTAL PECDD	0.34	4.4 J	ng/kg	16SS0270002	5/28	0.1 - 0.8	4.4	NA	NA	NA	NA	No	NTX
	30402-15-4	TOTAL PECDF	1.3 J	7.6 J	ng/kg	16SS0130002	8/28	0.07 - 0.87	7.6	NA	NA	NA	NA	No	NTX
	55722-27-5	TOTAL TCDF	0.26	13.3 J	ng/kg	16SS0320002	6/28	0.05 - 7.9	13.3	NA	NA	NA	NA	No	NTX
	Volatile Organic Compounds														
	78-93-3	2-Butanone	1.1 J	5 J	ug/kg	16SS0730102	5/65	0.888 - 1.3	5	NA	2200000 N	44000000	IDEM	No	BSL
	591-78-6	2-Hexanone	3 J	3 J	ug/kg	16SS0560102	1/69	0.888 - 1.3	3	NA	NA	NA	NA	No	NTX
	108-10-1	4-Methyl-2-Pentanone	1 J	1 J	ug/kg	16SS0730102	1/69	0.888 - 1.3	1	NA	530000 N	12000000	IDEM	No	BSL
	67-64-1	Acetone	1 J	71 J	ug/kg	16SS0290002	18/67	0.93 - 13	71	NA	1400000 N	4800000	IDEM	No	BSL
	75-15-0	Carbon Disulfide	2 J	3	ug/kg	16SS0720102	2/69	0.888 - 1.3	3	NA	36000 N	900000	IDEM	No	BSL
	67-66-3	Chloroform	1 J	1 J	ug/kg	16SS0990102	1/69	0.888 - 1.3	1	NA	220 C	910	IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1.1 J	73	ug/kg	16SS0660102	9/69	0.888 - 1.3	73	NA	4300 N	110000	IDEM	No	BSL
	75-71-8	Dichlorodifluoromethane	1 J	20 J	ug/kg	16SS0710102	15/69	0.893 - 1.3	20	NA	9400 N	NA	NA	No	BSL
	75-09-2	Methylene Chloride	3 J	3 J	ug/kg	16SS0710102	1/69	0.888 - 13	3	NA	9100 C	120000	IDEM	No	BSL
	100-42-5	Styrene	1 J	1 J	ug/kg	16SS0040002	1/69	0.888 - 1.3	1	NA	1700000 sat	11000000	IDEM	No	BSL
	108-88-3	Toluene	1 J	1 J	ug/kg	16SS0160002, 16SS0730102	2/69	0.888 - 1.3	1	NA	520000 sat	1700000	IDEM	No	BSL
	1330-20-7	Total Xylenes	3	3	ug/kg	16SS0730102	1/69	0.888 - 1.3	3	NA	27000 N	690000	IDEM	No	BSL
	156-60-5	trans-1,2-Dichloroethene	1 J	2 J	ug/kg	16SS0030002, 16SS0390002	5/69	0.888 - 1.3	2	NA	6900 N	180000	IDEM	No	BSL
	79-01-6	Trichloroethene	2 J	170	ug/kg	16SS0980102	17/69	0.893 - 1.3	170	NA	53 C	710	IDEM	Yes	ASL
	75-69-4	Trichlorofluoromethane	1	3	ug/kg	7 Samples	33/69	0.893 - 1.3	3	NA	39000 N	NA	NA	No	BSL
	108-05-4	Vinyl Acetate	1 J	1 J	ug/kg	16SS0190002, 16SS0350002	2/69	0.888 - 1.3	1	NA	43000 N	1100000	IDEM	No	BSL
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	4 J	94	ug/kg	16SS0030002	2/39	3.4 - 4.3	94	NA	5600 N[9]	3200000	IDEM	No	BSL
	83-32-9	Acenaphthene	5 J	1800	ug/kg	16SS0030002	2/39	3.5 - 4.3	1800	NA	370000 N	9500000	IDEM	No	BSL
	208-96-8	Acenaphthylene	4 J	680	ug/kg	16SS0030002	3/39	3.5 - 4.3	680	NA	370000 N[10]	1100000	IDEM	No	BSL
	120-12-7	Anthracene	5 J	3500	ug/kg	16SS0030002	4/39	3.5 - 4.3	3500	NA	2200000 N	47000000	IDEM	No	BSL
	56-55-3	Benzo(a)anthracene	4 J	9600	ug/kg	16SS0030002	12/39	3.5 - 4.3	9600	NA	620 C	5000	IDEM	Yes	ASL
	50-32-8	Benzo(a)pyrene	4 J	8400	ug/kg	16SS0030002	13/39	3.5 - 4.3	8400	NA	62 C	500	IDEM	Yes	ASL
	205-99-2	Benzo(b)fluoranthene	4 J	9200	ug/kg	16SS0030002	16/39	3.5 - 4.2	9200	NA	620 C	5000	IDEM	Yes	ASL
	191-24-2	Benzo(g,h,i)perylene	4 J	5100	ug/kg	16SS0030002	12/39	3.5 - 4.3	5100	NA	230000 N[11]	50000	IDEM	No	BSL
	207-08-9	Benzo(k)fluoranthene	4 J	5000	ug/kg	16SS0030002	11/39	3.5 - 4.3	5000	NA	6200 C	50000	IDEM	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	92 J	1200	ug/kg	16SS0040002	9/39	69 - 730	1200	NA	35000 C	300000	IDEM	No	BSL
	218-01-9	Chrysene	4 J	11000	ug/kg	16SS0030002	15/39	3.5 - 4.3	11000	NA	62000 C	500000	IDEM	No	BSL
	53-70-3	Dibenzo(a,h)anthracene	8	1600	ug/kg	16SS0030002	3/39	3.5 - 4.3	1600	NA	62 C	500	IDEM	Yes	ASL
	132-64-9	Dibenzofuran	560 J	560 J	ug/kg	16SS0030002	1/39	69 - 87	560	NA	15000 N	370000	IDEM	No	BSL
	206-44-0	Fluoranthene	4 J	19000	ug/kg	16SS0030002	15/39	3.5 - 4.3	19000	NA	230000 N	6300000	IDEM	No	BSL
	86-73-7	Fluorene	4 J	2300	ug/kg	16SS0030002	4/39	3.5 - 4.3	2300	NA	270000 N	6300000	IDEM	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	5 J	4400	ug/kg	16SS0030002	10/39	3.5 - 4.3	4400	NA	620 C	5000	IDEM	Yes	BSL

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	91-20-3	Naphthalene	4 J	180	ug/kg	16SS0030002	3/39	3.4 - 4.3	180	NA	5600 N	3200000	IDEM	No	BSL
	85-01-8	Phenanthrene	4 J	8700	ug/kg	16SS0030002	8/39	3.5 - 4.3	8700	NA	230000 N[11]	470000	IDEM	No	BSL
	129-00-0	Pyrene	4 J	35000	ug/kg	16SS0030002	17/39	3.5 - 4.3	35000	NA	230000 N	4700000	IDEM	No	BSL
	94-59-7	Safrole	340 J	15000	ug/kg	16SS0130002	5/39	69 - 150	15000	NA	NA	NA	NA	No	NTX
	Energetics														
	2691-41-0	HMX	0.34 J	0.34 J	mg/kg	16SS0330002	1/39	0.25	0.34	NA	3100 N	NA	NA	No	BSL
	Herbicides														
	70-30-4	Hexachlorophene	2.6 J	2.6 J	ug/kg	16SS0030002	1/39	0.62 - 1.1	2.6	NA	1800 N	NA	NA	No	BSL
	87-86-5	Pentachlorophenol	0.79 J	14	ug/kg	16SS0050002	4/39	0.46 - 0.58	14	NA	3000 C	20000	IDEM	No	BSL
	Inorganics														
	7429-90-5	**Aluminum**	1780 J	34200 J	mg/kg	16SS0880002	48/49	3610	34200	5020 - 17400	**7600 N**	NA	NA	**Yes**	ASL
	7440-36-0	**Antimony**	0.51 J	27.2 J	mg/kg	16SS0140002	22/49	0.19 - 3.4	27.2	0.49 - 11.3	**3.1 N**	140	IDEM	**Yes**	ASL
	7440-38-2	**Arsenic**	0.75 J	12.7 J	mg/kg	16SS0880002	49/49	---	12.7	1.1 - 10.2	**0.39 C**	**3.9**	IDEM	**Yes**	ASL
	7440-39-3	Barium	11.9 J	303 J	mg/kg	16SS0130002	49/49	---	303	24.8 - 155	540 N	23000	IDEM	No	BSL
	7440-41-7	Beryllium	0.23 J	1.4 J	mg/kg	16SS0170002	23/49	0.06 - 1	1.4	0.3 - 0.82	15 N	680	IDEM	No	BSL
	7440-43-9	Cadmium	0.19 J	2.8 J	mg/kg	16SS0150002	17/49	0.13 - 1	2.8	0.05 - 3.6	3.7 N	12	IDEM	No	BSL
	7440-70-2	Calcium	212 J	246000 J	mg/kg	16SS0030002	46/49	152 - 236	246000	53.6 - 35300	NA	NA	NA	No	NUT
	7440-47-3	Chromium	4.3 J	38.2 J	mg/kg	16SS0880002	49/49	---	38.2	7.7 - 30.6	210 C[12]	430[13]	IDEM	No	BSL
	7440-48-4	Cobalt	0.87 J	25.9 J	mg/kg	16SS0170002	49/49	---	25.9	1.8 - 27.1	140 N[14]	NA	NA	No	BSL
	7440-50-8	**Copper**	2.4 J	413 J	mg/kg	16SS0150002	49/49	---	413	3.5 - 23.8	**310 N**	13000	IDEM	**Yes**	ASL
	7439-89-6	**Iron**	2170 J	43000 J	mg/kg	16SS0200002	49/49	---	43000	7140 - 40800	**2300 N**	NA	NA	**Yes**	ASL
	7439-92-1	**Lead**	3.5 J	1240 J	mg/kg	16SS0140002	48/49	14.8	1240	6.4 - 21.5	**400**	**400**	IDEM	**Yes**	ASL
	7439-93-2	Lithium	0.81 J	21.5 J	mg/kg	16SS0170002	37/39	4.3 - 5.6	21.5	7.8 - 46.6	160 N	NA	NA	No	BSL
	7439-95-4	Magnesium	105 J	62500 J	mg/kg	16SS0030002	49/49	---	62500	496 - 2870	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	3.8 J	1040 J	mg/kg	16SS0130002	49/49	---	1040	23.2 - 3040	**180 N**	NA	NA	**Yes**	ASL
	7439-97-6	Mercury	0.015 J	0.22 J	mg/kg	16SS0050002	34/49	0.002 - 0.021	0.22	0.04 - 0.14	2.3 N	100	IDEM	No	BSL
	7440-02-0	Nickel	0.71 J	41.3 J	mg/kg	16SS0170002	49/49	---	41.3	4.6 - 23.7	160 N	6900	IDEM	No	BSL
	7440-09-7	Potassium	206 J	2980 J	mg/kg	16SS0880002	49/49	---	2980	280 - 1650	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.16 J	0.31 J	mg/kg	16SS0320002	2/49	0.03 - 0.82	0.31	0.28 - 0.88	39 N	1700	IDEM	No	BSL
	7440-22-4	Silver	0.28 J	0.28 J	mg/kg	16SS0330002	1/49	0.02 - 0.26	0.28	0.04 - 0.11	39 N	1700	IDEM	No	BSL
	7440-23-5	Sodium	162 J	496 J	mg/kg	16SS0030002	4/49	12.7 - 84.9	496	3.7 - 205	NA	NA	NA	No	NUT
	7440-24-6	Strontium	4.5 J	252 J	mg/kg	16SS0030002	39/39	---	252	4.2 - 63.2	4700 N	NA	NA	No	BSL
	7440-28-0	Thallium	0.16 J	0.32 J	mg/kg	16SS0110002	2/49	0.03 - 0.5	0.32	0.05 - 0.31	0.52 N	24	IDEM	No	BSL
	7440-31-5	Tin	0.25 J	12.3 J	mg/kg	16SS0080002	8/49	0.32 - 2.4	12.3	NA	4700 N	NA	NA	No	BSL
	7440-32-6	Titanium	7.5 J	348 J	mg/kg	16SS0110002	44/44	---	348	4.1 - 11.7	31000 N[15]	NA	NA	No	BSL
	7440-62-2	**Vanadium**	3.6 J	65.2 J	mg/kg	16SS0880002	49/49	---	65.2	14.1 - 48.5	**7.8 N**	NA	NA	**Yes**	ASL
	7440-66-6	Zinc	24 J	1840 J	mg/kg	16SS0420002	36/49	5.2 - 2510	1840	9.4 - 60.2	2300 N	100000	IDEM	No	BSL

Footnotes

1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Taken from Table 4-1 of the Final Basewide Background Soil Investigation Report, Naval Surface Warfare Center Crane, Crane, Indiana, January, 2001.
5 - U.S. EPA Region 9 Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (U.S. EPA Region 9, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Value is derived by multiplying criteria for 2,3,7,8-TCDD by World Health Organization Toxicity Equivalent Factor.
9 - The value for naphthalene was used as a surrogate for 2-methylnaphthalene.
10 - The value for acenaphthene was used as a surrogate for acenaphthylene.
11 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
12 - The PRG for residential land use for total chromium is presented.
13 - Value is for hexavalent chromium.
14 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
15 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
sat = Soil Saturation Limit
TEQs = Toxicity Equivalent Concentration

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]

Associated Samples

16SS0010002	16SS0160002	16SS0310002	16SS0520102	16SS0670102	16SS0880002
16SS0020002	16SS0170002	16SS0320002	16SS0530102	16SS0680102	16SS0890002
16SS0030002	16SS0180002	16SS0330002	16SS0540102	16SS0690102	16SS0980102
16SS0040002	16SS0190002	16SS0340002	16SS0550102	16SS0700102	16SS0990102
16SS0050002	16SS0200002	16SS0350002	16SS0560102	16SS0710102	
16SS0060002	16SS0210002	16SS0360002	16SS0570102	16SS0720102	
16SS0070002	16SS0220002	16SS0370002	16SS0580102	16SS0730102	
16SS0080002	16SS0230002	16SS0380002	16SS0590102	16SS0740102	
16SS0090002	16SS0240002	16SS0390002	16SS0600102	16SS0750102	
16SS0100002	16SS0250002	16SS0420002	16SS0610102	16SS0760102	
16SS0110002	16SS0260002	16SS0430002	16SS0620102	16SS0770102	
16SS0120002	16SS0270002	16SS0440002	16SS0630102	16SS0780102	
16SS0130002	16SS0280002	16SS0450002	16SS0640102	16SS0850002	
16SS0140002	16SS0290002	16SS0460002	16SS0650102	16SS0860002	
16SS0150002	16SS0300002	16SS0510102	16SS0660102	16SS0870002	

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NTX = No Toxicity Data
NUT = Essential Nutrient

TABLE 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	U.S. EPA Generic SSL for Soil to Air[5]	U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM SSL for Migration to Groundwater[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
SWMU 16	Dioxins/Furans														
	3268-87-9	1,2,3,4,6,7,8,9-OCDD	49.4	11500	ng/kg	16SS0330002	26/28	89.4 - 815	11500	NA	430000 C[8]	2800	NA	Yes	ASL
	39001-02-0	1,2,3,4,6,7,8,9-OCDF	0.62 J	20.1	ng/kg	16SS0130002	9/28	0.2 - 2.6	20.1	NA	430000 C[8]	2800	NA	No	BSL
	35822-46-9	1,2,3,4,6,7,8-HPCDD	1.1 J	151	ng/kg	16SS0060002	27/28	1.5	151	NA	4300 C[8]	28	NA	Yes	ASL
	67562-39-4	1,2,3,4,6,7,8-HPCDF	0.33 J	8	ng/kg	16SS0130002	10/28	0.07 - 6.2	8	NA	4300 C[8]	28	NA	No	BSL
	55673-89-7	1,2,3,4,7,8,9-HPCDF	1.8 J	1.8 J	ng/kg	16SS0130002	1/28	0.08 - 1.2	1.8	NA	4300 C[8]	28	NA	No	BSL
	39227-28-6	1,2,3,4,7,8-HXCDD	0.2 J	1.5 J	ng/kg	16SS0270002	6/28	0.1 - 0.82	1.5	NA	430 C[8]	2.8	NA	No	BSL
	70648-26-9	1,2,3,4,7,8-HXCDF	0.17 J	0.98 J	ng/kg	16SS0130002	9/28	0.05 - 0.44	0.98	NA	430 C[8]	2.8	NA	No	BSL
	57653-85-7	1,2,3,6,7,8-HXCDD	0.27 J	2.5 J	ng/kg	16SS0270002	8/28	0.09 - 0.92	2.5	NA	430 C[8]	2.8	NA	No	BSL
	57117-44-9	1,2,3,6,7,8-HXCDF	0.24 J	0.64 J	ng/kg	16SS0130002	4/28	0.04 - 0.4	0.64	NA	430 C[8]	2.8	NA	No	BSL
	19408-74-3	1,2,3,7,8,9-HXCDD	0.47 J	4.7 J	ng/kg	16SS0270002	14/28	0.1 - 1.1	4.7	NA	430 C[8]	2.8	NA	Yes	ASL
	72918-21-9	1,2,3,7,8,9-HXCDF	0.25 J	0.81 J	ng/kg	16SS0160002	3/28	0.06 - 0.5	0.81	NA	430 C[8]	2.8	NA	No	BSL
	40321-76-4	1,2,3,7,8-PECDD	0.14 J	1.5 J	ng/kg	16SS0320002	3/28	0.1 - 0.8	1.5	NA	43 C[8]	0.28	NA	Yes	ASL
	60851-34-5	2,3,4,6,7,8-HXCDF	0.12 J	0.75 J	ng/kg	16SS0270002	5/28	0.05 - 0.4	0.75	NA	430 C[8]	2.8	NA	No	BSL
	51207-31-9	2,3,7,8-TCDF	0.51 J	0.75 J	ng/kg	16SS0270002	2/28	0.05 - 0.4	0.75	NA	430 C[8]	2.8	NA	No	BSL
		2,3,7,8-TCDD TEQs	0.000079	3.30	ng/kg	16SS0270002	28/28	---	3.30	NA	43 C	0.28	NA	Yes	ASL
	37871-00-4	TOTAL HPCDD	2.3	302	ng/kg	16SS0270002	27/28	3.3	302	NA	NA	NA	NA	No	NTX
	38998-75-3	TOTAL HPCDF	0.48 J	27.5 J	ng/kg	16SS0130002	12/28	0.08 - 1.4	27.5	NA	NA	NA	NA	No	NTX
	34465-46-8	TOTAL HXCDD	1.6	45.9	ng/kg	16SS0270002	20/28	0.1 - 2	45.9	NA	NA	NA	NA	No	NTX
	55684-94-1	TOTAL HXCDF	0.17	11.7 J	ng/kg	16SS0270002	15/28	0.05 - 0.51	11.7	NA	NA	NA	NA	No	NTX
	36088-22-9	TOTAL PECDD	0.34	4.4 J	ng/kg	16SS0270002	5/28	0.1 - 0.8	4.4	NA	NA	NA	NA	No	NTX
	30402-15-4	TOTAL PECDF	1.3 J	7.6 J	ng/kg	16SS0130002	8/28	0.07 - 0.87	7.6	NA	NA	NA	NA	No	NTX
	55722-27-5	TOTAL TCDF	0.26	13.3 J	ng/kg	16SS0320002	6/28	0.05 - 7.9	13.3	NA	NA	NA	NA	No	NTX
	Volatile Organic Compounds														
	78-93-3	2-Butanone	1.1 J	5 J	ug/kg	16SS0730102	5/65	0.888 - 1.3	5	NA	24000000 sat	4400	35000	No	BSL
	591-78-6	2-Hexanone	3 J	3 J	ug/kg	16SS0560102	1/69	0.888 - 1.3	3	NA	NA	NA	NA	No	NTX
	108-10-1	4-Methyl-2-Pentanone	1 J	1 J	ug/kg	16SS0730102	1/69	0.888 - 1.3	1	NA	2700000 sat	620	20000	No	BSL
	67-64-1	Acetone	1 J	71 J	ug/kg	16SS0290002	18/67	0.93 - 13	71	NA	NA	6600	3800	No	BSL
	75-15-0	Carbon Disulfide	2 J	3	ug/kg	16SS0720102	2/69	0.888 - 1.3	3	NA	720000 sat	1500	10000	No	BSL
	67-66-3	Chloroform	1 J	1 J	ug/kg	16SS0990102	1/69	0.888 - 1.3	1	NA	280 C	29	470	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1.1 J	73	ug/kg	16SS0660102	9/69	0.888 - 1.3	73	NA	NA	20	400	Yes	ASL
	75-71-8	Dichlorodifluoromethane	1 J	20 J	ug/kg	16SS0710102	15/69	0.893 - 1.3	20	NA	25000 N	28000	NA	No	BSL
	75-09-2	Methylene Chloride	3 J	3 J	ug/kg	16SS0710102	1/69	0.888 - 13	3	NA	13000 C	1.2	23	Yes	ASL
	100-42-5	Styrene	1 J	1 J	ug/kg	16SS0040002	1/69	0.888 - 1.3	1	NA	1500000 sat	180	3500	No	BSL
	108-88-3	Toluene	1 J	1 J	ug/kg	16SS0160002, 16SS0730102	2/69	0.888 - 1.3	1	NA	650000 sat	590	12000	No	BSL
	1330-20-7	Total Xylenes	3	3	ug/kg	16SS0730102	1/69	0.888 - 1.3	3	NA	71000 N	7100	210000	No	BSL
	156-60-5	trans-1,2-Dichloroethene	1 J	2 J	ug/kg	16SS0030002, 16SS0390002	5/69	0.888 - 1.3	2	NA	NA	34	680	No	BSL
	79-01-6	Trichloroethene	2 J	170	ug/kg	16SS0980102	17/69	0.893 - 1.3	170	NA	71 C	2.8	57	Yes	ASL
	75-69-4	Trichlorofluoromethane	1	3	ug/kg	7 Samples	33/69	0.893 - 1.3	3	NA	110000 N	8000	NA	No	BSL
	108-05-4	Vinyl Acetate	1 J	1 J	ug/kg	16SS0190002, 16SS0350002	2/69	0.888 - 1.3	1	NA	99000 N	7800	2300	No	BSL
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	4 J	94	ug/kg	16SS0030002	2/39	3.4 - 4.3	94	NA	NA	NA	16000	No	BSL
	83-32-9	Acenaphthene	5 J	1800	ug/kg	16SS0030002	2/39	3.5 - 4.3	1800	NA	NA	31000	130000	No	BSL
	208-96-8	Acenaphthylene	4 J	680	ug/kg	16SS0030002	3/39	3.5 - 4.3	680	NA	NA	NA	18000	No	BSL
	120-12-7	Anthracene	5 J	3500	ug/kg	16SS0030002	4/39	3.5 - 4.3	3500	NA	NA	650000	51000	No	BSL
	56-55-3	Benzo(a)anthracene	4 J	9600	ug/kg	16SS0030002	12/39	3.5 - 4.3	9600	NA	NA	160	19000	Yes	ASL
	50-32-8	Benzo(a)pyrene	4 J	8400	ug/kg	16SS0030002	13/39	3.5 - 4.3	8400	NA	NA	410	6200	Yes	ASL
	205-99-2	Benzo(b)fluoranthene	4 J	9200	ug/kg	16SS0030002	16/39	3.5 - 4.2	9200	NA	NA	490	57000	Yes	ASL
	191-24-2	Benzo(g,h,i)perylene	4 J	5100	ug/kg	16SS0030002	12/39	3.5 - 4.3	5100	NA	NA	NA	16000	No	BSL
	207-08-9	Benzo(k)fluoranthene	4 J	5000	ug/kg	16SS0030002	11/39	3.5 - 4.3	5000	NA	NA	490	39000	Yes	ASL
	117-81-7	Bis(2-ethylhexyl)phthalate	92 J	1200	ug/kg	16SS0040002	9/39	69 - 730	1200	NA	NA	180000	3600000	No	BSL
	218-01-9	Chrysene	4 J	11000	ug/kg	16SS0030002	15/39	3.5 - 4.3	11000	NA	7500000 C	160	25000	Yes	ASL
	53-70-3	Dibenzo(a,h)anthracene	8	1600	ug/kg	16SS0030002	3/39	3.5 - 4.3	1600	NA	NA	1500	18000	Yes	ASL
	132-64-9	Dibenzofuran	560 J	560 J	ug/kg	16SS0030002	1/39	69 - 87	560	NA	NA	2400	4900	No	BSL
	206-44-0	Fluoranthene	4 J	19000	ug/kg	16SS0030002	15/39	3.5 - 4.3	19000	NA	NA	310000	880000	No	BSL
	86-73-7	Fluorene	4 J	2300	ug/kg	16SS0030002	4/39	3.5 - 4.3	2300	NA	NA	41000	170000	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	5 J	4400	ug/kg	16SS0030002	10/39	3.5 - 4.3	4400	NA	NA	1400	3100	Yes	ASL
	91-20-3	Naphthalene	4 J	180	ug/kg	16SS0030002	3/39	3.4 - 4.3	180	NA	17000 N	3100	700	No	BSL
	85-01-8	Phenanthrene	4 J	8700	ug/kg	16SS0030002	8/39	3.5 - 4.3	8700	NA	NA	NA	13000	No	BSL
	129-00-0	Pyrene	4 J	35000	ug/kg	16SS0030002	17/39	3.5 - 4.3	35000	NA	NA	230000	570000	No	BSL
	94-59-7	Safrole	340 J	15000	ug/kg	16SS0130002	5/39	69 - 150	15000	NA	NA	NA	NA	NA	NTX

TABLE 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	U.S. EPA Generic SSL for Soil to Air[5]	U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM SSL for Migration to Groundwater[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	Energetics														
	2691-41-0	HMX	0.34 J	0.34 J	ug/kg	16SS0330002	1/39	0.25	0.34	NA	NA	NA	NA	No	NTX
	Herbicides														
	70-30-4	Hexachlorophene	2.6 J	2.6 J	ug/kg	16SS0030002	1/39	0.62 - 1.1	2.6	NA	NA	570000	NA	No	BSL
	87-86-5	Pentachlorophenol	0.79 J	14	ug/kg	16SS0050002	4/39	0.46 - 0.58	14	NA	NA	1.4	28	Yes	ASL
	Inorganics														
	7429-90-5	Aluminum	1780 J	34200 J	mg/kg	16SS0880002	48/49	3610	34200	5020 - 17400	686000 N	8.3	NA	Yes	ASL
	7440-36-0	Antimony	0.51 J	27.2 J	mg/kg	16SS0140002	22/49	0.19 - 3.4	27.2	0.49 - 11.3	NA	0.27	5.4	Yes	ASL
	7440-38-2	Arsenic	0.75 J	12.7 J	mg/kg	16SS0880002	49/49	---	12.7	1.1 - 10.2	745 C	0.29	29	Yes	ASL
	7440-39-3	Barium	11.9 J	303 J	mg/kg	16SS0130002	49/49	---	303	24.8 - 155	68600 N	82	1600	Yes	ASL
	7440-41-7	Beryllium	0.23 J	1.4 J	mg/kg	16SS0170002	23/49	0.06 - 1	1.4	0.3 - 0.82	1330 C	3.2	63	No	BSL
	7440-43-9	Cadmium	0.19 J	2.8 J	mg/kg	16SS0150002	17/49	0.13 - 1	2.8	0.05 - 3.6	1780 C	0.38	7.5	Yes	ASL
	7440-70-2	Calcium	212 J	246000 J	mg/kg	16SS0030002	46/49	152 - 236	246000	53.6 - 35300	NA	NA	NA	No	NUT
	7440-47-3	Chromium[9]	4.3 J	38.2 J	mg/kg	16SS0880002	49/49	---	38.2	7.7 - 30.6	267 C	2.1	NA	Yes	ASL
	7440-48-4	Cobalt	0.87 J	25.9 J	mg/kg	16SS0170002	49/49	---	25.9	1.8 - 27.1	1140 C	0.17	NA	Yes	ASL
	7440-50-8	Copper	2.4 J	413 J	mg/kg	16SS0150002	49/49	---	413	3.5 - 23.8	NA	560	920	No	BSL
	7439-89-6	Iron	2170 J	43000 J	mg/kg	16SS0200002	49/49	---	43000	7140 - 40800	NA	NA	NA	No	NTX
	7439-92-1	Lead	3.5 J	1240 J	mg/kg	16SS0140002	48/49	14.8	1240	6.4 - 21.5	NA	NA	81	Yes	ASL
	7439-93-2	Lithium	0.81 J	21.5 J	mg/kg	16SS0170002	37/39	4.3 - 5.6	21.5	7.8 - 46.6	NA	NA	NA	No	NTX
	7439-95-4	Magnesium	105 J	62500 J	mg/kg	16SS0030002	49/49	---	62500	496 - 2870	NA	NA	NA	No	NUT
	7439-96-5	Manganese	3.8 J	1040 J	mg/kg	16SS0130002	49/49	---	1040	23.2 - 3040	6860 N	110	NA	Yes	ASL
	7439-97-6	Mercury	0.015 J	0.22 J	mg/kg	16SS0050002	34/49	0.002 - 0.021	0.22	0.04 - 0.14	2.9 sat	0.1	2.1	Yes	ASL
	7440-02-0	Nickel	0.71 J	41.3 J	mg/kg	16SS0170002	49/49	---	41.3	4.6 - 23.7	NA	14	NA	Yes	ASL
	7440-09-7	Potassium	206 J	2980 J	mg/kg	16SS0880002	49/49	---	2980	280 - 1650	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.16 J	0.31 J	mg/kg	16SS0320002	2/49	0.03 - 0.82	0.31	0.28 - 0.88	NA	0.26	5.2	Yes	ASL
	7440-22-4	Silver	0.28 J	0.28 J	mg/kg	16SS0330002	1/49	0.02 - 0.26	0.28	0.04 - 0.11	NA	1.6	31	No	BSL
	7440-23-5	Sodium	162 J	496 J	mg/kg	16SS0030002	4/49	12.7 - 84.9	496	3.7 - 205	NA	NA	NA	No	NUT
	7440-24-6	Strontium	4.5 J	252 J	mg/kg	16SS0030002	39/39	---	252	4.2 - 63.2	NA	770	NA	No	BSL
	7440-28-0	Thallium	0.16 J	0.32 J	mg/kg	16SS0110002	2/49	0.03 - 0.5	0.32	0.05 - 0.31	NA	0.056	2.8	Yes	ASL
	7440-31-5	Tin	0.25 J	12.3 J	mg/kg	16SS0080002	8/49	0.32 - 2.4	12.3	NA	NA	NA	NA	No	NTX
	7440-32-6	Titanium	7.5 J	348 J	mg/kg	16SS0110002	44/44	---	348	4.1 - 11.7	NA	NA	NA	No	NTX
	7440-62-2	Vanadium	3.6 J	65.2 J	mg/kg	16SS0880002	49/49	---	65.2	14.1 - 48.5	NA	260	NA	No	BSL
	7440-66-6	Zinc	24 J	1840 J	mg/kg	16SS0420002	36/49	5.2 - 2510	1840	9.4 - 60.2	NA	680	14000	Yes	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Taken from Table 4-1 of the Final Basewide Background Soil Investigation Report, Naval Surface Warfare Center Crane, Crane, Indiana, January, 2001.
5 - EPA Soil Screening Levels. EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm (Soil to air SSLs for noncarcinogens are divided by 10).
The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Value is derived by multiplying criteria for 2,3,7,8-TCDD by World Health Organization Toxicity Equivalent Factor.
9 - Value is for total chromium.

Associated Samples

16SS0010002	16SS0160002	16SS0310002	16SS0520102	16SS0670102	16SS0880002
16SS0020002	16SS0170002	16SS0320002	16SS0530102	16SS0680102	16SS0890002
16SS0030002	16SS0180002	16SS0330002	16SS0540102	16SS0690102	16SS0980102
16SS0040002	16SS0190002	16SS0340002	16SS0550102	16SS0700102	16SS0990102
16SS0050002	16SS0200002	16SS0350002	16SS0560102	16SS0710102	
16SS0060002	16SS0210002	16SS0360002	16SS0570102	16SS0720102	
16SS0070002	16SS0220002	16SS0370002	16SS0580102	16SS0730102	
16SS0080002	16SS0230002	16SS0380002	16SS0590102	16SS0740102	
16SS0090002	16SS0240002	16SS0390002	16SS0600102	16SS0750102	
16SS0100002	16SS0250002	16SS0420002	16SS0610102	16SS0760102	
16SS0110002	16SS0260002	16SS0430002	16SS0620102	16SS0770102	
16SS0120002	16SS0270002	16SS0440002	16SS0630102	16SS0780102	
16SS0130002	16SS0280002	16SS0450002	16SS0640102	16SS0850002	
16SS0140002	16SS0290002	16SS0460002	16SS0650102	16SS0860002	
16SS0150002	16SS0300002	16SS0510102	16SS0660102	16SS0870002	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
SSL = Soil Screening Level
sat = Soil Saturation Limit

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
SWMU 16	Volatile Organic Compounds														
	79-00-5	1,1,2-Trichloroethane	4	8 J	ug/kg	16SB0560206	2/79	0.814 - 1.48	8	NA	730 C	9400	IDEM	No	BSL
	78-93-3	2-Butanone	1 J	2 J	ug/kg	16SB0600206	3/70	0.814 - 1.48	2	NA	2200000 N	44000000	IDEM	No	BSL
	67-64-1	Acetone	3 J	72 J	ug/kg	16SB0650206	11/78	0.869 - 24	72	NA	1400000 N	4800000	IDEM	No	BSL
	74-83-9	Bromomethane	4 J	4 J	ug/kg	16SB0560206	1/79	0.814 - 1.48	4	NA	390 N	9900	IDEM	No	BSL
	75-15-0	Carbon Disulfide	2 J	2 J	ug/kg	16SB0650206	1/78	0.814 - 1.48	2	NA	36000 N	900000	IDEM	No	BSL
	67-66-3	Chloroform	1.1 J	15	ug/kg	16SB0950607	9/79	0.814 - 1.48	15	NA	220 C	910	IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1 J	200	ug/kg	16SB0390203	19/78	0.814 - 1.48	200	NA	4300 N	110000	IDEM	No	BSL
	75-71-8	Dichlorodifluoromethane	1 J	170	ug/kg	16SB0470405	49/78	0.929 - 1.45	170	NA	9400 N	NA	NA	No	BSL
	108-88-3	Toluene	1 J	1 J	ug/kg	16SB0980607	1/78	0.814 - 1.48	1	NA	520000 sat	1700000	IDEM	No	BSL
	1330-20-7	Total Xylenes	1 J	2 J	ug/kg	16SB0470405, 16SB0480203, 16SB0490405	4/78	0.869 - 1.48	2	NA	27000 N	690000	IDEM	No	BSL
	156-60-5	trans-1,2-Dichloroethene	1 J	12	ug/kg	16SB0390203	5/78	0.814 - 1.48	12	NA	6900 N	180000	IDEM	No	BSL
	79-01-6	Trichloroethene	1 J	9000	ug/kg	16SB0950406	50/79	0.92 - 1.35	9000	NA	53 C	710	IDEM	Yes	ASL
	75-69-4	Trichlorofluoromethane	1 J	2 J	ug/kg	11 Samples	15/78	0.814 - 1.45	2	NA	39000 N	NA	IDEM	No	BSL
	75-01-4	Vinyl Chloride	6	12	ug/kg	16SB0650206	2/79	0.814 - 1.48	12	NA	79 C	1500	IDEM	No	BSL
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	4 J	4 J	ug/kg	16SB0410507	1/27	3.5 - 4.1	4	NA	5600 N[8]	3200000	IDEM	No	BSL
	56-55-3	Benzo(a)anthracene	4 J	7 J	ug/kg	16SB0340203	2/27	3.5 - 4.1	7	NA	620 C	5000	IDEM	No	BSL
	50-32-8	Benzo(a)pyrene	6 J	10	ug/kg	16SB0340203	2/27	3.5 - 4.1	10	NA	62 C	500	IDEM	No	BSL
	205-99-2	Benzo(b)fluoranthene	8 J	16 J	ug/kg	16SB0340203	2/27	3.5 - 4.1	16	NA	620 C	5000	IDEM	No	BSL
	191-24-2	Benzo(g,h,i)perylene	6 J	6 J	ug/kg	16SB0340203	1/27	3.5 - 4.1	6	NA	230000 N[10]	50000	IDEM	No	BSL
	207-08-9	Benzo(k)fluoranthene	6 J	13	ug/kg	16SB0340203	2/27	3.5 - 4.1	13	NA	6200 C	50000	IDEM	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	86 J	1400	ug/kg	16SB0410507	3/27	70 - 1000	1400	NA	35000 C	300000	IDEM	No	BSL
	218-01-9	Chrysene	6 J	10	ug/kg	16SB0340203	3/27	3.5 - 4.1	10	NA	62000 C	500000	IDEM	No	BSL
	206-44-0	Fluoranthene	6 J	9	ug/kg	16SB0340203	2/27	3.5 - 4.1	9	NA	230000 N	6300000	IDEM	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	6 J	6 J	ug/kg	16SB0340203	1/27	3.5 - 4.1	6	NA	620 C	5000	IDEM	No	BSL
	120-58-1	Isosafrole	150 J	150 J	ug/kg	16SB0410507	1/27	70 - 83	150	NA	NA	NA	NA	No	NTX
	91-20-3	Naphthalene	5 J	6 J	ug/kg	16SB0410507	2/27	3.5 - 4.1	6	NA	5600 N	3200000	IDEM	No	BSL
	85-01-8	Phenanthrene	6 J	6 J	ug/kg	16SB0410507	1/27	3.5 - 4.1	6	NA	230000 N[10]	470000	IDEM	No	BSL
	129-00-0	Pyrene	6 J	12	ug/kg	16SB0340203	3/27	3.5 - 4.1	12	NA	230000 N	4700000	IDEM	No	BSL
	94-59-7	Safrole	480	67000	ug/kg	16SB0410507	2/27	70 - 83	67000	NA	NA	NA	NA	NA	NTX
	Herbicides														
	70-30-4	Hexachlorophene	0.96 J	0.96 J	ug/kg	16SB0260204	1/27	0.68 - 1	0.96	NA	1800 N	NA	NA	No	BSL
	87-86-5	Pentachlorophenol	1.6 J	1.6 J	ug/kg	16SB0300203	1/27	0.47 - 0.56	1.6	NA	3000 C	20000	IDEM	No	BSL
	Inorganics														
	7429-90-5	Aluminum	1540 J	26700 J	mg/kg	16SB0850204	32/32	---	26700	5020 - 17400	7600 N	NA	NA	Yes	ASL
	7440-36-0	Antimony	0.33 J	1.4 J	mg/kg	16SB0870204	4/32	0.14 - 1.5	1.4	0.49 - 11.3	3.1 N	140	IDEM	No	BSL
	7440-38-2	Arsenic	0.35 J	11.5 J	mg/kg	16SB0890204	32/32	---	11.5	1.1 - 10.2	0.39 C	3.9	IDEM	Yes	ASL
	7440-39-3	Barium	9.1 J	119 J	mg/kg	16SB0320204	32/32	---	119	24.8 - 155	540 N	23000	IDEM	No	BSL
	7440-41-7	Beryllium	0.2 J	2.4 J	mg/kg	16SB0180203	12/32	0.17 - 0.81	2.4	0.3 - 0.82	15 N	680	IDEM	No	BSL
	7440-43-9	Cadmium	0.19 J	0.74 J	mg/kg	16SB0180203	7/32	0.09 - 0.37	0.74	0.05 - 3.6	3.7 N	12	IDEM	No	BSL
	7440-70-2	Calcium	68.7 J	2150 J	mg/kg	16SB0340203	29/32	35.6 - 380	2150	53.6 - 35300	NA	NA	NA	No	NUT
	7440-47-3	Chromium	5.1 J	48.2 J	mg/kg	16SB0890204	32/32	---	48.2	7.7 - 30.6	210 C[11]	430[12]	IDEM	No	BSL
	7440-48-4	Cobalt	0.54 J	15.7 J	mg/kg	16SB0170204	32/32	---	15.7	1.8 - 27.1	140 N[13]	NA	NA	No	BSL
	7440-50-8	Copper	3.6 J	34.8 J	mg/kg	16SB0180203	32/32	---	34.8	3.5 - 23.8	310 N	13000	IDEM	No	BSL
	7439-89-6	Iron	3630 J	34500 J	mg/kg	16SB0850204	32/32	---	34500	7140 - 40800	2300 N	NA	NA	Yes	ASL
	7439-92-1	Lead	3.4 J	71.1 J	mg/kg	16SB0870204	31/32	7.9	71.1	6.4 - 21.5	400	400	IDEM	No	BSL
	7439-93-2	Lithium	3.4 J	23.6 J	mg/kg	16SB0170204	18/27	2 - 6.3	23.6	7.8 - 46.6	160 N	NA	NA	No	BSL
	7439-95-4	Magnesium	279 J	2620 J	mg/kg	16SB0410305	32/32	---	2620	496 - 2870	NA	NA	NA	No	NUT
	7439-96-5	Manganese	3.2 J	415 J	mg/kg	16SB0390203	32/32	---	415	23.2 - 3040	180 N	NA	NA	Yes	ASL
	7439-97-6	Mercury	0.003 J	0.083 J	mg/kg	16SB0860204	20/32	0.002 - 0.012	0.083	0.04 - 0.14	2.3 N	100	IDEM	No	BSL
	7440-02-0	Nickel	2 J	35.6 J	mg/kg	16SB0170204	32/32	---	35.6	4.6 - 23.7	160 N	6900	IDEM	No	BSL
	7440-09-7	Potassium	225 J	2980 J	mg/kg	16SB0890204	32/32	---	2980	280 - 1650	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.22 J	0.63 J	mg/kg	16SB0180203	2/32	0.02 - 0.62	0.63	0.28 - 0.88	39 N	1700	IDEM	No	BSL
	7440-22-4	Silver	0.42 J	0.42 J	mg/kg	16SB0340203	1/32	0.02 - 0.22	0.42	0.04 - 0.11	39 N	1700	IDEM	No	BSL
	7440-23-5	Sodium	50.5 J	50.5 J	mg/kg	16SB0320204	1/32	13.9 - 75.8	50.5	3.7 - 205	NA	NA	NA	No	NUT
	7440-24-6	Strontium	2.8 J	21.8 J	mg/kg	16SB0130204	27/27	---	21.8	4.2 - 63.2	4700 N	NA	NA	No	BSL
	7440-31-5	Tin	0.31 J	1.3 J	mg/kg	16SB0320204	5/32	0.22 - 0.71	1.3	NA - NA	4700 N	NA	NA	No	BSL
	7440-32-6	Titanium	12.2 J	177 J	mg/kg	16SB0410305	27/27	---	177	4.1 - 11.7	31000 N[14]	NA	NA	No	BSL

TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	EPA Region 9 PRG (Residential)(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7440-62-2	Vanadium	2.9 J	55.2 J	mg/kg	16SB0890204	32/32	---	55.2	14.1 - 48.5	7.8 N	NA	NA	Yes	ASL
	7440-66-6	Zinc	10.2 J	130	mg/kg	16SB0870204	24/32	4.5 - 39.7	130	9.4 - 60.2	2300 N	100000	IDEM	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 -
5 - U.S. EPA Region 9 Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1, Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (U.S. EPA Region 9, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for naphthalene is used as a surrogate for 2-methylnaphthalene.
9 - The value for acenaphthene is used as a surrogate for acenaphthylene.
10 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
11 - The PRG for residential land use for total chromium is presented.
12 - Value is for hexavalent chromium.
13 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
14 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
sat = Soil Saturation Limit

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

Associated Samples

16SB0010406	16SB0290203	16SB0500103	16SB0600609	16SB0680206	16SB0770610	16SB0930608
16SB0020406	16SB0300203	16SB0510204	16SB0610206	16SB0680609	16SB0780206	16SB0940708
16SB0110204	16SB0320204	16SB0520205	16SB0610607	16SB0690206	16SB0780609	16SB0950406
16SB0120204	16SB0330204	16SB0530205	16SB0620206	16SB0690607	16SB0850204	16SB0950607
16SB0130204	16SB0340203	16SB0540205	16SB0620607	16SB0700206	16SB0860204	16SB0960406
16SB0170204	16SB0360203	16SB0550206	16SB0630206	16SB0700607	16SB0870204	16SB0960608
16SB0180203	16SB0380203	16SB0550607	16SB0630608	16SB0710206	16SB0880204	16SB0970406
16SB0190203	16SB0390203	16SB0560206	16SB0640206	16SB0720206	16SB0890204	16SB0970607
16SB0220203	16SB0400506	16SB0560608	16SB0640608	16SB0720607	16SB0900406	16SB0980206
16SB0230203	16SB0400608	16SB0570206	16SB0650206	16SB0730204	16SB0900608	16SB0980607
16SB0240203	16SB0410305	16SB0580206	16SB0650608	16SB0740206	16SB0910406	16SB0990206
16SB0250203	16SB0410507	16SB0580607	16SB0660206	16SB0750203	16SB0910609	16SB0990608
16SB0260204	16SB0470405	16SB0590206	16SB0660608	16SB0760206	16SB0920406	
16SB0270203	16SB0480203	16SB0590608	16SB0670206	16SB0760607	16SB0920608	
16SB0280203	16SB0490405	16SB0600206	16SB0670609	16SB0770206	16SB0930406	

TABLE 2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	U.S. EPA Generic SSL for Soil to Air[5]	U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM SSL for Migration to Groundwater[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
SWMU 16	**Volatile Organic Compounds**														
	79-00-5	**1,1,2-Trichloroethane**	4	8 J	ug/kg	16SB0560206	2/79	0.814 - 1.48	8	NA	980 C	**0.91**	30	**Yes**	ASL
	78-93-3	2-Butanone	1 J	2 J	ug/kg	16SB0600206	3/70	0.814 - 1.48	2	NA	24000000 sat	4400	35000	No	BSL
	67-64-1	Acetone	3 J	72 J	ug/kg	16SB0650206	11/78	0.869 - 24	72	NA	NA	6600	3800	No	BSL
	74-83-9	Bromomethane	4 J	4 J	ug/kg	16SB0560206	1/79	0.814 - 1.48	4	NA	950 N	12	52	No	BSL
	75-15-0	Carbon Disulfide	2 J	2 J	ug/kg	16SB0650206	1/78	0.814 - 1.48	2	NA	720000 sat	1500	10000	No	BSL
	67-66-3	Chloroform	1.1 J	15	ug/kg	16SB0950607	9/79	0.814 - 1.48	15	NA	280 C	29	470	No	BSL
	156-59-2	**cis-1,2-Dichloroethene**	1 J	200	ug/kg	16SB0390203	19/78	0.814 - 1.48	200	NA	NA	**20**	400	**Yes**	ASL
	75-71-8	Dichlorodifluoromethane	1 J	170	ug/kg	16SB0470405	49/78	0.929 - 1.45	170	NA	25000 N	28000	NA	No	BSL
	108-88-3	Toluene	1 J	1 J	ug/kg	16SB0980607	1/78	0.814 - 1.48	1	NA	650000 sat	590	12000	No	BSL
	1330-20-7	Total Xylenes	1 J	2 J	ug/kg	16SB0470405, 16SB0480203, 16SB0490405	4/78	0.869 - 1.48	2	NA	71000 N	7100	210000	No	BSL
	156-60-5	trans-1,2-Dichloroethene	1 J	12	ug/kg	16SB0390203	5/78	0.814 - 1.48	12	NA	NA	34	680	No	BSL
	79-01-6	**Trichloroethene**	1 J	9000	ug/kg	16SB0950406	50/79	0.92 - 1.35	9000	NA	**71 C**	**2.8**	**57**	**Yes**	ASL
	75-69-4	Trichlorofluoromethane	1 J	2 J	ug/kg	11 Samples	15/78	0.814 - 1.45	2	NA	110000 N	8000	NA	No	BSL
	75-01-4	**Vinyl Chloride**	6	12	ug/kg	16SB0650206	2/79	0.814 - 1.48	12	NA	280 C	**0.67**	13	**Yes**	ASL
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	4 J	4 J	ug/kg	16SB0410507	1/27	3.5 - 4.1	4	NA	NA	NA	16000	No	BSL
	56-55-3	Benzo(a)anthracene	4 J	7 J	ug/kg	16SB0340203	2/27	3.5 - 4.1	7	NA	NA	160	19000	No	BSL
	50-32-8	Benzo(a)pyrene	6 J	10	ug/kg	16SB0340203	2/27	3.5 - 4.1	10	NA	NA	410	8200	No	BSL
	205-99-2	Benzo(b)fluoranthene	8 J	16 J	ug/kg	16SB0340203	2/27	3.5 - 4.1	16	NA	NA	490	57000	No	BSL
	191-24-2	Benzo(g,h,i)perylene	6 J	6 J	ug/kg	16SB0340203	1/27	3.5 - 4.1	6	NA	NA	NA	16000	No	BSL
	207-08-9	Benzo(k)fluoranthene	6 J	13	ug/kg	16SB0340203	2/27	3.5 - 4.1	13	NA	NA	490	39000	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	86 J	1400	ug/kg	16SB0410507	3/27	70 - 1000	1400	NA	NA	180000	3600000	No	BSL
	218-01-9	Chrysene	6 J	10	ug/kg	16SB0340203	3/27	3.5 - 4.1	10	NA	7500000 C	160	25000	No	BSL
	206-44-0	Fluoranthene	6 J	9	ug/kg	16SB0340203	2/27	3.5 - 4.1	9	NA	NA	310000	880000	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	6 J	6 J	ug/kg	16SB0340203	1/27	3.5 - 4.1	6	NA	NA	1400	3100	No	BSL
	120-58-1	Isosafrole	150 J	150 J	ug/kg	16SB0410507	1/27	70 - 83	150	NA	NA	NA	NA	No	NTX
	91-20-3	Naphthalene	5 J	6 J	ug/kg	16SB0410507	2/27	3.5 - 4.1	6	NA	17000 N	3100	700	No	BSL
	85-01-8	Phenanthrene	6 J	6 J	ug/kg	16SB0410507	1/27	3.5 - 4.1	6	NA	NA	NA	13000	No	BSL
	129-00-0	Pyrene	6 J	12	ug/kg	16SB0340203	3/27	3.5 - 4.1	12	NA	NA	230000	570000	No	BSL
	94-59-7	Safrole	480	67000	ug/kg	16SB0410507	2/27	70 - 83	67000	NA	NA	NA	NA	NA	NTX
	Herbicides														
	70-30-4	Hexachlorophene	0.96 J	0.96 J	ug/kg	16SB0260204	1/27	0.68 - 1	0.96	NA	NA	570000	NA	No	BSL
	87-86-5	**Pentachlorophenol**	1.6 J	1.6 J	ug/kg	16SB0300203	1/27	0.47 - 0.56	1.6	NA	NA	**1.4**	28	**Yes**	ASL
	Inorganics														
	7429-90-5	**Aluminum**	1540 J	26700 J	mg/kg	16SB0850204	32/32	---	26700	5020 - 17400	686000 N	**8.3**	NA	**Yes**	ASL
	7440-36-0	**Antimony**	0.33 J	1.4 J	mg/kg	16SB0870204	4/32	0.14 - 1.5	1.4	0.49 - 11.3	NA	**0.27**	5.4	**Yes**	ASL
	7440-38-2	**Arsenic**	0.35 J	11.5 J	mg/kg	16SB0890204	32/32	---	11.5	1.1 - 10.2	745 C	**0.29**	29	**Yes**	ASL
	7440-39-3	**Barium**	9.1 J	119 J	mg/kg	16SB0320204	32/32	---	119	24.8 - 155	68600 N	**82**	1600	**Yes**	ASL
	7440-41-7	Beryllium	0.2 J	2.4 J	mg/kg	16SB0180203	12/32	0.17 - 0.81	2.4	0.3 - 0.82	1330 C	3.2	63	No	BSL
	7440-43-9	**Cadmium**	0.19 J	0.74 J	mg/kg	16SB0180203	7/32	0.09 - 0.37	0.74	0.05 - 3.6	1780 C	**0.38**	7.5	**Yes**	ASL
	7440-70-2	Calcium	68.7 J	2150 J	mg/kg	16SB0340203	29/32	35.6 - 380	2150	53.6 - 35300	NA	NA	NA	No	NUT
	7440-47-3	**Chromium**	5.1 J	48.2 J	mg/kg	16SB0890204	32/32	---	48.2	7.7 - 30.6	267 C	**2.1**	NA	**Yes**	ASL
	7440-48-4	**Cobalt**	0.54 J	15.7 J	mg/kg	16SB0170204	32/32	---	15.7	1.8 - 27.1	1140 C	**0.17**	NA	**Yes**	ASL
	7440-50-8	Copper	3.6 J	34.8 J	mg/kg	16SB0180203	32/32	---	34.8	3.5 - 23.8	NA	560	920	No	BSL
	7439-89-6	Iron	3630 J	34500 J	mg/kg	16SB0850204	32/32	---	34500	7140 - 40800	NA	NA	NA	No	NTX
	7439-92-1	Lead	3.4 J	71.1 J	mg/kg	16SB0870204	31/32	7.9	71.1	6.4 - 21.5	NA	NA	81	No	BSL
	7439-93-2	Lithium	3.4 J	23.6 J	mg/kg	16SB0170204	18/27	2 - 6.3	23.6	7.8 - 46.6	NA	NA	NA	No	NTX
	7439-95-4	Magnesium	279 J	2620 J	mg/kg	16SB0410305	32/32	---	2620	496 - 2870	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	3.2 J	415 J	mg/kg	16SB0390203	32/32	---	415	23.2 - 3040	6860 N	**110**	NA	**Yes**	ASL
	7439-97-6	Mercury	0.003 J	0.083 J	mg/kg	16SB0860204	20/32	0.002 - 0.012	0.083	0.04 - 0.14	2.9 sat	0.1	2.1	No	BSL
	7440-02-0	**Nickel**	2 J	35.6 J	mg/kg	16SB0170204	32/32	---	35.6	4.6 - 23.7	NA	**14**	NA	**Yes**	ASL
	7440-09-7	Potassium	225 J	2980 J	mg/kg	16SB0890204	32/32	---	2980	280 - 1650	NA	NA	NA	No	NUT
	7782-49-2	**Selenium**	0.22 J	0.63 J	mg/kg	16SB0180203	2/32	0.02 - 0.62	0.63	0.28 - 0.88	NA	**0.26**	5.2	**Yes**	ASL
	7440-22-4	Silver	0.42 J	0.42 J	mg/kg	16SB0340203	1/32	0.02 - 0.22	0.42	0.04 - 0.11	NA	1.6	31	No	BSL
	7440-23-5	Sodium	50.5 J	50.5 J	mg/kg	16SB0320204	1/32	13.9 - 75.8	50.5	3.7 - 205	NA	NA	NA	No	NUT
	7440-24-6	Strontium	2.8 J	21.8 J	mg/kg	16SB0130204	27/27	---	21.8	4.2 - 63.2	NA	770	NA	No	BSL
	7440-31-5	Tin	0.31 J	1.3 J	mg/kg	16SB0320204	5/32	0.22 - 0.71	1.3	NA - NA	NA	NA	NA	No	NTX
	7440-32-6	Titanium	12.2 J	177 J	mg/kg	16SB0410305	27/27	---	177	4.1 - 11.7	NA	NA	NA	No	NTX
	7440-62-2	Vanadium	2.9 J	55.2 J	mg/kg	16SB0890204	32/32	---	55.2	14.1 - 48.5	NA	260	NA	No	BSL
	7440-66-6	Zinc	10.2 J	130	mg/kg	16SB0870204	24/32	4.5 - 39.7	130	9.4 - 60.2	NA	680	14000	No	BSL

TABLE 2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SUBSURFACE SOIL
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	U.S. EPA Generic SSL for Soil to Air(5)	U.S. EPA Generic SSL for Migration to Groundwater(5)	IDEM SSL for Migration to Groundwater(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected condentration is used for screening purposes.
4 -
5 - EPA Soil Screening Levels. EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm (Soil to air SSLs for noncarcinogens are divided by 10).
The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples

16SB0010406	16SB0290203	16SB0500103	16SB0600609	16SB0680206	16SB0770610	16SB0930608
16SB0020406	16SB0300203	16SB0510204	16SB0610206	16SB0680609	16SB0780206	16SB0940708
16SB0110204	16SB0320204	16SB0520205	16SB0610607	16SB0690206	16SB0780609	16SB0950406
16SB0120204	16SB0330204	16SB0530205	16SB0620206	16SB0690607	16SB0850204	16SB0950607
16SB0130204	16SB0340203	16SB0540205	16SB0620607	16SB0700206	16SB0860204	16SB0960406
16SB0170204	16SB0360203	16SB0550206	16SB0630206	16SB0700607	16SB0870204	16SB0960608
16SB0180203	16SB0380203	16SB0550607	16SB0630608	16SB0710206	16SB0880204	16SB0970406
16SB0190203	16SB0390203	16SB0560206	16SB0640206	16SB0720206	16SB0890204	16SB0970607
16SB0220203	16SB0400506	16SB0560608	16SB0640608	16SB0720607	16SB0900406	16SB0980206
16SB0230203	16SB0400608	16SB0570206	16SB0650206	16SB0730204	16SB0900608	16SB0980607
16SB0240203	16SB0410305	16SB0580206	16SB0650608	16SB0740206	16SB0910406	16SB0990206
16SB0250203	16SB0410507	16SB0580607	16SB0660206	16SB0750203	16SB0910609	16SB0990608
16SB0260204	16SB0470405	16SB0590206	16SB0660608	16SB0760206	16SB0920406	
16SB0270203	16SB0480203	16SB0590608	16SB0670206	16SB0760607	16SB0920608	
16SB0280203	16SB0490405	16SB0600206	16SB0670609	16SB0770206	16SB0930406	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
SSL = Soil Screening Level
sat = Soil Saturation Limit

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Upper Zone	Volatile Organic Compounds														
	79-34-5	1,1,2,2-Tetrachloroethane	1.6 J	2.1	ug/L	16GWT0604	2/23	0.3 - 60	2.1	ND	0.055 C	NA 0.9	NA IDEM	Yes	ASL
	79-00-5	1,1,2-Trichloroethane	2.1	220 J	ug/L	16GWT0603	7/23	0.3 - 60	220	ND	0.2 C	5 5	FED-MCL IDEM	Yes	ASL
	75-35-4	1,1-Dichloroethene	1.4	160	ug/L	16GWT0604	6/23	0.3 - 60	160	ND	34 N	7 7	FED-MCL IDEM	Yes	ASL
	96-18-4	1,2,3-Trichloropropane	0.6 J	0.6 J	ug/L	16GWT0604	1/23	0.3 - 60	0.6	ND	0.0056 C	NA NA	NA NA	Yes	ASL
	107-06-2	1,2-Dichloroethane	0.6 J	2.3	ug/L	16GWT0604	2/23	0.3 - 60	2.3	ND	0.12 C	5 5	FED-MCL IDEM	Yes	ASL
	591-78-6	2-Hexanone	1.4 J	16 J	ug/L	16GWT0603	2/23	0.5 - 100	16	ND	NA	NA NA	NA NA	No	NTX
	108-10-1	4-Methyl-2-Pentanone	3.5 J	27	ug/L	16GWT0604	3/23	0.5 - 100	27	ND	200 N	NA 2200	NA IDEM	No	BSL
	67-64-1	Acetone	0.5 J	18 J	ug/L	16GWT0603	3/17	0.5 - 100	18	ND	550 N	NA 950	NA IDEM	No	BSL
	71-43-2	Benzene	0.9 J	3.5	ug/L	16GWT0604	5/23	0.3 - 60	3.5	ND	0.35 C	5 5	FED-MCL IDEM	Yes	ASL
	75-27-4	Bromodichloromethane	0.8 J	0.8 J	ug/L	16GWT0601	1/23	0.3 - 60	0.8	ND	0.18 C	80 80	FED-MCL IDEM	Yes	ASL
	75-15-0	Carbon Disulfide	0.8 J	4.3	ug/L	16GWT0603	3/23	0.3 - 60	4.3	ND	100 N	NA 1300	NA IDEM	No	BSL
	56-23-5	Carbon Tetrachloride	0.8 J	15	ug/L	16GW0301	4/23	0.3 - 60	15	ND	0.17 C	5 5	FED-MCL IDEM	Yes	ASL
	67-66-3	Chloroform	0.8 J	15	ug/L	16GWT0604	12/23	0.3 - 60	15	ND	0.17 C	80 80	FED-MCL IDEM	Yes	ASL
	156-59-2	cis-1,2-Dichloroethene	0.2 J	4200	ug/L	16GWT0603	16/23	0.3	4200	ND	6.1 N	70 70	FED-MCL IDEM	Yes	ASL
	74-84-0	Ethane	0.013	7.7	ug/L	16GWT0603	4/4	---	7.7	0.062	NA	NA NA	NA NA	No	NTX
	74-85-1	Ethene	0.027	65	ug/L	16GWT0603	4/4	---	65	0.018	NA	NA NA	NA NA	No	NTX
	100-41-4	Ethylbenzene	1.6	3.9	ug/L	16GWT0604	3/23	0.3 - 60	3.9	ND	130 N	700 700	FED-MCL IDEM	No	BSL
	74-82-8	Methane	0.032	280	ug/L	16GWT0603	4/4	---	280	15	NA	NA NA	NA NA	No	NTX
	75-09-2	Methylene Chloride	59 J	59 J	ug/L	16GWT1301	1/23	0.3 - 60	59	ND	4.3 C	5 5	FED-MCL IDEM	Yes	ASL
	127-18-4	Tetrachloroethene	1.4	160	ug/L	16GWT0603	5/23	0.3 - 60	160	ND	0.1 C	5 5	FED-MCL IDEM	Yes	ASL
	108-88-3	Toluene	2.8	310 J	ug/L	16GWT0604	4/23	0.3 - 60	310	ND	72 N	1000 1000	FED-MCL IDEM	Yes	ASL
	1330-20-7	Total Xylenes	2.8	6.5	ug/L	16GWT0604	3/23	0.3 - 60	6.5	ND	21 N	10000 10000	FED-MCL IDEM	No	BSL
	156-60-5	Trans-1,2-Dichloroethene	1	22	ug/L	16GWT0603	6/23	0.3 - 60	22	ND	12 N	100 100	FED-MCL IDEM	Yes	ASL
	79-01-6	Trichloroethene	1.2	330000	ug/L	16GWT0604	23/23	---	330000	ND	0.028 C	5 5	FED-MCL IDEM	Yes	ASL
	75-01-4	Vinyl Chloride	0.3 J	390 J	ug/L	16GWT0604	7/23	0.3 - 60	390	ND	0.02 C	2 2	FED-MCL IDEM	Yes	ASL
	Semivolatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	0.11	0.11	ug/L	16GWT0601	1/4	0.05	0.11	ND	0.62 N[8]	NA 150	NA IDEM	No	BSL
	83-32-9	Acenaphthene	0.07 J	0.07 J	ug/L	16GWT0601	1/4	0.05	0.07	ND	37 N	NA 460	NA IDEM	No	BSL
	205-99-2	Benzo(b)fluoranthene	0.09 J	0.09 J	ug/L	16GWT0601	1/4	0.05	0.09	ND	0.092 C	NA 1.2	NA IDEM	No	BSL
	218-01-9	Chrysene	0.1 J	0.1 J	ug/L	16GWT0601	1/4	0.05	0.1	ND	9.2 C	NA 1.6	NA IDEM	No	BSL
	84-66-2	Diethyl Phthalate	1 J	1 J	ug/L	16GWT0601	1/5	1	1	ND	2900 N	NA 29000	NA IDEM	No	BSL

TABLE 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	206-44-0	Fluoranthene	0.11	0.11	ug/L	16GWT0601	1/4	0.05	0.11	ND	150 N	NA 210	NA IDEM	No	BSL
	86-73-7	Fluorene	0.1 J	0.1 J	ug/L	16GWT0601	1/4	0.05	0.1	ND	24 N	NA 310	NA IDEM	No	BSL
	85-01-8	Phenanthrene	0.54	0.54	ug/L	16GWT0601	1/4	0.05	0.54	ND	18 N[8]	NA 23	NA IDEM	No	BSL
	129-00-0	Pyrene	0.2	0.2	ug/L	16GWT0601	1/4	0.05	0.2	ND	18 N	NA 140	NA IDEM	No	BSL
	110-86-1	Pyridine	9	9	ug/L	16GWT0602	1/5	1	9	ND	3.6 N	NA NA	NA NA	Yes	ASL
	Energetics														
	99-35-4	1,3,5-Trinitrobenzene	1.8	1.8	ug/L	16GWT0604	1/21	0.242 - 0.55	1.8	ND	110 N	NA NA	NA NA	No	BSL
	118-96-7	2,4,6-Trinitrotoluene	4.8	4.8	ug/L	16GWT0604	1/21	0.242 - 0.55	4.8	ND	1.8 N[10]	NA NA	NA NA	Yes	ASL
	6629-29-4	2,4-Diamino-6-Nitrotoluene	0.27 J	0.27 J	ug/L	16GWT0603	1/8	0.25 - 0.287	0.27	ND	NA	NA NA	NA NA	No	NTX
	121-14-2	2,4-Dinitrotoluene	0.8	0.8	ug/L	16GWT0604	1/21	0.242 - 0.55	0.8	ND	7.3 N	NA NA	NA NA	No	BSL
	35572-78-2	2-Amino-4,6-Dinitrotoluene	0.31 J	29 J	ug/L	16GWT0604	7/21	0.26 - 0.55	29	ND	0.73 N[11]	NA NA	NA NA	Yes	ASL
	99-08-1	3-Nitrotoluene	1.5 J	2.1 J	ug/L	16GWT1002	2/21	0.242 - 0.55	2.1	ND	12 N	NA NA	NA NA	No	BSL
	19406-51-0	4-Amino-2,6-Dinitrotoluene	0.56	14	ug/L	16GWT0604	8/21	0.26 - 0.55	14	ND	0.73 N[11]	NA NA	NA NA	Yes	ASL
	TTNUS498	DNX	0.63 J	0.63 J	ug/L	16GWT0402	1/8	0.25 - 0.287	0.63	ND	NA	NA NA	NA NA	No	NTX
	2691-41-0	HMX	0.27 J	21	ug/L	16GWT0402	13/21	0.26 - 0.385	21	ND	180 N	NA NA	NA NA	No	BSL
	TTNUS232	MNX	0.5 J	4.1	ug/L	16GWT0402	4/8	0.25 - 0.275	4.1	ND	NA	NA NA	NA NA	No	NTX
	121-82-4	RDX	0.79	200	ug/L	16GWT0402	18/21	0.26 - 0.275	200	ND	0.61 C	NA NA	NA NA	Yes	ASL
	Total Metals														
	7429-90-5	Aluminum	168	5810 J	ug/L	16GWT1001	11/12	29.1	5810	85.6	3600 N	NA NA	NA NA	Yes	ASL
	7440-38-2	Arsenic	0.81 J	4.5 J	ug/L	16GWT0601	4/12	0.1 - 1.9	4.5	0.66 J	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
	7440-39-3	Barium	13.4 J	107 J	ug/L	16GWT0201	12/12	---	107	17.8 J - 21.6 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-41-7	Beryllium	1.9 J	1.9 J	ug/L	16GWT1001	1/12	0.03 - 1.3	1.9	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-70-2	Calcium	22600 J	101000 J	ug/L	16GWT0603	12/12	---	101000	97300 J - 212000 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium	0.68 J	5.5 J	ug/L	16GWT1301	4/12	0.3 - 1.3	5.5	ND	11 N[12]	100 100	FED-MCL IDEM[12]	No	BSL
	7440-48-4	Cobalt	2 J	131 J	ug/L	16GWT1001	12/12	---	131	9.2 J - 18.7 J	73 N	NA NA	NA NA	Yes	ASL
	7440-50-8	Copper	0.82 J	12.4 J	ug/L	16GWT1001	7/12	0.56 - 1.2	12.4	0.87 J	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	Iron	171 J	50200 J	ug/L	16GWT1001	12/12	---	50200	287 J - 13700 J	1100 N	NA NA	NA NA	Yes	ASL
	7439-92-1	Lead	2.6 J	6.6 J	ug/L	16GWT1001	3/12	0.12 - 0.55	6.6	ND	NA	15 15	FED-MCL[13] IDEM[13]	No	BSL
	7439-93-2	Lithium	8.5 J	33.2 J	ug/L	16GW0301	3/4	0.72	33.2	32.7 J - 33.6 J	73 N	NA NA	NA NA	No	BSL
	7439-95-4	Magnesium	8270 J	78800 J	ug/L	16GWT1001	12/12	---	78800	6240 J - 35200 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese	353 J	24600 J	ug/L	16GWT1001	12/12	---	24600	864 J - 2440 J	88 N	NA NA	NA NA	Yes	ASL

TABLE 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	7440-02-0	Nickel	1.5 J	219 J	ug/L	16GWT1001	12/12	---	219	27 J - 36.7 J	73 N	NA NA	NA NA	Yes	ASL
	7440-09-7	Potassium	1360 J	11900 J	ug/L	16GWT0601	12/12	---	11900	738 J - 2640 J	NA	NA NA	NA NA	No	NUT
	7782-49-2	Selenium	1.2 J	1.2 J	ug/L	16GWT0601	1/12	0.04 - 1.4	1.2	ND	18 N	50 50	FED-MCL IDEM	No	BSL
	7440-23-5	Sodium	6770 J	149000 J	ug/L	16GWT0603	12/12	---	149000	17900 J - 20200 J	NA	NA NA	NA NA	No	NUT
	7440-24-6	Strontium	186 J	387 J	ug/L	16GWT0201	4/4	---	387	88.4 J - 98.4 J	2200 N	NA NA	NA NA	No	BSL
	7440-32-6	Titanium	1 J	35 J	ug/L	16GWT0603	7/12	0.45 - 4.5	35	3 J - 3.8 J	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	Vanadium	0.51 J	4.1 J	ug/L	16GWT1301	4/12	0.05 - 0.36	4.1	ND	3.6 N	NA NA	NA NA	Yes	ASL
	7440-66-6	Zinc	6.2 J	443 J	ug/L	16GWT1001	12/12	---	443	15.8 J - 50 J	1100 N	NA 11000	NA IDEM	No	BSL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	342 J	342 J	ug/L	16GWT1301-F	1/1	---	342	NA	3600 N	NA NA	NA NA	No	BSL
	7440-39-3	Barium, Filtered	56.6 J	56.6 J	ug/L	16GWT1301-F	1/1	---	56.6	NA	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-70-2	Calcium, Filtered	38800 J	38800 J	ug/L	16GWT1301-F	1/1	---	38800	NA	NA	NA NA	NA NA	No	NUT
	7440-48-4	Cobalt, Filtered	58.5 J	58.5 J	ug/L	16GWT1301-F	1/1	---	58.5	NA	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper, Filtered	5.4 J	5.4 J	ug/L	16GWT1301-F	1/1	---	5.4	NA	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	Iron, Filtered	5230 J	5230 J	ug/L	16GWT1301-F	1/1	---	5230	NA	1100 N	NA NA	NA NA	Yes	ASL
	7439-95-4	Magnesium, Filtered	11800 J	11800 J	ug/L	16GWT1301-F	1/1	---	11800	NA	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese, Filtered	3600 J	3600 J	ug/L	16GWT1301-F	1/1	---	3600	NA	88 N	NA NA	NA NA	Yes	ASL
	7440-02-0	Nickel, Filtered	193 J	193 J	ug/L	16GWT1301-F	1/1	---	193	NA	73 N	NA NA	NA NA	Yes	ASL
	7440-09-7	Potassium, Filtered	7280 J	7280 J	ug/L	16GWT1301-F	1/1	---	7280	NA	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium, Filtered	18500 J	18500 J	ug/L	16GWT1301-F	1/1	---	18500	NA	NA	NA NA	NA NA	No	NUT
	7440-66-6	Zinc, Filtered	244 J	244 J	ug/L	16GWT1301-F	1/1	---	244	NA	1100 N	NA 11000	NA IDEM	No	BSL
	Miscellaneous Parameters														
		Nitrite/Nitrate-N	0.03	0.7	mg/L	16GW0302	8/12	0.025 - 0.05	0.7	ND	1	1 NA	FED-MCL NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - The U.S. EPA Region 9 tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004).
Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Value is for naphthalene.
9 - Value is for pyrene.
10 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
11 - Values are for aminodinitrotoluene.
12 - Values are for hexavalent chromium.
13 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected
PRG = Preliminary Remediation Goal
SWDA = Safe Water Drinking Act

TABLE 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]

Associated Samples

16GW0301	16GWT0402	16GWT1301
16GW0302	16GWT0403	16GWT1301-F
16GW0303	16GWT0601	16GWT1302
16GWT0101	16GWT0602	16GWT1701
16GWT0102	16GWT0603	16GWT1702
16GWT0103	16GWT0604	16GW0201
16GWT0201	16GWT0901	16GW0202
16GWT0202	16GWT0902	16GW0203
16GWT0203	16GWT1001	16GW0204
16GWT0401	16GWT1002	

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - VAPOR INTRUSION - UPPER ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
Upper Zone	Volatile Organic Compounds														
	79-34-5	1,1,2,2-Tetrachloroethane	1.6 J	2.1	ug/L	16GWT0604	2/23	0.3 - 60	2.1	ND	3	NA	NA	No	BSL
	79-00-5	**1,1,2-Trichloroethane**	2.1	220 J	ug/L	16GWT0603	7/23	0.3 - 60	220	ND	**5**	NA	NA	**Yes**	ASL
	75-35-4	1,1-Dichloroethene	1.4	160	ug/L	16GWT0604	6/23	0.3 - 60	160	ND	190	NA	NA	No	BSL
	96-18-4	1,2,3-Trichloropropane	0.6 J	0.6 J	ug/L	16GWT0604	1/23	0.3 - 60	0.6	ND	290	NA	NA	No	BSL
	107-06-2	1,2-Dichloroethane	0.6 J	2.3	ug/L	16GWT0604	2/23	0.3 - 60	2.3	ND	5	NA	NA	No	BSL
	591-78-6	2-Hexanone	1.4 J	16 J	ug/L	16GWT0603	2/23	0.5 - 100	16	ND	NA	NA	NA	No	NTX
	108-10-1	4-Methyl-2-Pentanone	3.5 J	27	ug/L	16GWT0604	3/23	0.5 - 100	27	ND	14000	NA	NA	No	BSL
	67-64-1	Acetone	0.5 J	18 J	ug/L	16GWT0603	3/17	0.5 - 100	18	ND	220000	NA	NA	No	BSL
	71-43-2	Benzene	0.9 J	3.5	ug/L	16GWT0604	5/23	0.3 - 60	3.5	ND	5	NA	NA	No	BSL
	75-27-4	Bromodichloromethane	0.8 J	0.8 J	ug/L	16GWT0601	1/23	0.3 - 60	0.8	ND	2.1	NA	NA	No	BSL
	75-15-0	Carbon Disulfide	0.8 J	4.3	ug/L	16GWT0603	3/23	0.3 - 60	4.3	ND	560	NA	NA	No	BSL
	56-23-5	**Carbon Tetrachloride**	0.8 J	15	ug/L	16GW0301	4/23	0.3 - 60	15	ND	**5**	NA	NA	**Yes**	ASL
	67-66-3	Chloroform	0.8 J	15	ug/L	16GWT0604	12/23	0.3 - 60	15	ND	80	NA	NA	No	BSL
	156-59-2	**cis-1,2-Dichloroethene**	0.2 J	4200	ug/L	16GWT0603	16/23	0.3	4200	ND	**210**	NA	NA	**Yes**	ASL
	74-84-0	Ethane	0.013	7.7	ug/L	16GWT0603	4/4	---	7.7	0.062	NA	NA	NA	No	NTX
	74-85-1	Ethene	0.027	65	ug/L	16GWT0603	4/4	---	65	0.018	NA	NA	NA	No	NTX
	100-41-4	Ethylbenzene	1.6	3.9	ug/L	16GWT0604	3/23	0.3 - 60	3.9	ND	700	NA	NA	No	BSL
	74-82-8	Methane	0.032	280	ug/L	16GWT0603	4/4	---	280	15	NA	NA	NA	No	NTX
	75-09-2	**Methylene Chloride**	59 J	59 J	ug/L	16GWT1301	1/23	0.3 - 60	59	ND	**6.7**	NA	NA	**Yes**	ASL
	127-18-4	**Tetrachloroethene**	1.4	160	ug/L	16GWT0603	5/23	0.3 - 60	160	ND	**5**	NA	NA	**Yes**	ASL
	108-88-3	Toluene	2.8	310 J	ug/L	16GWT0604	4/23	0.3 - 60	310	ND	1500	NA	NA	No	BSL
	1330-20-7	Total Xylenes	2.8	6.5	ug/L	16GWT0604	3/23	0.3 - 60	6.5	ND	NA	NA	NA	No	BSL
	156-60-5	Trans-1,2-Dichloroethene	1	22	ug/L	16GWT0603	6/23	0.3 - 60	22	ND	180	NA	NA	No	BSL
	79-01-6	**Trichloroethene**	1.2	330000	ug/L	16GWT0604	23/23	---	330000	ND	**5**	NA	NA	**Yes**	ASL
	75-01-4	**Vinyl Chloride**	0.3 J	390 J	ug/L	16GWT0604	7/23	0.3 - 60	390	ND	**2**	NA	NA	**Yes**	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002. EPA530-F-02-052.
Values are from Table 2c and correspond to a target cancer risk level of 1E-6 or HI =1 and an attenuation factor of 0.001.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples

16GW0301	16GWT0402	16GWT1301
16GW0302	16GWT0403	16GWT1301-F
16GW0303	16GWT0601	16GWT1302
16GWT0101	16GWT0602	16GWT1701
16GWT0102	16GWT0603	16GWT1702
16GWT0103	16GWT0604	16GW0201
16GWT0201	16GWT0901	16GW0202
16GWT0202	16GWT0902	16GW0203
16GWT0203	16GWT1001	16GW0204
16GWT0401	16GWT1002	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - MIDDLE ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Middle Zone	Volatile Organic Compounds														
	75-15-0	Carbon Disulfide	0.3 J	0.3 J	ug/L	16GWT1601	1/19	0.3	0.3	ND	100 N	NA 1300	NA IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	0.3 J	0.3 J	ug/L	16GW0401 16GWT1601	2/19	0.3	0.3	ND	6.1 N	70 70	FED-MCL IDEM	No	BSL
	74-84-0	Ethane	0.032	0.37 J	ug/L	16GWT1201	2/2	---	0.37	0.062	NA	NA NA	NA NA	No	NTX
	74-85-1	Ethene	0.0093	0.031 J	ug/L	16GWT1201	2/2	---	0.031	0.018	NA	NA NA	NA NA	No	NTX
	74-82-8	Methane	0.86	11	ug/L	16GWT1201	2/2	---	11	15	NA	NA NA	NA NA	No	NTX
	127-18-4	Tetrachloroethene	0.3 J	0.3 J	ug/L	16GWT1601	1/19	0.3	0.3	ND	0.1 C	5 5	FED-MCL IDEM	Yes	ASL
	79-01-6	Trichloroethene	0.5 J	340	ug/L	16GWT1602	9/19	0.3	340	ND	0.028 C	5 5	FED-MCL IDEM	Yes	ASL
	Energetics														
	88-72-2	2-Nitrotoluene	1	1	ug/L	16GWT1602	1/19	0.165 - 0.65	1	ND	0.049 C	NA NA	NA NA	Yes	ASL
	2691-41-0	HMX	0.39	1.3 J	ug/L	16GWT1201	6/19	0.25 - 0.65	1.3	ND	180 N	NA NA	NA NA	No	BSL
	121-82-4	RDX	0.66	4.8	ug/L	16GW0501	6/19	0.25 - 0.6	4.8	ND	0.61 C	NA NA	NA NA	Yes	ASL
	Total Metals														
	7429-90-5	Aluminum	19.2 J	53900 J	ug/L	16GWT1601	12/13	26.4	53900	85.6	3600 N	NA NA	NA NA	Yes	ASL
	7440-38-2	Arsenic	1.1 J	32.1 J	ug/L	16GW0102	12/13	1.5	32.1	0.66 J	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
	7440-39-3	Barium	5 J	286 J	ug/L	16GWT1601	13/13	---	286	17.8 J - 21.6 J	260 N	2000 2000	FED-MCL IDEM	Yes	ASL
	7440-41-7	Beryllium	2 J	8.3 J	ug/L	16GWT1601	6/13	0.16 - 2.7	8.3	ND	7.3 N	4 4	FED-MCL IDEM	Yes	ASL
	7440-43-9	Cadmium	0.83 J	4 J	ug/L	16GWT1601	4/13	0.05 - 1.4	4	ND	1.8 N	5 5	FED-MCL IDEM	Yes	ASL
	7440-70-2	Calcium	39500 J	194000 J	ug/L	16GW0101	12/13	106000	194000	97300 J - 212000 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium	12.4 J	73.6 J	ug/L	16GWT1601	3/13	0.27 - 0.68	73.6	ND	11 N[9]	100 100	FED-MCL IDEM[8]	Yes	ASL
	7440-48-4	Cobalt	32 J	563 J	ug/L	16GWT1602	13/13	---	563	9.2 J - 18.7 J	73 N	NA NA	NA NA	Yes	ASL
	7440-50-8	Copper	1.4 J	51.5 J	ug/L	16GWT1602	6/13	0.06 - 0.32	51.5	0.87 J	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	Iron	2190 J	83900 J	ug/L	16GW0102	13/13	---	83900	287 J - 13700 J	1100 N	NA NA	NA NA	Yes	ASL
	7439-92-1	Lead	0.89 J	54.8 J	ug/L	16GWT1601	7/13	0.03 - 0.7	54.8	ND	NA	15 15	FED-MCL[5] IDEM[5]	Yes	ASL
	7439-93-2	Lithium	92.7 J	328 J	ug/L	16GW0101	5/5	---	328	32.7 J - 33.6 J	73 N	NA NA	NA NA	Yes	ASL
	7439-95-4	Magnesium	25000 J	133000 J	ug/L	16GWT1601	13/13	---	133000	6240 J - 35200 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese	2450 J	29300 J	ug/L	16GW0101	13/13	---	29300	864 J - 2440 J	88 N	NA NA	NA NA	Yes	ASL
	7440-02-0	Nickel	86.3 J	808 J	ug/L	16GWT1602	13/13	---	808	27 J - 36.7 J	73 N	NA NA	NA NA	Yes	ASL
	7440-09-7	Potassium	2970 J	19300 J	ug/L	16GWT1601	13/13	---	19300	738 J - 2640 J	NA	NA NA	NA NA	No	NUT
	7782-49-2	Selenium	2.8 J	5.2 J	ug/L	16GWT1601	2/13	0.04 - 0.9	5.2	ND	18 N	50 50	FED-MCL IDEM	No	BSL
	7440-23-5	Sodium	10400 J	107000 J	ug/L	16GWT1601	13/13	---	107000	17900 J - 20200 J	NA	NA NA	NA NA	No	NUT
	7440-24-6	Strontium	106 J	279 J	ug/L	16GW0501	5/5	---	279	88.4 J - 98.4 J	2200 N	NA NA	NA NA	No	BSL

TABLE 2.7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - MIDDLE ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	7440-31-5	Tin	1.8 J	2.5 J	ug/L	16GWT1601	2/13	0.03 - 0.58	2.5	ND	2200 N	NA NA	NA NA	No	BSL
	7440-32-6	Titanium	1.2 J	134 J	ug/L	16GWT1601	7/12	0.07 - 1.5	134	3 J - 3.8 J	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	Vanadium	0.6 J	64.8 J	ug/L	16GWT1601	8/13	0.05 - 1.7	64.8	ND	3.6 N	NA NA	NA NA	Yes	ASL
	7440-66-6	Zinc	86.1 J	791 J	ug/L	16GWT1601	13/13	---	791	15.8 J - 50 J	1100 N	NA 11000	NA IDEM	No	BSL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	2460 J	2460 J	ug/L	16GWT1601-F	1/2	33	2460	NA	3600 N	NA NA	NA NA	No	BSL
	7440-38-2	Arsenic, Filtered	4.6 J	4.6 J	ug/L	16GWT1601-F	1/2	1.2	4.6	NA	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
	7440-39-3	Barium, Filtered	12.9 J	17 J	ug/L	16GWT1601-F	2/2	---	17	NA	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-41-7	Beryllium, Filtered	3.8 J	3.8 J	ug/L	16GWT1601-F	1/2	0.17	3.8	NA	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	Cadmium, Filtered	3 J	3 J	ug/L	16GWT1601-F	1/2	0.04	3	NA	1.8 N	5 5	FED-MCL IDEM	Yes	ASL
	7440-70-2	Calcium, Filtered	38900 J	158000 J	ug/L	16GWT1601-F	2/2	---	158000	NA	NA	NA NA	NA NA	No	NUT
	7440-48-4	Cobalt, Filtered	36.9 J	522 J	ug/L	16GWT1601-F	2/2	---	522	NA	73 N	NA NA	NA NA	Yes	ASL
	7440-50-8	Copper, Filtered	20 J	20 J	ug/L	16GWT1601-F	1/2	0.49	20	NA	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	Iron, Filtered	43200 J	43200 J	ug/L	16GWT0302-F	1/2	1140	43200	NA	1100 N	NA NA	NA NA	Yes	ASL
	7439-92-1	Lead, Filtered	6.2 J	6.2 J	ug/L	16GWT1601-F	1/2	0.15	6.2	NA	NA	15 15	FED-MCL[8] IDEM[8]	No	BSL
	7439-95-4	Magnesium, Filtered	27200 J	131000 J	ug/L	16GWT1601-F	2/2	---	131000	NA	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese, Filtered	4030 J	16700 J	ug/L	16GWT1601-F	2/2	---	16700	NA	88 N	NA NA	NA NA	Yes	ASL
	7440-02-0	Nickel, Filtered	80.6 J	622 J	ug/L	16GWT1601-F	2/2	---	622	NA	73 N	NA NA	NA NA	Yes	ASL
	7440-09-7	Potassium, Filtered	3920 J	16500 J	ug/L	16GWT1601-F	2/2	---	16500	NA	NA	NA NA	NA NA	No	NUT
	7782-49-2	Selenium, Filtered	3.1 J	3.1 J	ug/L	16GWT1601-F	1/2	0.05	3.1	NA	18 N	50 50	FED-MCL IDEM	No	BSL
	7440-23-5	Sodium, Filtered	29000 J	105000 J	ug/L	16GWT1601-F	2/2	---	105000	NA	NA	NA NA	NA NA	No	NUT
	7440-32-6	Titanium, Filtered	2.4 J	2.4 J	ug/L	16GWT1601-F	1/2	2.3	2.4	NA	15000 N	NA NA	NA NA	No	BSL
	7440-66-6	Zinc, Filtered	67 J	596 J	ug/L	16GWT1601-F	2/2	---	596	NA	1100 N	NA 11000	NA IDEM	No	BSL
	Miscellaneous Parameters														
		Nitrite/Nitrate-N	0.07	0.07	mg/L	16GW0102	1/11	0.025 - 0.05	0.7	ND	1	1 NA	FED-MCL NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - The U.S. EPA Region 9 tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004).
Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Values are for hexavalent chromium.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SWDA - Safe Water Drinking Act

TABLE 2.7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - MIDDLE ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)

9 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Associated Samples

16GW0101	16GWT0302	16GW0202
16GW0102	16GWT1602	16GW0203
16GW0103	16GWT0303	16GW0204
16GW0401	16GWT0501	16GWT0302-F
16GW0402	16GWT0502	16GWT1601-F
16GW0403	16GWT0503	
16GW0501	16GWT1201	
16GW0502	16GWT1202	
16GW0503	16GWT1601	
16GWT0301	16GW0201	

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - VAPOR INTRUSION - MIDDLE ZONE
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Middle Zone	Volatile Organic Compounds														
	75-15-0	Carbon Disulfide	0.3 J	0.3 J	ug/L	16GWT1601	1/19	0.3	0.3	ND	560	NA	NA	No	BSL
	156-59-2	cis-1,2-Dichloroethene	0.3 J	0.3 J	ug/L	16GW0401	2/19	0.3	0.3	ND	210	NA	NA	No	BSL
	74-84-0	Ethane	0.032	0.37 J	ug/L	16GWT1201	2/2	---	0.37	0.062	NA	NA	NA	No	NTX
	74-85-1	Ethene	0.0093	0.031 J	ug/L	16GWT1201	2/2	---	0.031	0.018	NA	NA	NA	No	NTX
	74-82-8	Methane	0.86	11	ug/L	16GWT1201	2/2	---	11	15	NA	NA	NA	No	NTX
	127-18-4	Tetrachloroethene	0.3 J	0.3 J	ug/L	16GWT1601	1/19	0.3	0.3	ND	5	NA	NA	No	BSL
	79-01-6	Trichloroethene	0.5 J	340	ug/L	16GWT1602	9/19	0.3	340	ND	5	NA	NA	Yes	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002. EPA530-F-02-052.
Values are from Table 2c and correspond to a target cancer risk level of 1E-6 or HI =1 and an attenuation factor of 0.001.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples

16GW0101	16GWT0302	16GW0202
16GW0102	16GWT1602	16GW0203
16GW0103	16GWT0303	16GW0204
16GW0401	16GWT0501	16GWT0302-F
16GW0402	16GWT0502	16GWT1601-F
16GW0403	16GWT0503	
16GW0501	16GWT1201	
16GW0502	16GWT1202	
16GW0503	16GWT1601	
16GWT0301	16GW0201	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - LOWER ZONE AND VALLEY WELLS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Lower Zone and Valley Wells	Volatile Organic Compounds														
	67-64-1	Acetone	0.8 J	7.4 J	ug/L	16GWT2101	4/10	0.5	7.4	ND	550 N	NA 950	NA IDEM	No	BSL
	71-43-2	Benzene	0.7 J	0.7 J	ug/L	16GWT1501	1/10	0.3	0.7	ND	0.35 C	5 5	FED-MCL IDEM	Yes	ASL
	67-66-3	Chloroform	0.8 J	16	ug/L	16GWT1101	5/10	0.3	16	ND	0.17 C	80 80	FED-MCL IDEM	Yes	ASL
	74-84-0	Ethane	1	5.4	ug/L	16GWT1801	2/2	---	5.4	0.062	NA	NA NA	NA NA	No	NTX
	74-85-1	Ethene	0.14	0.22	ug/L	16GWT1501	2/2	---	0.22	0.018	NA	NA NA	NA NA	No	NTX
	100-41-4	Ethylbenzene	0.9 J	0.9 J	ug/L	16GWT2101	1/10	0.3	0.9	ND	130 N	700 700	FED-MCL IDEM	No	BSL
	74-82-8	Methane	4500	5800	ug/L	16GWT1801	2/2	---	5800	15	NA	NA NA	NA NA	No	NTX
	75-09-2	Methylene Chloride	0.6 J	0.6 J	ug/L	16GWT0801	1/10	0.3	0.6	ND	4.3 C	5 5	FED-MCL IDEM	No	BSL
	107-12-0	Propionitrile	26 J	26 J	ug/L	16GWT1501	1/10	20	26	ND	NA	NA NA	NA NA	No	NTX
	108-88-3	Toluene	1.3	1.3	ug/L	16GWT2101	1/10	0.3	1.3	ND	72 N	1000 1000	FED-MCL IDEM	No	BSL
	1330-20-7	Total Xylenes	2.2	2.2	ug/L	16GWT2101	1/10	0.3	2.2	ND	21 N	10000 10000	FED-MCL IDEM	No	BSL
	Total Metals														
	7429-90-5	Aluminum	65.8 J	296000 J	ug/L	16GWT0801	7/8	8.35	296000	85.6	3600 N	NA NA	NA NA	Yes	ASL
	7440-36-0	Antimony	2.1 J	6.3 J	ug/L	16GWT1101	2/8	0.09 - 1.3	6.3	ND	1.5 N	6 6	FED-MCL IDEM	Yes	ASL
	7440-38-2	Arsenic	1.9 J	29.2 J	ug/L	16GWT0801	5/8	0.13 - 1.5	29.2	0.66 J	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
	7440-39-3	Barium	41.7 J	1700 J	ug/L	16GWT0801	8/8	---	1700	17.8 J - 21.6 J	260 N	2000 2000	FED-MCL IDEM	Yes	ASL
	7440-41-7	Beryllium	4.8 J	15.1 J	ug/L	16GWT0801	2/8	0.02 - 0.5	15.1	ND	7.3 N	4 4	FED-MCL IDEM	Yes	ASL
	7440-70-2	Calcium	6800 J	91800 J	ug/L	16GWT2101	7/8	19700	91800	97300 J - 212000 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium	5.1 J	452 J	ug/L	16GWT0801	5/8	0.69 - 1.1	452	ND	11 N[8]	100 100	FED-MCL IDEM[8]	Yes	ASL
	7440-48-4	Cobalt	0.3 J	95.7 J	ug/L	16GWT0801	7/8	0.71	95.7	9.2 J - 18.7 J	73 N	NA NA	NA NA	Yes	ASL
	7440-50-8	Copper	2.5	86.1 J	ug/L	16GWT0801	5/8	0.24 - 0.47	86.1	0.87 J	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-89-6	Iron	376	241000 J	ug/L	16GWT0801	6/8	19.8 - 73.5	241000	287 J - 13700 J	1100 N	NA NA	NA NA	Yes	ASL
	7439-92-1	Lead	3 J	127 J	ug/L	16GWT0801	3/8	0.069 - 2	127	ND	NA	15 15	FED-MCL[9] IDEM[9]	Yes	ASL
	7439-95-4	Magnesium	108 J	39000 J	ug/L	16GWT1901	8/8	---	39000	6240 J - 35200 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese	5.7	3800 J	ug/L	16GWT0801	8/8	---	3800	864 J - 2440 J	88 N	NA NA	NA NA	Yes	ASL
	7439-97-6	Mercury	0.028 J	0.12 J	ug/L	16GWT0801	2/8	0.007 - 0.049	0.12	ND	1.1 N	2 2	FED-MCL IDEM	No	BSL
	7440-02-0	Nickel	1.6	338 J	ug/L	16GWT0801	8/8	---	338	27 J - 36.7 J	73 N	NA NA	NA NA	Yes	ASL
	7440-09-7	Potassium	1140 J	74400 J	ug/L	16GWT0801	8/8	---	74400	738 J - 2640 J	NA	NA NA	NA NA	No	NUT
	7782-49-2	Selenium	2.1 J	5 J	ug/L	16GWT0801	3/8	0.094 - 1.4	5	ND	18 N	50 50	FED-MCL IDEM	No	BSL
	7440-23-5	Sodium	11100 J	231000 J	ug/L	16GWT2101	8/8	---	231000	17900 J - 20200 J	NA	NA NA	NA NA	No	NUT

TABLE 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - LOWER ZONE AND VALLEY WELLS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	7440-31-5	Tin	3.9 J	3.9 J	ug/L	16GWT0801	1/8	0.06 - 2.6	3.9	ND	2200 N	NA NA	NA NA	No	BSL
	7440-32-6	Titanium	32.3 J	1020 J	ug/L	16GWT0801	4/4	---	1020	3 J - 3.8 J	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	Vanadium	4.4 J	410 J	ug/L	16GWT0801	5/8	1.14	410	ND	3.6 N	NA NA	NA NA	Yes	ASL
	7440-66-6	Zinc	6.5 J	454 J	ug/L	16GWT0801	6/8	2.7 - 4.8	454	15.8 J - 50 J	1100 N	NA 11000	NA IDEM	No	BSL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	126 J	126 J	ug/L	16GWT1801-F	1/3	65.9 - 85.5	126	NA	3600 N	NA NA	NA NA	No	BSL
	7440-36-0	Antimony, Filtered	1.5 J	8.8 J	ug/L	16GWT1101-F	2/3	1.5	8.8	NA	1.5 N	6 6	FED-MCL IDEM	Yes	ASL
	7440-38-2	Arsenic, Filtered	1.3 J	1.3 J		16GWT1801-F	1/3	1.3 - 1.5	1.3	NA	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
	7440-39-3	Barium, Filtered	28 J	341 J	ug/L	16GWT1801-F	3/3	---	341	NA	260 N	2000 2000	FED-MCL IDEM	Yes	ASL
	7440-70-2	Calcium, Filtered	7910 J	10600 J	ug/L	16GWT1101-F	3/3	---	10600	NA	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium, Filtered	0.59 J	0.59 J	ug/L	16GWT1801-F	1/3	0.42 - 0.69	0.59	NA	11 N[8]	100 100	FED-MCL IDEM[8]	No	BSL
	7440-48-4	Cobalt, Filtered	4.8 J	7.5 J	ug/L	16GWT1101-F	2/3	1.1	7.5	NA	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper, Filtered	2.8 J	2.8 J	ug/L	16GWT1501-F	1/3	0.72 - 1.5	2.8	NA	150 N	1300 1300	FED-MCL IDEM	No	BSL
	7439-95-4	Magnesium, Filtered	2850 J	3500 J	ug/L	16GWT1801-F	3/3	---	3500	NA	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese, Filtered	17.7 J	194 J	ug/L	16GWT1101-F	3/3	---	194	NA	88 N	NA NA	NA NA	Yes	ASL
	7440-02-0	Nickel, Filtered	4.6 J	5.2 J	ug/L	16GWT1101-F	2/3	1.4	5.2	NA	73 N	NA NA	NA NA	No	BSL
	7440-09-7	Potassium, Filtered	3410 J	5880 J	ug/L	16GWT1801-F	3/3	---	5880	NA	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium, Filtered	77500 J	218000 J	ug/L	16GWT1801-F	3/3	---	218000	NA	NA	NA NA	NA NA	No	NUT
	7440-32-6	Titanium, Filtered	1.9 J	1.9 J	ug/L	16GWT1801-F	1/3	0.68 - 0.85	1.9	NA	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	Vanadium, Filtered	0.53 J	0.53 J	ug/L	16GWT1801-F	1/3	0.31 - 0.59	0.53	NA	3.6 N	NA NA	NA NA	No	BSL
	7440-66-6	Zinc, Filtered	1.6 J	48.2 J	ug/L	16GWT1101-F	3/3	---	48.2	NA	1100 N	NA 11000	NA IDEM	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - The U.S. EPA Region 9 tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004).
Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Values are for hexavalent chromium.
9 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SWDA - Safe Water Drinking Act

TABLE 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - DIRECT CONTACT - LOWER ZONE AND VALLEY WELLS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]

Associated Samples

16GWT0801	16GWT1802
16GWT0802	16GWT2101
16GWT1101	16GWT1901
16GWT1101-F	16GWT2001
16GWT1102	16GW0201
16GWT1501	16GW0202
16GWT1501-F	16GW0203
16GWT1502	16GW0204
16GWT1801	
16GWT1801-F	

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.10
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER - VAPOR INTRUSION - LOWER ZONE AND VALLEY WELLS
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
Lower Zone and Valley Wells	Volatile Organic Compounds														
	67-64-1	Acetone	0.8 J	7.4 J	ug/L	16GWT2101	4/10	0.5	7.4	ND	220000	NA	NA	No	BSL
	71-43-2	Benzene	0.7 J	0.7 J	ug/L	16GWT1501	1/10	0.3	0.7	ND	5	NA	NA	No	BSL
	67-66-3	Chloroform	0.8 J	16	ug/L	16GWT1101	5/10	0.3	16	ND	80	NA	NA	No	BSL
	74-84-0	Ethane	1	5.4	ug/L	16GWT1801	2/2	---	5.4	0.062	NA	NA	NA	No	NTX
	74-85-1	Ethene	0.14	0.22	ug/L	16GWT1501	2/2	---	0.22	0.018	NA	NA	NA	No	NTX
	100-41-4	Ethylbenzene	0.9 J	0.9 J	ug/L	16GWT2101	1/10	0.3	0.9	ND	700	NA	NA	No	BSL
	74-82-8	Methane	4500	5800	ug/L	16GWT1801	2/2	---	5800	15	NA	NA	NA	No	NTX
	75-09-2	Methylene Chloride	0.6 J	0.6 J	ug/L	16GWT0801	1/10	0.3	0.6	ND	6.7	NA	NA	No	BSL
	107-12-0	Propionitrile	26 J	26 J	ug/L	16GWT1501	1/10	20	26	ND	NA	NA	NA	No	NTX
	108-88-3	Toluene	1.3	1.3	ug/L	16GWT2101	1/10	0.3	1.3	ND	1500	NA	NA	No	BSL
	1330-20-7	Total Xylenes	2.2	2.2	ug/L	16GWT2101	1/10	0.3	2.2	ND	NA	NA	NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from location 16MW02.
5 - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002. EPA530-F-02-052.
Values are from Table 2c and correspond to a target cancer risk level of 1E-6 or HI =1 and an attenuation factor of 0.001.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples

16GWT0801	16GWT1802
16GWT0802	16GWT2101
16GWT1101	16GWT1901
16GWT1101-F	16GWT2001
16GWT1102	16GW0201
16GWT1501	16GW0202
16GWT1501-F	16GW0203
16GWT1502	16GW0204
16GWT1801	
16GWT1801-F	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Gullies	Volatile Organic Compounds														
	67-64-1	Acetone	0.5 J	2.8 J	ug/L	16SW2701	3/10	0.5	2.8	0.6 J	550 N	NA 950	NA IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1.4	3.4	ug/L	16SW2901	2/11	0.3	3.4	ND	6.1 N	70 70	FED-MCL IDEM	No	BSL
	79-01-6	Trichloroethene	0.8 J	26	ug/L	16SW2901	5/11	0.3	26	ND	0.028 C	5 5	FED-MCL IDEM	Yes	ASL
	Energetics														
	35572-78-2	2-Amino-4,6-Dinitrotoluene	0.29 J	0.29 J	ug/L	16SW3001	1/7	0.25 - 0.255	0.29	ND	0.73 N	NA NA	NA NA	No	BSL
	19406-51-0	4-Amino-2,6-Dinitrotoluene	0.63	0.63	ug/L	16SW3001	1/7	0.25 - 0.255	0.63	ND	0.73 N	NA NA	NA NA	No	BSL
	2691-41-0	HMX	0.27 J	4.8	ug/L	16SW3001	3/7	0.25 - 0.255	4.8	ND	180 N	NA NA	NA NA	No	BSL
	121-82-4	RDX	0.29 J	24	ug/L	16SW3001	2/7	0.25 - 0.255	24	ND	0.61 C	NA NA	NA NA	Yes	ASL
	Total Metals														
	7429-90-5	Aluminum	173 J	9510 J	ug/L	16SW1501	18/21	87.3 - 128	9510	485 J - 891 J	3600 N	NA NA	NA NA	Yes	ASL
	7440-36-0	Antimony	4.2 J	14.2 J	ug/L	16SW0301	8/21	0.085 - 2.7	14.2	ND	1.5 N	6 6	FED-MCL IDEM	Yes	ASL
	7440-38-2	Arsenic	0.29 J	3.8 J	ug/L	16SW1501	15/21	0.16 - 0.52	3.8	ND	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
	7440-39-3	Barium	44.3 J	425 J	ug/L	16SW0601	21/21	---	425	53.4 J - 57.3 J	260 N	2000 2000	FED-MCL IDEM	Yes	ASL
	7440-41-7	Beryllium	0.02 J	0.5 J	ug/L	16SW2801	12/21	0.02 - 0.52	0.5	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	Cadmium	0.2 J	4.4	ug/L	16SW0601	15/21	0.04 - 0.4	4.4	ND	1.8 N	5 5	FED-MCL IDEM	Yes	ASL
	7440-70-2	Calcium	6800 J	49600 J	ug/L	16SW0601	21/21	---	49600	16600 J - 38700 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium	1.4 J	11.8 J	ug/L	16SW1501	11/21	0.34 - 1.3	11.8	0.78 J	11 N[12]	100 110	FED-MCL IDEM[12]	Yes	ASL
	7440-48-4	Cobalt	0.11 J	4.6 J	ug/L	16SW1501	18/21	0.1 - 0.48	4.6	ND	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper	0.95 J	134 J	ug/L	16SW0401	19/21	1.1 - 1.5	134	ND	150 N	1300 1300	FED-MCL[13] IDEM	No	BSL
	7439-89-6	Iron	278 J	9990 J	ug/L	16SW1501	18/21	44.6 - 114	9990	263 J - 599 J	1100 N	NA NA	NA NA	Yes	ASL
	7439-92-1	Lead	4.8 J	281 J	ug/L	16SW0401	17/21	0.27 - 0.55	281	ND	NA	15 15	FED-MCL[13] IDEM	Yes	ASL
	7439-95-4	Magnesium	1310 J	9450 J	ug/L	16SW1501	21/21	---	9450	5820 J - 7810 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese	4.9 J	443 J	ug/L	16SW1501	18/21	3 - 10	443	19.2 J - 135 J	88 N	NA NA	NA NA	Yes	ASL
	7440-02-0	Nickel	1.2 J	11.8	ug/L	16SW2701	18/21	0.94 - 1.6	11.8	1.1 J - 2.3 J	73 N	NA NA	NA NA	No	BSL
	7440-09-7	Potassium	727	4520 J	ug/L	16SW1101	21/21	---	4520	1780 J - 2230 J	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium	1820 J	18900 J	ug/L	16SW1101	16/21	1070 - 1540	18900	9580 J - 15000 J	NA	NA NA	NA NA	No	NUT
	7440-28-0	Thallium	0.16 J	0.16 J	ug/L	16SW0601	1/21	0.04 - 0.41	0.16	ND	0.24 N	2 2	FED-MCL IDEM	No	BSL
	7440-31-5	Tin	0.47 J	0.84 J	ug/L	16SW0401	2/21	0.05 - 0.52	0.84	ND	2200 N	NA NA	NA NA	No	BSL
	7440-32-6	Titanium	2 J	156 J	ug/L	16SW1501	4/4	---	156	3.4 J - 19.7 J	15000 N	NA NA	NA NA	No	BSL
	7440-62-2	Vanadium	0.63 J	19 J	ug/L	16SW1501	15/21	0.56 - 1.14	19	0.85 J	3.6 N	NA NA	NA NA	Yes	ASL
	7440-66-6	Zinc	16.9 J	1340 J	ug/L	16SW0401	19/21	4.2 - 12.3	1340	16.6 J	1100 N	NA 11000	NA IDEM	Yes	ASL

TABLE 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	21 J	124	ug/L	16SW2701-F	8/21	8.35 - 71.1	124	164 J	3600 N	NA NA	NA NA	No	BSL
	7440-36-0	Antimony, Filtered	4.3 J	10.8 J	ug/L	16SW0301-F	6/21	0.21 - 3.4	10.8	ND	1.5 N	6 6	FED-MCL IDEM	Yes	ASL
	7440-38-2	Arsenic, Filtered	0.26 J	0.65 J	ug/L	16SW1101-F	3/21	0.07 - 0.22	0.65	ND	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
	7440-39-3	Barium, Filtered	43.2 J	335 J	ug/L	16SW0601-F	21/21	---	335	46.6 J - 57.2 J	260 N	2000 2000	FED-MCL IDEM	Yes	ASL
	7440-41-7	Beryllium, Filtered	0.02 J	0.1 J	ug/L	6SW1302-F, 16SW2701-	6/21	0.02 - 0.06	0.1	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	Cadmium, Filtered	0.12 J	3.7	ug/L	16SW0901-F	15/21	0.039 - 0.09	3.7	ND	1.8 N	5 5	FED-MCL IDEM	Yes	ASL
	7440-70-2	Calcium, Filtered	6570 J	49100 J	ug/L	16SW1501-F	21/21	---	49100	15700 J - 37400 J	NA	NA NA	NA NA	No	NUT
	7440-47-3	Chromium, Filtered	2.1 J	2.1 J	ug/L	16SW3001-F	1/21	0.16 - 0.7	2.1	ND	11 N[12]	100 110	FED-MCL IDEM[12]	No	BSL
	7440-48-4	Cobalt, Filtered	0.09 J	2.9 J	ug/L	16SW1301-F	17/21	0.088 - 0.11	2.9	2.7 J - 3.1 J	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper, Filtered	1 J	35.7 J	ug/L	16SW1001-F	17/21	0.57 - 0.93	35.7	ND	150 N	1300 1300	FED-MCL[13] IDEM	No	BSL
	7439-89-6	Iron, Filtered	76.4 J	188 J	ug/L	16SW2901-F	9/21	7.8 - 131	188	ND	1100 N	NA NA	NA NA	No	BSL
	7439-92-1	Lead, Filtered	0.81 J	35.8 J	ug/L	16SW0301-F	15/21	0.08 - 0.38	35.8	ND	NA	15 15	FED-MCL[13] IDEM	Yes	ASL
	7439-95-4	Magnesium, Filtered	1280 J	8870 J	ug/L	16SW1501-F	21/21	---	8870	5400 J - 7390 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese, Filtered	1.9 J	171 J	ug/L	16SW1201-F	18/21	0.82 - 9.7	171	10.9 J - 29.8 J	88 N	NA NA	NA NA	Yes	ASL
	7439-97-6	Mercury, Filtered	0.04 J	0.04 J	ug/L	16SW1501-F	1/21	0.02 - 0.03	0.04	ND	1.1 N	2 2	FED-MCL IDEM	No	BSL
	7440-02-0	Nickel, Filtered	0.95 J	9.4	ug/L	16SW1202-F	18/21	0.83 - 1.4	9.4	1.2 J	73 N	NA NA	NA NA	No	BSL
	7440-09-7	Potassium, Filtered	647	4720	ug/L	16SW1101-F	21/21	---	4720	1550 J - 2140 J	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium, Filtered	2030 J	19900 J	ug/L	16SW1101-F	15/21	1060 - 1480	19900	9010 J - 14000 J	NA	NA NA	NA NA	No	NUT
	7440-32-6	Titanium, Filtered	1.4 J	1.6 J	ug/L	16SW1301-F	2/4	0.55 - 1.1	1.6	1.5 J - 8.5 J	15000 N	NA NA	NA NA	No	BSL
	7440-66-6	Zinc, Filtered	3.1 J	421 J	ug/L	16SW1601-F	18/21	6 - 197	421	18.1 J - 33.3 J	1100 N	NA 11000	NA IDEM	No	BSL
	Miscellaneous Parameters														
		Nitrite/Nitrate-N	0.11	0.55	mg/L	16SW1302	4/7	0.025 - 0.05	0.55	0.07 - 3.2	1	1 NA	FED-MCL NA	No	BSL

TABLE 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentrations(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from locations 16SW/SD14, 16SW/SD20, and 16SW/SD21.
5 - The U.S. EPA Region 9 tap water PRG is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004, updated December 28, 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004). Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Value is for naphthalene.
9 - Value is for pyrene.
10 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
11 - Values are for aminodinitrotoluene.
12 - Values are for hexavalent chromium.
13 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Associated Samples

16SW0301	16SW1001	16SW1501	16SW2801
16SW0301-F	16SW1001-F	16SW1501-F	16SW2801-F
16SW0401	16SW1101	16SW1601	16SW2901
16SW0401-F	16SW1101-F	16SW1601-F	16SW2901-F
16SW0501	16SW1201	16SW1701	16SW3001
16SW0501-F	16SW1201-F	16SW1701-F	16SW3001-F
16SW0601	16SW1202	16SW2301	16SW1401
16SW0601-F	16SW1202-F	16SW2301-F	16SW1401-F
16SW0801	16SW1301	16SW2601	16SW2001
16SW0801-F	16SW1301-F	16SW2601-F	16SW2001-F
16SW0901	16SW1302	16SW2701	16SW2101
16SW0901-F	16SW1302-F	16SW2701-F	16SW2101-F

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SWDA = Safe Water Drinking Act

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
	Energetics														
Turkey Creek	2691-41-0	HMX	0.32 J	0.32 J	ug/L	16SW2401	1/1	---	0.32	ND	180 N	NA NA	NA NA	No	BSL
	Total Metals														
	7429-90-5	Aluminum	146 J	822 J	ug/L	16SW1901	2/3	48.7	822	ND	3600 N	NA NA	NA NA	No	BSL
	7440-38-2	Arsenic	0.37 J	0.37 J	ug/L	16SW1901	1/3	0.09 - 0.23	0.37	ND	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
	7440-39-3	Barium	48.1 J	95.7 J	ug/L	16SW2401	3/3	---	95.7	23 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-41-7	Beryllium	0.09 J	0.09 J	ug/L	16SW1901	1/3	0.02 - 0.03	0.09	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	Cadmium	0.66 J	0.66 J	ug/L	16SW1901	1/3	0.039 - 0.05	0.66	ND	1.8 N	5 5	FED-MCL IDEM	No	BSL
	7440-70-2	Calcium	9360 J	17900 J	ug/L	16SW2501	3/3	---	17900	9930 J	NA	NA NA	NA NA	No	NUT
	7440-48-4	Cobalt	0.14 J	0.72 J	ug/L	16SW2501	3/3	---	0.72	ND	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper	0.24 J	4.1 J	ug/L	16SW1901	3/3	---	4.1	2.7 J	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
	7439-89-6	Iron	43.6 J	886 J	ug/L	16SW1901	3/3	---	886	ND	1100 N	NA NA	NA NA	No	BSL
	7439-92-1	Lead	1.2	1.2	ug/L	16SW1901	1/3	0.11 - 0.31	1.2	ND	NA	15 15	FED-MCL[8] IDEM	No	BSL
	7439-95-4	Magnesium	3370	6340 J	ug/L	16SW2501	3/3	---	6340	2460 J	NA	NA NA	NA NA	No	NTX
	7439-96-5	Manganese	21.5	476	ug/L	16SW2501	3/3	---	476	30 J	88 N	NA NA	NA NA	Yes	ASL
	7440-02-0	Nickel	4.5 J	5.7	ug/L	16SW2401 16SW2501	3/3	---	5.7	ND	73 N	NA NA	NA NA	No	NTX
	7440-09-7	Potassium	989 J	1680	ug/L	16SW1901	3/3	---	1680	790 J	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium	3660 J	8600 J	ug/L	16SW2401	3/3	---	8600	8330 J	NA	NA NA	NA NA	No	NUT
	7440-62-2	Vanadium	1.5 J	1.5 J	ug/L	16SW1901	1/3	1.14	1.5	ND	3.6 N	NA NA	NA NA	No	BSL
	7440-66-6	Zinc	6.9 J	18.7 J	ug/L	16SW1901	3/3	---	18.7	ND	1100 N	NA 11000	NA IDEM	No	BSL
	Dissolved Metals														
	7429-90-5	Aluminum, Filtered	90.1	119 J	ug/L	16SW2401-F	2/3	61.8	119	ND	3600 N	NA NA	NA NA	No	BSL
	7440-39-3	Barium, Filtered	43.7 J	98.3 J	ug/L	16SW2401-F	3/3	---	98.3	48.2 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
	7440-41-7	Beryllium, Filtered	0.04 J	0.04 J	ug/L	16SW1901-F	1/3	0.02	0.04	ND	7.3 N	4 4	FED-MCL IDEM	No	BSL
	7440-43-9	Cadmium, Filtered	1.4	1.4	ug/L	16SW1901-F	1/3	0.039	1.4	ND	1.8 N	5 5	FED-MCL IDEM	No	BSL
	7440-70-2	Calcium, Filtered	9910 J	17400 J	ug/L	16SW2501-F	3/3	---	17400	10100 J	NA	NA NA	NA NA	No	NUT
	7440-48-4	Cobalt, Filtered	0.16 J	1.9	ug/L	16SW2501-F	3/3	---	1.9	2.6 J	73 N	NA NA	NA NA	No	BSL
	7440-50-8	Copper, Filtered	0.22 J	3.9 J	ug/L	16SW1901-F	3/3	---	3.9	ND	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
	7439-89-6	Iron, Filtered	11.8 J	163	ug/L	16SW2501-F	3/3	---	163	ND	1100 N	NA NA	NA NA	No	BSL
	7439-92-1	Lead, Filtered	0.54 J	0.54 J	ug/L	16SW1901-F	1/3	0.11 - 0.19	0.54	ND	NA	15 15	FED-MCL[8] IDEM	No	BSL
	7439-95-4	Magnesium, Filtered	3020 J	6450	ug/L	16SW2501-F	3/3	---	6450	3770 J	NA	NA NA	NA NA	No	NUT
	7439-96-5	Manganese, Filtered	7.7	1970 J	ug/L	16SW2501-F	3/3	---	1970	12.5 J	88 N	NA NA	NA NA	Yes	ASL

TABLE 2.12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Upgradient Concentration(4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	7440-02-0	Nickel, Filtered	4 J	8.6	ug/L	16SW2501-F	3/3	---	8.6	ND	73 N	NA NA	NA NA	No	BSL
	7440-09-7	Potassium, Filtered	1030 J	1900 J	ug/L	16SW2501-F	3/3	---	1900	846 J	NA	NA NA	NA NA	No	NUT
	7440-23-5	Sodium, Filtered	3840 J	8190 J	ug/L	16SW2401-F	3/3	---	8190	4360 J	NA	NA NA	NA NA	No	NUT
	7440-66-6	Zinc, Filtered	9.1 J	21.8 J	ug/L	16SW2401-F	3/3	---	21.8	ND	1100 N	NA 11000	NA IDEM	No	BSL
	Miscellaneous Parameters														
		Nitrite/Nitrate-N	0.05	0.05	mg/L	16SW2401	1/1	---	0.05	ND	1	1 NA	FED-MCL NA	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient concentrations are from location 16SW/SD18.
5 - The U.S. EPA Region 9 tap water PRG is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (U.S. EPA Region 9, October 2004, updated December 28, 2004).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, Winter 2004). Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

Associated Samples
16SW1901
16SW1901-F
16SW2401
16SW2401-F
16SW2501
16SW2501-F

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SWDA = Safe Water Drinking Act

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2-13
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - GULLY
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Gullies	**Volatile Organic Compounds**														
	67-64-1	Acetone	3 J	69 J	ug/kg	16SD2201	6/10	1.3 - 10	69	5 J - 7 J	1400000 N	4800000	IDEM	No	BSL
	156-59-2	cis-1,2-Dichloroethene	3 J	3 J	ug/kg	16SD1201	1/10	0.948 - 1.58	3	ND	4300 N	110000	IDEM	No	BSL
	75-71-8	Dichlorodifluoromethane	2 J	2 J	ug/kg	16SD2701	1/10	0.948 - 1.58	2	ND	9400 N	NA	NA	No	BSL
	79-01-6	Trichloroethene	2 J	19	ug/kg	16SD2901	2/10	0.948 - 1.58	19	ND	53 C	710	IDEM	No	BSL
	Semi-Volatile Organic Compounds														
	91-57-6	2-Methylnaphthalene	5 J	5 J	ug/kg	16SD0301	1/10	4 - 5.8	5	NA	5600 N[8]	3200000	IDEM	No	BSL
	83-32-9	Acenaphthene	8 J	8 J	ug/kg	16SD0501	1/10	3.9 - 5.8	8	NA	370000 N	9500000	IDEM	No	BSL
	208-96-8	Acenaphthylene	4 J	8	ug/kg	16SD0301	3/10	4.1 - 5.8	8	NA	370000 N[9]	1100000	IDEM	No	BSL
	120-12-7	Anthracene	5 J	15	ug/kg	16SD0501	4/10	3.9 - 4.6	15	NA	2200000 N	47000000	IDEM	No	BSL
	56-55-3	Benzo(a)anthracene	5 J	66	ug/kg	16SD0501	8/10	4.3 - 4.4	66	NA	620 C	5000	IDEM	No	BSL
	50-32-8	Benzo(a)pyrene	7 J	84	ug/kg	16SD0501	6/10	3.9 - 4.6	84	NA	62 C	500	IDEM	Yes	ASL
	205-99-2	Benzo(b)fluoranthene	6 J	120	ug/kg	16SD0501	7/10	3.9 - 4.6	120	NA	620 C	5000	IDEM	No	BSL
	191-24-2	Benzo(g,h,i)perylene	5 J	65	ug/kg	16SD0501	7/10	4.3 - 4.6	65	NA	230000 N[10]	50000	IDEM	No	BSL
	207-08-9	Benzo(k)fluoranthene	7 J	65	ug/kg	16SD0501	6/10	3.9 - 4.6	65	NA	6200 C	50000	IDEM	No	BSL
	218-01-9	Chrysene	5 J	100	ug/kg	16SD0501	8/10	4.4 - 4.6	100	NA	62000 C	500000	IDEM	No	BSL
	84-74-2	di-n-Butyl Phthalate	130 J	130 J	ug/kg	16SD0801	1/9	79 - 120	130	NA	610000 N	18000000	IDEM	No	BSL
	53-70-3	Dibenzo(a,h)anthracene	18	18	ug/kg	16SD0501	1/10	3.9 - 5.8	18	NA	62 C	500	IDEM	No	BSL
	122-39-4	Diphenylamine	140 J	170 J	ug/kg	16SD0301	2/9	82 - 120	170	NA	150000 N	NA	NA	No	BSL
	206-44-0	Fluoranthene	5 J	160	ug/kg	16SD0501	9/10	4.6	160	NA	230000 N	6300000	IDEM	No	BSL
	86-73-7	Fluorene	8 J	8 J	ug/kg	16SD0501	1/10	3.9 - 5.8	8	NA	270000 N	6300000	IDEM	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	7 J	55	ug/kg	16SD0501	6/10	4.1 - 4.6	55	NA	620 C	5000	IDEM	No	BSL
	91-20-3	Naphthalene	5 J	6 J	ug/kg	16SD0301	2/10	4.1 - 5.8	6	NA	5600 N	3200000	IDEM	No	BSL
	85-01-8	Phenanthrene	4 J	100	ug/kg	16SD0501	8/10	4.3 - 4.6	100	NA	230000 N[10]	470000	IDEM	No	BSL
	129-00-0	Pyrene	6 J	170	ug/kg	16SD0501	9/10	4.6	170	NA	230000 N	4700000	IDEM	No	BSL
	Energetics														
	606-20-2	2,6-Dinitrotoluene	0.54 J	0.92 J	mg/kg	16SD1501	2/14	0.25	0.92	ND	6.1 N	6.3	IDEM[11]	No	BSL
	121-82-4	RDX	0.27 J	0.27 J	mg/kg	16SD0301	1/14	0.25	0.27	ND	4.4 C	NA	NA	No	BSL
	Herbicides														
	87-86-5	Pentachlorophenol	2.6 J	19 J	ug/kg	16SD1101	5/9	0.55 - 0.6	19	NA	3000 C	20000	IDEM	No	BSL
	Inorganics														
	7429-90-5	Aluminum	5560	19500 J	mg/kg	16SD0402	31/31	---	19500	8710 J - 12800 J	7600 N	NA	NA	Yes	ASL
	7440-36-0	Antimony	0.65 J	174 J	mg/kg	16SD0601	30/31	0.6	174	1.3 J - 1.7 J	3.1 N	140	IDEM	Yes	ASL
	7440-38-2	Arsenic	2.5 J	34.1 J	mg/kg	16SD2601	31/31	---	34.1	24.4 J - 27.5 J	0.39 C	3.9	IDEM	Yes	ASL
	7440-39-3	Barium	56.6 J	2820 J	mg/kg	16SD0301	31/31	---	2820	84.5 J - 454 J	540 N	23000	IDEM	Yes	ASL
	7440-41-7	Beryllium	0.43 J	2.3 J	mg/kg	16SD1301	21/31	0.39 - 1.4	2.3	1.6 J - 3 J	15 N	680	IDEM	No	BSL
	7440-43-9	Cadmium	0.47 J	27.2 J	mg/kg	16SD0402	30/31	0.33	27.2	0.38 J - 0.62 J	3.7 N	12	IDEM	Yes	ASL
	7440-70-2	Calcium	395 J	98100 J	mg/kg	16SD0602	31/31	---	98100	539 J - 846 J	NA	NA	NA	No	NUT
	7440-47-3	Chromium	13.3 J	85.2 J	mg/kg	16SD1002	31/31	---	85.2	36.9 J - 85 J	210 C[12]	430[13]	IDEM	No	BSL
	7440-48-4	Cobalt	2.5 J	41.2 J	mg/kg	16SD1201	31/31	---	41.2	29.7 J - 38.7 J	140 N[14]	NA	NA	No	BSL
	7440-50-8	Copper	9.2 J	2570 J	mg/kg	16SD0601	31/31	---	2570	14.8 J - 15 J	310 N	13000	IDEM	Yes	ASL
	7439-89-6	Iron	16500 J	127000 J	mg/kg	16SD1002	31/31	---	127000	74000 J - 141000 J	2300 N	NA	NA	Yes	ASL
	7439-92-1	Lead	13.6 J	15200 J	mg/kg	16SD0601	31/31	---	15200	29.6 J - 73.2 J	400	400	IDEM	Yes	ASL
	7439-93-2	Lithium	2.9 J	10.4 J	mg/kg	16SD0401	9/9	---	10.4	NA	160 N	NA	NA	No	BSL
	7439-95-4	Magnesium	470 J	6080 J	mg/kg	16SD0501	31/31	---	6080	491 J - 916 J	NA	NA	NA	No	NUT
	7439-96-5	Manganese	54.6 J	2510 J	mg/kg	16SD2601	31/31	---	2510	2270 J - 3650 J	180 N	NA	NA	Yes	ASL
	7439-97-6	Mercury	0.023 J	4.6	mg/kg	16SD0402	26/31	0.03 - 0.056	4.6	0.026 J - 0.043 J	2.3 N	100	IDEM	Yes	ASL
	7440-02-0	Nickel	8.9 J	804 J	mg/kg	16SD0602	31/31	---	804	34.5 J - 39.2 J	160 N	6900	IDEM	Yes	ASL
	7440-09-7	Potassium	282 J	1530 J	mg/kg	16SD0902	31/31	---	1530	739 J - 1120 J	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.33 J	1.5 J	mg/kg	16SD1301	18/31	0.14 - 0.57	1.5	0.7 J - 1.2 J	39 N	1700	IDEM	No	BSL
	7440-22-4	Silver	1.5 J	1.5 J	mg/kg	16SD2901	1/31	0.01 - 0.53	1.5	ND	39 N	1700	IDEM	No	BSL
	7440-23-5	Sodium	33.8 J	283 J	mg/kg	16SD1102	8/31	11.7 - 65.3	283	40.3 J - 43.9 J	NA	NA	NA	No	NUT
	7440-24-6	Strontium	51 J	2740 J	mg/kg	16SD0301	9/9	---	2740	NA	4700 N	NA	NA	No	BSL
	7440-31-5	Tin	0.4 J	19.6 J	mg/kg	16SD0602	20/31	0.31 - 1.8	19.6	ND	4700 N	NA	NA	No	BSL
	7440-32-6	Titanium	9.4 J	156 J	mg/kg	16SD0401	14/14	---	156	39.5 J - 54.3 J	31000 N[15]	NA	NA	No	BSL
	7440-62-2	Vanadium	12.8 J	71.7 J	mg/kg	16SD1301	31/31	---	71.7	43.7 J - 52.4 J	7.8 N	NA	NA	Yes	ASL
	7440-66-6	Zinc	68.3 J	23400 J	mg/kg	16SD0301	30/31	270	23400	109 J - 131 J	2300 N	100000	IDEM	Yes	ASL

TABLE 2-13
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - GULLY
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient samples are from locations 16SW/SD14, 16SW/SD20, and 16SW/SD21.
5 - U.S. EPA Region 9 Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (U.S. EPA Region 9, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for naphthalene is used as a surrogate for 2-methylnaphthalene.
9 - The value for acenaphthene is used as a surrogate for acenaphthylene.
10 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
11 - Value is for dinitrotoluene mixtures.
12 - The RBC for residential land use for total chromium is presented.
13 - Value is for hexavalent chromium.
14 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
15 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Associated Samples

16SD0201	16SD0802	16SD1302	16SD2901
16SD0301	16SD0901	16SD1501	16SD3001
16SD0302	16SD0902	16SD1601	16SD1401
16SD0401	16SD1001	16SD1602	16SD2001
16SD0402	16SD1002	16SD1701	16SD2101
16SD0501	16SD1101	16SD2201	
16SD0502	16SD1102	16SD2302	
16SD0601	16SD1201	16SD2601	
16SD0602	16SD1202	16SD2701	
16SD0801	16SD1301	16SD2801	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected
PRG = Preliminary Remediation Goal
sat = Soil Saturation Limit

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.14
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - TURKEY CREEK
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentration[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Turkey Creek	**Volatile Organic Compounds**														
	67-64-1	Acetone	7 J	7 J	ug/kg	16SD1901	1/1	---	7	ND	1400000 N	4800000	IDEM	No	BSL
	75-71-8	Dichlorodifluoromethane	22	22	ug/kg	16SD1901	1/1	---	22	ND	9400 N	NA	NA	No	BSL
	Inorganics														
	7429-90-5	**Aluminum**	8730 J	10500 J	mg/kg	16SD1902	4/4	---	10500	8090 J	**7600 N**	NA	NA	**Yes**	ASL
	7440-36-0	Antimony	0.8 J	1.1 J	mg/kg	16SD1901, 16SD2501	3/4	0.74	1.1	1.2 J	3.1 N	140	IDEM	No	BSL
	7440-38-2	**Arsenic**	7 J	30.8 J	mg/kg	16SD1901	4/4	---	30.8	34.8 J	**0.39 C**	**3.9**	IDEM	**Yes**	ASL
	7440-39-3	Barium	69.7 J	110 J	mg/kg	16SD1901	4/4	---	110	62.5 J	540 N	23000	IDEM	No	BSL
	7440-41-7	Beryllium	1.5 J	2.4 J	mg/kg	16SD1901	3/4	0.4	2.4	2.6 J	15 N	680	IDEM	No	BSL
	7440-43-9	Cadmium	0.54 J	0.79 J	mg/kg	16SD1901	3/4	0.47	0.79	0.54 J	3.7 N	12	IDEM	No	BSL
	7440-70-2	Calcium	539 J	973 J	mg/kg	16SD1901	4/4	---	973	362 J	NA	NA	NA	No	NUT
	7440-47-3	Chromium	16.3 J	79.9 J	mg/kg	16SD2401	4/4	---	79.9	78.5 J	210 C[8]	430[8]	IDEM	No	BSL
	7440-48-4	Cobalt	16.1 J	26.9 J	mg/kg	16SD1901	4/4	---	26.9	21.4 J	140 N[10]	NA	NA	No	BSL
	7440-50-8	Copper	13.4 J	15.1 J	mg/kg	16SD1902	4/4	---	15.1	12.6 J	310 N	13000	IDEM	No	BSL
	7439-89-6	**Iron**	15800 J	122000 J	mg/kg	16SD1901	4/4	---	122000	124000 J	**2300 N**	NA	NA	**Yes**	ASL
	7439-92-1	Lead	23.3 J	32.9 J	mg/kg	16SD2501	4/4	---	32.9	28.1 J	400	400	IDEM	No	BSL
	7439-95-4	Magnesium	400 J	916 J	mg/kg	16SD2501	4/4	---	916	292 J	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	398 J	1900 J	mg/kg	16SD1901	4/4	---	1900	1370 J	**180 N**	NA	NA	**Yes**	ASL
	7439-97-6	Mercury	0.022 J	0.022 J	mg/kg	16SD1901	1/4	0.036 - 0.046	0.022	0.025 J	2.3 N	100	IDEM	No	BSL
	7440-02-0	Nickel	20.8 J	43.4 J	mg/kg	16SD1901	4/4	---	43.4	43 J	160 N	6900	IDEM	No	BSL
	7440-09-7	Potassium	462 J	1040 J	mg/kg	16SD2501	4/4	---	1040	438 J	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.5 J	0.8 J	mg/kg	16SD2401	3/4	0.31	0.8	0.5 J	39 N	1700	IDEM	No	BSL
	7440-32-6	Titanium	50.6 J	50.6 J	mg/kg	16SD1901	1/1	---	50.6	56.4 J	31000 N[11]	NA	NA	No	BSL
	7440-62-2	**Vanadium**	21.1 J	51.2 J	mg/kg	16SD2401	4/4	---	51.2	56.3 J	**7.8 N**	NA	NA	**Yes**	ASL
	7440-66-6	Zinc	84.4 J	206 J	mg/kg	16SD1901	4/4	---	206	92.5 J	2300 N	100000	IDEM	No	BSL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Upgradient concentrations are from location 16SW/SD18.
5 - U.S. EPA Region 9 Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (U.S. EPA Region 9, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The RBC for residential land use for total chromium is presented.
9 - Value is for hexavalent chromium.
10 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
11 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Associated Samples
16SD1901 16SD2501
16SD1902 16SD1801
16SD2401

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected
PRG = Preliminary Remediation Goal
sat = Soil Saturation Limit

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

RAGS Part D Table 3

Medium-Specific Exposure Point Concentration Summary

LIST OF TABLES
RAGS PART D TABLE 3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Table No.	Reasonable Maximum/Central Tendency Exposures
3.1.RME	Surface Soil
3.2.RME	Surface/Subsurface Soil
3.3.RME	Groundwater
3.4.RME	Surface Water - Gullies
3.5.RME	Surface Water - Turkey Creek
3.6.RME	Sediment - Gullies
3.7.RME	Sediment - Turkey Creek

TABLE 3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
SWMU 16	Trichloroethene	mg/kg	0.010	0.031 (NP)	0.170	0.031	mg/kg	97.5% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (1)
	Benzo(a)anthracene	mg/kg	0.254	2.7 (NP)	9.60	2.70	mg/kg	99% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Benzo(a)pyrene	mg/kg	0.223	2.36 (NP)	8.40	2.36	mg/kg	99% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Benzo(b)fluoranthene	mg/kg	0.246	2.59 (NP)	9.20	2.59	mg/kg	99% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Dibenzo(a,h)anthracene	mg/kg	0.043	0.451 (NP)	1.60	0.451	mg/kg	99% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Indeno(1,2,3-cd)pyrene	mg/kg	0.117	1.24 (NP)	4.40	1.24	mg/kg	99% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Naphthalene	mg/kg	0.007	0.027 (NP)	0.180	0.027	mg/kg	95% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (3)
	Aluminum	mg/kg	12037	13725 (N)	34200 J	13725	mg/kg	Student-t	W-Test (4)
	Antimony	mg/kg	2.85	5.15 (L)	27.2 J	5.15	mg/kg	H-UCL	W-Test (5)
	Arsenic	mg/kg	5.28	6.29 (G)	12.7 J	6.29	mg/kg	Approximate Gamma 95% UCL	A-D & K-S Test (6)
	Copper	mg/kg	51.4	70.0 (L)	413 J	70.0	mg/kg	H-UCL	W-Test (5)
	Iron	mg/kg	19814	21817 (N)	43000 J	21817	mg/kg	Student-t	W-Test (4)
	Lead	mg/kg	127	436 (NP)	1240 J	127	mg/kg	Arithmetic Mean	(7)
	Manganese (Soil)	mg/kg	275	354 (G)	1040 J	354	mg/kg	Approximate Gamma 95% UCL	A-D & K-S Test (6)
	Vanadium	mg/kg	24.6	28.3 (G)	65.2 J	28.3	mg/kg	Approximate Gamma 95% UCL	A-D & K-S Test (6)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
G = Gamma
L = Lognormal
N = Normal
NP = Non-parametric
1 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 97.5% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
2 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 99% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
3 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 95% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
4 - The Shapiro-Wilks W test indicates that the data are normally distributed. The ProUCL guidance recommends that the 95% Student-t UCL be used as the exposure point concentration.
5 - The Shapiro-Wilks W test indicates that the data are log-normally distributed. The ProUCL guidance recommends that the H-UCL be used as the exposure point concentration.
6 - Anderson-Darling (A-D) and Kolmogorov Smirnov (K-S) test indicates that the data follows a gamma distribution, the approximate gamma 95% UCL is used as the exposure point concentration.
7 - Mean concentration is used as exposure point concentration for evaluating exposures to lead.
U.S. EPA, 1994:Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for lead in Children.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
SWMU 16	Trichloroethene	mg/kg	0.140	0.774 (NP)	9	0.774	mg/kg	99% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (1)
	Benzo(a)anthracene	mg/kg	0.151	1.06 (NP)	9.6	1.06	mg/kg	97.5% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Benzo(a)pyrene	mg/kg	0.133	0.927 (NP)	8.4	0.927	mg/kg	97.5% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Benzo(b)fluoranthene	mg/kg	0.146	1.02 (NP)	9.2	1.02	mg/kg	97.5% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Dibenzo(a,h)anthracene	mg/kg	0.026	0.132 (NP)	1.6	0.132	mg/kg	95% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (3)
	Indeno(1,2,3-cd)pyrene	mg/kg	0.070	0.486 (NP)	4.4	0.486	mg/kg	97.5% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Naphthalene	mg/kg	0.005	0.017 (NP)	0.18	0.017	mg/kg	95% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (3)
	Aluminum	mg/kg	11345	12636 (N)	34200 J	12636	mg/kg	Student-t	W-Test (4)
	Antimony	mg/kg	1.84	4.59 (NP)	27.2 J	4.59	mg/kg	97.5% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Arsenic	mg/kg	5.08	5.81 (G)	12.7 J	5.81	mg/kg	Approximate Gamma 95% UCL	A-D & K-S Test (5)
	Copper	mg/kg	35.7	82.9 (NP)	413 J	82.9	mg/kg	97.5% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (2)
	Iron	mg/kg	18923	20410 (N)	43000 J	20410	mg/kg	Student-t	W-Test (4)
	Lead	mg/kg	82.2	82.2 (NP)	1240 J	82.2	mg/kg	Arithmetic Mean	(6)
	Manganese (Soil)	mg/kg	207	257 (G)	1040 J	257	mg/kg	Approximate Gamma 95% UCL	A-D & K-S Test (5)
	Vanadium	mg/kg	22.9	25.4 (N)	65.2 J	25.4	mg/kg	Student-t	W-Test (4)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.
G = Gamma
N = Normal
NP = Non-parametric
1 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 99% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
2 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 97.5% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
3 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 95% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
4 - The Shapiro-Wilks W test indicates that the data are normally distributed. The ProUCL guidance recommends that the 95% Student-t UCL be used as the exposure point concentration.
5 - The Anderson-Darling and Kolmogorov-Smirnov tests indicate that the data follows a gamma distribution. The ProUCL guidance recommends that the approximate gamma UCL be used as the exposure point concentration.
6 - Mean concentration is used as exposure point concentration for evaluating exposures to lead.
U.S. EPA, 1994:Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for lead in Children

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.3.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
SWMU 16	1,1,2,2-Tetrachloroethane	ug/L	1.52	10.9 (NP)	2.1	1.52	ug/L	Arithmetic Mean	(1)
	1,1,2-Trichloroethane	ug/L	18.2	102 (NP)	220 J	18.2	ug/L	Arithmetic Mean	(1)
	1,1-Dichloroethene	ug/L	10.5	66.7 (NP)	160	10.5	ug/L	Arithmetic Mean	(1)
	1,2,3-Trichloropropane	ug/L	1.44	10.8 (NP)	0.6 J	1.44	ug/L	Arithmetic Mean	(1)
	1,2-Dichloroethane	ug/L	1.50	10.9 (NP)	2.3	1.50	ug/L	Arithmetic Mean	(1)
	Benzene	ug/L	1.70	11.1 (NP)	3.5	1.70	ug/L	Arithmetic Mean	(1)
	Bromodichloromethane	ug/L	1.45	10.8 (NP)	0.8 J	1.45	ug/L	Arithmetic Mean	(1)
	Carbon Tetrachloride	ug/L	2.58	13.5 (NP)	15	2.58	ug/L	Arithmetic Mean	(1)
	Chloroform	ug/L	4.24	15.6 (NP)	16	4.24	ug/L	Arithmetic Mean	(1)
	cis-1,2-Dichloroethene	ug/L	286	1922 (NP)	4200	286	ug/L	Arithmetic Mean	(1)
	Methylene Chloride	ug/L	2.70	21.2 (NP)	59 J	2.70	ug/L	Arithmetic Mean	(1)
	Tetrachloroethene	ug/L	10.9	72.3 (NP)	160	10.9	ug/L	Arithmetic Mean	(1)
	Toluene	ug/L	19.0	134 (NP)	310 J	19.0	ug/L	Arithmetic Mean	(1)
	trans-1,2-Dichloroethene	ug/L	2.89	15.0 (NP)	22	2.89	ug/L	Arithmetic Mean	(1)
	Trichloroethene	ug/L	21055	126972 (NP)	330000	21055	ug/L	Arithmetic Mean	(1)
	Vinyl Chloride	ug/L	24.2	169 (NP)	390 J	24.2	ug/L	Arithmetic Mean	(1)
	Pyridine	ug/L	1.92	16.0 (NP)	9	1.92	ug/L	Arithmetic Mean	(1)
	2-Nitrotoluene	ug/L	0.172	0.216 (NP)	1	0.172	ug/L	Arithmetic Mean	(1)
	2,4,6-Trinitrotoluene	ug/L	0.284	0.881 (NP)	4.8	0.284	ug/L	Arithmetic Mean	(1)
	2-Amino-4,6-Dinitrotoluene	ug/L	1.18	9.65 (NP)	29 J	1.18	ug/L	Arithmetic Mean	(1)
	4-Amino-2,6-Dinitrotoluene	ug/L	0.722	4.77 (NP)	14	0.722	ug/L	Arithmetic Mean	(1)
	RDX	ug/L	25.1	100 (NP)	200	25.1	ug/L	Arithmetic Mean	(1)
	Aluminum	ug/L	23388	287425 (L)	296000 J	23388	ug/L	Arithmetic Mean	(1)
	Antimony	ug/L	0.745	1.47 (G)	6.3 J	0.745	ug/L	Arithmetic Mean	(1)
	Arsenic	ug/L	5.29	10.7 (G)	29.2 J	5.29	ug/L	Arithmetic Mean	(1)
	Barium	ug/L	284	691 (L)	1700 J	284	ug/L	Arithmetic Mean	(1)
	Beryllium	ug/L	1.88	8.99 (L)	15.1 J	1.88	ug/L	Arithmetic Mean	(1)
	Cadmium	ug/L	0.455	1.20 (L)	4 J	0.455	ug/L	Arithmetic Mean	(1)
	Chromium	ug/L	32.0	247 (NP)	452 J	32.0	ug/L	Arithmetic Mean	(1)
	Cobalt	ug/L	81.7	164 (G)	563 J	81.7	ug/L	Arithmetic Mean	(1)
	Iron	ug/L	29423	59932 (G)	241000 J	29423	ug/L	Arithmetic Mean	(1)
	Lead	ug/L	13.6	85.7 (L)	127 J	13.6	ug/L	Arithmetic Mean	(1)
	Lithium	ug/L	33.0	71.2 (N)	101 J	33.0	ug/L	Arithmetic Mean	(1)
	Manganese (Water)	ug/L	4948	8491 (G)	24600 J	4948	ug/L	Arithmetic Mean	(1)
	Nickel	ug/L	145	264 (G)	808 J	145	ug/L	Arithmetic Mean	(1)
	Vanadium	ug/L	29.3	291 (L)	410 J	29.3	ug/L	Arithmetic Mean	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
G - Gamma distribution.
N - Normal distribution.
NP - Non-parmetric distribution.
L - Lognormal distribution.
J - Estimated value.
1 - Mean concentration is used as the exposure point concentration for groundwater.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.4.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Gullies	Trichloroethene	ug/L	4.51	29.8 (NP)	26	20.4	ug/L	97.5% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (1)
	RDX	ug/L	3.56	37.5 (NP)	24	24.0	ug/L	Maximum Concentration	W-, A-D, & K-S Test (2)
	Aluminum	ug/L	1647	2767 (G)	9510 J	2767	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)
	Antimony	ug/L	3.25	5.82 (G)	14.2 J	5.82	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)
	Arsenic	ug/L	0.747	1.49 (L)	3.8 J	1.49	ug/L	95% Chebyshev(MVUE) UCL	W-Test (4)
	Barium	ug/L	155	200 (G)	425 J	200	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)
	Cadmium	ug/L	1.35	2.25 (G)	4.4	2.25	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)
	Chromium	ug/L	2.30	3.67 (G)	11.8 J	3.67	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)
	Iron	ug/L	1787	3038 (G)	9990 J	3038	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)
	Lead	ug/L	48.4	102 (G)	281 J	48.4	ug/L	Arithmetic Mean	(5)
	Manganese (Water)	ug/L	71.1	127 (G)	443 J	127	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)
	Vanadium	ug/L	3.37	5.29 (G)	19 J	5.29	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)
	Zinc	ug/L	308	513 (G)	1340 J	513	ug/L	Approximate Gamma 95% UCL	A-D, K-S (3)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.
G - Gamma distribution.
NP - Non-parmetric distribution.
L - Lognormal distribution.
J - Estimated value.
1 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 99% Chebyshev(Mean, Std) UCL be used as the exposure point concentration. The 99% Chebyshev(Mean, Std) UCL is greater than the maximum detected concentration therefore ProUCL suggested that the 97.5% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
2 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 99% Chebyshev(Mean, Std) UCL be used as the exposure point concentration. The 99% Chebyshev(Mean, Std) UCL is greater than the maximum detected concentration therefore ProUCL suggested that either the 95% or 97.5% Chebyshev(Mean, Std) UCL be used as the exposure point concentration. Both are greater than the maximum detected concentration, therefore, the maximum detected concentration is used as the exposure point concentration.
3 - Anderson-Darling (A-D) and Kolmogorov Smirnov (K-S) test indicates that the data follows a gamma distribution, the approximate gamma 95% UCL is used as the exposure point concentration.
4 - The Shapiro-Wilks W test indicates that the data are log-normally distributed. The ProUCL guidance recommends that the 95% Chebyshev(MVUE) UCL be used as the exposure point concentration.
5 - Mean concentration is used as exposure point concentration for evaluating exposures to lead.
U.S. EPA, 1994:Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for lead in Children.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.5.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Turkey Creek	Arsenic	ug/L	0.177	(1)	0.37 J	0.37	ug/L	Maximum Detected Concentration	(1)
	Manganese (Water)	ug/L	200	(1)	476	476	ug/L	Maximum Detected Concentration	(1)

1 - There were an insufficient number of samples to calculate statistics, therefore the maximum detected concentration was used for the exposure point concentration.
Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.6.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Gullies	Benzo(a)pyrene	mg/kg	0.018	0.043 (G)	0.084	0.043	mg/kg	Approximate Gamma 95% UCL	A-D, K-S (1)
	Aluminum	mg/kg	11885	12961 (N)	19500 J	12961	mg/kg	Student-t	W-Test (2)
	Antimony	mg/kg	30.9	48.7 (G)	174 J	48.7	mg/kg	Approximate Gamma 95% UCL	A-D, K-S (1)
	Arsenic	mg/kg	10.9	13.1 (G)	34.1 J	13.1	mg/kg	Approximate Gamma 95% UCL	A-D, K-S (1)
	Barium	mg/kg	511	1662 (NP)	2820 J	1662	mg/kg	99% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (3)
	Cadmium	mg/kg	6.27	14.5 (L)	27.2 J	14.5	mg/kg	H-UCL	W-Test (4)
	Copper	mg/kg	468	1864 (L)	2570 J	1463	mg/kg	95% Chebyshev(MVUE) UCL	W-Test (5)
	Iron	mg/kg	40797	64255 (NP)	127000 J	64255	mg/kg	95% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (6)
	Lead	mg/kg	1730	1730 (G)	15200 J	1730	mg/kg	Arithmetic Mean	(7)
	Manganese (Soil)	mg/kg	1005	1193 (N)	2510 J	1193	mg/kg	Student-t	W-Test (2)
	Mercury	mg/kg	0.437	1.18 (L)	4.6	0.933	mg/kg	95% Chebyshev(MVUE) UCL	W-Test (5)
	Nickel	mg/kg	48.7	159 (NP)	804 J	159	mg/kg	95% Chebyshev(Mean, Std) UCL	W-, A-D, & K-S Test (6)
	Vanadium	mg/kg	33.7	38.4 (G)	71.7 J	38.4	mg/kg	Approximate Gamma 95% UCL	A-D, K-S (1)
	Zinc	mg/kg	3669	5842 (G)	23400 J	5842	mg/kg	Approximate Gamma 95% UCL	A-D, K-S (1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
G - Gamma distribution.
N - Normal distribution.
NP - Non-parmetric distribution.
L - Lognormal distribution.
J - Estimated value.
1 - Anderson-Darling (A-D) and Kolmogorov Smirnov (K-S) test indicates that the data follows a gamma distribution, the approximate gamma 95% UCL is used as the exposure point concentration.
2 - The Shapiro-Wilks W test indicates that the data are normally distributed. The ProUCL guidance recommends that the 95% Student-t UCL be used as the exposure point concentration.
3 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 99% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
4 - The Shapiro-Wilks W test indicates that the data are log-normally distributed. The ProUCL guidance recommends that the H-UCL be used as the exposure point concentration.
5 - The Shapiro-Wilks W test indicates that the data are log-normally distributed. The ProUCL guidance recommends that the 95% Chebyshev(MVUE) UCL be used as the exposure point concentration.
6 - The Shapiro-Wilks, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. The ProUCL guidance recommends that the 95% Chebyshev(Mean, Std) UCL be used as the exposure point concentration.
7 - Mean concentration is used as exposure point concentration for evaluating exposures to lead.
U.S. EPA, 1994:Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for lead in Children

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.7.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Turkey Creek	Aluminum	mg/kg	9658	(1)	10500 J	10500	mg/kg	Maximum Detected Concentration	(1)
	Arsenic	mg/kg	21.1	(1)	30.8 J	30.8	mg/kg	Maximum Detected Concentration	(1)
	Iron	mg/kg	74325	(1)	122000 J	122000	mg/kg	Maximum Detected Concentration	(1)
	Manganese (Soil)	mg/kg	1337	(1)	1900 J	1900	mg/kg	Maximum Detected Concentration	(1)
	Vanadium	mg/kg	40.0	(1)	51.2 J	51.2	mg/kg	Maximum Detected Concentration	(1)

1 - There were an insufficient number of samples to calculate statistics, therefore the maximum detected concentration was used for the exposure point concentration.
Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

RAGS Part D Table 4

Values Used For Daily Intake Calculations

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TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	24	days/year	(1)	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	
Dermal	Maintenance Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	24	days/year	(1)	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	

Notes:

1 - Professional Judgement. Assume 2 days a month for RME and 1 day a month for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.35E-08 Cancer Dermal Intake = 2.21E-07

Noncancer Ingestion Intake = 9.39E-08 Noncancer Dermal Intake = 6.20E-07

TABLE 4.2.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Maintenance Workers	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	8	hours/day	(1)	BW x AT
				EF	Exposure Frequency	24	days/year	(1)	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x Cs
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Professional Judgement. Assume 2 days a month for RME and 1 day a month for CTE.

Sources:

IDEM, 2004: RISC Technical Guide. January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 6.71E-03 Noncancer Inhalation Intake = 1.88E-02

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Maintenance Workers	Adult	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	2	hours/event	(1)	BW x AT
				EF	Exposure Frequency	24	days/year	(1)	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	

Notes:

1 - Professional Judgement. Assume 2 days a month for RME and 1 day a month for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 0.00E+00

Noncancer Ingestion Intake = 0.00E+00

Cancer Dermal Intake = 1.11E+00

Noncancer Dermal Intake = 3.10E+00

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Workers	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	24	days/year	(1)	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	
Dermal	Maintenance Workers	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	24	days/year	(1)	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	

Notes:

1 - Professional Judgement. Assume 2 days a month for RME and 1 day a month for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.35E-08 Cancer Dermal Intake = 2.21E-07

Noncancer Ingestion Intake = 9.39E-08 Noncancer Dermal Intake = 6.20E-07

TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Occupational Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	250	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	
Dermal	Occupational Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	250	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.49E-07 Cancer Dermal Intake = 2.31E-06

Noncancer Ingestion Intake = 9.78E-07 Noncancer Dermal Intake = 6.46E-06

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Occupational Workers	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1993	CA x IR x ET x EF x ED
				ET	Exposure Time	8	hours/day	(1)	BW x AT
				EF	Exposure Frequency	250	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Length of typical work day.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 6.99E-02 Noncancer Inhalation Intake = 1.96E-01

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Occupational Workers	Adult	SWMU 16	CGW	Chemical Concentration In Groundwater	Average	ug/L	U.S. EPA , 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1	L/day	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	250	days/year	U.S. EPA, 1993	BW x AT
				ED	Exposure Duration	25	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	
Dermal	Occupational Workers	Adult	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	U.S. EPA, 2004	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.25	hours/day	U.S. EPA, 2004	BW x AT
				EF	Exposure Frequency	250	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	25	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	

Notes

(1) - Professional judgement.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.49E-06

Noncancer Ingestion Intake = 9.78E-06

Cancer Dermal Intake = 1.15E+01

Noncancer Dermal Intake = 3.23E+01

TABLE 4.8.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	11	years	(2)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4015	days	U.S. EPA, 1989	
Dermal	Trespassers	Adolescent	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3280	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	11	years	(2)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4015	days	U.S. EPA, 1989	

Notes:

1 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

2 - Adolescents from age 6 to 17.

3 - Assumes that the lower arms, hands, lower legs, and feet are exposed. (Values based on Exposure Factors Handbook 1997.)

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual. Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.60E-08 Cancer Dermal Intake = 1.71E-07

Noncancer Ingestion Intake = 1.66E-07 Noncancer Dermal Intake = 1.09E-06

TABLE 4.9.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Trespassers	Adolescent	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	1.2	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	4	hours/day	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	11	years	(3)	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Professional judgement.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Adolescents from age 6 to 17.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 1.25E-03 Noncancer Inhalation Intake = 7.95E-03

TABLE 4.10.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.05	L/hr	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	4	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	26	events/year	(2)	BW x AT
				ED	Exposure Duration	11	years	(3)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	
Dermal	Trespassers	Adolescent	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3,280	cm2	(4)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	4	hours/event	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	11	years	(3)	See text for calculation of DAevent.
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Adolescents from age 6 to 17.

4 - Assumes 25 percent of total body surface area is exposed, U.S. EPA 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.

U.S. EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 5.21E-08

Noncancer Ingestion Intake = 3.31E-07

Cancer Dermal Intake = 8.54E-01

Noncancer Dermal Intake = 5.43E+00

TABLE 4.11.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	11	years	(2)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	
Dermal	Trespassers	Adolescent	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,280	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	11	years	(2)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	

Notes:

1 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

2 - Adolescents from age 6 to 17.

3 - Assumes 25 percent of total body surface area is exposed, U.S. EPA 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.60E-08 Cancer Dermal Intake = 1.71E-07

Noncancer Ingestion Intake = 1.66E-07 Noncancer Dermal Intake = 1.09E-06

TABLE 4.12.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	330	mg/day	U.S. EPA, 2002b	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 2002b	BW x AT
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	
Dermal	Construction Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	

Notes:

1 - Professional judgement. Ground is assumed to be frozen or snow covered for 22 weeks/year.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002a: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.77E-08 Cancer Dermal Intake = 8.30E-08

Noncancer Ingestion Intake = 1.94E-06 Noncancer Dermal Intake = 5.81E-06

TABLE 4.13.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	8	hours/day	(1)	BW x AT
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	CA = (1/PEF + 1/VF) x Cs
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.49E+06	m3/kg	U.S. EPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	14.31	g/m2-s per kg/m3	U.S. EPA, 2002a	

Notes:

1 - Professional judgement. Ground is assumed to be frozen or snow covered for 22 weeks/year.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual. Part A. EPA/540/1-86/060.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

TABLE 4.14.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Construction Workers	Adult	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	2	hours/day	(1)	BW x AT
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	

Sources:

1 - Professional judgement. Ground is assumed to be frozen or snow covered for 22 weeks/year.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = NA

Noncancer Ingestion Intake = NA

Cancer Dermal Intake = 2.77E-01

Noncancer Dermal Intake = 1.94E+01

TABLE 4.15.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	VDEQ, 2004	Intake (mg/kg/day) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x IR x ET x EF x ED
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1997	BW x AT
				ET	Exposure Time	2	hours/day	(1)	
				EF	Exposure Frequency	150	days/year	(1)	CA = CW x CF x VF
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	
				VF	Volatilization Factor	Calculated	(mg/m3)/(mg/L)	VDEQ, 2004	

Notes:

1 - Professional judgment.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

VDEQ, 2004: Virginia Department of Environmental Quality (VDEQ, online- http://www.deq.state.va.us/vrprisk).

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 4.19E-07 Noncancer Inhalation Intake = 2.94E-05

TABLE 4.16.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	
Dermal	Recreational Users	Child	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,300	cm2	(2)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 8.14E-08 Cancer Dermal Intake = 5.37E-07

Noncancer Ingestion Intake = 9.50E-07 Noncancer Dermal Intake = 6.27E-06

TABLE 4.17.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Recreational Users	Child	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	1.2	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	4	hours/day	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund, Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 3.91E-03 Noncancer Inhalation Intake = 4.56E-02

TABLE 4.18.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	mg/kg	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1	L/day	(1)	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	52	days/year	(2)	BW x AT
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	
Dermal	Recreational Users	Child	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3,300	cm2	(3)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.25	hours/day	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment.

2 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

3 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 8.14E-07

Noncancer Ingestion Intake = 9.50E-06

Cancer Dermal Intake = 2.69E+00

Noncancer Dermal Intake = 3.13E+01

TABLE 4.19.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.05	L/hour	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	4	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	52	events/year	(1)	BW x AT
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	
Dermal	Recreational Users	Child	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3,300	cm2	(2)	
				EV	Event Frequency	1	events/day	U.S. EPA, 2004	DAevent x EV x EF x ED x SA
				ET	Exposure Time	4	hours/event	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.63E-07 Cancer Dermal Intake = 2.69E+00

Noncancer Ingestion Intake = 1.90E-06 Noncancer Dermal Intake = 3.13E+01

TABLE 4.20.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	
Dermal	Recreational Users	Child	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,300	cm2	(2)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 8.14E-08 Cancer Dermal Intake = 5.37E-07

Noncancer Ingestion Intake = 9.50E-07 Noncancer Dermal Intake = 6.27E-06

TABLE 4.21.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	
Dermal	Recreational Users	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	9,070	cm2	(2)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.49E-08 Cancer Dermal Intake = 4.43E-07

Noncancer Ingestion Intake = 1.02E-07 Noncancer Dermal Intake = 1.29E-06

TABLE 4.22.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Recreational Users	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	1.6	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	4	hours/day	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 2.23E-03 Noncancer Inhalation Intake = 6.51E-03

TABLE 4.23.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	mg/kg	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1	L/day	(1)	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	52	days/year	(2)	BW x AT
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	
Dermal	Recreational Users	Adult	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	9,070	cm2	(3)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.25	hours/day	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment.

2 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

3 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 6.98E-07 Cancer Dermal Intake = 6.33E+00

Noncancer Ingestion Intake = 2.04E-06 Noncancer Dermal Intake = 1.85E+01

TABLE 4.24.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hour	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	4	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	52	events/year	(1)	BW x AT
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	
Dermal	Recreational Users	Adult	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	9,070	cm2	(2)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	4	hours/event	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.79E-08 Cancer Dermal Intake = 3.16E+00

Noncancer Ingestion Intake = 8.14E-08 Noncancer Dermal Intake = 9.23E+00

TABLE 4.25.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CSx IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	
Dermal	Recreational Users	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	9,070	cm2	(2)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.49E-08 Cancer Dermal Intake = 4.43E-07

Noncancer Ingestion Intake = 1.02E-07 Noncancer Dermal Intake = 1.29E-06

TABLE 4.26.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	
Dermal	Residents	Child	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,800	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.10E-06 Cancer Dermal Intake = 3.07E-06

Noncancer Ingestion Intake = 1.28E-05 Noncancer Dermal Intake = 3.58E-05

TABLE 4.27.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Residents	Child	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	0.625	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	24	hours/day	U.S. EPA, 1997	BW x AT
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 8.22E-02 Noncancer Inhalation Intake = 9.59E-01

TABLE 4.28.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	mg/kg	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1.5	L/day	U.S. EPA, 1997	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	BW x AT
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	
Dermal	Residents	Child	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	6,600	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	U.S. EPA, 2004	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.25	hours/day	U.S. EPA, 2004	BW x AT
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 8.22E-06

Noncancer Ingestion Intake = 9.59E-05

Cancer Dermal Intake = 3.62E+01

Noncancer Dermal Intake = 4.22E+02

TABLE 4.29.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Child	SWMU 16	S	Volatile Chemical Generation Rate	Derived	mg/m3-min shower	Foster&Chrostowski 1987	Intake (mg/kg/day) =
				IRsh	Inhalation Rate of volatiles in shower	0.6	m3/hr	U.S. EPA, 1993	
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	S x IR x K x EF x ED
				K	Masss Transfer Coefficient	Derived	min	Foster&Chrostowski 1987	BW x AT x Ra x CF
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				Ra	Air Exchange Rate	0.0167	min-1	Foster&Chrostowski 1987	
				CF	Conversion Factor	60	min/hr		
				Ds	Shower Duration	15	min	U.S. EPA, 2004	
				Dt	Total Time in Bathroom	20	min	Professional judgement	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Noncancer)	2,190	days	U.S. EPA, 1989	

Sources

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Foster, S.A. and P.C. Chrostowski, 1987. Inhalation Exposure to Volatile Organic Contaminants in the Shower.

TABLE 4.30.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.05	L/hour	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	4	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	52	events/year	(1)	BW x AT
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	
Dermal	Residents	Child	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3,300	cm2	(2)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	4	hours/event	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.63E-07 Cancer Dermal Intake = 2.69E+00

Noncancer Ingestion Intake = 1.90E-06 Noncancer Dermal Intake = 3.13E+01

TABLE 4.31.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	(1)	
				CF3	Conversion Factor 3	1E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	
Dermal	Residents	Child	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,800	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 8.14E-08 Cancer Dermal Intake = 4.56E-07

Noncancer Ingestion Intake = 9.50E-07 Noncancer Dermal Intake = 5.32E-06

TABLE 4.32.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	
Dermal	Residents	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	5,700	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 4.70E-07 Cancer Dermal Intake = 1.87E-06

Noncancer Ingestion Intake = 1.37E-06 Noncancer Dermal Intake = 5.47E-06

TABLE 4.33.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	0.83	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	24	hours/day	U.S. EPA, 1997	BW x AT
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 9.36E-02 Noncancer Inhalation Intake = 2.73E-01

TABLE 4.34.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	2	L/day	U.S. EPA, 1993	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	BW x AT
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	
Dermal	Residents	Adult	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	18,000	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	U.S. EPA, 2004	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.25	hours/day	U.S. EPA, 2004	BW x AT
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 9.39E-06

Noncancer Ingestion Intake = 2.74E-05

Cancer Dermal Intake = 8.45E+01

Noncancer Dermal Intake = 2.47E+02

TABLE 4.35.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Adult	SWMU 16	S	Volatile Chemical Generation Rate	Derived	mg/m3-min shower	Foster&Chrostowski 1987	Chronic Daily Intake (CDI) (mg/kg-day)=
				IRsh	Inhalation Rate of volatiles in shower	0.6	m3/hr	U.S. EPA, 1993	
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	$\frac{S \times IRsh \times K \times EF \times ED}{BW \times AT \times Ra \times CF}$
				K	Masss Transfer Coefficient	Derived	min	Foster&Chrostowski 1987	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				Ra	Air Exchange Rate	0.017	min-1	Foster&Chrostowski 1987	
				CF	Conversion Factor	60	min/hr		
				Ds	Shower Duration	15	min	U.S. EPA, 2004	
				Dt	Total Time in Bathroom	20	min	Professional judgement	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Noncancer)	8760	days	U.S. EPA ,1989	

Sources

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Foster, S.A. and P.C. Chrostowski, 1987. Inhalation Exposure to Volatile Organic Contaminants in the Shower.

TABLE 4.36.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hour	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	4	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	52	events/year	(1)	BW x AT
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	
Dermal	Residents	Adult	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	9,070	cm2	(2)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	4	hours/event	(1)	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.79E-08

Noncancer Ingestion Intake = 8.14E-08

Cancer Dermal Intake = 6.33E+00

Noncancer Dermal Intake = 1.85E+01

TABLE 4.37.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	(1)	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CSs x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	
Dermal	Residents	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	5,700	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	24	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.49E-08 Cancer Dermal Intake = 1.39E-07

Noncancer Ingestion Intake = 1.02E-07 Noncancer Dermal Intake = 4.06E-07

TABLE 4.1.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	12	days/year	(1)	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	
Dermal	Maintenance Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	12	days/year	(1)	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	

Notes:

1 - Professional Judgement. Assume 2 days a month for RME and 1 day a month for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.02E-09 Cancer Dermal Intake = 3.99E-09

Noncancer Ingestion Intake = 2.35E-08 Noncancer Dermal Intake = 3.10E-08

TABLE 4.2.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Maintenance Workers	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				Cs	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	8	hours/day	(1)	BW x AT
				EF	Exposure Frequency	12	days/year	(1)	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x Cs
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Professional Judgement. Assume 2 days a month for RME and 1 day a month for CTE.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 1.21E-03 Noncancer Inhalation Intake = 9.39E-03

TABLE 4.3.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Maintenance Workers	Adult	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	1.5	hours/event	(1)	BW x AT
				EF	Exposure Frequency	12	days/year	(1)	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	

Notes:

1 - Professional Judgement. Assume 2 days a month for RME and 1 day a month for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 0.00E+00

Noncancer Ingestion Intake = 0.00E+00

Cancer Dermal Intake = 1.99E-01

Noncancer Dermal Intake = 1.55E+00

TABLE 4.4.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Workers	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	12	days/year	(1)	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	
Dermal	Maintenance Workers	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	12	days/year	(1)	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	

Notes:

1 - Professional Judgement. Assume 2 days a month for RME and 1 day a month for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.02E-09 Cancer Dermal Intake = 3.99E-09

Noncancer Ingestion Intake = 2.35E-08 Noncancer Dermal Intake = 3.10E-08

TABLE 4.5.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Occupational Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	(1)	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	219	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	
Dermal	Occupational Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	219	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	

Notes

1 - One half the RME value is used for the CTE value.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 5.51E-08 Cancer Dermal Intake = 7.27E-08

Noncancer Ingestion Intake = 4.29E-07 Noncancer Dermal Intake = 5.66E-07

TABLE 4.6.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Occupational Workers	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1993	CA x IR x ET x EF x ED
				ET	Exposure Time	8	hours/day	(1)	BW x AT
				EF	Exposure Frequency	219	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Length of typical work day.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 2.20E-02 Noncancer Inhalation Intake = 1.71E-01

TABLE 4.7.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Occupational Workers	Adult	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	ug/L	U.S. EPA , 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1	L/day	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	219	days/year	U.S. EPA, 1993	BW x AT
				ED	Exposure Duration	9	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	
Dermal	Occupational Workers	Adult	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	U.S. EPA, 2004	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.167	hours/day	U.S. EPA, 2004	BW x AT
				EF	Exposure Frequency	219	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	9	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	

Notes

(1) - Professional judgement.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.10E-06

Noncancer Ingestion Intake = 8.57E-06

Cancer Dermal Intake = 3.64E+00

Noncancer Dermal Intake = 2.83E+01

TABLE 4.8.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CSs x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	11	years	(2)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4015	days	U.S. EPA, 1989	
Dermal	Trespassers	Adolescent	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3100	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	11	years	(2)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4015	days	U.S. EPA, 1989	

Notes:

1 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

2 - Adolescents from age 6 to 17.

3 - Assumes that the lower arms, hands, lower legs, and feet are exposed. (Values based on Exposure Factors Handbook 1997.)

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 6.51E-09 Cancer Dermal Intake = 1.61E-08

Noncancer Ingestion Intake = 4.14E-08 Noncancer Dermal Intake = 1.03E-07

TABLE 4.9.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Trespassers	Adolescent	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	1.2	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	2	hours/day	(1)	BW x AT
				EF	Exposure Frequency	13	days/year	(2)	
				ED	Exposure Duration	11	years	(3)	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Professional judgement.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Adolescents from age 6 to 17.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 3.12E-04 Noncancer Inhalation Intake = 1.99E-03

TABLE 4.10.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.05	L/hr	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	2	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	13	events/year	(2)	BW x AT
				ED	Exposure Duration	11	years	(3)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	
Dermal	Trespassers	Adolescent	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3,100	cm2	(4)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	2	hours/event	(1)	BW x AT
				EF	Exposure Frequency	13	days/year	(2)	
				ED	Exposure Duration	11	years	(3)	See text for calculation of DAevent.
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Adolescents from age 6 to 17.

4 - Assumes 25 percent of total body surface area is exposed, U.S. EPA 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.

EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.30E-08 Cancer Dermal Intake = 4.03E-01

Noncancer Ingestion Intake = 8.28E-08 Noncancer Dermal Intake = 2.57E+00

TABLE 4.11.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	13	days/year	(2)	
				ED	Exposure Duration	11	years	(3)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	
Dermal	Trespassers	Adolescent	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 1992	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,100	cm2	(4)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	13	days/year	(2)	
				ED	Exposure Duration	11	years	(3)	
				BW	Body Weight	43	kg	U.S. EPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	4,015	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Adolescents from age 6 to 17.

4 - Assumes 25 percent of total body surface area is exposed, U.S. EPA 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.25E-09 Cancer Dermal Intake = 1.61E-08

Noncancer Ingestion Intake = 2.07E-08 Noncancer Dermal Intake = 1.03E-07

TABLE 4.12.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	165	mg/day	(1)	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 2002b	BW x AT
				EF	Exposure Frequency	150	days/year	(2)	
				ED	Exposure Duration	1	years	(2)	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	
Dermal	Construction Workers	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2002b	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.1	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	150	days/year	(2)	
				ED	Exposure Duration	1	years	(2)	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	

Notes:

1 - CTE is assumed to be one half of RME.

2 - Professional judgement. Ground is assumed to be frozen or snow covered for 22 weeks/year.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002a: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.38E-08 Cancer Dermal Intake = 2.77E-08

Noncancer Ingestion Intake = 9.69E-07 Noncancer Dermal Intake = 1.94E-06

TABLE 4.13.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	8	hours/day	(1)	BW x AT
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	CA = (1/PEF + 1/VF) x Cs
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.49E+06	m3/kg	U.S. EPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	14.31	g/m2-s per kg/m3	U.S. EPA, 2002a	

Notes:

1 - Professional judgement. Ground is assumed to be frozen or snow covered for 22 weeks/year.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 1.68E-03 Noncancer Inhalation Intake = 1.17E-01

TABLE 4.14.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Construction Workers	Adult	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3300	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	1.5	hours/day	(1)	BW x AT
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	

Sources:

1 - Professional judgment.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = NA

Noncancer Ingestion Intake = NA

Cancer Dermal Intake = 2.77E-01

Noncancer Dermal Intake = 1.94E+01

TABLE 4.15.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	VDEQ, 2004	Intake (mg/kg/day) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x IR x ET x EF x ED
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1997	BW x AT
				ET	Exposure Time	1.5	hours/day	(1)	
				EF	Exposure Frequency	30	days/year	(1)	CA = CW x CF x VF
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	U.S. EPA, 1989	
				VF	Volatilization Factor	Calculated	(mg/m3)/(mg/L)	VDEQ, 2004	

Notes:

1 - Professional judgment.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

VDEQ, 2004: Virginia Department of Environmental Quality (VDEQ, online- http://www.deq.state.va.us/vrprisk).

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 6.29E-08 Noncancer Inhalation Intake = 4.40E-06

TABLE 4.16.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
Dermal	Recreational Users	Child	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,300	cm2	(2)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 6.78E-09 Cancer Dermal Intake = 1.79E-08

Noncancer Ingestion Intake = 2.37E-07 Noncancer Dermal Intake = 6.27E-07

TABLE 4.17.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational Users	Child	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	1.2	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	2	hours/day	(1)	BW x AT
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 1.63E-04 Noncancer Inhalation Intake = 5.70E-03

TABLE 4.18.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	mg/kg	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1	L/day	(1)	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	26	days/year	(2)	BW x AT
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
Dermal	Recreational Users	Child	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3,300	cm2	(3)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.167	hours/day	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment.

2 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

3 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.36E-07

Noncancer Ingestion Intake = 4.75E-06

Cancer Dermal Intake = 4.48E-01

Noncancer Dermal Intake = 1.57E+01

TABLE 4.19.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.05	L/hour	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	2	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	26	events/year	(1)	BW x AT
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
Dermal	Recreational Users	Child	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3,300	cm2	(2)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	2	hours/event	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.36E-08 Cancer Dermal Intake = 4.48E-01

Noncancer Ingestion Intake = 4.75E-07 Noncancer Dermal Intake = 1.57E+01

TABLE 4.20.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
Dermal	Recreational Users	Child	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,300	cm2	(2)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1; Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 6.78E-09 Cancer Dermal Intake = 1.79E-08

Noncancer Ingestion Intake = 2.37E-07 Noncancer Dermal Intake = 6.27E-07

TABLE 4.21.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	
Dermal	Recreational Users	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	9,070	cm2	(2)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.54E-09 Cancer Dermal Intake = 9.23E-09

Noncancer Ingestion Intake = 2.54E-08 Noncancer Dermal Intake = 9.23E-08

TABLE 4.22.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Recreational Users	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	1.6	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	2	hours/day	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2555	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 3.26E-04 Noncancer Inhalation Intake = 3.26E-03

TABLE 4.23.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	mg/kg	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1	L/day	(1)	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	26	days/year	(2)	BW x AT
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	
Dermal	Recreational Users	Adult	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	9,070	cm2	(3)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.167	hours/day	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment.

2 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

3 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.02E-07 Cancer Dermal Intake = 9.23E-01

Noncancer Ingestion Intake = 1.02E-06 Noncancer Dermal Intake = 9.23E+00

TABLE 4.242.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hour	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	2	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	26	events/year	(1)	BW x AT
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	
Dermal	Recreational Users	Adult	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	9,070	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	2	hours/event	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.04E-09 Cancer Dermal Intake = 9.23E-01

Noncancer Ingestion Intake = 2.04E-08 Noncancer Dermal Intake = 9.23E+00

TABLE 4.25.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	
Dermal	Recreational Users	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	9,070	cm2	(2)	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.54E-09 Cancer Dermal Intake = 9.23E-09

Noncancer Ingestion Intake = 2.54E-08 Noncancer Dermal Intake = 9.23E-08

TABLE 4.26.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
Dermal	Residents	Child	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,800	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.22E-07 Cancer Dermal Intake = 1.37E-07

Noncancer Ingestion Intake = 4.27E-06 Noncancer Dermal Intake = 4.79E-06

TABLE 4.27.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Residents	Child	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	0.625	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	24	hours/day	U.S. EPA, 1997	BW x AT
				EF	Exposure Frequency	350	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	15	kg	U.S. EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 2.74E-02 Noncancer Inhalation Intake = 9.59E-01

TABLE 4.28.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	mg/kg	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	0.66	L/day	U.S. EPA, 1997	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	BW x AT
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
Dermal	Residents	Child	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	6,600	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	U.S. EPA, 2004	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.167	hours/day	U.S. EPA, 2004	BW x AT
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 8.06E-07

Noncancer Ingestion Intake = 2.82E-05

Cancer Dermal Intake = 8.06E+00

Noncancer Dermal Intake = 2.82E+02

TABLE 4.29.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Child	SWMU 16	S	Volatile Chemical Generation Rate	Derived	mg/m3-min shower	Foster&Chrostowski 1987	Intake (mg/kg/day) =
				IRsh	Inhalation Rate of volatiles in shower	0.6	m3/hr	U.S. EPA, 1993	
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	S x IR x K x EF x ED
				K	Masss Transfer Coefficient	Derived	min	Foster&Chrostowski 1987	BW x AT x Ra x CF
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				Ra	Air Exchange Rate	0.0167	min-1	Foster&Chrostowski 1987	
				CF	Conversion Factor	60	min/hr		
				Ds	Shower Duration	10	min	U.S. EPA, 2004	
				Dt	Total Time in Bathroom	15	min	Professional judgement	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Noncancer)	730	days	U.S. EPA, 1989	

Sources

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Foster, S.A. and P.C. Chrostowski, 1987. Inhalation Exposure to Volatile Organic Contaminants in the Shower.

TABLE 4.30.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.05	L/hour	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	2	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	26	events/year	(1)	BW x AT
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
Dermal	Residents	Child	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	3,300	cm2	(2)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	2	hours/event	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	15	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that 50 percent of the total body surface area is exposed. U.S. EPA, 2004.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.36E-08

Noncancer Ingestion Intake = 4.75E-07

Cancer Dermal Intake = 4.48E-01

Noncancer Dermal Intake = 1.57E+01

TABLE 4.31.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	
Dermal	Residents	Child	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.00E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,800	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	2	years	U.S. EPA, 1993	
				BW	Body Weight	15	kg	U.S. EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 6.78E-09 Cancer Dermal Intake = 1.52E-08

Noncancer Ingestion Intake = 2.37E-07 Noncancer Dermal Intake = 5.32E-07

TABLE 4.32.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	U.S. EPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	
Dermal	Residents	Adult	SWMU 16	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	5,700	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 4.58E-08 Cancer Dermal Intake = 5.22E-08

Noncancer Ingestion Intake = 4.58E-07 Noncancer Dermal Intake = 5.22E-07

TABLE 4.33.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name (1)
Inhalation	Residents	Adult	SWMU 16	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002a	Intake (mg/kg/day) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	U.S. EPA, 2002b	
				IR	Inhalation Rate	0.83	m3/hour	U.S. EPA, 1997	CA x IR x ET x EF x ED
				ET	Exposure Time	24	hours/day	U.S. EPA, 1997	BW x AT
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	CA = (1/PEF + 1/VF) x CS
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2555	days	U.S. EPA, 1989	
				PEF	Particulate Emission Factor	1.316E+09	m3/kg	IDEM, 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	U.S. EPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.81	g/m2-s per kg/m3	IDEM, 2004	

Sources:

IDEM, 2004: RISC Technical Guide, January Update.

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. U.S. EPA/600/8-95/002FA.

U.S. EPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

U.S. EPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 1.82E-02 Noncancer Inhalation Intake = 1.82E-01

TABLE 4.34.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	SWMU 16	CGW	Chemical Concentration in Groundwater	Average	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1.4	L/day	U.S. EPA, 1993	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	BW x AT
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	
Dermal	Residents	Adult	SWMU 16	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	18,000	cm2	U.S. EPA, 2004	
				EV	Event Frequency	1	events/day	U.S. EPA, 2004	DAevent x EV x EF x ED x SA
				ET	Exposure Time	0.167	hours/day	U.S. EPA, 2004	BW x AT
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.28E-06

Noncancer Ingestion Intake = 1.28E-05

Cancer Dermal Intake = 1.65E+01

Noncancer Dermal Intake = 1.65E+02

TABLE 4.35.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Adult	SWMU 16	S	Volatile Chemical Generation Rate	Derived	mg/m3-min shower	Foster&Chrostowski 1987	Chronic Daily Intake (CDI) (mg/kg-day)=
				IRsh	Inhalation Rate of volatiles in shower	0.6	m3/hr	U.S. EPA, 1993	
				EF	Exposure Frequency	234	days/year	U.S. EPA, 1993	S x IRsh x K x EF x ED
				K	Masss Transfer Coefficient	Derived	min	Foster&Chrostowski 1987	BW x AT x Ra x CF
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				Ra	Air Exchange Rate	0.017	min-1	Foster&Chrostowski 1987	
				CF	Conversion Factor	60	min/hr		
				Ds	Shower Duration	10	min	U.S. EPA, 2004	
				Dt	Total Time in Bathroom	15	min	Professional judgement	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Noncancer)	730	days	U.S. EPA ,1989	

Sources

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Foster, S.A. and P.C. Chrostowski, 1987. Inhalation Exposure to Volatile Organic Contaminants in the Shower.

TABLE 4.36.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	SWMU 16	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	U.S. EPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hour	U.S. EPA 4, 2000	
				CF	Conversion factor	0.001	ug/mg	- -	
				ET	Exposure Time	2	hours/event	(1)	CW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	26	events/year	(1)	BW x AT
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	
Dermal	Residents	Adult	SWMU 16	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	U.S. EPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				SA	Skin Surface Available for Contact	9,070	cm2	(2)	
				EV	Event Frequency	1	events/day	(1)	DAevent x EV x EF x ED x SA
				ET	Exposure Time	2	hours/event	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	See text for calculation of DAevent.
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

2 - Assumes that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA Region 4, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (CR x CF x ET x EF x ED)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.04E-09

Noncancer Ingestion Intake = 2.04E-08

Cancer Dermal Intake = 9.23E-01

Noncancer Dermal Intake = 9.23E+00

TABLE 4.37.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	25	mg/day	(1)	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CSs x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	U.S. EPA, 1993	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	
Dermal	Residents	Adult	SWMU 16	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	U.S. EPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.00E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	5,700	cm2	U.S. EPA, 2004	CS x CF3 x SA x SSAF x DABS x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	U.S. EPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	U.S. EPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	7	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	U.S. EPA, 1989	

Notes:

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.54E-09 Cancer Dermal Intake = 5.80E-09

Noncancer Ingestion Intake = 2.54E-08 Noncancer Dermal Intake = 5.80E-08

RAGS Part D Table 5

Non-Cancer Toxicity Data

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NON-CANCER TOXICITY DATA

Table No.

5-1 Non-Cancer Toxicity Data - Oral/Dermal
5-2 Non-Cancer Toxicity Data - Inhalation

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds										
1,1,2,2-Tetrachloroethane	Chronic	6.0E-02	mg/kg/day	1	6.0E-02	mg/kg/day	Liver	NA	NCEA	10/19/2004
1,1,2-Trichloroethane	Chronic	4.0E-03	mg/kg/day	1	4.0E-03	mg/kg/day	Blood	1000/1	IRIS	3/24/2005
1,1-Dichloroethene	Chronic	5.0E-02	mg/kg/day	1	5.0E-02	mg/kg/day	Liver	100/1	IRIS	3/24/2005
1,2,3-Trichloropropane	Chronic	6.0E-03	mg/kg/day	1	6.0E-03	mg/kg/day	Blood	1000/1	IRIS	3/24/2005
1,2-Dichloroethane	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	NA	NA	NCEA	10/19/2004
Benzene	Chronic	4.0E-03	mg/kg/day	1	4.0E-03	mg/kg/day	Blood	300/1	IRIS	3/24/2005
Bromodichloromethane	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Kidney	1000/1	IRIS	3/24/2005
Carbon Tetrachloride	Chronic	7.0E-04	mg/kg/day	1	7.0E-04	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
Chloroform	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
cis-1,2-Dichloroethene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Blood	NA	EPA 3	10/19/2004
Methylene Chloride	Chronic	6.0E-02	mg/kg/day	1	6.0E-02	mg/kg/day	Liver	100/1	IRIS	3/24/2005
Tetrachloroethene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
Toluene	Chronic	2.0E-01	mg/kg/day	1	2.0E-01	mg/kg/day	Kidney, Liver	1000/1	IRIS	3/24/2005
trans-1,2-Dichloroethene	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Blood	1000/1	IRIS	3/24/2005
Trichloroethene	Chronic	5.0E-01	mg/kg/day	1	5.0E-01	mg/kg/day	Liver	NA	CA EPA	12/2002
Vinyl Chloride	Chronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Liver	30/1	IRIS	3/24/2005
Semivolatile Organic Compounds										
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Body Weight	3000/1	IRIS	3/24/2005
Pyridine	Chronic	1.0E-03	mg/kg/day	1	1.0E-03	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
Herbicides										
Pentachlorophenol	Chronic	3.0E-02	mg/kg/day	1	3.0E-02	mg/kg/day	Liver, Kidney	100/1	IRIS	3/24/2005
Energetics										
2-Nitrotoluene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Spleen	1000	HEAST	7/1997
2,4,6-Trinitrotoluene	Chronic	5.0E-04	mg/kg/day	1	5.0E-04	mg/kg/day	Liver	1000/1	IRIS	3/24/2005
2-Amino-4,6-Dinitrotoluene	Chronic	2.00E-04	mg/kg/day	1	2.0E-04	mg/kg/day	Liver	NA	NCEA	10/19/2004
4-Amino-2,6-Dinitrotoluene	Chronic	2.00E-04	mg/kg/day	1	2.0E-04	mg/kg/day	Liver	NA	NCEA	10/19/2004
HMX	Chronic	5.0E-02	mg/kg/day	1	5.0E-02	mg/kg/day	Liver, Blood	1000/1	IRIS	3/24/2005
RDX	Chronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Prostate	100/1	IRIS	3/24/2005
Metals										
Aluminum	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	CNS	100	NCEA	10/19/2004
Antimony	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	3/24/2005
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, CVS	3/1	IRIS	3/24/2005
Barium	Chronic	7.0E-02	mg/kg/day	0.07	4.9E-03	mg/kg/day	Kidney	3/1	IRIS	3/24/2005
Beryllium	Chronic	2.0E-03	mg/kg/day	0.007	1.4E-05	mg/kg/day	GS	300/1	IRIS	3/24/2005
Cadmium[3]	Chronic	5.0E-04	mg/kg/day	0.05	2.5E-05	mg/kg/day	Kidney	10/1	IRIS	3/24/2005
Chromium III	Chronic	1.5E+00	mg/kg/day	0.013	2.0E-02	mg/kg/day	NOEL	100/10	IRIS	3/24/2005
Chromium VI	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	Fetotoxicity/GS/Bone	300/3	IRIS	3/24/2005
Cobalt	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	NA	NA	EPA 3	10/19/2004
Copper	Chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	GS	NA	HEAST	7/1997
Iron	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	NA	1	NCEA	10/19/2004
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lithium	Chronic	2.0E-03	mg/kg/day	1	2.0E-03	mg/kg/day	NA	NA	NCEA	10/19/2004
Manganese (Soil)	Chronic	7.0E-02	mg/kg/day	0.04	2.8E-03	mg/kg/day	CNS	1/1	IRIS	3/24/2005
Manganese (Water)	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	CNS	3/1	IRIS	3/24/2005

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Mercury[4]	Chronic	3.0E-04	mg/kg/day	0.07	2.1E-05	mg/kg/day	CNS	1000/1	IRIS	3/24/2005
Nickel	Chronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	300/1	IRIS	3/24/2005
Selenium	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	Skin, CNS	3/1	IRIS	3/24/2005
Vanadium	Chronic	1.0E-03	mg/kg/day	0.026	2.6E-05	mg/kg/day	Kidney	300	NCEA	10/19/2004
Zinc	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Blood	3/1	IRIS	3/24/2005

Notes:
1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.
3 - Water value for cadmium is listed.
4 - Value is for mercuric chloride.

Definitions:
CNS = Central Nervous System
CVS = Cardiovascular system
EPA 3 = U.S. EPA Region 3 Risk-Based Concentration Table, October 19, 2004.
GS = Gastrointestinal System
HEAST= Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
NA = Not Applicable
NOEL = No Observed Effect Level.
CA EPA = California EPA, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds									
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	Chronic	2.0E-01	mg/m^3	5.7E-02	(mg/kg/day)	Liver	30/1	IRIS	3/24/2005
1,2,3-Trichloropropane	Chronic	4.9E-03	mg/m^3	1.4E-03	(mg/kg/day)	Blood	NA	NCEA	10/19/2004
1,2-Dichloroethane	Chronic	4.9E-03	mg/m^3	1.4E-03	(mg/kg/day)	NA	NA	NCEA	10/19/2004
Benzene	Chronic	3.0E-02	mg/m^3	1.4E-03	(mg/kg/day)	Blood	300/1	IRIS	3/24/2005
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	Chronic	2.0E-03	mg/m^3	5.7E-04	(mg/kg/day)	Liver	NA	NCEA	10/19/2004
Chloroform	Chronic	4.9E-02	mg/m^3	1.4E-02	(mg/kg/day)	Liver	NA	NCEA	10/19/2004
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	Chronic	3.0E+00	mg/m^3	8.6E-01	(mg/kg/day)	Liver	100	HEAST	7/1997
Tetrachloroethene	Chronic	4.9E-01	mg/m^3	1.4E-01	(mg/kg/day)	Liver	NA	NCEA	10/19/2004
Toluene	Chronic	4.0E-01	mg/m^3	1.1E-01	(mg/kg/day)	CNS	300/1	IRIS	3/24/2005
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	Chronic	6.0E-01	mg/m^3	1.7E-01	(mg/kg/day)	Liver	NA	CA EPA	12/2002
Vinyl Chloride	Chronic	1.0E-01	mg/m^3	2.9E-02	(mg/kg/day)	Liver	30/1	IRIS	3/24/2005
Semivolatile Organic Compounds									
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	0.003	mg/m^3	8.6E-04	(mg/kg/day)	Nasal	3000/1	IRIS	3/24/2005
Pyridine	NA	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides									
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Energetics									
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	NA	NA	NA	NA	NA	NA	NA
RDX	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Metals									
Aluminum	Chronic	3.5E-03	mg/m^3	1.0E-03	(mg/kg/day)	CNS	300	NCEA	7/26/2001
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	Chronic	5.0E-04	mg/m^3	1.4E-04	(mg/kg/day)	Fetus	1000/1	HEAST	7/1997
Beryllium	Chronic	2.0E-05	mg/m^3	5.7E-06	(mg/kg/day)	Lungs	10/1	IRIS	3/24/2005
Cadmium	Chronic	2.0E-04	mg/m^3	5.7E-05	(mg/kg/day)	Kidney	NA	EPA 3	10/19/2004
Chromium III	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium VI	Chronic	1.0E-04	mg/m^3	2.9E-05	(mg/kg/day)	Lungs	300/1	IRIS	3/24/2005
Cobalt	Chronic	2.0E-05	mg/m^3	5.7E-06	(mg/kg/day)	NA	NA	EPA 3	10/19/2004
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lithium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Chronic	5.0E-05	mg/m^3	1.4E-05	(mg/kg/day)	CNS	1000/1	IRIS	3/24/2005
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg

Definitions:

CNS = Central Nervous System

EPA 3 = U.S. EPA Region 3 RBC Table, October 19, 2004.

HEAST= Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

NA = Not Applicable

NCEA = National Center for Environmental Assessment

CA EPA = California EPA, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

RAGS Part D Table 6

Cancer Toxicity Data

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RAGS PART D TABLE 6
CANCER TOXICITY DATA

Table No.

6-1 Cancer Toxicity Data - Oral/Dermal
6-2 Cancer Toxicity Data - Inhalation

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds								
1,1,2,2-Tetrachloroethane	2.0E-01	$(mg/kg/day)^{-1}$	1	2.0E-01	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
1,1,2-Trichloroethane	5.7E-02	$(mg/kg/day)^{-1}$	1	5.7E-02	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
1,1-Dichloroethene	NA	NA	NA	NA	NA	C	IRIS	3/24/2005
1,2,3-Trichloropropane	2.0E-03	$(mg/kg/day)^{-1}$	1	2.0E-03	$(mg/kg/day)^{-1}$	NA	NCEA	10/19/2004
1,2-Dichloroethane	9.1E-02	$(mg/kg/day)^{-1}$	1	9.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Benzene	5.5E-02	$(mg/kg/day)^{-1}$	1	5.5E-02	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Bromodichloromethane	6.2E-02	$(mg/kg/day)^{-1}$	1	6.2E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Carbon Tetrachloride	1.3E-01	$(mg/kg/day)^{-1}$	1	1.3E-01	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Chloroform	NA	NA	NA	NA	NA	B2	IRIS	3/24/2005
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Methylene Chloride	7.5E-03	$(mg/kg/day)^{-1}$	1	7.5E-03	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Tetrachloroethene	5.4E-01	$(mg/kg/day)^{-1}$	1	5.4E-01	$(mg/kg/day)^{-1}$	NA	EPA 3	10/19/2004
Toluene	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	1.3E-02	$(mg/kg/day)^{-1}$	1	1.3E-02	$(mg/kg/day)^{-1}$	C	CA EPA	12/2002
Vinyl Chloride	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Semivolatile Organic Compounds								
Benzo(a)anthracene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Benzo(a)pyrene	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Benzo(b)fluoranthene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Bis(2-ethylhexyl)phthalate	1.4E-02	$(mg/kg/day)^{-1}$	1	1.4E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Dibenzo(a,h)anthracene	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Indeno(1,2,3-cd)pyrene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Naphthalene	NA	NA	NA	NA	NA	C	IRIS	3/24/2005
Pyridine	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides								
Pentachlorophenol	1.2E-01	$(mg/kg/day)^{-1}$	1	1.2E-01	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Energetics								
2-Nitrotoluene	2.3E-01	$(mg/kg/day)^{-1}$	1	2.3E-01	$(mg/kg/day)^{-1}$	NA	EPA 3	10/19/2004
2,4,6-Trinitrotoluene	3.0E-02	$(mg/kg/day)^{-1}$	1	3.0E-02	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
2-Amino-4,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	1.0E+00	NA	NA	D	IRIS	3/24/2005
RDX	1.1E-01	$(mg/kg/day)^{-1}$	1	1.1E-01	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Metals								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Barium	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	B1	IRIS	3/24/2005
Chromium III	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Chromium VI	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	B2	IRIS	3/24/2005
Lithium	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	C	IRIS	3/24/2005
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	D	IRIS	3/24/2005
Zinc	NA	NA	NA	NA	NA	D	IRIS	3/24/2005

Notes:
1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor x Oral Absorption Efficiency for Dermal.

EPA Group:
A - Human carcinogen.
B1 - Probable human carcinogen - indicates that limited human data are available.
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans .
C - Possible human carcinogen.
D - Not classifiable as a human carcinogen.
E - Evidence of noncarcinogenicity.

EPA 3 = U.S. EPA Region 3 RBC Table, October 19, 2004.

EPA(1) = U.S. EPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.

IRIS = Integrated Risk Information System.

NA = Not Available.

CA EPA = California EPA, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds							
1,1,2,2-Tetrachloroethane	5.8E-02	$(mg/m^3)^{-1}$	2.0E-01	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
1,1,2-Trichloroethane	1.6E-02	$(mg/m^3)^{-1}$	5.6E-02	$(mg/kg/day)^{-1}$	C	IRIS	3/24/2005
1,1-Dichloroethene	NA	NA	NA	NA	C	IRIS	3/24/2005
1,2,3-Trichloropropane	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	2.6E-02	$(mg/m^3)^{-1}$	9.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Benzene	7.8E-03	$(mg/m^3)^{-1}$	2.7E-02	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	1.5E-02	$(mg/m^3)^{-1}$	5.3E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Chloroform	2.3E-02	$(mg/m^3)^{-1}$	8.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
cis-1,2-Dichloroethene	NA	NA	NA	NA	D	IRIS	3/24/2005
Methylene Chloride	4.7E-04	$(mg/m^3)^{-1}$	1.6E-03	$(mg/kg/day)^{-1}$	B2	IRIS	3/24/2005
Tetrachloroethene	5.7E-03	$(mg/m^3)^{-1}$	2.0E-02	$(mg/kg/day)^{-1}$	NA	EPA 3	10/19/2004
Toluene	NA	NA	NA	NA	D	IRIS	3/24/2005
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	2.0E-03	$(mg/m^3)^{-1}$	7.0E-03	$(mg/kg/day)^{-1}$	C	CA EPA	12/2002
Vinyl Chloride	4.4E-03	$(mg/m^3)^{-1}$	1.5E-02	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Semivolatile Organic Compounds							
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	8.9E-01	$(mg/m^3)^{-1}$	3.1E+00	$(mg/kg/day)^{-1}$	B2	NCEA	10/19/2004
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	4.0E-03	$(mg/m^3)^{-1}$	1.4E-02	$(mg/kg/day)^{-1}$	B2	NCEA	10/19/2004
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	C	IRIS	3/24/2005
Pyridine	NA	NA	NA	NA	NA	NA	NA
Herbicides							
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Energetics							
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	NA	NA	D	IRIS	3/24/2005
RDX	NA	NA	NA	NA	NA	NA	NA
Metals							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	4.3E+00	$(mg/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Barium	NA	NA	NA	NA	D	IRIS	3/24/2005
Beryllium	2.4E+00	$(mg/m^3)^{-1}$	8.4E+00	$(mg/kg/day)^{-1}$	B1	IRIS	3/24/2005
Cadmium	1.8E+00	$(mg/m^3)^{-1}$	6.3E+00	$(mg/kg/day)^{-1}$	B1	IRIS	3/24/2005
Chromium III	NA	NA	NA	NA	D	IRIS	3/24/2005
Chromium VI	1.2E+01	$(mg/m^3)^{-1}$	4.2E+01	$(mg/kg/day)^{-1}$	A	IRIS	3/24/2005
Cobalt	2.8E+00	$(mg/m^3)^{-1}$	9.8E+00	$(mg/kg/day)^{-1}$	NA	EPA 3	10/19/2004
Copper	NA	NA	NA	NA	D	IRIS	3/24/2005
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	B2	IRIS	3/24/2005
Lithium	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	D	IRIS	3/24/2005
Nickel	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	C	IRIS	3/24/2005
Vanadium	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	D	IRIS	3/24/2005
Zinc	NA	NA	NA	NA	D	IRIS	3/24/2005

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)

Notes:

1 - Inhalation CSF = Unit Risk * 70 kg / 20m^3/day.

Definitions:

IRIS = Integrated Risk Information System.

NA = Not Available.

NCEA = National Center for Environmental Assessment

EPA 3 = U.S. EPA Region 3 RBC Table, October 19, 2004.

CA EPA = California EPA, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

EPA Group:

A - Human carcinogen.

B1 - Probable human carcinogen - indicates that limited human data are available.

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans .

C - Possible human carcinogen.

D - Not classifiable as a human carcinogen.

E - Evidence of noncarcinogenicity.

RAGS Part D Table 7

Calculation Of Cancer Risks and Non-Cancer Hazards

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RAGS PART D TABLE 7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Table No.

REASONABLE MAXIMUM EXPOSURES

7.1.RME Maintenance Workers
7.2.RME Occupational Workers
7.3.RME Adolescent Trespassers
7.4.RME Construction Workers
7.5.RME Child Recreational Users
7.6.RME Adult Recreational Users
7.7.RME Child Residents
7.8.RME Adult Residents

CENTRAL TENDENCY EXPOSURES

7.1.CTE Maintenance Workers
7.2.CTE Occupational Workers
7.3.CTE Adolescent Trespassers
7.4.CTE Construction Workers
7.5.CTE Child Recreational Users
7.6.CTE Adult Recreational Users
7.7.CTE Child Residents
7.8.CTE Adult Residents

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	1.0E-09	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.4E-11	2.9E-09	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000000006
				Benzo(a)anthracene	2.70	mg/kg	9.1E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.6E-08	2.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	7.9E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5.8E-07	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	8.7E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.3E-08	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.5E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.1E-07	4.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	4.2E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3.0E-08	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	9.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000001
				Aluminum	13725	mg/kg	4.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Antimony	5.15	mg/kg	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.8E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Arsenic	6.29	mg/kg	2.1E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.2E-07	5.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Copper	70.0	mg/kg	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.6E-06	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0002
				Iron	21817	mg/kg	7.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.007
				Lead	127	mg/kg	4.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.3E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0005
				Vanadium	28.3	mg/kg	9.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.003
			Exp. Route Total								1.2E-06					0.01
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	7.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.7E-08	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	6.8E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5.0E-07	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	7.5E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.4E-08	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.3E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	9.5E-08	3.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	3.6E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.6E-08	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	7.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000001
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	4.2E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.3E-08	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								7.9E-07					0.0004
		Exposure Point Total									2.0E-06					0.01
	Exposure Medium Total										2.0E-06					0.01
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	6.5E-08	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	4.5E-10	1.8E-07	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.000001
				Benzo(a)anthracene	2.1E-9	mg/m^3	1.4E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	1.2E-11	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	3.7E-11	3.4E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	1.3E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-11	(mg/kg/day)	NA	(mg/kg/day)	-
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	2.3E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-12	(mg/kg/day)	NA	(mg/kg/day)	
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	6.3E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	3.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.2E-09	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.00001
				Aluminum	1.0E-5	mg/m^3	7.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0002
				Antimony	3.9E-9	mg/m^3	2.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.4E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	3.2E-11	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	4.8E-10	9.0E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	3.6E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	6.5E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.1E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0004
				Vanadium	2.2E-8	mg/m^3	1.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-10	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								9.7E-10					0.0006
		Exposure Point Total									9.7E-10					0.0006
	Exposure Medium Total										9.7E-10					0.0006
Medium Total											2.0E-06					0.02
Surface Water	Surface Water	Gullies	Dermal	Trichloroethene	20.4	ug/L	8.2E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.1E-08	2.3E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000005
				RDX	24.0	ug/L	4.8E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	5.3E-09	1.3E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00004
				Aluminum	2767	ug/L	6.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00002
				Antimony	5.8	ug/L	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.6E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0006
				Arsenic	1.49	ug/L	3.3E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.9E-09	9.2E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00003
				Barium	200	ug/L	4.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0003
				Cadmium	2.25	ug/L	5.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0006
				Chromium	3.67	ug/L	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.6E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.0006
				Iron	3038	ug/L	6.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00006
				Lead	48.4	ug/L	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.9E-07	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.0008
				Vanadium	5.29	ug/L	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-08	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.001
				Zinc	513	ug/L	6.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-06	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.000006
			Exp. Route Total								2.1E-08					0.004
		Exposure Point Total									2.1E-08					0.004
	Exposure Medium Total										2.1E-08					0.004
Medium Total											2.1E-08					0.009
Surface Water	Surface Water	Turkey Creek	Dermal	Arsenic	0.370	ug/L	8.2E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.2E-09	2.3E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.000008
				Manganese (Water)	476	ug/L	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.003
			Exp. Route Total								1.2E-09					0.003
		Exposure Point Total									1.2E-09					0.003
	Exposure Medium Total										1.2E-09					0.003
Medium Total											1.2E-09					0.003
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	1.4E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.1E-08	4.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	4.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Antimony	48.7	mg/kg	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.6E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Arsenic	13.1	mg/kg	4.4E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.6E-07	1.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Barium	1662	mg/kg	5.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.002
				Cadmium	14.5	mg/kg	4.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Copper	1463	mg/kg	4.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	64255	mg/kg	2.2E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.0E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.02
				Lead	1730	mg/kg	5.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	4.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.002
				Mercury	0.93	mg/kg	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.8E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Nickel	159	mg/kg	5.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Vanadium	38.4	mg/kg	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.6E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.004
				Zinc	5842	mg/kg	2.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.5E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.002
			Exp. Route Total								6.7E-07					0.05

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Dermal	Benzo(a)pyrene	0.043	mg/kg	1.2E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	9.0E-09	3.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	8.7E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-07	2.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	3.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.0E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0004
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								1.4E-07					0.001
		Exposure Point Total									8.1E-07					0.05
	Exposure Medium Total										8.1E-07					0.05
Medium Total											8.1E-07					0.05
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	3.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.9E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Arsenic	30.8	mg/kg	1.0E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.5E-06	2.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Iron	122000	mg/kg	4.1E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.04
				Manganese (Soil)	1900	mg/kg	6.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.002
				Vanadium	51.2	mg/kg	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.8E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								1.5E-06					0.06
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	2.0E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.1E-07	5.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								3.1E-07					0.002
		Exposure Point Total									1.9E-06					0.06
	Exposure Medium Total										1.9E-06					0.06
Medium Total											1.9E-06					0.06
										Total of Receptor Risks Across All Media	4.6E-06				Total of Receptor Hazards Across All Media	0.1

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	1.1E-08	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.4E-10	3.0E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00000006
				Benzo(a)anthracene	2.70	mg/kg	9.4E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.9E-07	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	8.2E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6.0E-06	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	9.1E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.6E-07	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.6E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.2E-06	4.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	4.3E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3.2E-07	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	9.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.6E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000001
				Aluminum	13725	mg/kg	4.8E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.01
				Antimony	5.15	mg/kg	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.0E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Arsenic	6.29	mg/kg	2.2E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.3E-06	6.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	70.0	mg/kg	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.8E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.002
				Iron	21817	mg/kg	7.6E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.07
				Lead	127	mg/kg	4.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.005
				Vanadium	28.3	mg/kg	9.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.03
			Exp. Route Total								1.2E-05					0.2
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	8.1E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.9E-07	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	7.1E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5.2E-06	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	7.8E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.7E-07	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.4E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	9.9E-07	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	3.7E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.7E-07	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	8.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000001
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	4.4E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.5E-07	1.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								8.2E-06					0.004
		Exposure Point Total									2.0E-05					0.2
	Exposure Medium Total										2.0E-05					0.2
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	6.7E-07	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	4.7E-09	1.9E-06	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.00001
				Benzo(a)anthracene	2.1E-9	mg/m^3	1.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.0E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	1.3E-10	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	3.9E-10	3.5E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	1.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	2.4E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.7E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	6.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	3.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.6E-08	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.0001
				Aluminum	1.0E-5	mg/m^3	7.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.002
				Antimony	3.9E-9	mg/m^3	2.7E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	3.3E-10	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	5.0E-09	9.4E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	3.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	6.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	1.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.3E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.004
				Vanadium	2.2E-8	mg/m^3	1.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.0E-08					0.006
		Exposure Point Total									1.0E-08					0.006
	Exposure Medium Total										1.0E-08					0.006
Medium Total											2.0E-05					0.2
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	5.3E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	1.1E-06	1.5E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0002
				1,1,2-Trichloroethane	18.2	ug/L	6.4E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	3.6E-06	1.8E-04	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.04
				1,1-Dichloroethene	10.5	ug/L	3.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-04	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.002
				1,2,3-Trichloropropane	1.44	ug/L	5.0E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	1.0E-08	1.4E-05	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.002
				1,2-Dichloroethane	1.50	ug/L	5.2E-06	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	4.8E-07	1.5E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Benzene	1.70	ug/L	5.9E-06	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	3.3E-07	1.7E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.004
				Bromodichloromethane	1.45	ug/L	5.1E-06	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	3.1E-07	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Carbon Tetrachloride	2.58	ug/L	9.0E-06	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	1.2E-06	2.5E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.04
				Chloroform	4.24	ug/L	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.1E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.004
				cis-1,2-Dichloroethene	286	ug/L	1.0E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.3
				Methylene Chloride	2.70	ug/L	9.4E-06	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	7.1E-08	2.6E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0004
				Tetrachloroethene	10.9	ug/L	3.8E-05	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	2.1E-05	1.1E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.01
				Toluene	19.0	ug/L	6.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0009
				trans-1,2-Dichloroethene	2.89	ug/L	1.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.001
				Trichloroethene	21055	ug/L	7.4E-02	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	9.6E-04	2.1E-01	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.4
				Vinyl Chloride	24.2	ug/L	8.5E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-04	2.4E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.08
				Pyridine	1.92	ug/L	6.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.02
				2-Nitrotoluene	0.172	ug/L	6.0E-07	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	1.4E-07	1.7E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0002
				2,4,6-Trinitrotoluene	0.284	ug/L	9.9E-07	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	3.0E-08	2.8E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.006
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	4.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.06
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.04
				RDX	25.1	ug/L	8.8E-05	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	9.6E-06	2.5E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.08
				Aluminum	23388	ug/L	8.2E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.2
				Antimony	0.745	ug/L	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.3E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.02
				Arsenic	5.29	ug/L	1.8E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.8E-05	5.2E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Barium	284	ug/L	9.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.04
				Beryllium	1.88	ug/L	6.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.009
				Cadmium	0.455	ug/L	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.009
				Chromium	32.0	ug/L	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.1
				Cobalt	81.7	ug/L	2.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.0E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.04
				Iron	29423	ug/L	1.0E-01	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.9E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	1.0
				Lead	13.6	ug/L	4.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.2E-04	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.2
				Manganese (Water)	4948	ug/L	1.7E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.8E-02	(mg/kg/day)	2.4E-02	(mg/kg/day)	2.0
				Nickel	145	ug/L	5.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.07
				Vanadium	29.3	ug/L	1.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.9E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.3
			Exp. Route Total								1.1E-03					5.2

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.6E-07	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	3.2E-08	4.5E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000008
				1,1,2-Trichloroethane	18.2	ug/L	1.4E-06	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	8.2E-08	4.0E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.001
				1,1-Dichloroethene	10.5	ug/L	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-06	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.00007
				1,2,3-Trichloropropane	1.44	ug/L	1.4E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	2.9E-10	4.0E-07	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.00007
				1,2-Dichloroethane	1.50	ug/L	6.2E-08	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	5.6E-09	1.7E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000009
				Benzene	1.70	ug/L	2.2E-07	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	1.2E-08	6.1E-07	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0002
				Bromodichloromethane	1.45	ug/L	1.0E-07	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	6.2E-09	2.8E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00001
				Carbon Tetrachloride	2.58	ug/L	5.9E-07	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	7.7E-08	1.7E-06	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.002
				Chloroform	4.24	ug/L	3.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.1E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00009
				cis-1,2-Dichloroethene	286	ug/L	3.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.4E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.008
				Methylene Chloride	2.70	ug/L	8.6E-08	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	6.5E-10	2.4E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000004
				Tetrachloroethene	10.9	ug/L	5.5E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	3.0E-06	1.5E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.002
				Toluene	19.0	ug/L	5.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.00008
				trans-1,2-Dichloroethene	2.89	ug/L	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.1E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00003
				Trichloroethene	21055	ug/L	3.0E-03	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.9E-05	8.3E-03	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.02
				Vinyl Chloride	24.2	ug/L	1.1E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.6E-06	3.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.001
				Pyridine	1.92	ug/L	2.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00007
				2-Nitrotoluene	0.172	ug/L	1.9E-08	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	4.4E-09	5.4E-08	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.000005
				2,4,6-Trinitrotoluene	0.284	ug/L	6.1E-09	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.8E-10	1.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	4.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0006
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	9.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.001
				RDX	25.1	ug/L	1.8E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	2.0E-08	5.2E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Aluminum	23388	ug/L	6.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0002
				Antimony	0.745	ug/L	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.0E-09	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0001
				Arsenic	5.29	ug/L	1.5E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.3E-08	4.3E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Barium	284	ug/L	8.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0005
				Beryllium	1.88	ug/L	5.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.001
				Cadmium	0.455	ug/L	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.7E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0001
				Chromium	32.0	ug/L	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.2E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.007
				Cobalt	81.7	ug/L	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.6E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00003
				Iron	29423	ug/L	8.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0008
				Lead	13.6	ug/L	3.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	4.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.00007
				Manganese (Water)	4948	ug/L	1.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.04
				Nickel	145	ug/L	8.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.0003
				Vanadium	29.3	ug/L	8.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.009
			Exp. Route Total								4.4E-05					0.09
		Exposure Point Total									1.2E-03					5.3
	Exposure Medium Total										1.2E-03					5.3
Medium Total											1.2E-03					11
										Total of Receptor Risks Across All Media	1.2E-03				Total of Receptor Hazards Across All Media	11

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	8.1E-10	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.0E-11	5.1E-09	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00000001
				Benzo(a)anthracene	2.70	mg/kg	7.0E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.1E-08	4.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	6.1E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4.5E-07	3.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	6.7E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.9E-08	4.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.2E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8.6E-08	7.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	3.2E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.4E-08	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	7.0E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000002
				Aluminum	13725	mg/kg	3.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.002
				Antimony	5.15	mg/kg	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.5E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.002
				Arsenic	6.29	mg/kg	1.6E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.5E-07	1.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Copper	70.0	mg/kg	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0003
				Iron	21817	mg/kg	5.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.01
				Lead	127	mg/kg	3.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	9.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.9E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0008
				Vanadium	28.3	mg/kg	7.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.7E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								9.0E-07					0.03
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	6.0E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.4E-08	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	5.2E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3.8E-07	3.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	5.7E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.2E-08	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.0E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	7.3E-08	6.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	2.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.0E-08	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	6.0E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000002
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	3.2E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.8E-08	2.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								6.1E-07					0.0007
		Exposure Point Total									1.5E-06					0.03
	Exposure Medium Total										1.5E-06					0.03
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	1.2E-08	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	8.4E-11	7.7E-08	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.0000005
				Benzo(a)anthracene	2.1E-9	mg/m^3	2.6E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	2.2E-12	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	6.9E-12	1.4E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	2.5E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	4.3E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	1.2E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.5E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	6.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-09	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.000005
				Aluminum	1.0E-5	mg/m^3	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.3E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00008
				Antimony	3.9E-9	mg/m^3	4.9E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	6.0E-12	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	9.0E-11	3.8E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	6.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.2E-10	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	1.2E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	3.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.1E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0002
				Vanadium	2.2E-8	mg/m^3	2.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.8E-10					0.0002
		Exposure Point Total									1.8E-10					0.0002
	Exposure Medium Total										1.8E-10					0.0002
Medium Total											1.5E-06					0.03
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	1.1E-06	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.4E-08	6.8E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00001
				RDX	24.0	ug/L	1.2E-06	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.4E-07	8.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.003
				Aluminum	2767	ug/L	1.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.2E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0009
				Antimony	5.8	ug/L	3.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.005
				Arsenic	1.49	ug/L	7.8E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.2E-07	4.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Barium	200	ug/L	1.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.6E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.0009
				Cadmium	2.25	ug/L	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				Chromium	3.67	ug/L	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0004
				Iron	3038	ug/L	1.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Lead	48.4	ug/L	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	6.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.002
				Vanadium	5.29	ug/L	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.002
				Zinc	513	ug/L	2.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0006
			Exp. Route Total								2.7E-07					0.02
			Dermal	Trichloroethene	20.4	ug/L	1.0E-06	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.3E-08	6.5E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00001
				RDX	24.0	ug/L	5.2E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	5.7E-09	3.3E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Aluminum	2767	ug/L	9.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.0E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00006
				Antimony	5.8	ug/L	2.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.002
				Arsenic	1.49	ug/L	5.1E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.6E-09	3.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Barium	200	ug/L	6.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.3E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0009
				Cadmium	2.25	ug/L	7.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.9E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.002
				Chromium	3.67	ug/L	2.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.002
				Iron	3038	ug/L	1.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.6E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0002
				Lead	48.4	ug/L	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	4.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.003
				Vanadium	5.29	ug/L	1.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.004
				Zinc	513	ug/L	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.7E-06	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00002
			Exp. Route Total								2.7E-08					0.01
		Exposure Point Total									2.9E-07					0.04
	Exposure Medium Total										2.9E-07					0.04
Medium Total											2.9E-07					0.07

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	1.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.9E-08	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Manganese (Water)	476	ug/L	2.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.007
			Exp. Route Total								2.9E-08					0.007
			Dermal	Arsenic	0.370	ug/L	1.3E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.9E-09	8.0E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00003
				Manganese (Water)	476	ug/L	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.01
			Exp. Route Total								1.9E-09					0.01
		Exposure Point Total									3.1E-08					0.02
	Exposure Medium Total										3.1E-08					0.02
Medium Total											3.1E-08					0.02
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	1.1E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8.2E-09	7.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	3.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.002
				Antimony	48.7	mg/kg	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.1E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.02
				Arsenic	13.1	mg/kg	3.4E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.1E-07	2.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Barium	1662	mg/kg	4.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.004
				Cadmium	14.5	mg/kg	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.005
				Copper	1463	mg/kg	3.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.006
				Iron	64255	mg/kg	1.7E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.04
				Lead	1730	mg/kg	4.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	3.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.003
				Mercury	0.93	mg/kg	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Nickel	159	mg/kg	4.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.6E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.001
				Vanadium	38.4	mg/kg	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.006
				Zinc	5842	mg/kg	1.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.7E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
			Exp. Route Total								5.2E-07					0.09
			Dermal	Benzo(a)pyrene	0.043	mg/kg	9.5E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	7.0E-09	6.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	6.7E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.0E-07	4.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	2.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0006
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								1.1E-07					0.002
		Exposure Point Total									6.3E-07					0.1
	Exposure Medium Total										6.3E-07					0.1
Medium Total											6.3E-07					0.1

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	2.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-03	(mg/kg/day)	1 0E+00	(mg/kg/day)	0.002
				Arsenic	30.8	mg/kg	8.0E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.2E-06	5.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Iron	122000	mg/kg	3.2E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0 07
				Manganese (Soil)	1900	mg/kg	4.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0 004
				Vanadium	51.2	mg/kg	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.5E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0 008
			Exp. Route Total								1.2E-06					0 1
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	1.6E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.4E-07	1.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0 003
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								2.4E-07					0 003
		Exposure Point Total									1.4E-06					0 1
	Exposure Medium Total										1.4E-06					0 1
Medium Total											1.4E-06					0 1
										Total of Receptor Risks Across All Media	3.9E-06				Total of Receptor Hazards Across All Media	0 3

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	8.6E-10	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.1E-11	6.0E-08	(mg/kg/day)	5 0E-01	(mg/kg/day)	0 0000001
				Benzo(a)anthracene	2.70	mg/kg	7.5E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.5E-08	5.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	6.5E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4.8E-07	4.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	7.2E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.2E-08	5.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.2E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	9.1E-08	8.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	3.4E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.5E-08	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	7.5E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.2E-08	(mg/kg/day)	2 0E-02	(mg/kg/day)	0 000003
				Aluminum	13725	mg/kg	3.8E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2 7E-02	(mg/kg/day)	1 0E+00	(mg/kg/day)	0 03
				Antimony	5.15	mg/kg	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-05	(mg/kg/day)	4 0E-04	(mg/kg/day)	0 02
				Arsenic	6.29	mg/kg	1.7E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.6E-07	1.2E-05	(mg/kg/day)	3 0E-04	(mg/kg/day)	0.04
				Copper	70.0	mg/kg	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-04	(mg/kg/day)	4 0E-02	(mg/kg/day)	0 003
				Iron	21817	mg/kg	6.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-02	(mg/kg/day)	3 0E-01	(mg/kg/day)	0 1
				Lead	127	mg/kg	3.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	9.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.9E-04	(mg/kg/day)	7 2E-02	(mg/kg/day)	0 01
				Vanadium	28.3	mg/kg	7.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.5E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0 05
			Exp. Route Total								9.6E-07					0 3
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	2.9E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.1E-08	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	2.5E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.9E-07	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	2.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.0E-08	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	4.9E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3.6E-08	3.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	1.3E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	9.8E-09	9.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	2.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000001
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5 15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	1.6E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.4E-08	1.1E-06	(mg/kg/day)	3 0E-04	(mg/kg/day)	0 004
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								3.0E-07					0.004
		Exposure Point Total									1.3E-06					0.3
	Exposure Medium Total										1.3E-06					0.3
	Air	SWMU 16	Inhalation	Trichloroethene	4.7E-5	mg/m^3	7.9E-08	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	5.5E-10	5.5E-06	(mg/kg/day)	1 7E-01	(mg/kg/day)	0 00003
				Benzo(a)anthracene	1.8E-6	mg/m^3	3.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.6E-6	mg/m^3	2.7E-09	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	8.2E-09	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	1.7E-6	mg/m^3	2.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.0E-7	mg/m^3	5.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	8.3E-7	mg/m^3	1.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	2.4E-6	mg/m^3	4.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-07	(mg/kg/day)	8.6E-04	(mg/kg/day)	0 0003
				Aluminum	0.009	mg/m^3	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-03	(mg/kg/day)	1 0E-03	(mg/kg/day)	1 1
				Antimony	3.5E-6	mg/m^3	5.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.2E-6	mg/m^3	7.1E-09	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	1.1E-07	5.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	4.7E-5	mg/m^3	7.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil/Subsurface Soil	Air	SWMU 16	Inhalation	Iron	0.015	mg/m^3	2.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	8.5E-5	mg/m^3	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.4E-4	mg/m^3	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-05	(mg/kg/day)	1.4E-05	(mg/kg/day)	2.0
				Vanadium	1.9E-5	mg/m^3	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.2E-07					3.1
		Exposure Point Total									1.2E-07					3.1
	Exposure Medium Total										1.2E-07					3.1
Medium Total											1.4E-06					3.4
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.1E-08	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	2.2E-09	7.7E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00001
				1,1,2-Trichloroethane	18.2	ug/L	1.0E-07	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	5.9E-09	7.2E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.002
				1,1-Dichloroethene	10.5	ug/L	9.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-06	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.0001
				1,2,3-Trichloropropane	1.44	ug/L	1.0E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	2.0E-11	7.0E-07	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.0001
				1,2-Dichloroethane	1.50	ug/L	4.8E-09	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	4.4E-10	3.3E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00002
				Benzene	1.70	ug/L	1.8E-08	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	9.7E-10	1.2E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0003
				Bromodichloromethane	1.45	ug/L	6.8E-09	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	4.2E-10	4.8E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00002
				Carbon Tetrachloride	2.58	ug/L	4.1E-08	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	5.3E-09	2.9E-06	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.004
				Chloroform	4.24	ug/L	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0002
				cis-1,2-Dichloroethene	286	ug/L	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.02
				Methylene Chloride	2.70	ug/L	6.9E-09	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	5.2E-11	4.9E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000008
				Tetrachloroethene	10.9	ug/L	3.8E-07	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	2.0E-07	2.6E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.003
				Toluene	19.0	ug/L	4.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0001
				trans-1,2-Dichloroethene	2.89	ug/L	1.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00006
				Trichloroethene	21055	ug/L	2.1E-04	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.8E-06	1.5E-02	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.03
				Vinyl Chloride	24.2	ug/L	9.2E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.4E-07	6.4E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Pyridine	1.92	ug/L	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0001
				2-Nitrotoluene	0.172	ug/L	1.4E-09	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	3.1E-10	9.5E-08	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00001
				2,4,6-Trinitrotoluene	0.284	ug/L	4.2E-10	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.2E-11	2.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	3.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.001
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	6.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.8E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.002
				RDX	25.1	ug/L	1.2E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.4E-09	8.7E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0003
				Aluminum	23388	ug/L	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.1E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0009
				Antimony	0.745	ug/L	4.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0005
				Arsenic	5.29	ug/L	2.9E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.4E-09	2.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
				Barium	284	ug/L	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-05	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.002
				Beryllium	1.88	ug/L	1.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.3E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.005
				Cadmium	0.455	ug/L	2.5E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0007
				Chromium	32.0	ug/L	3.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-06	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.03
				Cobalt	81.7	ug/L	4.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Iron	29423	ug/L	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.004
				Lead	13.6	ug/L	7.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	9.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.3E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.0003
				Manganese (Water)	4948	ug/L	2.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-04	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.2
				Nickel	145	ug/L	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-06	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.001
				Vanadium	29.3	ug/L	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-06	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.04
			Exp. Route Total								3.1E-06					0.4
		Exposure Point Total									3.1E-06					0.4
	Exposure Medium Total										3.1E-06					0.4

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Air	SWMU 16	Inhalation	1,1,2,2-Tetrachloroethane	3.8E-5	mg/m3	1.6E-08	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	3.2E-09	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1,2-Trichloroethane	5.5E-4	mg/m3	2.3E-07	(mg/kg/day)	5.6E-02	(mg/kg/day)$^{-1}$	1.3E-08	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1-Dichloroethene	4.0E-4	mg/m3	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)	0.0002
				1,2,3-Trichloropropane	4.4E-5	mg/m3	1.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-06	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.0009
				1,2-Dichloroethane	5.3E-5	mg/m3	2.2E-08	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	2.0E-09	1.5E-06	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.001
				Benzene	7.1E-5	mg/m3	3.0E-08	(mg/kg/day)	2.7E-02	(mg/kg/day)$^{-1}$	8.0E-10	2.1E-06	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.001
				Bromodichloromethane	4.1E-5	mg/m3	1.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Carbon Tetrachloride	7.7E-5	mg/m3	3.2E-08	(mg/kg/day)	5.3E-02	(mg/kg/day)$^{-1}$	1.7E-09	2.3E-06	(mg/kg/day)	5.7E-04	(mg/kg/day)	0.004
				Chloroform	1.4E-4	mg/m3	5.9E-08	(mg/kg/day)	8.1E-02	(mg/kg/day)$^{-1}$	4.8E-09	4.2E-06	(mg/kg/day)	1.4E-02	(mg/kg/day)	0.0003
				cis-1,2-Dichloroethene	0.011	mg/m3	4.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Methylene Chloride	1.1E-4	mg/m3	4.4E-08	(mg/kg/day)	1.6E-03	(mg/kg/day)$^{-1}$	7.1E-11	3.1E-06	(mg/kg/day)	8.6E-01	(mg/kg/day)	0.000004
				Tetrachloroethene	3.1E-4	mg/m3	1.3E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)$^{-1}$	2.6E-09	9.2E-06	(mg/kg/day)	1.4E-01	(mg/kg/day)	0.00007
				Toluene	7.3E-4	mg/m3	3.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-05	(mg/kg/day)	1.1E-01	(mg/kg/day)	0.0002
				trans-1,2-Dichloroethene	1.1E-4	mg/m3	4.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Trichloroethene	0.678	mg/m3	2.8E-04	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	2.0E-06	2.0E-02	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.1
				Vinyl Chloride	0.001	mg/m3	4.8E-07	(mg/kg/day)	1.5E-02	(mg/kg/day)$^{-1}$	7.1E-09	3.3E-05	(mg/kg/day)	2.9E-02	(mg/kg/day)	0.001
				Pyridine	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Nitrotoluene	3.3E-6	mg/m3	1.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				2,4,6-Trinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Amino-4,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4-Amino-2,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				RDX	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E-03	(mg/kg/day)	--
				Antimony	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Beryllium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	8.4E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Cadmium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	6.3E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-05	(mg/kg/day)	--
				Chromium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	4.1E+01	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-05	(mg/kg/day)	--
				Cobalt	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	9.8E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Iron	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Nickel	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.0E-06					0.1
		Exposure Point Total									2.0E-06					0.1
	Exposure Medium Total										2.0E-06					0.5
Medium Total											5.1E-06					0.8
										Total of Receptor Risks Across All Media	6.5E-06				Total of Receptor Hazards Across All Media	4.2

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	2.5E-09	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.3E-11	2.9E-08	(mg/kg/day)	5 0E-01	(mg/kg/day)	0 00000006
				Benzo(a)anthracene	2.70	mg/kg	2.2E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.6E-07	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.9E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.4E-06	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	2.1E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.5E-07	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	3.7E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.7E-07	4.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	1.0E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	7.4E-08	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	2.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.6E-08	(mg/kg/day)	2 0E-02	(mg/kg/day)	0 000001
				Aluminum	13725	mg/kg	1.1E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0 01
				Antimony	5.15	mg/kg	4.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.9E-06	(mg/kg/day)	4 0E-04	(mg/kg/day)	0 01
				Arsenic	6.29	mg/kg	5.1E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.7E-07	6.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0 02
				Copper	70.0	mg/kg	5.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.6E-05	(mg/kg/day)	4 0E-02	(mg/kg/day)	0 002
				Iron	21817	mg/kg	1.8E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-02	(mg/kg/day)	3 0E-01	(mg/kg/day)	0 07
				Lead	127	mg/kg	1.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	2.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.4E-04	(mg/kg/day)	7 2E-02	(mg/kg/day)	0 005
				Vanadium	28.3	mg/kg	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0 03
			Exp. Route Total								2.8E-06					0 1
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	1.9E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.4E-07	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.6E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.2E-06	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.8E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.3E-07	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	3.2E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.3E-07	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	8.7E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.3E-08	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-08	(mg/kg/day)	2 0E-02	(mg/kg/day)	0 000001
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6 0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	1.0E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.5E-07	1.2E-06	(mg/kg/day)	3 0E-04	(mg/kg/day)	0 004
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4 0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2 9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2 6E-05	(mg/kg/day)	--
			Exp. Route Total								1.9E-06					0 004
		Exposure Point Total									4.7E-06					0 2
	Exposure Medium Total										4.7E-06					0 2
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	3.8E-08	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	2.6E-10	4.4E-07	(mg/kg/day)	1 7E-01	(mg/kg/day)	0 000003
				Benzo(a)anthracene	2.1E-9	mg/m^3	8.0E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.4E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	7.0E-12	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	2.2E-11	8.2E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	7.7E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.0E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	1.3E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	3.7E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.3E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	1.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2 2E-08	(mg/kg/day)	8.6E-04	(mg/kg/day)	0 00003
				Aluminum	1.0E-5	mg/m^3	4.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.8E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0 0005
				Antimony	3.9E-9	mg/m^3	1.5E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	1.9E-11	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	2.8E-10	2.2E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	2.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	6.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	3.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0009
				Vanadium	2.2E-8	mg/m^3	8.4E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.8E-10	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5.7E-10					0.001
		Exposure Point Total									5.7E-10					0.001
	Exposure Medium Total										5.7E-10					0.001
Medium Total											4.7E-06					0.2
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.2E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	2.5E-07	1.4E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0002
				1,1,2-Trichloroethane	18.2	ug/L	1.5E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	8.4E-07	1.7E-04	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.04
				1,1-Dichloroethene	10.5	ug/L	8.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-04	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.002
				1,2,3-Trichloropropane	1.44	ug/L	1.2E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	2.3E-09	1.4E-05	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.002
				1,2-Dichloroethane	1.50	ug/L	1.2E-06	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.1E-07	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Benzene	1.70	ug/L	1.4E-06	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	7.6E-08	1.6E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.004
				Bromodichloromethane	1.45	ug/L	1.2E-08	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	7.3E-08	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Carbon Tetrachloride	2.58	ug/L	2.1E-06	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	2.7E-07	2.5E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.04
				Chloroform	4.24	ug/L	3.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.004
				cis-1,2-Dichloroethene	286	ug/L	2.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.7E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.3
				Methylene Chloride	2.70	ug/L	2.2E-06	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	1.6E-08	2.6E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0004
				Tetrachloroethene	10.9	ug/L	8.9E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	4.8E-06	1.0E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.01
				Toluene	19.0	ug/L	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0009
				trans-1,2-Dichloroethene	2.89	ug/L	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.7E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.001
				Trichloroethene	21055	ug/L	1.7E-02	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.2E-04	2.0E-01	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.4
				Vinyl Chloride	24.2	ug/L	2.0E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.0E-05	2.3E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.08
				Pyridine	1.92	ug/L	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.02
				2-Nitrotoluene	0.172	ug/L	1.4E-07	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	3.2E-08	1.6E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0002
				2,4,6-Trinitrotoluene	0.284	ug/L	2.3E-07	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	6.9E-09	2.7E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.005
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	9.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.06
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	5.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.9E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.03
				RDX	25.1	ug/L	2.0E-05	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	2.2E-06	2.4E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.08
				Aluminum	23388	ug/L	1.9E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.2
				Antimony	0.745	ug/L	6.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.02
				Arsenic	5.29	ug/L	4.3E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.5E-06	5.0E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Barium	284	ug/L	2.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.7E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.04
				Beryllium	1.88	ug/L	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.009
				Cadmium	0.455	ug/L	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.3E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.009
				Chromium	32.0	ug/L	2.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.1
				Cobalt	81.7	ug/L	6.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.8E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.04
				Iron	29423	ug/L	2.4E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.9
				Lead	13.6	ug/L	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	2.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-04	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.2
				Manganese (Water)	4948	ug/L	4.0E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.7E-02	(mg/kg/day)	2.4E-02	(mg/kg/day)	2.0
				Nickel	145	ug/L	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.07
				Vanadium	29.3	ug/L	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.3
			Exp. Route Total								2.7E-04					5.0

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	3.8E-08	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	7.6E-09	4.4E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000007
				1,1,2-Trichloroethane	18.2	ug/L	3.4E-07	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	1.9E-08	3.9E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0010
				1,1-Dichloroethene	10.5	ug/L	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-06	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.00006
				1,2,3-Trichloropropane	1.44	ug/L	3.3E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	6.7E-11	3.9E-07	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.00006
				1,2-Dichloroethane	1.50	ug/L	1.4E-08	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.3E-09	1.7E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000008
				Benzene	1.70	ug/L	5.1E-08	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	2.8E-09	5.9E-07	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0001
				Bromodichloromethane	1.45	ug/L	2.3E-08	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	1.4E-09	2.7E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00001
				Carbon Tetrachloride	2.58	ug/L	1.4E-07	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	1.8E-08	1.6E-06	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.002
				Chloroform	4.24	ug/L	7.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.8E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00009
				cis-1,2-Dichloroethene	286	ug/L	7.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.2E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.008
				Methylene Chloride	2.70	ug/L	2.0E-08	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	1.5E-10	2.3E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000004
				Tetrachloroethene	10.9	ug/L	1.3E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	7.0E-07	1.5E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.002
				Toluene	19.0	ug/L	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.00008
				trans-1,2-Dichloroethene	2.89	ug/L	5.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.9E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00003
				Trichloroethene	21055	ug/L	6.9E-04	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	9.0E-06	8.1E-03	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.02
				Vinyl Chloride	24.2	ug/L	2.5E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.7E-07	2.9E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0010
				Pyridine	1.92	ug/L	5.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.9E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00007
				2-Nitrotoluene	0.172	ug/L	4.5E-09	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	1.0E-09	5.2E-08	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.000005
				2,4,6-Trinitrotoluene	0.284	ug/L	1.4E-09	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	4.3E-11	1.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0006
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.001
				RDX	25.1	ug/L	4.3E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	4.7E-09	5.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Aluminum	23388	ug/L	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0002
				Antimony	0.745	ug/L	5.0E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.8E-09	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.00010
				Arsenic	5.29	ug/L	3.6E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.3E-09	4.1E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Barium	284	ug/L	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0005
				Beryllium	1.88	ug/L	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.001
				Cadmium	0.455	ug/L	3.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0001
				Chromium	32.0	ug/L	4.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.0E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.007
				Cobalt	81.7	ug/L	5.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00003
				Iron	29423	ug/L	2.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0008
				Lead	13.6	ug/L	9.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.00006
				Manganese (Water)	4948	ug/L	3.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.04
				Nickel	145	ug/L	1.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.0003
				Vanadium	29.3	ug/L	2.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.009
			Exp. Route Total								1.0E-05					0.09
		Exposure Point Total									2.8E-04					5.1
	Exposure Medium Total										2.8E-04					5.1
Medium Total											2.8E-04					10

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	3.3E-06	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.3E-08	3.9E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00008
				RDX	24.0	ug/L	3.9E-06	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	4.3E-07	4.6E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.02
				Aluminum	2767	ug/L	4.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.005
				Antimony	5.8	ug/L	9.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.03
				Arsenic	1.49	ug/L	2.4E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.6E-07	2.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.009
				Barium	200	ug/L	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.005
				Cadmium	2.25	ug/L	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.3E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.009
				Chromium	3.67	ug/L	6.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Iron	3038	ug/L	4.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.8E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.02
				Lead	48.4	ug/L	7.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	2.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.01
				Vanadium	5.29	ug/L	8.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.010
				Zinc	513	ug/L	8.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.7E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
			Exp. Route Total								8.4E-07					0.1
			Dermal	Trichloroethene	20.4	ug/L	3.2E-06	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.2E-08	3.7E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00007
				RDX	24.0	ug/L	1.6E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.8E-08	1.9E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0006
				Aluminum	2767	ug/L	3.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0003
				Antimony	5.8	ug/L	6.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.3E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.01
				Arsenic	1.49	ug/L	1.6E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.4E-08	1.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Barium	200	ug/L	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-05	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.005
				Cadmium	2.25	ug/L	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-07	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.01
				Chromium	3.67	ug/L	7.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.2E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.01
				Iron	3038	ug/L	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.001
				Lead	48.4	ug/L	5.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.02
				Vanadium	5.29	ug/L	5.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.6E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.03
				Zinc	513	ug/L	3.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0001
			Exp. Route Total								8.4E-08					0.1
		Exposure Point Total									9.2E-07					0.2
	Exposure Medium Total										9.2E-07					0.2
Medium Total											9.2E-07					0.2
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	6.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	9.0E-08	7.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Manganese (Water)	476	ug/L	7.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.0E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.04
			Exp. Route Total								9.0E-08					0.04
			Dermal	Arsenic	0.370	ug/L	4.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.0E-09	4.6E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Manganese (Water)	476	ug/L	5.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.0E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.06
			Exp. Route Total								6.0E-09					0.06
		Exposure Point Total									9.6E-08					0.1
	Exposure Medium Total										9.6E-08					0.1
Medium Total											9.6E-08					0.1

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	3.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.6E-08	4.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	1.1E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.01
				Antimony	48.7	mg/kg	4.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.6E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.1
				Arsenic	13.1	mg/kg	1.1E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.6E-06	1.2E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Barium	1662	mg/kg	1.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.02
				Cadmium	14.5	mg/kg	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.03
				Copper	1463	mg/kg	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.03
				Iron	64255	mg/kg	5.2E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.1E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.2
				Lead	1730	mg/kg	1.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	9.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-03	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.02
				Mercury	0.93	mg/kg	7.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Nickel	159	mg/kg	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.008
				Vanadium	38.4	mg/kg	3.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.04
				Zinc	5842	mg/kg	4.8E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.5E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.02
			Exp. Route Total								1.6E-06					0.5
			Dermal	Benzo(a)pyrene	0.043	mg/kg	3.0E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.2E-08	3.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	2.1E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.2E-07	2.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.008
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	7.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.1E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.004
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								3.4E-07					0.01
		Exposure Point Total									2.0E-06					0.6
	Exposure Medium Total										2.0E-06					0.6
Medium Total											2.0E-06					0.6
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	8.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.01
				Arsenic	30.8	mg/kg	2.5E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.8E-06	2.9E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.1
				Iron	122000	mg/kg	9.9E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.4
				Manganese (Soil)	1900	mg/kg	1.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-03	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.03
				Vanadium	51.2	mg/kg	4.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.9E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.05
			Exp. Route Total								3.8E-06					0.6
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	5.0E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.4E-07	5.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								7.4E-07					0.02
		Exposure Point Total									4.5E-06					0.6
	Exposure Medium Total										4.5E-06					0.6
Medium Total											4.5E-06					0.6
										Total of Receptor Risks Across All Media	2.9E-04				Total of Receptor Hazards Across All Media	12

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	1.1E-09	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.4E-11	3.2E-09	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000000006
				Benzo(a)anthracene	2.70	mg/kg	9.4E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.9E-08	2.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	8.2E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6.0E-07	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	9.0E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.6E-08	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.6E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.1E-07	4.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	4.3E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3.2E-08	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	9.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000001
				Aluminum	13725	mg/kg	4.8E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Antimony	5.15	mg/kg	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.2E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Arsenic	6.29	mg/kg	2.2E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.3E-07	6.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Copper	70.0	mg/kg	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.1E-06	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0002
				Iron	21817	mg/kg	7.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.007
				Lead	127	mg/kg	4.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0005
				Vanadium	28.3	mg/kg	9.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.003
			Exp. Route Total								1.2E-06					0.02
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	1.6E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.1E-07	4.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.4E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	9.9E-07	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.5E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.1E-07	4.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	2.6E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.9E-07	7.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	7.1E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.2E-08	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000002
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	8.4E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-07	2.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								1.6E-06					0.0008
		Exposure Point Total									2.8E-06					0.02
	Exposure Medium Total										2.8E-06					0.02
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	4.3E-08	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	3.0E-10	1.3E-07	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.0000007
				Benzo(a)anthracene	2.1E-9	mg/m^3	9.2E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	8.0E-12	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	2.5E-11	2.3E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	8.8E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.6E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	1.5E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	4.2E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	2.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-09	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.000007
				Aluminum	1.0E-5	mg/m^3	4.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0001
				Antimony	3.9E-9	mg/m^3	1.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.1E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	2.1E-11	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	3.2E-10	6.2E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	2.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.9E-10	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	7.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	4.3E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	1.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.5E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0003
				Vanadium	2.2E-8	mg/m^3	9.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-10	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								6.5E-10					0.0004
		Exposure Point Total									6.5E-10					0.0004
	Exposure Medium Total										6.5E-10					0.0004
Medium Total											2.8E-06					0.02
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.1E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	2.1E-07	3.1E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00005
				1,1,2-Trichloroethane	18.2	ug/L	1.3E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	7.2E-07	3.7E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.009
				1,1-Dichloroethene	10.5	ug/L	7.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.1E-05	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.0004
				1,2,3-Trichloropropane	1.44	ug/L	1.0E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	2.0E-09	2.9E-06	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.0005
				1,2-Dichloroethane	1.50	ug/L	1.0E-06	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	9.5E-08	3.1E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Benzene	1.70	ug/L	1.2E-06	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	6.5E-08	3.5E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0009
				Bromodichloromethane	1.45	ug/L	1.0E-06	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	6.3E-08	3.0E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0001
				Carbon Tetrachloride	2.58	ug/L	1.8E-06	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	2.3E-07	5.3E-06	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.008
				Chloroform	4.24	ug/L	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.6E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0009
				cis-1,2-Dichloroethene	286	ug/L	2.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.8E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.06
				Methylene Chloride	2.70	ug/L	1.9E-06	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	1.4E-08	5.5E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00009
				Tetrachloroethene	10.9	ug/L	7.6E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	4.1E-06	2.2E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.002
				Toluene	19.0	ug/L	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0002
				trans-1,2-Dichloroethene	2.89	ug/L	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.9E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0003
				Trichloroethene	21055	ug/L	1.5E-02	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.9E-04	4.3E-02	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.09
				Vinyl Chloride	24.2	ug/L	1.7E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.5E-05	4.9E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.02
				Pyridine	1.92	ug/L	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.004
				2-Nitrotoluene	0.172	ug/L	1.2E-07	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	2.8E-08	3.5E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00004
				2,4,6-Trinitrotoluene	0.284	ug/L	2.0E-07	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	5.9E-09	5.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	8.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.01
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	5.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.007
				RDX	25.1	ug/L	1.8E-05	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.9E-06	5.1E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.02
				Aluminum	23388	ug/L	1.6E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.8E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.05
				Antimony	0.745	ug/L	5.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.004
				Arsenic	5.29	ug/L	3.7E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.5E-06	1.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Barium	284	ug/L	2.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.8E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.008
				Beryllium	1.88	ug/L	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.002
				Cadmium	0.455	ug/L	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.3E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				Chromium	32.0	ug/L	2.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.5E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.02
				Cobalt	81.7	ug/L	5.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.008
				Iron	29423	ug/L	2.1E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.0E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.2
				Lead	13.6	ug/L	9.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	2.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.7E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.03
				Manganese (Water)	4948	ug/L	3.5E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-02	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.4
				Nickel	145	ug/L	1.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.01
				Vanadium	29.3	ug/L	2.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.0E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.06
			Exp. Route Total								2.3E-04					1.1

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	8.9E-08	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	1.8E-08	2.6E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000004
				1,1,2-Trichloroethane	18.2	ug/L	7.9E-07	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	4.5E-08	2.3E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0006
				1,1-Dichloroethene	10.5	ug/L	6.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-06	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.00004
				1,2,3-Trichloropropane	1.44	ug/L	7.9E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	1.6E-10	2.3E-07	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.00004
				1,2-Dichloroethane	1.50	ug/L	3.4E-08	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	3.1E-09	9.9E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000005
				Benzene	1.70	ug/L	1.2E-07	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	6.6E-09	3.5E-07	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.00009
				Bromodichloromethane	1.45	ug/L	5.5E-08	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	3.4E-09	1.6E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000008
				Carbon Tetrachloride	2.58	ug/L	3.2E-07	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	4.2E-08	9.5E-07	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.001
				Chloroform	4.24	ug/L	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.2E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00005
				cis-1,2-Dichloroethene	286	ug/L	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.8E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.005
				Methylene Chloride	2.70	ug/L	4.7E-08	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	3.5E-10	1.4E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000002
				Tetrachloroethene	10.9	ug/L	3.0E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	1.6E-06	8.8E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0009
				Toluene	19.0	ug/L	3.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.9E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.00004
				trans-1,2-Dichloroethene	2.89	ug/L	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.5E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00002
				Trichloroethene	21055	ug/L	1.6E-03	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.1E-05	4.8E-03	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.010
				Vinyl Chloride	24.2	ug/L	5.8E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8.7E-07	1.7E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0006
				Pyridine	1.92	ug/L	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.1E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00004
				2-Nitrotoluene	0.172	ug/L	1.1E-08	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	2.4E-09	3.1E-08	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.000003
				2,4,6-Trinitrotoluene	0.284	ug/L	3.4E-09	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.0E-10	9.8E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				2-Amino-4,6-Dinitrotoluene	1.16	ug/L	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-08	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0004
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	4.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0007
				RDX	25.1	ug/L	1.0E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.1E-08	2.9E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00010
				Aluminum	23388	ug/L	3.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0001
				Antimony	0.745	ug/L	1.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.4E-09	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.00006
				Arsenic	5.29	ug/L	8.4E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-08	2.4E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00008
				Barium	284	ug/L	4.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0003
				Beryllium	1.88	ug/L	3.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.7E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0006
				Cadmium	0.455	ug/L	7.2E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.1E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00008
				Chromium	32.0	ug/L	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.004
				Cobalt	81.7	ug/L	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00002
				Iron	29423	ug/L	4.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0005
				Lead	13.6	ug/L	2.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	2.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.5E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.00004
				Manganese (Water)	4948	ug/L	7.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.02
				Nickel	145	ug/L	4.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.0002
				Vanadium	29.3	ug/L	4.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.005
			Exp. Route Total								2.4E-05					0.05
		Exposure Point Total									2.5E-04					1.1
	Exposure Medium Total										2.5E-04					1.1
Medium Total											2.5E-04					1.1
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	5.7E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	7.4E-09	1.7E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000003
				RDX	24.0	ug/L	6.7E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	7.4E-08	2.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0007
				Aluminum	2767	ug/L	7.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0002
				Antimony	5.8	ug/L	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.7E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Arsenic	1.49	ug/L	4.2E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.2E-08	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Gullies	Ingestion	Barium	200	ug/L	5.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.0002
				Cadmium	2.25	ug/L	6.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				Chromium	3.67	ug/L	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Iron	3038	ug/L	8.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0008
				Lead	48.4	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	3.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0004
				Vanadium	5.29	ug/L	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.3E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0004
				Zinc	513	ug/L	1.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0001
			Exp. Route Total								1.4E-07					0.005
			Dermal	Trichloroethene	20.4	ug/L	7.6E-08	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	9.8E-08	2.2E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00004
				RDX	24.0	ug/L	3.9E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	4.2E-08	1.1E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0004
				Aluminum	2767	ug/L	7.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0002
				Antimony	5.8	ug/L	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.3E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.01
				Arsenic	1.49	ug/L	3.8E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.7E-08	1.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Barium	200	ug/L	5.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-05	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.003
				Cadmium	2.25	ug/L	5.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-07	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.007
				Chromium	3.67	ug/L	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.4E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.007
				Iron	3038	ug/L	7.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0007
				Lead	48.4	ug/L	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.4E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.01
				Vanadium	5.29	ug/L	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.02
				Zinc	513	ug/L	7.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00008
			Exp. Route Total								2.0E-07					0.05
		Exposure Point Total									3.4E-07					0.06
	Exposure Medium Total										3.4E-07					0.06
Medium Total											3.4E-07					0.06
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	1.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.5E-08	3.0E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Manganese (Water)	476	ug/L	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.002
			Exp. Route Total								1.5E-08					0.002
			Dermal	Arsenic	0.370	ug/L	9.4E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.4E-08	2.7E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00009
				Manganese (Water)	476	ug/L	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.5E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.04
			Exp. Route Total								1.4E-08					0.04
		Exposure Point Total									3.0E-08					0.04
	Exposure Medium Total										3.0E-08					0.04
Medium Total											3.0E-08					0.04
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	1.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.1E-08	4.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	4.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Antimony	48.7	mg/kg	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.0E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Arsenic	13.1	mg/kg	4.6E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.9E-07	1.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Barium	1662	mg/kg	5.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.002
				Cadmium	14.5	mg/kg	5.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Copper	1463	mg/kg	5.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.004
				Iron	64255	mg/kg	2.2E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.5E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.02
				Lead	1730	mg/kg	6.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	4.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.002

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Ingestion	Mercury	0.93	mg/kg	3.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Nickel	159	mg/kg	5.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0008
				Vanadium	38.4	mg/kg	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.004
				Zinc	5842	mg/kg	2.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.9E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.002
			Exp. Route Total								7.0E-07					0.06
			Dermal	Benzo(a)pyrene	0.043	mg/kg	2.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.8E-08	7.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	1.7E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.6E-07	5.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	6.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0007
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								2.8E-07					0.002
		Exposure Point Total									9.8E-07					0.06
	Exposure Medium Total										9.8E-07					0.06
Medium Total											9.8E-07					0.06
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	3.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Arsenic	30.8	mg/kg	1.1E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.6E-06	3.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Iron	122000	mg/kg	4.3E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.04
				Manganese (Soil)	1900	mg/kg	6.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.003
				Vanadium	51.2	mg/kg	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.2E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								1.6E-06					0.06
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	4.1E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.1E-07	1.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								6.1E-07					0.004
		Exposure Point Total									2.2E-06					0.06
	Exposure Medium Total										2.2E-06					0.06
Medium Total											2.2E-06					0.06
										Total of Receptor Risks Across All Media	2.6E-04				Total of Receptor Hazards Across All Media	1.4

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	3.4E-08	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.4E-10	4.0E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.0000008
				Benzo(a)anthracene	2.70	mg/kg	3.0E-06	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.2E-06	3.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	2.6E-06	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.9E-05	3.0E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	2.8E-06	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.1E-06	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	4.9E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3.6E-06	5.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	1.4E-06	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	9.9E-07	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	3.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00002
				Aluminum	13725	mg/kg	1.5E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.2
				Antimony	5.15	mg/kg	5.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.6E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.2
				Arsenic	6.29	mg/kg	6.9E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.0E-05	8.0E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.3
				Copper	70.0	mg/kg	7.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.02
				Iron	21817	mg/kg	2.4E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.9
				Lead	127	mg/kg	1.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	3.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-03	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.06
				Vanadium	28.3	mg/kg	3.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.4
			Exp. Route Total								3.8E-05					2.0
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	1.1E-06	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	7.9E-07	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	9.4E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6.9E-06	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.0E-06	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	7.5E-07	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.8E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.3E-06	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	4.9E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3.6E-07	5.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000006
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	5.8E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8.7E-07	6.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								1.1E-05					0.02
		Exposure Point Total									4.9E-05					2.0
	Exposure Medium Total										4.9E-05					2.0
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	7.9E-07	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	5.5E-09	9.2E-06	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.00005
				Benzo(a)anthracene	2.1E-9	mg/m^3	1.7E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	1.5E-10	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	4.6E-10	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	1.6E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	2.8E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.3E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	7.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.0E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	4.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.7E-07	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.0005
				Aluminum	1.0E-5	mg/m^3	8.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.01
				Antimony	3.9E-9	mg/m^3	3.2E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	3.9E-10	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	5.9E-09	4.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	4.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m³	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m³	7.9E-09	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	9.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m³	2.2E-08	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	2.6E-07	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.02
				Vanadium	2.2E-8	mg/m³	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.2E-08					0.03
		Exposure Point Total									1.2E-08					0.03
	Exposure Medium Total										1.2E-08					0.03
Medium Total											4.9E-05					2.0
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.2E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)⁻¹	2.5E-06	1.5E-04	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.002
				1,1,2-Trichloroethane	18.2	ug/L	1.5E-04	(mg/kg/day)	5.7E-02	(mg/kg/day)⁻¹	8.5E-06	1.7E-03	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.4
				1,1-Dichloroethene	10.5	ug/L	8.6E-05	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	1.0E-03	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.02
				1,2,3-Trichloropropane	1.44	ug/L	1.2E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)⁻¹	2.4E-08	1.4E-04	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.02
				1,2-Dichloroethane	1.50	ug/L	1.2E-05	(mg/kg/day)	9.1E-02	(mg/kg/day)⁻¹	1.1E-06	1.4E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.007
				Benzene	1.70	ug/L	1.4E-05	(mg/kg/day)	5.5E-02	(mg/kg/day)⁻¹	7.7E-07	1.6E-04	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.04
				Bromodichloromethane	1.45	ug/L	1.2E-05	(mg/kg/day)	6.2E-02	(mg/kg/day)⁻¹	7.4E-07	1.4E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.007
				Carbon Tetrachloride	2.58	ug/L	2.1E-05	(mg/kg/day)	1.3E-01	(mg/kg/day)⁻¹	2.8E-06	2.5E-04	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.4
				Chloroform	4.24	ug/L	3.5E-05	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	4.1E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.04
				cis-1,2-Dichloroethene	286	ug/L	2.4E-03	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	2.7E-02	(mg/kg/day)	1.0E-02	(mg/kg/day)	2.7
				Methylene Chloride	2.70	ug/L	2.2E-05	(mg/kg/day)	7.5E-03	(mg/kg/day)⁻¹	1.7E-07	2.6E-04	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.004
				Tetrachloroethene	10.9	ug/L	9.0E-05	(mg/kg/day)	5.4E-01	(mg/kg/day)⁻¹	4.8E-05	1.0E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.1
				Toluene	19.0	ug/L	1.6E-04	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	1.8E-03	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.009
				trans-1,2-Dichloroethene	2.89	ug/L	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	2.8E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.01
				Trichloroethene	21055	ug/L	1.7E-01	(mg/kg/day)	1.3E-02	(mg/kg/day)⁻¹	2.2E-03	2.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	4.0
				Vinyl Chloride	24.2	ug/L	2.0E-04	(mg/kg/day)	1.5E+00	(mg/kg/day)⁻¹	3.0E-04	2.3E-03	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.8
				Pyridine	1.92	ug/L	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	1.8E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.2
				2-Nitrotoluene	0.172	ug/L	1.4E-06	(mg/kg/day)	2.3E-01	(mg/kg/day)⁻¹	3.3E-07	1.6E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.002
				2,4,6-Trinitrotoluene	0.284	ug/L	2.3E-06	(mg/kg/day)	3.0E-02	(mg/kg/day)⁻¹	7.0E-08	2.7E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.05
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	9.7E-06	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	1.1E-04	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.6
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	5.9E-06	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	6.9E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.3
				RDX	25.1	ug/L	2.1E-04	(mg/kg/day)	1.1E-01	(mg/kg/day)⁻¹	2.3E-05	2.4E-03	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.8
				Aluminum	23388	ug/L	1.9E-01	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	2.2E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	2.2
				Antimony	0.745	ug/L	6.1E-06	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	7.1E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.2
				Arsenic	5.29	ug/L	4.3E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)⁻¹	6.5E-05	5.1E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	1.7
				Barium	284	ug/L	2.3E-03	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	2.7E-02	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.4
				Beryllium	1.88	ug/L	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	1.8E-04	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.09
				Cadmium	0.455	ug/L	3.7E-06	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	4.4E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.09
				Chromium	32.0	ug/L	2.6E-04	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	3.1E-03	(mg/kg/day)	3.0E-03	(mg/kg/day)	1.0
				Cobalt	81.7	ug/L	6.7E-04	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	7.8E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.4
				Iron	29423	ug/L	2.4E-01	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	2.8E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	9.4
				Lead	13.6	ug/L	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	1.3E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	2.7E-04	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	3.2E-03	(mg/kg/day)	2.0E-03	(mg/kg/day)	1.6
				Manganese (Water)	4948	ug/L	4.1E-02	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	4.7E-01	(mg/kg/day)	2.4E-02	(mg/kg/day)	20
				Nickel	145	ug/L	1.2E-03	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	1.4E-02	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.7
				Vanadium	29.3	ug/L	2.4E-04	(mg/kg/day)	NA	(mg/kg/day)⁻¹	- -	2.8E-03	(mg/kg/day)	1.0E-03	(mg/kg/day)	2.8
			Exp. Route Total								2.7E-03					51

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	5.1E-07	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	1.0E-07	5.9E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00010
				1,1,2-Trichloroethane	18.2	ug/L	4.5E-06	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	2.6E-07	5.3E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.01
				1,1-Dichloroethene	10.5	ug/L	3.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.4E-05	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.0009
				1,2,3-Trichloropropane	1.44	ug/L	4.5E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	9.0E-10	5.2E-06	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.0009
				1,2-Dichloroethane	1.50	ug/L	1.9E-07	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.8E-08	2.3E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0001
				Benzene	1.70	ug/L	6.8E-07	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	3.8E-08	8.0E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.002
				Bromodichloromethane	1.45	ug/L	3.1E-07	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	2.0E-08	3.7E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Carbon Tetrachloride	2.58	ug/L	1.9E-06	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	2.4E-07	2.2E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.03
				Chloroform	4.24	ug/L	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.001
				cis-1,2-Dichloroethene	286	ug/L	9.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.1
				Methylene Chloride	2.70	ug/L	2.7E-07	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	2.0E-09	3.1E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00005
				Tetrachloroethene	10.9	ug/L	1.7E-05	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	9.4E-06	2.0E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.02
				Toluene	19.0	ug/L	1.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.001
				trans-1,2-Dichloroethene	2.89	ug/L	6.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.9E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0004
				Trichloroethene	21055	ug/L	9.3E-03	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.2E-04	1.1E-01	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.2
				Vinyl Chloride	24.2	ug/L	3.3E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.0E-06	3.9E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.01
				Pyridine	1.92	ug/L	7.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.3E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0009
				2-Nitrotoluene	0.172	ug/L	6.0E-08	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	1.4E-08	7.0E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00007
				2,4,6-Trinitrotoluene	0.284	ug/L	1.9E-08	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	5.8E-10	2.2E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.008
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.02
				RDX	25.1	ug/L	5.8E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	6.3E-08	6.7E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Aluminum	23388	ug/L	2.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.002
				Antimony	0.745	ug/L	6.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.9E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.001
				Arsenic	5.29	ug/L	4.8E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.2E-08	5.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Barium	284	ug/L	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-05	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.006
				Beryllium	1.88	ug/L	1.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-07	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.01
				Cadmium	0.455	ug/L	4.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.8E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.002
				Chromium	32.0	ug/L	5.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.8E-06	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.09
				Cobalt	81.7	ug/L	7.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.6E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0004
				Iron	29423	ug/L	2.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.01
				Lead	13.6	ug/L	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.0009
				Manganese (Water)	4948	ug/L	4.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.2E-04	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.5
				Nickel	145	ug/L	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-06	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.004
				Vanadium	29.3	ug/L	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-06	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.1
			Exp. Route Total								1.4E-04					1.2
		Exposure Point Total									2.8E-03					52
	Exposure Medium Total										2.8E-03					52
	Air	SWMU 16	Inhalation	1,1,2,2-Tetrachloroethane	8.1E-4	mg/m3	2.7E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	5.3E-07	3.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1,2-Trichloroethane	0.014	mg/m3	4.6E-05	(mg/kg/day)	5.6E-02	(mg/kg/day)$^{-1}$	2.5E-06	5.3E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1-Dichloroethene	0.011	mg/m3	3.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-04	(mg/kg/day)	5.7E-02	(mg/kg/day)	0.007
				1,2,3-Trichloropropane	0.001	mg/m3	4.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.9E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.03
				1,2-Dichloroethane	0.001	mg/m3	4.3E-06	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	3.9E-07	5.0E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.04
				Benzene	0.002	mg/m3	6.1E-06	(mg/kg/day)	2.7E-02	(mg/kg/day)$^{-1}$	1.6E-07	7.1E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.05

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Air	SWMU 16	Inhalation	Bromodichloromethane	0.001	mg/m3	3.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Carbon Tetrachloride	0.002	mg/m3	7.4E-06	(mg/kg/day)	5.3E-02	(mg/kg/day)$^{-1}$	3.9E-07	8.6E-05	(mg/kg/day)	5.7E-04	(mg/kg/day)	0 2
				Chloroform	0.004	mg/m3	1.3E-05	(mg/kg/day)	8.1E-02	(mg/kg/day)$^{-1}$	1.0E-06	1.5E-04	(mg/kg/day)	1.4E-02	(mg/kg/day)	0 01
				cis-1,2-Dichloroethene	0.284	mg/m3	9.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-02	(mg/kg/day)	NA	(mg/kg/day)	--
				Methylene Chloride	0.003	mg/m3	8.9E-06	(mg/kg/day)	1.6E-03	(mg/kg/day)$^{-1}$	1.4E-08	1.0E-04	(mg/kg/day)	8.6E-01	(mg/kg/day)	0 0001
				Tetrachloroethene	0.009	mg/m3	3.0E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)$^{-1}$	6.0E-07	3.5E-04	(mg/kg/day)	1 4E-01	(mg/kg/day)	0 003
				Toluene	0.020	mg/m3	6.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.5E-04	(mg/kg/day)	1 1E-01	(mg/kg/day)	0 007
				trans-1,2-Dichloroethene	0.003	mg/m3	9.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Trichloroethene	19.2	mg/m3	6.3E-02	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	4.4E-04	7.4E-01	(mg/kg/day)	1.7E-01	(mg/kg/day)	4 3
				Vinyl Chloride	0.029	mg/m3	9.6E-05	(mg/kg/day)	1.5E-02	(mg/kg/day)$^{-1}$	1.4E-06	1.1E-03	(mg/kg/day)	2.9E-02	(mg/kg/day)	0 04
				Pyridine	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Nitrotoluene	4.9E-5	mg/m3	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				2,4,6-Trinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Amino-4,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4-Amino-2,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				RDX	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1 0E-03	(mg/kg/day)	--
				Antimony	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Beryllium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	8.4E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5 7E-06	(mg/kg/day)	--
				Cadmium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	6.3E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.7E-05	(mg/kg/day)	--
				Chromium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	4.1E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.9E-05	(mg/kg/day)	--
				Cobalt	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	9.8E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Iron	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Nickel	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.5E-04					4.7
		Exposure Point Total									4.5E-04					4 7
	Exposure Medium Total										4.5E-04					4 7
Medium Total											3.3E-03					57
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	3.3E-06	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.3E-08	3.9E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)	0 00008
				RDX	24.0	ug/L	3.9E-06	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	4.3E-07	4.6E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0 02
				Aluminum	2767	ug/L	4.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0 005
				Antimony	5.8	ug/L	9.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0 03
				Arsenic	1.49	ug/L	2.4E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.6E-07	2.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0 009
				Barium	200	ug/L	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-04	(mg/kg/day)	7 0E-02	(mg/kg/day)	0.005
				Cadmium	2.25	ug/L	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.3E-06	(mg/kg/day)	5 0E-04	(mg/kg/day)	0 009
				Chromium	3.67	ug/L	6.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0 002
				Iron	3038	ug/L	4.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.8E-03	(mg/kg/day)	3 0E-01	(mg/kg/day)	0 02
				Lead	48.4	ug/L	7.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	2.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2 4E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0 01

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Gullies	Ingestion	Vanadium	5.29	ug/L	8.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.010
				Zinc	513	ug/L	8.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.7E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
			Exp. Route Total								8.4E-07					0.1
			Dermal	Trichloroethene	20.4	ug/L	3.2E-06	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.2E-08	3.7E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00007
				RDX	24.0	ug/L	1.6E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.8E-08	1.9E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0006
				Aluminum	2767	ug/L	3.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.5E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0003
				Antimony	5.8	ug/L	6.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.3E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.01
				Arsenic	1.49	ug/L	1.6E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.4E-08	1.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Barium	200.	ug/L	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-05	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.005
				Cadmium	2.25	ug/L	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-07	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.01
				Chromium	3.67	ug/L	7.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.2E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.01
				Iron	3038	ug/L	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.001
				Lead	48.4	ug/L	5.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.02
				Vanadium	5.29	ug/L	5.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.6E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.03
				Zinc	513	ug/L	3.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0001
			Exp. Route Total								8.4E-08					0.1
		Exposure Point Total									9.2E-07					0.2
	Exposure Medium Total										9.2E-07					0.2
Medium Total											9.2E-07					0.2
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	6.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	9.0E-08	7.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Manganese (Water)	476	ug/L	7.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.0E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.04
			Exp. Route Total								9.0E-08					0.04
			Dermal	Arsenic	0.370	ug/L	4.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.0E-09	4.6E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Manganese (Water)	476	ug/L	5.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.0E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.06
			Exp. Route Total								6.0E-09					0.06
		Exposure Point Total									9.6E-08					0.1
	Exposure Medium Total										9.6E-08					0.1
Medium Total											9.6E-08					0.1
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	3.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.6E-08	4.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	1.1E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.01
				Antimony	48.7	mg/kg	4.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.6E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.1
				Arsenic	13.1	mg/kg	1.1E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.6E-06	1.2E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Barium	1662	mg/kg	1.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.02
				Cadmium	14.5	mg/kg	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.03
				Copper	1463	mg/kg	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.03
				Iron	64255	mg/kg	5.2E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.1E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.2
				Lead	1730	mg/kg	1.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	9.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-03	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.02
				Mercury	0.93	mg/kg	7.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Nickel	159	mg/kg	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.008
				Vanadium	38.4	mg/kg	3.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.6E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.04
				Zinc	5842	mg/kg	4.8E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.5E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.02
			Exp. Route Total								1.6E-06					0.5

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Dermal	Benzo(a)pyrene	0.043	mg/kg	2.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.9E-08	3.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	1.8E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.7E-07	2.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	6.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.7E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.003
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								2.9E-07					0.01
		Exposure Point Total									1.9E-06					0.5
	Exposure Medium Total										1.9E-06					0.5
Medium Total											1.9E-06					0.5
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	8.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.010
				Arsenic	30.8	mg/kg	2.5E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.8E-06	2.9E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.10
				Iron	122000	mg/kg	9.9E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.4
				Manganese (Soil)	1900	mg/kg	1.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-03	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.03
				Vanadium	51.2	mg/kg	4.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.9E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.05
			Exp. Route Total								3.8E-06					0.6
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	4.2E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.3E-07	4.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								6.3E-07					0.02
		Exposure Point Total									4.4E-06					0.6
	Exposure Medium Total										4.4E-06					0.6
Medium Total											4.4E-06					0.6
										Total of Receptor Risks Across All Media	3.3E-03				Total of Receptor Hazards Across All Media	60

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	1.5E-08	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.9E-10	4.2E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00000008
				Benzo(a)anthracene	2.70	mg/kg	1.3E-06	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	9.3E-07	3.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.1E-06	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8.1E-06	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.2E-06	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	8.9E-07	3.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	2.1E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.5E-06	6.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	5.8E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.3E-07	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000002
				Aluminum	13725	mg/kg	6.4E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.02
				Antimony	5.15	mg/kg	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.1E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.02
				Arsenic	6.29	mg/kg	3.0E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.4E-06	8.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Copper	70.0	mg/kg	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.6E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.002
				Iron	21817	mg/kg	1.0E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.1
				Lead	127	mg/kg	6.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	1.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.8E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.007
				Vanadium	28.3	mg/kg	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.04
			Exp. Route Total								1.6E-05					0.2
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	6.6E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.8E-07	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	5.7E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4.2E-06	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	6.3E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.6E-07	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.1E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8.0E-07	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	3.0E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.2E-07	8.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	6.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000001
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	3.5E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.3E-07	1.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								6.7E-06					0.003
		Exposure Point Total									2.3E-05					0.2
	Exposure Medium Total										2.3E-05					0.2
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	9.0E-07	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	6.3E-09	2.6E-06	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.00002
				Benzo(a)anthracene	2.1E-9	mg/m^3	1.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.6E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	1.7E-10	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	5.2E-10	4.9E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	1.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.4E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	3.2E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.4E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	8.8E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.6E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	4.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-07	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.0002
				Aluminum	1.0E-5	mg/m^3	9.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.003
				Antimony	3.9E-9	mg/m^3	3.7E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	4.5E-10	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	6.8E-09	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	5.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	9.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	2.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.3E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.005
				Vanadium	2.2E-8	mg/m^3	2.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.4E-08					0.008
		Exposure Point Total									1.4E-08					0.008
	Exposure Medium Total										1.4E-08					0.008
Medium Total											2.3E-05					0.2
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.4E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	2.9E-06	4.2E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0007
				1,1,2-Trichloroethane	18.2	ug/L	1.7E-04	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	9.7E-06	5.0E-04	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.1
				1,1-Dichloroethene	10.5	ug/L	9.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.9E-04	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.006
				1,2,3-Trichloropropane	1.44	ug/L	1.4E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	2.7E-08	3.9E-05	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.007
				1,2-Dichloroethane	1.50	ug/L	1.4E-05	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.3E-06	4.1E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Benzene	1.70	ug/L	1.6E-05	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	8.8E-07	4.7E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.01
				Bromodichloromethane	1.45	ug/L	1.4E-05	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	8.4E-07	4.0E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Carbon Tetrachloride	2.58	ug/L	2.4E-05	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	3.2E-06	7.1E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.1
				Chloroform	4.24	ug/L	4.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.01
				cis-1,2-Dichloroethene	286	ug/L	2.7E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.8E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.8
				Methylene Chloride	2.70	ug/L	2.5E-05	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	1.9E-07	7.4E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.001
				Tetrachloroethene	10.9	ug/L	1.0E-04	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	5.5E-05	3.0E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.03
				Toluene	19.0	ug/L	1.8E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.2E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.003
				trans-1,2-Dichloroethene	2.89	ug/L	2.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.9E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.004
				Trichloroethene	21055	ug/L	2.0E-01	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.6E-03	5.8E-01	(mg/kg/day)	5.0E-01	(mg/kg/day)	1.2
				Vinyl Chloride	24.2	ug/L	2.3E-04	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.4E-04	6.6E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.2
				Pyridine	1.92	ug/L	1.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.3E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.05
				2-Nitrotoluene	0.172	ug/L	1.6E-06	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	3.7E-07	4.7E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0005
				2,4,6-Trinitrotoluene	0.284	ug/L	2.7E-06	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	8.0E-08	7.8E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.02
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.2E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.2
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	6.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.10
				RDX	25.1	ug/L	2.4E-04	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	2.6E-05	6.9E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.2
				Aluminum	23388	ug/L	2.2E-01	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.4E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.6
				Antimony	0.745	ug/L	7.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.05
				Arsenic	5.29	ug/L	5.0E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.5E-05	1.4E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.5
				Barium	284	ug/L	2.7E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.8E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.1
				Beryllium	1.88	ug/L	1.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.2E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.03
				Cadmium	0.455	ug/L	4.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.02
				Chromium	32.0	ug/L	3.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.8E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.3
				Cobalt	81.7	ug/L	7.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.1
				Iron	29423	ug/L	2.8E-01	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.1E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	2.7
				Lead	13.6	ug/L	1.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.7E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	3.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.0E-04	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.5
				Manganese (Water)	4948	ug/L	4.6E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-01	(mg/kg/day)	2.4E-02	(mg/kg/day)	5.6
				Nickel	145	ug/L	1.4E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.2
				Vanadium	29.3	ug/L	2.8E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.0E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.8
			Exp. Route Total								3.1E-03					15

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.2E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	2.4E-07	3.5E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00006
				1,1,2-Trichloroethane	18.2	ug/L	1.1E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	6.0E-07	3.1E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.008
				1,1-Dichloroethene	10.5	ug/L	8.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-05	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.0005
				1,2,3-Trichloropropane	1.44	ug/L	1.1E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	2.1E-09	3.1E-06	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.0005
				1,2-Dichloroethane	1.50	ug/L	4.5E-07	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	4.1E-08	1.3E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00007
				Benzene	1.70	ug/L	1.6E-06	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	8.8E-08	4.7E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.001
				Bromodichloromethane	1.45	ug/L	7.4E-07	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	4.6E-08	2.1E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0001
				Carbon Tetrachloride	2.58	ug/L	4.3E-06	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	5.6E-07	1.3E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.02
				Chloroform	4.24	ug/L	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.0E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0007
				cis-1,2-Dichloroethene	286	ug/L	2.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.06
				Methylene Chloride	2.70	ug/L	6.3E-07	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	4.7E-09	1.8E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00003
				Tetrachloroethene	10.9	ug/L	4.1E-05	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	2.2E-05	1.2E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.01
				Toluene	19.0	ug/L	4.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0006
				trans-1,2-Dichloroethene	2.89	ug/L	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.6E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Trichloroethene	21055	ug/L	2.2E-02	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.8E-04	6.4E-02	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.1
				Vinyl Chloride	24.2	ug/L	7.7E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.2E-05	2.3E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.008
				Pyridine	1.92	ug/L	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.4E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0005
				2-Nitrotoluene	0.172	ug/L	1.4E-07	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	3.2E-08	4.1E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00004
				2,4,6-Trinitrotoluene	0.284	ug/L	4.5E-08	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.3E-09	1.3E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	3.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.5E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.005
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	6.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.010
				RDX	25.1	ug/L	1.3E-06	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.5E-07	3.9E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.001
				Aluminum	23388	ug/L	4.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Antimony	0.745	ug/L	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.6E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0008
				Arsenic	5.29	ug/L	1.1E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.7E-07	3.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Barium	284	ug/L	6.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-05	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.004
				Beryllium	1.88	ug/L	4.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-07	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.008
				Cadmium	0.455	ug/L	9.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.001
				Chromium	32.0	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-06	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.05
				Cobalt	81.7	ug/L	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.0E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0003
				Iron	29423	ug/L	6.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.006
				Lead	13.6	ug/L	2.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	3.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.0005
				Manganese (Water)	4948	ug/L	1.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-04	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.3
				Nickel	145	ug/L	6.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-06	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.002
				Vanadium	29.3	ug/L	6.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-06	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.07
			Exp. Route Total								3.2E-04					0.7
		Exposure Point Total									3.4E-03					1.5
	Exposure Medium Total										3.4E-03					1.5
	Air	SWMU 16	Inhalation	1,1,2,2-Tetrachloroethane	8.1E-4	mg/m3	2.3E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	4.6E-07	6.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1,2-Trichloroethane	0.014	mg/m3	3.9E-05	(mg/kg/day)	5.6E-02	(mg/kg/day)$^{-1}$	2.2E-06	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1-Dichloroethene	0.011	mg/m3	3.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)	0.002
				1,2,3-Trichloropropane	0.001	mg/m3	3.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.007
				1,2-Dichloroethane	0.001	mg/m3	3.7E-06	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	3.3E-07	1.1E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.008
				Benzene	0.002	mg/m3	5.2E-06	(mg/kg/day)	2.7E-02	(mg/kg/day)$^{-1}$	1.4E-07	1.5E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.01

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Air	SWMU 16	Inhalation	Bromodichloromethane	0.001	mg/m3	3.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Carbon Tetrachloride	0.002	mg/m3	6.3E-06	(mg/kg/day)	5.3E-02	(mg/kg/day)$^{-1}$	3.3E-07	1.8E-05	(mg/kg/day)	5.7E-04	(mg/kg/day)	0.03
				Chloroform	0.004	mg/m3	1.1E-05	(mg/kg/day)	8.1E-02	(mg/kg/day)$^{-1}$	8.8E-07	3.2E-05	(mg/kg/day)	1.4E-02	(mg/kg/day)	0.002
				cis-1,2-Dichloroethene	0.284	mg/m3	8.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Methylene Chloride	0.003	mg/m3	7.7E-06	(mg/kg/day)	1.6E-03	(mg/kg/day)$^{-1}$	1.2E-08	2.2E-05	(mg/kg/day)	8.6E-01	(mg/kg/day)	0.00003
				Tetrachloroethene	0.009	mg/m3	2.6E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)$^{-1}$	5.1E-07	7.5E-05	(mg/kg/day)	1.4E-01	(mg/kg/day)	0.0005
				Toluene	0.020	mg/m3	5.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-04	(mg/kg/day)	1.1E-01	(mg/kg/day)	0.001
				trans-1,2-Dichloroethene	0.003	mg/m3	8.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Trichloroethene	19.2	mg/m3	5.4E-02	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	3.8E-04	1.6E-01	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.9
				Vinyl Chloride	0.029	mg/m3	8.2E-05	(mg/kg/day)	1.5E-02	(mg/kg/day)$^{-1}$	1.2E-06	2.4E-04	(mg/kg/day)	2.9E-02	(mg/kg/day)	0.008
				Pyridine	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Nitrotoluene	4.9E-5	mg/m3	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				2,4,6-Trinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Amino-4,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4-Amino-2,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				RDX	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-03	(mg/kg/day)	--
				Antimony	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Beryllium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	8.4E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Cadmium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	6.3E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.7E-05	(mg/kg/day)	--
				Chromium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	4.1E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.9E-05	(mg/kg/day)	--
				Cobalt	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	9.8E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Iron	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Nickel	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3.8E-04					1.0
		Exposure Point Total									3.8E-04					1.0
	Exposure Medium Total										3.8E-04					1.0
Medium Total											3.8E-03					16
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	5.7E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	7.4E-09	1.7E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000003
				RDX	24.0	ug/L	6.7E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	7.4E-08	2.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0007
				Aluminum	2767	ug/L	7.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0002
				Antimony	5.8	ug/L	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.7E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Arsenic	1.49	ug/L	4.2E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.2E-08	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Barium	200	ug/L	5.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.0002
				Cadmium	2.25	ug/L	6.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				Chromium	3.67	ug/L	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Iron	3038	ug/L	8.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0008
				Lead	48.4	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	3.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0004

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Gullies	Ingestion	Vanadium	5.29	ug/L	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.3E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0004
				Zinc	513	ug/L	1.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0001
			Exp. Route Total								1.4E-07					0.005
			Dermal	Trichloroethene	20.4	ug/L	7.6E-06	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	9.8E-08	2.2E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00004
				RDX	24.0	ug/L	3.9E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	4.2E-08	1.1E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0004
				Aluminum	2767	ug/L	7.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0002
				Antimony	5.8	ug/L	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.3E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.01
				Arsenic	1.49	ug/L	3.8E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.7E-08	1.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Barium	200	ug/L	5.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-05	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.003
				Cadmium	2.25	ug/L	5.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-07	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.007
				Chromium	3.67	ug/L	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.4E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.007
				Iron	3038	ug/L	7.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0007
				Lead	48.4	ug/L	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.4E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.01
				Vanadium	5.29	ug/L	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.02
				Zinc	513	ug/L	7.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00008
			Exp. Route Total								2.0E-07					0.05
		Exposure Point Total									3.4E-07					0.06
	Exposure Medium Total										3.4E-07					0.06
Medium Total											3.4E-07					0.06
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	1.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.5E-08	3.0E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Manganese (Water)	476	ug/L	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.002
			Exp. Route Total								1.5E-08					0.002
			Dermal	Arsenic	0.370	ug/L	9.4E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.4E-08	2.7E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00009
				Manganese (Water)	476	ug/L	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.5E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.04
			Exp. Route Total								1.4E-08					0.04
		Exposure Point Total									3.0E-08					0.04
	Exposure Medium Total										3.0E-08					0.04
Medium Total											3.0E-08					0.04
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	1.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.1E-08	4.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	4.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Antimony	48.7	mg/kg	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.0E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Arsenic	13.1	mg/kg	4.6E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.9E-07	1.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Barium	1662	mg/kg	5.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.002
				Cadmium	14.5	mg/kg	5.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Copper	1463	mg/kg	5.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.004
				Iron	64255	mg/kg	2.2E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.5E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.02
				Lead	1730	mg/kg	6.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	4.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.002
				Mercury	0.93	mg/kg	3.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Nickel	159	mg/kg	5.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0008
				Vanadium	38.4	mg/kg	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.004
				Zinc	5842	mg/kg	2.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.9E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.002
			Exp. Route Total								7.0E-07					0.06

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Dermal	Benzo(a)pyrene	0.043	mg/kg	1.6E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.1E-08	4.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	1.1E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.6E-07	3.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	4.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0005
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								1.8E-07					0.002
		Exposure Point Total									8.7E-07					0.06
	Exposure Medium Total										8.7E-07					0.06
Medium Total											8.7E-07					0.06
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	3.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Arsenic	30.8	mg/kg	1.1E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.6E-06	3.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Iron	122000	mg/kg	4.3E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.04
				Manganese (Soil)	1900	mg/kg	6.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.003
				Vanadium	51.2	mg/kg	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.2E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								1.6E-06					0.06
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	2.6E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.9E-07	7.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								3.9E-07					0.003
		Exposure Point Total									2.0E-06					0.06
	Exposure Medium Total										2.0E-06					0.06
Medium Total											2.0E-06					0.06
										Total of Receptor Risks Across All Media	3.8E-03				Total of Receptor Hazards Across All Media	17

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	9.4E-11	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.2E-12	7.3E-10	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000000001
				Benzo(a)anthracene	2.70	mg/kg	8.2E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.0E-09	6.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	7.1E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5.2E-08	5.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	7.8E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.7E-09	6.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.4E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	9.9E-09	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	3.7E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.7E-09	2.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	8.2E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.3E-10	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00000003
				Aluminum	13725	mg/kg	4.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0003
				Antimony	5.15	mg/kg	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0003
				Arsenic	6.29	mg/kg	1.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.8E-08	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Copper	70.0	mg/kg	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-06	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.00004
				Iron	21817	mg/kg	6.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.1E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.002
				Lead	127	mg/kg	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.3E-06	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0001
				Vanadium	28.3	mg/kg	8.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.6E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0007
			Exp. Route Total								1.0E-07					0.004
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	1.4E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.0E-09	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.2E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8.9E-09	9.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.3E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	9.8E-10	1.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	2.3E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.7E-09	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	6.4E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.7E-10	5.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.4E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-10	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000000005
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	7.5E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.1E-09	5.8E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00002
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								1.4E-08					0.00002
		Exposure Point Total									1.2E-07					0.004
	Exposure Medium Total										1.2E-07					0.004
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	1.2E-08	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	8.1E-11	9.1E-08	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.0000005
				Benzo(a)anthracene	2.1E-9	mg/m^3	2.5E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	2.2E-12	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	6.7E-12	1.7E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	2.4E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	4.1E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	1.1E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	5.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.6E-09	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.000005
				Aluminum	1.0E-5	mg/m^3	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.8E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00010
				Antimony	3.9E-9	mg/m^3	4.7E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	5.8E-12	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	8.7E-11	4.5E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	6.4E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.0E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Iron	1.7E-5	mg/m^3	2.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Lead	9.7E-8	mg/m^3	1.2E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.1E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	3.2E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0002
				Vanadium	2.2E-8	mg/m^3	2.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-10	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.8E-10					0.0003
		Exposure Point Total									1.8E-10					0.0003
	Exposure Medium Total										1.8E-10					0.0003
Medium Total											1.2E-07					0.004
Surface Water	Surface Water	Gullies	Dermal	Trichloroethene	20.4	ug/L	1.3E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.6E-09	9.7E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000002
				RDX	24.0	ug/L	7.4E-09	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	8.2E-10	5.8E-08	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00002
				Aluminum	2767	ug/L	8.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.4E-06	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.000006
				Antimony	5.8	ug/L	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0002
				Arsenic	1.49	ug/L	4.5E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.7E-10	3.5E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00001
				Barium	200	ug/L	6.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.6E-07	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.00009
				Cadmium	2.25	ug/L	6.7E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.2E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0002
				Chromium	3.67	ug/L	2.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.0002
				Iron	3038	ug/L	9.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-06	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00002
				Lead	48.4	ug/L	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	3.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-07	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.0003
				Vanadium	5.29	ug/L	1.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-08	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.0005
				Zinc	513	ug/L	9.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.2E-07	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.000002
			Exp. Route Total								3.1E-09					0.002
		Exposure Point Total									3.1E-09					0.002
	Exposure Medium Total										3.1E-09					0.002
Medium Total											3.1E-09					0.003
Surface Water	Surface Water	Turkey Creek	Dermal	Arsenic	0.370	ug/L	1.1E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.7E-10	8.6E-10	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.000003
				Manganese (Water)	476	ug/L	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.001
			Exp. Route Total								1.7E-10					0.001
		Exposure Point Total									1.7E-10					0.001
	Exposure Medium Total										1.7E-10					0.001
Medium Total											1.7E-10					0.001
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	1.3E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	9.5E-10	1.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	3.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0003
				Antimony	48.7	mg/kg	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.003
				Arsenic	13.1	mg/kg	4.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.9E-08	3.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Barium	1662	mg/kg	5.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.0006
				Cadmium	14.5	mg/kg	4.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.4E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0007
				Copper	1463	mg/kg	4.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.4E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0009
				Iron	64255	mg/kg	1.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.005
				Lead	1730	mg/kg	5.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	3.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0004
				Mercury	0.93	mg/kg	2.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00007
				Nickel	159	mg/kg	4.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.7E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Vanadium	38.4	mg/kg	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.0E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0009
				Zinc	5842	mg/kg	1.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0005
			Exp. Route Total								6.0E-08					0.01

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Dermal	Benzo(a)pyrene	0.043	mg/kg	2.2E-11	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.6E-10	1.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	1.6E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.3E-09	1.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00004
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	5.8E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-10	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00002
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								2.5E-09					0.00006
		Exposure Point Total									6.3E-08					0.01
	Exposure Medium Total										6.3E-08					0.01
Medium Total											6.3E-08					0.01
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	3.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0002
				Arsenic	30.8	mg/kg	9.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.4E-07	7.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Iron	122000	mg/kg	3.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.010
				Manganese (Soil)	1900	mg/kg	5.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0006
				Vanadium	51.2	mg/kg	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								1.4E-07					0.01
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	3.7E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.5E-09	2.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								5.5E-09					0.0001
		Exposure Point Total									1.5E-07					0.01
	Exposure Medium Total										1.5E-07					0.01
Medium Total											1.5E-07					0.01
										Total of Receptor Risks Across All Media	3.3E-07				Total of Receptor Hazards Across All Media	0.04

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	1.7E-09	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.2E-11	1.3E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00000003
				Benzo(a)anthracene	2.70	mg/kg	1.5E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.1E-07	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	9.5E-07	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.4E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.0E-07	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	2.5E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.8E-07	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	6.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.0E-08	5.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000006
				Aluminum	13725	mg/kg	7.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.9E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.006
				Antimony	5.15	mg/kg	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.006
				Arsenic	6.29	mg/kg	3.5E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.2E-07	2.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.009
				Copper	70.0	mg/kg	3.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0008
				Iron	21817	mg/kg	1.2E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.4E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.03
				Lead	127	mg/kg	7.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	2.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.002
				Vanadium	28.3	mg/kg	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.01
			Exp. Route Total								1.9E-06					0.07
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	2.6E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.9E-08	2.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	2.2E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.6E-07	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	2.4E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.8E-08	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	4.3E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3.1E-08	3.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	1.2E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	8.6E-09	9.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	2.6E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00000010
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	1.4E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.1E-08	1.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								2.6E-07					0.0004
		Exposure Point Total									2.2E-06					0.07
	Exposure Medium Total										2.2E-06					0.07
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	2.1E-07	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	1.5E-09	1.7E-06	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.00001
				Benzo(a)anthracene	2.1E-9	mg/m^3	4.5E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	4.0E-11	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	1.2E-10	3.1E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	4.3E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.4E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	7.6E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.9E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	2.1E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.4E-08	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.0001
				Aluminum	1.0E-5	mg/m^3	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.002
				Antimony	3.9E-9	mg/m^3	8.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	1.1E-10	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	1.6E-09	8.2E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	1.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	5.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.6E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.003
				Vanadium	2.2E-8	mg/m^3	4.7E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3.2E-09					0.005
		Exposure Point Total									3.2E-09					0.005
	Exposure Medium Total										3.2E-09					0.005
Medium Total											2.2E-06					0.07
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.7E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	3.4E-07	1.3E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0002
				1,1,2-Trichloroethane	18.2	ug/L	2.0E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	1.1E-06	1.6E-04	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.04
				1,1-Dichloroethene	10.5	ug/L	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.0E-05	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.002
				1,2,3-Trichloropropane	1.44	ug/L	1.6E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	3.2E-09	1.2E-05	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.002
				1,2-Dichloroethane	1.50	ug/L	1.7E-06	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.5E-07	1.3E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0006
				Benzene	1.70	ug/L	1.9E-06	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	1.0E-07	1.5E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.004
				Bromodichloromethane	1.45	ug/L	1.6E-06	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	9.9E-08	1.2E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0006
				Carbon Tetrachloride	2.58	ug/L	2.8E-06	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	3.7E-07	2.2E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.03
				Chloroform	4.24	ug/L	4.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.004
				cis-1,2-Dichloroethene	286	ug/L	3.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.2
				Methylene Chloride	2.70	ug/L	3.0E-06	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	2.2E-08	2.3E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0004
				Tetrachloroethene	10.9	ug/L	1.2E-05	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	6.5E-06	9.3E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.009
				Toluene	19.0	ug/L	2.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0008
				trans-1,2-Dichloroethene	2.89	ug/L	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.001
				Trichloroethene	21055	ug/L	2.3E-02	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.0E-04	1.8E-01	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.4
				Vinyl Chloride	24.2	ug/L	2.7E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.0E-05	2.1E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.07
				Pyridine	1.92	ug/L	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.02
				2-Nitrotoluene	0.172	ug/L	1.9E-07	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	4.4E-08	1.5E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0001
				2,4,6-Trinitrotoluene	0.284	ug/L	3.1E-07	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	9.4E-09	2.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.005
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.05
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	8.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.2E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.03
				RDX	25.1	ug/L	2.8E-05	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	3.0E-06	2.2E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.07
				Aluminum	23388	ug/L	2.6E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.2
				Antimony	0.745	ug/L	8.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.02
				Arsenic	5.29	ug/L	5.8E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8.7E-06	4.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Barium	284	ug/L	3.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.03
				Beryllium	1.88	ug/L	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.008
				Cadmium	0.455	ug/L	5.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.008
				Chromium	32.0	ug/L	3.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.09
				Cobalt	81.7	ug/L	9.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.0E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.04
				Iron	29423	ug/L	3.2E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.8
				Lead	13.6	ug/L	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	3.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-04	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.1
				Manganese (Water)	4948	ug/L	5.5E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.2E-02	(mg/kg/day)	2.4E-02	(mg/kg/day)	1.8
				Nickel	145	ug/L	1.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.06
				Vanadium	29.3	ug/L	3.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.3
			Exp. Route Total								3.6E-04					4.6

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	4.2E-08	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	8.4E-09	3.3E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000005
				1,1,2-Trichloroethane	18.2	ug/L	3.7E-07	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	2.1E-08	2.9E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0007
				1,1-Dichloroethene	10.5	ug/L	3.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-06	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.00005
				1,2,3-Trichloropropane	1.44	ug/L	3.7E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	7.4E-11	2.9E-07	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.00005
				1,2-Dichloroethane	1.50	ug/L	1.6E-08	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.5E-09	1.2E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000006
				Benzene	1.70	ug/L	5.6E-08	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	3.1E-09	4.4E-07	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0001
				Bromodichloromethane	1.45	ug/L	2.6E-08	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	1.6E-09	2.0E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00001
				Carbon Tetrachloride	2.58	ug/L	1.5E-07	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	2.0E-08	1.2E-06	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.002
				Chloroform	4.24	ug/L	8.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.5E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00007
				cis-1,2-Dichloroethene	286	ug/L	7.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.0E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.006
				Methylene Chloride	2.70	ug/L	2.2E-08	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	1.7E-10	1.7E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000003
				Tetrachloroethene	10.9	ug/L	1.4E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	7.7E-07	1.1E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.001
				Toluene	19.0	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.00005
				trans-1,2-Dichloroethene	2.89	ug/L	5.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.3E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00002
				Trichloroethene	21055	ug/L	7.7E-04	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.0E-05	6.0E-03	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.01
				Vinyl Chloride	24.2	ug/L	2.7E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.1E-07	2.1E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0007
				Pyridine	1.92	ug/L	6.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.1E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00005
				2-Nitrotoluene	0.172	ug/L	4.9E-09	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	1.1E-09	3.8E-08	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.000004
				2,4,6-Trinitrotoluene	0.284	ug/L	1.6E-09	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	4.7E-11	1.2E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-08	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0004
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	2.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0009
				RDX	25.1	ug/L	4.7E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	5.2E-09	3.7E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Aluminum	23388	ug/L	1.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0001
				Antimony	0.745	ug/L	4.5E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-09	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.00006
				Arsenic	5.29	ug/L	3.2E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.8E-09	2.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00008
				Barium	284	ug/L	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0003
				Beryllium	1.88	ug/L	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0006
				Cadmium	0.455	ug/L	2.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00009
				Chromium	32.0	ug/L	3.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.004
				Cobalt	81.7	ug/L	5.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00002
				Iron	29423	ug/L	1.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0005
				Lead	13.6	ug/L	8.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	9.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.6E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.00004
				Manganese (Water)	4948	ug/L	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.02
				Nickel	145	ug/L	1.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.0002
				Vanadium	29.3	ug/L	1.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.005
			Exp. Route Total								1.1E-05					0.06
		Exposure Point Total									3.7E-04					4.6
	Exposure Medium Total										3.7E-04					4.6
Medium Total											3.7E-04					9.2
										Total of Receptor Risks Across All Media	3.8E-04				Total of Receptor Hazards Across All Media	9.3

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	2.0E-10	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.6E-12	1.3E-09	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000000003
				Benzo(a)anthracene	2.70	mg/kg	1.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.3E-08	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.5E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.1E-07	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.7E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.2E-08	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	2.9E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.1E-08	1.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	8.1E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.9E-09	5.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00000006
				Aluminum	13725	mg/kg	8.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.7E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0006
				Antimony	5.15	mg/kg	3.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0005
				Arsenic	6.29	mg/kg	4.1E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.1E-08	2.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0009
				Copper	70.0	mg/kg	4.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-06	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.00007
				Iron	21817	mg/kg	1.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.0E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Lead	127	mg/kg	8.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0002
				Vanadium	28.3	mg/kg	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								2.3E-07					0.006
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	5.7E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.1E-09	3.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	5.0E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3.6E-08	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	5.4E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.0E-09	3.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	9.5E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6.9E-09	6.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	2.6E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.9E-09	1.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	5.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-10	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00000002
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	3.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.6E-09	1.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00006
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								5.8E-08					0.00006
		Exposure Point Total									2.8E-07					0.006
	Exposure Medium Total										2.8E-07					0.006
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	3.0E-09	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	2.1E-11	1.9E-08	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.0000001
				Benzo(a)anthracene	2.1E-9	mg/m^3	6.4E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.1E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	5.6E-13	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	1.7E-12	3.6E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	6.1E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	1.1E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.8E-13	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	2.9E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	1.5E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.7E-10	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.000001
				Aluminum	1.0E-5	mg/m^3	3.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00002
				Antimony	3.9E-9	mg/m^3	1.2E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.8E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	1.5E-12	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	2.3E-11	9.5E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	1.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-10	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	5.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	3.0E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	8.4E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.3E-10	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.00004
				Vanadium	2.2E-8	mg/m^3	6.7E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.3E-11	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.5E-11					0.00006
		Exposure Point Total									4.5E-11					0.00006
	Exposure Medium Total										4.5E-11					0.00006
Medium Total											2.8E-07					0.007
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	2.7E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.5E-09	1.7E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000003
				RDX	24.0	ug/L	3.1E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	3.4E-08	2.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0007
				Aluminum	2767	ug/L	3.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0002
				Antimony	5.8	ug/L	7.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.8E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Arsenic	1.49	ug/L	1.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.9E-08	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Barium	200	ug/L	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.0002
				Cadmium	2.25	ug/L	2.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				Chromium	3.67	ug/L	4.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Iron	3038	ug/L	4.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0008
				Lead	48.4	ug/L	6.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0004
				Vanadium	5.29	ug/L	6.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.4E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0004
				Zinc	513	ug/L	6.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0001
			Exp. Route Total								6.7E-08					0.005
			Dermal	Trichloroethene	20.4	ug/L	3.0E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.9E-09	1.9E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000004
				RDX	24.0	ug/L	1.7E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.9E-09	1.1E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00004
				Aluminum	2767	ug/L	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00001
				Antimony	5.8	ug/L	4.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0005
				Arsenic	1.49	ug/L	1.2E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.8E-09	7.7E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00003
				Barium	200	ug/L	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0002
				Cadmium	2.25	ug/L	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0005
				Chromium	3.67	ug/L	5.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.0005
				Iron	3038	ug/L	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00005
				Lead	48.4	ug/L	3.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.5E-07	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.0007
				Vanadium	5.29	ug/L	4.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.7E-08	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.001
				Zinc	513	ug/L	2.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-06	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.000005
			Exp. Route Total								7.6E-09					0.004
		Exposure Point Total									7.5E-08					0.009
	Exposure Medium Total										7.5E-08					0.009
Medium Total											7.5E-08					0.02

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	4.8E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.2E-09	3.1E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Manganese (Water)	476	ug/L	6.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.002
			Exp. Route Total								7.2E-09					0.002
			Dermal	Arsenic	0.370	ug/L	3.0E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.5E-10	1.9E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.000006
				Manganese (Water)	476	ug/L	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.003
			Exp. Route Total								4.5E-10					0.003
		Exposure Point Total									7.7E-09					0.004
	Exposure Medium Total										7.7E-09					0.004
Medium Total											7.7E-09					0.004
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	2.8E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.0E-09	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	8.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.4E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0005
				Antimony	48.7	mg/kg	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.005
				Arsenic	13.1	mg/kg	8.5E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-07	5.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Barium	1662	mg/kg	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.9E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.0010
				Cadmium	14.5	mg/kg	9.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.0E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				Copper	1463	mg/kg	9.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.1E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.002
				Iron	64255	mg/kg	4.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.009
				Lead	1730	mg/kg	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	7.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.9E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0007
				Mercury	0.93	mg/kg	6.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Nickel	159	mg/kg	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.6E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0003
				Vanadium	38.4	mg/kg	2.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.002
				Zinc	5842	mg/kg	3.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0008
			Exp. Route Total								1.3E-07					0.02
			Dermal	Benzo(a)pyrene	0.043	mg/kg	9.0E-11	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6.6E-10	5.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	6.3E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	9.5E-09	4.0E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	2.3E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00006
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								1.0E-08					0.0002
		Exposure Point Total									1.4E-07					0.02
	Exposure Medium Total										1.4E-07					0.02
Medium Total											1.4E-07					0.02

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	3.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-04	(mg/kg/day)	1 0E+00	(mg/kg/day)	0 0002
				Arsenic	30.8	mg/kg	1.0E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.5E-07	6.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0 002
				Iron	122000	mg/kg	4.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-03	(mg/kg/day)	3 0E-01	(mg/kg/day)	0 008
				Manganese (Soil)	1900	mg/kg	6.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0 0005
				Vanadium	51.2	mg/kg	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-06	(mg/kg/day)	1 0E-03	(mg/kg/day)	0 001
			Exp. Route Total								1.5E-07					0 01
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1 0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	1.5E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.2E-08	9.5E-08	(mg/kg/day)	3 0E-04	(mg/kg/day)	0.0003
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2 9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								2.2E-08					0 0003
		Exposure Point Total									1.7E-07					0 01
	Exposure Medium Total										1.7E-07					0 01
Medium Total											1.7E-07					0 01
										Total of Receptor Risks Across All Media	6.8E-07				Total of Receptor Hazards Across All Media	0 06

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	4.3E-10	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	5.6E-12	3.0E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00000006
				Benzo(a)anthracene	2.70	mg/kg	3.7E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.7E-08	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	3.3E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.4E-07	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	3.6E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.6E-08	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	6.2E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4.6E-08	4.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	1.7E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.3E-08	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	3.7E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.6E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000001
				Aluminum	13725	mg/kg	1.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.01
				Antimony	5.15	mg/kg	7.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.0E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Arsenic	6.29	mg/kg	8.7E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-07	6.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	70.0	mg/kg	9.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.8E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.002
				Iron	21817	mg/kg	3.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.07
				Lead	127	mg/kg	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	4.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.4E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.005
				Vanadium	28.3	mg/kg	3.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.03
			Exp. Route Total								4.8E-07					0.2
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	9.7E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	7.1E-09	6.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	8.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6.2E-08	5.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	9.3E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.8E-09	6.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.6E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.2E-08	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	4.5E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3.3E-09	3.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	9.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.8E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000003
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	5.2E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.8E-09	3.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								9.9E-08					0.001
		Exposure Point Total									5.8E-07					0.2
	Exposure Medium Total										5.8E-07					0.2
	Air	SWMU 16	Inhalation	Trichloroethene	2.5E-4	mg/m^3	4.3E-07	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	3.0E-09	3.0E-05	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.0002
				Benzo(a)anthracene	1.8E-6	mg/m^3	3.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.6E-6	mg/m^3	2.7E-09	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	8.2E-09	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	1.7E-6	mg/m^3	2.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.0E-7	mg/m^3	5.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	8.3E-7	mg/m^3	1.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	1.3E-5	mg/m^3	2.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-06	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.002
				Aluminum	0.009	mg/m^3	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-03	(mg/kg/day)	1.0E-03	(mg/kg/day)	1.1
				Antimony	3.5E-6	mg/m^3	5.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.2E-6	mg/m^3	7.1E-09	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	1.1E-07	5.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	4.7E-5	mg/m^3	7.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil/Subsurface Soil	Air	SWMU 16	Inhalation	Iron	0.015	mg/m^3	2.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	8.5E-5	mg/m^3	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.4E-4	mg/m^3	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-05	(mg/kg/day)	1.4E-05	(mg/kg/day)	2.0
				Vanadium	1.9E-5	mg/m^3	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.2E-07					3.1
		Exposure Point Total									1.2E-07					3.1
	Exposure Medium Total										1.2E-07					3.1
Medium Total											7.0E-07					3.2
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	9.5E-09	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	1.9E-09	6.7E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00001
				1,1,2-Trichloroethane	18.2	ug/L	8.7E-08	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	5.0E-09	6.1E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.002
				1,1-Dichloroethene	10.5	ug/L	7.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.3E-06	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.0001
				1,2,3-Trichloropropane	1.44	ug/L	8.4E-09	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	1.7E-11	5.9E-07	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.0001
				1,2-Dichloroethane	1.50	ug/L	3.9E-09	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	3.6E-10	2.7E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00001
				Benzene	1.70	ug/L	1.4E-08	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	7.9E-10	1.0E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0002
				Bromodichloromethane	1.45	ug/L	5.9E-09	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	3.7E-10	4.1E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00002
				Carbon Tetrachloride	2.58	ug/L	3.5E-08	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	4.5E-09	2.4E-06	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.003
				Chloroform	4.24	ug/L	2.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0001
				cis-1,2-Dichloroethene	286	ug/L	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.01
				Methylene Chloride	2.70	ug/L	5.6E-09	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	4.2E-11	3.9E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000007
				Tetrachloroethene	10.9	ug/L	3.3E-07	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	1.8E-07	2.3E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.002
				Toluene	19.0	ug/L	3.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0001
				trans-1,2-Dichloroethene	2.89	ug/L	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.6E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00005
				Trichloroethene	21055	ug/L	1.8E-04	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.3E-06	1.3E-02	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.03
				Vinyl Chloride	24.2	ug/L	7.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.1E-07	5.1E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Pyridine	1.92	ug/L	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0001
				2-Nitrotoluene	0.172	ug/L	1.2E-09	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	2.7E-10	8.1E-08	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.000008
				2,4,6-Trinitrotoluene	0.284	ug/L	3.6E-10	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.1E-11	2.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00005
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	2.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0009
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	5.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.002
				RDX	25.1	ug/L	1.1E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.2E-09	7.6E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0003
				Aluminum	23388	ug/L	9.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.8E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0007
				Antimony	0.745	ug/L	3.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0004
				Arsenic	5.29	ug/L	2.2E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.3E-09	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Barium	284	ug/L	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.3E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.002
				Beryllium	1.88	ug/L	7.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.5E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.004
				Cadmium	0.455	ug/L	1.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0005
				Chromium	32.0	ug/L	2.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-06	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.02
				Cobalt	81.7	ug/L	3.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0001
				Iron	29423	ug/L	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.6E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Lead	13.6	ug/L	5.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	6.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.7E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.0002
				Manganese (Water)	4948	ug/L	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-04	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.1
				Nickel	145	ug/L	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.4E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.001
				Vanadium	29.3	ug/L	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.5E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.03
			Exp. Route Total								2.6E-06					0.3
		Exposure Point Total									2.6E-06					0.3
	Exposure Medium Total										2.6E-06					0.3

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Air	SWMU 16	Inhalation	1,1,2,2-Tetrachloroethane	3.8E-5	mg/m3	2.4E-09	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	4.7E-10	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1,2-Trichloroethane	5.5E-4	mg/m3	3.5E-08	(mg/kg/day)	5.6E-02	(mg/kg/day)$^{-1}$	1.9E-09	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1-Dichloroethene	4.0E-4	mg/m3	2.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-06	(mg/kg/day)	5.7E-02	(mg/kg/day)	0.00003
				1,2,3-Trichloropropane	4.4E-5	mg/m3	2.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-07	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.0001
				1,2-Dichloroethane	5.3E-5	mg/m3	3.3E-09	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	3.0E-10	2.3E-07	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.0002
				Benzene	7.1E-5	mg/m3	4.4E-09	(mg/kg/day)	2.7E-02	(mg/kg/day)$^{-1}$	1.2E-10	3.1E-07	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.0002
				Bromodichloromethane	4.1E-5	mg/m3	2.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Carbon Tetrachloride	7.7E-5	mg/m3	4.8E-09	(mg/kg/day)	5.3E-02	(mg/kg/day)$^{-1}$	2.6E-10	3.4E-07	(mg/kg/day)	5.7E-04	(mg/kg/day)	0.0006
				Chloroform	1.4E-4	mg/m3	8.9E-09	(mg/kg/day)	8.1E-02	(mg/kg/day)$^{-1}$	7.2E-10	6.2E-07	(mg/kg/day)	1.4E-02	(mg/kg/day)	0.00004
				cis-1,2-Dichloroethene	0.011	mg/m3	6.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.7E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Methylene Chloride	1.1E-4	mg/m3	6.7E-09	(mg/kg/day)	1.6E-03	(mg/kg/day)$^{-1}$	1.1E-11	4.7E-07	(mg/kg/day)	8.6E-01	(mg/kg/day)	0.0000005
				Tetrachloroethene	3.1E-4	mg/m3	2.0E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)$^{-1}$	3.9E-10	1.4E-06	(mg/kg/day)	1.4E-01	(mg/kg/day)	0.00001
				Toluene	7.3E-4	mg/m3	4.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-06	(mg/kg/day)	1.1E-01	(mg/kg/day)	0.00003
				trans-1,2-Dichloroethene	1.1E-4	mg/m3	6.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Trichloroethene	0.678	mg/m3	4.3E-05	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	3.0E-07	3.0E-03	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.02
				Vinyl Chloride	0.001	mg/m3	7.1E-08	(mg/kg/day)	1.5E-02	(mg/kg/day)$^{-1}$	1.1E-09	5.0E-06	(mg/kg/day)	2.9E-02	(mg/kg/day)	0.0002
				Pyridine	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Nitrotoluene	3.3E-6	mg/m3	2.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				2,4,6-Trinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Amino-4,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4-Amino-2,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				RDX	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E-03	(mg/kg/day)	--
				Antimony	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Beryllium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	8.4E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Cadmium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	6.3E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-05	(mg/kg/day)	--
				Chromium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	4.1E+01	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-05	(mg/kg/day)	--
				Cobalt	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	9.8E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Iron	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Nickel	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3.0E-07					0.02
		Exposure Point Total									3.0E-07					0.02
	Exposure Medium Total										3.0E-07					0.3
Medium Total											2.9E-06					0.6
									Total of Receptor Risks Across All Media		3.6E-06			Total of Receptor Hazards Across All Media		3.8

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	2.1E-10	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.7E-12	7.4E-09	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00000001
				Benzo(a)anthracene	2.70	mg/kg	1.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.3E-08	6.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.6E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.2E-07	5.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.3E-08	6.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	3.1E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.2E-08	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	8.4E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.1E-09	2.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000003
				Aluminum	13725	mg/kg	9.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.003
				Antimony	5.15	mg/kg	3.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.003
				Arsenic	6.29	mg/kg	4.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.4E-08	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Copper	70.0	mg/kg	4.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0004
				Iron	21817	mg/kg	1.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.2E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.02
				Lead	127	mg/kg	8.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.4E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.001
				Vanadium	28.3	mg/kg	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.7E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.007
			Exp. Route Total								2.4E-07					0.04
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	6.3E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.6E-09	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	5.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4.0E-08	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	6.0E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.4E-09	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.1E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	7.7E-09	3.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	2.9E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.1E-09	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	6.3E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000001
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	3.4E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.1E-09	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								6.4E-08					0.0004
		Exposure Point Total									3.0E-07					0.04
	Exposure Medium Total										3.0E-07					0.04
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	3.1E-09	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	2.2E-11	1.1E-07	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.0000006
				Benzo(a)anthracene	2.1E-9	mg/m^3	6.7E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	5.8E-13	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	1.8E-12	2.0E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	6.4E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	1.1E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	3.1E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	1.6E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.6E-09	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.000006
				Aluminum	1.0E-5	mg/m^3	3.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0001
				Antimony	3.9E-9	mg/m^3	1.3E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	1.6E-12	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	2.4E-11	5.4E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	1.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.1E-10	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	5.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	3.1E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	8.8E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0002
				Vanadium	2.2E-8	mg/m^3	7.0E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-10	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.7E-11					0.0003
		Exposure Point Total									4.7E-11					0.0003
	Exposure Medium Total										4.7E-11					0.0003
Medium Total											3.0E-07					0.04
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	2.1E-07	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	4.1E-08	7.2E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0001
				1,1,2-Trichloroethane	18.2	ug/L	2.5E-06	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	1.4E-07	8.6E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.02
				1,1-Dichloroethene	10.5	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.0E-05	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.001
				1,2,3-Trichloropropane	1.44	ug/L	2.0E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	3.9E-10	6.8E-06	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.001
				1,2-Dichloroethane	1.50	ug/L	2.0E-07	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.9E-08	7.1E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0004
				Benzene	1.70	ug/L	2.3E-07	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	1.3E-08	8.1E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.002
				Bromodichloromethane	1.45	ug/L	2.0E-07	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	1.2E-08	6.9E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0003
				Carbon Tetrachloride	2.58	ug/L	3.5E-07	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	4.6E-08	1.2E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.02
				Chloroform	4.24	ug/L	5.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.002
				cis-1,2-Dichloroethene	286	ug/L	3.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.1
				Methylene Chloride	2.70	ug/L	3.7E-07	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	2.7E-09	1.3E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0002
				Tetrachloroethene	10.9	ug/L	1.5E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	8.0E-07	5.2E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.005
				Toluene	19.0	ug/L	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.0E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0005
				trans-1,2-Dichloroethene	2.89	ug/L	3.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Trichloroethene	21055	ug/L	2.9E-03	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.7E-05	1.0E-01	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.2
				Vinyl Chloride	24.2	ug/L	3.3E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.9E-06	1.1E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.04
				Pyridine	1.92	ug/L	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.1E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.009
				2-Nitrotoluene	0.172	ug/L	2.3E-08	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	5.4E-09	8.2E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00008
				2,4,6-Trinitrotoluene	0.284	ug/L	3.9E-08	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.2E-09	1.3E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.6E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.03
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.4E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.02
				RDX	25.1	ug/L	3.4E-06	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	3.7E-07	1.2E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.04
				Aluminum	23388	ug/L	3.2E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.1
				Antimony	0.745	ug/L	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.5E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.009
				Arsenic	5.29	ug/L	7.2E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.1E-06	2.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.08
				Barium	284	ug/L	3.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.02
				Beryllium	1.88	ug/L	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.9E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.004
				Cadmium	0.455	ug/L	6.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.004
				Chromium	32.0	ug/L	4.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.05
				Cobalt	81.7	ug/L	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.02
				Iron	29423	ug/L	4.0E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.5
				Lead	13.6	ug/L	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	4.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-04	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.08
				Manganese (Water)	4948	ug/L	6.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-02	(mg/kg/day)	2.4E-02	(mg/kg/day)	1.0
				Nickel	145	ug/L	2.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.9E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.03
				Vanadium	29.3	ug/L	4.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.1
			Exp. Route Total								4.5E-05					2.5

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
			Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	5.1E-09	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	1.0E-09	1.8E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000003
				1,1,2-Trichloroethane	18.2	ug/L	4.6E-08	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	2.6E-09	1.6E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0004
				1,1-Dichloroethene	10.5	ug/L	3.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-06	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.00003
				1,2,3-Trichloropropane	1.44	ug/L	4.6E-09	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	9.1E-12	1.6E-07	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.00003
				1,2-Dichloroethane	1.50	ug/L	2.0E-09	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.8E-10	6.9E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000003
				Benzene	1.70	ug/L	6.9E-09	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	3.8E-10	2.4E-07	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.00006
				Bromodichloromethane	1.45	ug/L	3.2E-09	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	2.0E-10	1.1E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000006
				Carbon Tetrachloride	2.58	ug/L	1.9E-08	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	2.4E-09	6.6E-07	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.0009
				Chloroform	4.24	ug/L	1.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.6E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00004
				cis-1,2-Dichloroethene	286	ug/L	9.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.003
				Methylene Chloride	2.70	ug/L	2.7E-09	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	2.0E-11	9.6E-08	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000002
				Tetrachloroethene	10.9	ug/L	1.8E-07	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	9.5E-08	6.1E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0006
				Toluene	19.0	ug/L	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.2E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.00003
				trans-1,2-Dichloroethene	2.89	ug/L	6.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00001
				Trichloroethene	21055	ug/L	9.4E-05	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.2E-06	3.3E-03	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.007
				Vinyl Chloride	24.2	ug/L	3.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.0E-08	1.2E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0004
				Pyridine	1.92	ug/L	8.0E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00003
				2-Nitrotoluene	0.172	ug/L	6.1E-10	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	1.4E-10	2.1E-08	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.000002
				2,4,6-Trinitrotoluene	0.284	ug/L	1.9E-10	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	5.8E-12	6.8E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.9E-08	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0002
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	2.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.9E-08	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0005
				RDX	25.1	ug/L	5.8E-09	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	6.4E-10	2.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00007
				Aluminum	23388	ug/L	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.1E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00006
				Antimony	0.745	ug/L	5.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-09	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.00003
				Arsenic	5.29	ug/L	4.0E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.9E-10	1.4E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00005
				Barium	284	ug/L	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.4E-07	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0002
				Beryllium	1.88	ug/L	1.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.9E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0004
				Cadmium	0.455	ug/L	3.4E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00005
				Chromium	32.0	ug/L	4.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.002
				Cobalt	81.7	ug/L	6.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.1E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00001
				Iron	29423	ug/L	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.7E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0003
				Lead	13.6	ug/L	1.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	1.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.2E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.00002
				Manganese (Water)	4948	ug/L	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.01
				Nickel	145	ug/L	2.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.6E-08	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.00009
				Vanadium	29.3	ug/L	2.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.7E-08	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.003
			Exp. Route Total								1.4E-06					0.03
		Exposure Point Total									4.6E-05					2.6
	Exposure Medium Total										4.6E-05					2.6
Medium Total											4.6E-05					2.6

TABLE 7.5.CTE.

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	2.8E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.6E-09	9.7E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00002
				RDX	24.0	ug/L	3.3E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	3.6E-08	1.1E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.004
				Aluminum	2767	ug/L	3.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Antimony	5.8	ug/L	7.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Arsenic	1.49	ug/L	2.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.0E-08	7.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Barium	200	ug/L	2.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.5E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.001
				Cadmium	2.25	ug/L	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				Chromium	3.67	ug/L	5.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0006
				Iron	3038	ug/L	4.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.005
				Lead	48.4	ug/L	6.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.0E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.003
				Vanadium	5.29	ug/L	7.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.003
				Zinc	513	ug/L	7.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0008
			Exp. Route Total								7.0E-08					0.03
			Dermal	Trichloroethene	20.4	ug/L	3.3E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.3E-09	1.2E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00002
				RDX	24.0	ug/L	1.9E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	2.1E-09	6.8E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Aluminum	2767	ug/L	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.7E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00009
				Antimony	5.8	ug/L	5.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.003
				Arsenic	1.49	ug/L	1.3E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.0E-09	4.7E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Barium	200	ug/L	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.3E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.001
				Cadmium	2.25	ug/L	2.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.1E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.003
				Chromium	3.67	ug/L	6.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.003
				Iron	3038	ug/L	2.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.5E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0003
				Lead	48.4	ug/L	4.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.0E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.004
				Vanadium	5.29	ug/L	4.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.006
				Zinc	513	ug/L	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.6E-06	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00003
			Exp. Route Total								8.4E-09					0.02
		Exposure Point Total									7.8E-08					0.05
	Exposure Medium Total										7.8E-08					0.05
Medium Total											7.8E-08					0.05
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	5.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.5E-09	1.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Manganese (Water)	476	ug/L	6.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.009
			Exp. Route Total								7.5E-09					0.01
			Dermal	Arsenic	0.370	ug/L	3.3E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.0E-10	1.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00004
				Manganese (Water)	476	ug/L	4.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.02
			Exp. Route Total								5.0E-10					0.02
		Exposure Point Total									8.0E-09					0.03
	Exposure Medium Total										8.0E-09					0.03
Medium Total											8.0E-09					0.03

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	2.9E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.1E-09	1.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	8.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.003
				Antimony	48.7	mg/kg	3.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.03
				Arsenic	13.1	mg/kg	8.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-07	3.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Barium	1662	mg/kg	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.006
				Cadmium	14.5	mg/kg	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.007
				Copper	1463	mg/kg	9.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.009
				Iron	64255	mg/kg	4.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.05
				Lead	1730	mg/kg	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.1E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	8.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.8E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.004
				Mercury	0.93	mg/kg	6.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Nickel	159	mg/kg	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Vanadium	38.4	mg/kg	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.1E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.009
				Zinc	5842	mg/kg	4.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.005
			Exp. Route Total								1.4E-07					0.1
			Dermal	Benzo(a)pyrene	0.043	mg/kg	1.0E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	7.3E-10	3.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	7.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.1E-08	2.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	2.6E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.1E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0004
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								1.1E-08					0.001
		Exposure Point Total									1.5E-07					0.1
	Exposure Medium Total										1.5E-07					0.1
Medium Total											1.5E-07					0.1
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	7.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.002
				Arsenic	30.8	mg/kg	2.1E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.1E-07	7.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Iron	122000	mg/kg	8.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.1
				Manganese (Soil)	1900	mg/kg	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.006
				Vanadium	51.2	mg/kg	3.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.01
			Exp. Route Total								3.1E-07					0.1
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	1.7E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.5E-08	5.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								2.5E-08					0.002
		Exposure Point Total									3.4E-07					0.1
	Exposure Medium Total										3.4E-07					0.1
Medium Total											3.4E-07					0.1
										Total of Receptor Risks Across All Media	4.7E-05				Total of Receptor Hazards Across All Media	2.9

4/12/2005

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	7.9E-11	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.0E-12	7.9E-10	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.000000002
				Benzo(a)anthracene	2.70	mg/kg	6.9E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5.0E-09	6.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	6.0E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4.4E-08	6.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	6.6E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.8E-09	6.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	1.1E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8.4E-09	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	3.2E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.3E-09	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	6.9E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.9E-10	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00000003
				Aluminum	13725	mg/kg	3.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0003
				Antimony	5.15	mg/kg	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0003
				Arsenic	6.29	mg/kg	1.6E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.4E-08	1.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Copper	70.0	mg/kg	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-06	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.00004
				Iron	21817	mg/kg	5.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.6E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.002
				Lead	127	mg/kg	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	9.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.0E-06	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0001
				Vanadium	28.3	mg/kg	7.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.2E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0007
			Exp. Route Total								8.8E-08					0.004
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	3.2E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.4E-09	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	2.8E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.1E-08	2.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	3.1E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.3E-09	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	5.4E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4.0E-09	5.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	1.5E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.1E-09	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	3.2E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-10	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00000002
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	1.7E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.6E-09	1.7E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00006
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								3.3E-08					0.00006
		Exposure Point Total									1.2E-07					0.004
	Exposure Medium Total										1.2E-07					0.004
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	3.1E-09	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	2.2E-11	3.1E-08	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.0000002
				Benzo(a)anthracene	2.1E-9	mg/m^3	6.7E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.7E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	5.8E-13	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	1.8E-12	5.8E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	6.4E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	1.1E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	3.1E-13	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-12	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	1.6E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-09	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.000002
				Aluminum	1.0E-5	mg/m^3	3.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.4E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00003
				Antimony	3.9E-9	mg/m^3	1.3E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	1.6E-12	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	2.4E-11	1.6E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	1.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	5.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	3.1E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	8.8E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.8E-10	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.00006
				Vanadium	2.2E-8	mg/m^3	7.0E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.0E-11	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.7E-11					0.0001
		Exposure Point Total									4.7E-11					0.0001
	Exposure Medium Total										4.7E-11					0.0001
Medium Total											1.2E-07					0.004
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.5E-07	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	3.1E-08	1.5E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00003
				1,1,2-Trichloroethane	18.2	ug/L	1.9E-06	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	1.1E-07	1.9E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.005
				1,1-Dichloroethene	10.5	ug/L	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-05	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.0002
				1,2,3-Trichloropropane	1.44	ug/L	1.5E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	2.9E-10	1.5E-06	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.0002
				1,2-Dichloroethane	1.50	ug/L	1.5E-07	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.4E-08	1.5E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00008
				Benzene	1.70	ug/L	1.7E-07	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	9.5E-09	1.7E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0004
				Bromodichloromethane	1.45	ug/L	1.5E-07	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	9.1E-09	1.5E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00007
				Carbon Tetrachloride	2.58	ug/L	2.6E-07	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	3.4E-08	2.6E-06	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.004
				Chloroform	4.24	ug/L	4.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.3E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0004
				cis-1,2-Dichloroethene	286	ug/L	2.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.03
				Methylene Chloride	2.70	ug/L	2.7E-07	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	2.1E-09	2.7E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00005
				Tetrachloroethene	10.9	ug/L	1.1E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	6.0E-07	1.1E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.001
				Toluene	19.0	ug/L	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0001
				trans-1,2-Dichloroethene	2.89	ug/L	2.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0001
				Trichloroethene	21055	ug/L	2.1E-03	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.8E-05	2.1E-02	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.04
				Vinyl Chloride	24.2	ug/L	2.5E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.7E-06	2.5E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.008
				Pyridine	1.92	ug/L	2.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.002
				2-Nitrotoluene	0.172	ug/L	1.8E-08	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	4.0E-09	1.8E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00002
				2,4,6-Trinitrotoluene	0.284	ug/L	2.9E-08	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	8.7E-10	2.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0006
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.006
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	7.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.3E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.004
				RDX	25.1	ug/L	2.6E-06	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	2.8E-07	2.6E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.009
				Aluminum	23388	ug/L	2.4E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.02
				Antimony	0.745	ug/L	7.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.6E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.002
				Arsenic	5.29	ug/L	5.4E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8.1E-07	5.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Barium	284	ug/L	2.9E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.004
				Beryllium	1.88	ug/L	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.001
				Cadmium	0.455	ug/L	4.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.6E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0009
				Chromium	32.0	ug/L	3.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.3E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.01
				Cobalt	81.7	ug/L	8.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.3E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.004
				Iron	29423	ug/L	3.0E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.10
				Lead	13.6	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	3.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.4E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.02
				Manganese (Water)	4948	ug/L	5.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.0E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.2
				Nickel	145	ug/L	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.007
				Vanadium	29.3	ug/L	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.03
			Exp. Route Total								3.3E-05					0.5

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.1E-08	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	2.1E-09	1.1E-07	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.000002
				1,1,2-Trichloroethane	18.2	ug/L	9.4E-08	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	5.4E-09	9.4E-07	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0002
				1,1-Dichloroethene	10.5	ug/L	7.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.8E-07	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.00002
				1,2,3-Trichloropropane	1.44	ug/L	9.4E-09	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	1.9E-11	9.4E-08	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.00002
				1,2-Dichloroethane	1.50	ug/L	4.1E-09	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	3.7E-10	4.1E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000002
				Benzene	1.70	ug/L	1.4E-08	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	7.8E-10	1.4E-07	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.00004
				Bromodichloromethane	1.45	ug/L	6.6E-09	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	4.1E-10	6.6E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000003
				Carbon Tetrachloride	2.58	ug/L	3.9E-08	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	5.0E-09	3.9E-07	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.0006
				Chloroform	4.24	ug/L	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00002
				cis-1,2-Dichloroethene	286	ug/L	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.0E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.002
				Methylene Chloride	2.70	ug/L	5.6E-09	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	4.2E-11	5.6E-08	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0000009
				Tetrachloroethene	10.9	ug/L	3.6E-07	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	2.0E-07	3.6E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0004
				Toluene	19.0	ug/L	3.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.00002
				trans-1,2-Dichloroethene	2.89	ug/L	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000007
				Trichloroethene	21055	ug/L	1.9E-04	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.5E-06	1.9E-03	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.004
				Vinyl Chloride	24.2	ug/L	6.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.0E-07	6.9E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Pyridine	1.92	ug/L	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-08	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00002
				2-Nitrotoluene	0.172	ug/L	1.3E-09	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	2.9E-10	1.3E-08	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.000001
				2,4,6-Trinitrotoluene	0.284	ug/L	4.0E-10	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.2E-11	4.0E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000008
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	2.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-08	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0001
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	5.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.9E-08	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.0003
				RDX	25.1	ug/L	1.2E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.3E-09	1.2E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00004
				Aluminum	23388	ug/L	3.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00004
				Antimony	0.745	ug/L	1.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-09	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.00002
				Arsenic	5.29	ug/L	8.2E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.2E-09	8.2E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00003
				Barium	284	ug/L	4.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.4E-07	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.00009
				Beryllium	1.88	ug/L	2.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-09	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.0002
				Cadmium	0.455	ug/L	7.0E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.0E-10	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00003
				Chromium	32.0	ug/L	9.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.9E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.001
				Cobalt	81.7	ug/L	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000006
				Iron	29423	ug/L	4.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0002
				Lead	13.6	ug/L	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	2.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.00001
				Manganese (Water)	4948	ug/L	7.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.6E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.008
				Nickel	145	ug/L	4.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-08	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.00006
				Vanadium	29.3	ug/L	4.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-08	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.002
			Exp. Route Total								2.8E-06					0.02
		Exposure Point Total									3.6E-05					0.6
	Exposure Medium Total										3.6E-05					0.6
Medium Total											3.6E-05					0.6
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	4.2E-08	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	5.4E-10	4.2E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.0000008
				RDX	24.0	ug/L	4.9E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	5.4E-09	4.9E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Aluminum	2767	ug/L	5.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.6E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00006
				Antimony	5.8	ug/L	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0003
				Arsenic	1.49	ug/L	3.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.5E-09	3.0E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00010

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Gullies	Ingestion	Barium	200	ug/L	4.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.1E-06	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.00006
				Cadmium	2.25	ug/L	4.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.6E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00009
				Chromium	3.67	ug/L	7.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.5E-08	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00002
				Iron	3038	ug/L	6.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.2E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0002
				Lead	48.4	ug/L	9.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.6E-06	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0001
				Vanadium	5.29	ug/L	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.00011
				Zinc	513	ug/L	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00003
			Exp. Route Total								1.0E-08					0.001
			Dermal	Trichloroethene	20.4	ug/L	6.8E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	8.9E-09	6.8E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00001
				RDX	24.0	ug/L	4.0E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	4.4E-09	4.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Aluminum	2767	ug/L	5.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.1E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00005
				Antimony	5.8	ug/L	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.002
				Arsenic	1.49	ug/L	2.8E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.1E-09	2.8E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00009
				Barium	200	ug/L	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0008
				Cadmium	2.25	ug/L	4.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.2E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.002
				Chromium	3.67	ug/L	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.002
				Iron	3038	ug/L	5.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.6E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0002
				Lead	48.4	ug/L	8.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.002
				Vanadium	5.29	ug/L	9.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.8E-08	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.004
				Zinc	513	ug/L	5.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.7E-06	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00002
			Exp. Route Total								1.7E-08					0.01
		Exposure Point Total									2.8E-08					0.01
	Exposure Medium Total										2.8E-08					0.01
Medium Total											2.8E-08					0.01
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	7.5E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.1E-09	7.5E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00003
				Manganese (Water)	476	ug/L	9.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.7E-06	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0004
			Exp. Route Total								1.1E-09					0.0004
			Dermal	Arsenic	0.370	ug/L	6.8E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.0E-09	6.8E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00002
				Manganese (Water)	476	ug/L	8.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.8E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.009
			Exp. Route Total								1.0E-09					0.009
		Exposure Point Total									2.2E-09					0.01
	Exposure Medium Total										2.2E-09					0.01
Medium Total											2.2E-09					0.01
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	1.1E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8.0E-10	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.3E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0003
				Antimony	48.7	mg/kg	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.003
				Arsenic	13.1	mg/kg	3.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.0E-08	3.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Barium	1662	mg/kg	4.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.2E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.0006
				Cadmium	14.5	mg/kg	3.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0007
				Copper	1463	mg/kg	3.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0009
				Iron	64255	mg/kg	1.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.005
				Lead	1730	mg/kg	4.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0004

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Ingestion	Mercury	0.93	mg/kg	2.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-08	(mg/kg/day)	3 0E-04	(mg/kg/day)	0 0001
				Nickel	159	mg/kg	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-06	(mg/kg/day)	2 0E-02	(mg/kg/day)	0 0002
				Vanadium	38.4	mg/kg	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.8E-07	(mg/kg/day)	1 0E-03	(mg/kg/day)	0 0010
				Zinc	5842	mg/kg	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1 5E-04	(mg/kg/day)	3 0E-01	(mg/kg/day)	0 0005
			Exp. Route Total								5.1E-08					0 01
			Dermal	Benzo(a)pyrene	0.043	mg/kg	5.2E-11	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3.8E-10	5.2E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1 0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6 0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	3.6E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.4E-09	3.6E-08	(mg/kg/day)	3 0E-04	(mg/kg/day)	0 0001
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4 9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	1.3E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-09	(mg/kg/day)	2 5E-05	(mg/kg/day)	0 00005
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4 0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3 0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2 9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	8 0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								5.8E-09					0 0002
		Exposure Point Total									5.7E-08					0 01
	Exposure Medium Total										5.7E-08					0.01
Medium Total											5.7E-08					0 01
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	2.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.7E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0 0003
				Arsenic	30.8	mg/kg	7.8E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.2E-07	7.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0 003
				Iron	122000	mg/kg	3.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-03	(mg/kg/day)	3 0E-01	(mg/kg/day)	0 01
				Manganese (Soil)	1900	mg/kg	4.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.8E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0 0007
				Vanadium	51.2	mg/kg	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0 001
			Exp. Route Total								1.2E-07					0 02
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	8.5E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-08	8.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0 0003
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3 0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								1.3E-08					0 0003
		Exposure Point Total									1.3E-07					0.02
	Exposure Medium Total										1.3E-07					0 02
Medium Total											1.3E-07					0 02
										Total of Receptor Risks Across All Media	3.7E-05				Total of Receptor Hazards Across All Media	0 6

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	3.8E-09	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.9E-11	1.3E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.0000003
				Benzo(a)anthracene	2.70	mg/kg	3.3E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.4E-07	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	2.9E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.1E-06	1.0E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	3.2E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2.3E-07	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	5.5E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4.0E-07	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	1.5E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.1E-07	5.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	3.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.000006
				Aluminum	13725	mg/kg	1.7E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.9E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.06
				Antimony	5.15	mg/kg	6.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.06
				Arsenic	6.29	mg/kg	7.7E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.2E-06	2.7E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.09
				Copper	70.0	mg/kg	8.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.007
				Iron	21817	mg/kg	2.7E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.3E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.3
				Lead	127	mg/kg	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.4E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	4.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-03	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.02
				Vanadium	28.3	mg/kg	3.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.1
			Exp. Route Total								4.2E-06					0.7
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	4.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3.5E-08	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	4.2E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3.1E-07	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	4.6E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3.4E-08	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	8.0E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5.9E-08	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	2.2E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.6E-08	7.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	4.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000008
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	2.6E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.9E-08	9.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								4.9E-07					0.003
		Exposure Point Total									4.7E-06					0.7
	Exposure Medium Total										4.7E-06					0.7
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	1.8E-07	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	1.2E-09	6.2E-06	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.00004
				Benzo(a)anthracene	2.1E-9	mg/m^3	3.8E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	3.3E-11	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	1.0E-10	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	3.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	6.3E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	1.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.0E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	9.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-07	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.0004
				Aluminum	1.0E-5	mg/m^3	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.7E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.007
				Antimony	3.9E-9	mg/m^3	7.2E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	8.8E-11	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	1.3E-09	3.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	9.7E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	3.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	4.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-07	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.01
				Vanadium	2.2E-8	mg/m^3	3.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.7E-09					0.02
		Exposure Point Total									2.7E-09					0.02
	Exposure Medium Total										2.7E-09					0.02
Medium Total											4.7E-06					0.7
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.2E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	2.5E-07	4.3E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0007
				1,1,2-Trichloroethane	18.2	ug/L	1.5E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	8.4E-07	5.1E-04	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.1
				1,1-Dichloroethene	10.5	ug/L	8.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-04	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.006
				1,2,3-Trichloropropane	1.44	ug/L	1.2E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	2.3E-09	4.1E-05	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.007
				1,2-Dichloroethane	1.50	ug/L	1.2E-06	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.1E-07	4.2E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Benzene	1.70	ug/L	1.4E-06	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	7.5E-08	4.8E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.01
				Bromodichloromethane	1.45	ug/L	1.2E-06	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	7.2E-08	4.1E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Carbon Tetrachloride	2.58	ug/L	2.1E-06	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	2.7E-07	7.3E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.1
				Chloroform	4.24	ug/L	3.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.01
				cis-1,2-Dichloroethene	286	ug/L	2.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.1E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.8
				Methylene Chloride	2.70	ug/L	2.2E-06	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	1.6E-08	7.6E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.001
				Tetrachloroethene	10.9	ug/L	8.8E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	4.7E-06	3.1E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.03
				Toluene	19.0	ug/L	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.4E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.003
				trans-1,2-Dichloroethene	2.89	ug/L	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.2E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.004
				Trichloroethene	21055	ug/L	1.7E-02	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.2E-04	5.9E-01	(mg/kg/day)	5.0E-01	(mg/kg/day)	1.2
				Vinyl Chloride	24.2	ug/L	2.0E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.9E-05	6.8E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.2
				Pyridine	1.92	ug/L	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.4E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.05
				2-Nitrotoluene	0.172	ug/L	1.4E-07	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	3.2E-08	4.9E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0005
				2,4,6-Trinitrotoluene	0.284	ug/L	2.3E-07	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	6.9E-09	8.0E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.02
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	9.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.2
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	5.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.1
				RDX	25.1	ug/L	2.0E-05	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	2.2E-06	7.1E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.2
				Aluminum	23388	ug/L	1.9E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.6E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.7
				Antimony	0.745	ug/L	6.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.1E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.05
				Arsenic	5.29	ug/L	4.3E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.4E-06	1.5E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.5
				Barium	284	ug/L	2.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.0E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.1
				Beryllium	1.88	ug/L	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.3E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.03
				Cadmium	0.455	ug/L	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.03
				Chromium	32.0	ug/L	2.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.0E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.3
				Cobalt	81.7	ug/L	6.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.1
				Iron	29423	ug/L	2.4E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.3E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	2.8
				Lead	13.6	ug/L	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	2.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.3E-04	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.5
				Manganese (Water)	4948	ug/L	4.0E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-01	(mg/kg/day)	2.4E-02	(mg/kg/day)	5.8
				Nickel	145	ug/L	1.2E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.1E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.2
				Vanadium	29.3	ug/L	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.3E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.8
			Exp. Route Total								2.6E-04					15

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	9.3E-08	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	1.9E-08	3.2E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00005
				1,1,2-Trichloroethane	18.2	ug/L	8.2E-07	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	4.7E-08	2.9E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.007
				1,1-Dichloroethene	10.5	ug/L	6.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-05	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.0005
				1,2,3-Trichloropropane	1.44	ug/L	8.2E-08	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	1.6E-10	2.9E-06	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.0005
				1,2-Dichloroethane	1.50	ug/L	3.5E-08	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	3.2E-09	1.2E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00006
				Benzene	1.70	ug/L	1.2E-07	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	6.6E-09	4.4E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.001
				Bromodichloromethane	1.45	ug/L	5.7E-08	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	3.6E-09	2.0E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0001
				Carbon Tetrachloride	2.58	ug/L	3.4E-07	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	4.4E-08	1.2E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.02
				Chloroform	4.24	ug/L	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.5E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0007
				cis-1,2-Dichloroethene	286	ug/L	1.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.0E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.06
				Methylene Chloride	2.70	ug/L	4.9E-08	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	3.7E-10	1.7E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00003
				Tetrachloroethene	10.9	ug/L	3.2E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	1.7E-06	1.1E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.01
				Toluene	19.0	ug/L	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0006
				trans-1,2-Dichloroethene	2.89	ug/L	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.3E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Trichloroethene	21055	ug/L	1.7E-03	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	2.2E-05	6.0E-02	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.1
				Vinyl Chloride	24.2	ug/L	6.0E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	9.0E-07	2.1E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.007
				Pyridine	1.92	ug/L	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.1E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0005
				2-Nitrotoluene	0.172	ug/L	1.1E-08	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	2.5E-09	3.8E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00004
				2,4,6-Trinitrotoluene	0.284	ug/L	3.5E-09	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.0E-10	1.2E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	2.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.004
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	5.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.009
				RDX	25.1	ug/L	1.1E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	1.2E-08	3.7E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.001
				Aluminum	23388	ug/L	3.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.001
				Antimony	0.745	ug/L	1.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0006
				Arsenic	5.29	ug/L	7.1E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.1E-08	2.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Barium	284	ug/L	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-05	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.003
				Beryllium	1.88	ug/L	2.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.006
				Cadmium	0.455	ug/L	6.1E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0009
				Chromium	32.0	ug/L	8.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-06	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.04
				Cobalt	81.7	ug/L	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Iron	29423	ug/L	4.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.005
				Lead	13.6	ug/L	1.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	2.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.6E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.0004
				Manganese (Water)	4948	ug/L	6.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-04	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.2
				Nickel	145	ug/L	3.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-06	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.002
				Vanadium	29.3	ug/L	3.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-06	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.05
			Exp. Route Total								2.5E-05					0.6
		Exposure Point Total									2.9E-04					16
	Exposure Medium Total										2.9E-04					16
	Air	SWMU 16	Inhalation	1,1,2,2-Tetrachloroethane	4.4E-4	mg/m3	3.2E-07	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	6.5E-08	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1,2-Trichloroethane	0.008	mg/m3	5.5E-06	(mg/kg/day)	5.6E-02	(mg/kg/day)$^{-1}$	3.1E-07	1.9E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1-Dichloroethene	0.006	mg/m3	4.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-04	(mg/kg/day)	5.7E-02	(mg/kg/day)	0.003
				1,2,3-Trichloropropane	6.9E-4	mg/m3	5.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.01
				1,2-Dichloroethane	7.1E-4	mg/m3	5.2E-07	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	4.7E-08	1.8E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.01
				Benzene	0.001	mg/m3	7.4E-07	(mg/kg/day)	2.7E-02	(mg/kg/day)$^{-1}$	2.0E-08	2.6E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.02

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Air	SWMU 16	Inhalation	Bromodichloromethane	6.0E-4	mg/m3	4.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Carbon Tetrachloride	0.001	mg/m3	9.0E-07	(mg/kg/day)	5.3E-02	(mg/kg/day)$^{-1}$	4.7E-08	3.1E-05	(mg/kg/day)	5.7E-04	(mg/kg/day)	0 05
				Chloroform	0.002	mg/m3	1.6E-06	(mg/kg/day)	8.1E-02	(mg/kg/day)$^{-1}$	1.3E-07	5.4E-05	(mg/kg/day)	1 4E-02	(mg/kg/day)	0 004
				cis-1,2-Dichloroethene	0.156	mg/m3	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Methylene Chloride	0.001	mg/m3	1.1E-06	(mg/kg/day)	1.6E-03	(mg/kg/day)$^{-1}$	1.7E-09	3.8E-05	(mg/kg/day)	8.6E-01	(mg/kg/day)	0.00004
				Tetrachloroethene	0.005	mg/m3	3.7E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)$^{-1}$	7.3E-08	1.3E-04	(mg/kg/day)	1.4E-01	(mg/kg/day)	0 0009
				Toluene	0.011	mg/m3	7.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.7E-04	(mg/kg/day)	1 1E-01	(mg/kg/day)	0 002
				trans-1,2-Dichloroethene	0.002	mg/m3	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Trichloroethene	10.5	mg/m3	7.7E-03	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	5.4E-05	2.7E-01	(mg/kg/day)	1.7E-01	(mg/kg/day)	1 6
				Vinyl Chloride	0.016	mg/m3	1.2E-05	(mg/kg/day)	1.5E-02	(mg/kg/day)$^{-1}$	1.8E-07	4.1E-04	(mg/kg/day)	2.9E-02	(mg/kg/day)	0 01
				Pyridine	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Nitrotoluene	2.7E-5	mg/m3	1.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				2,4,6-Trinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Amino-4,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4-Amino-2,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				RDX	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-03	(mg/kg/day)	--
				Antimony	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Beryllium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	8.4E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Cadmium	0.0E+0	mg/m3	.0.0E+00	(mg/kg/day)	6.3E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.7E-05	(mg/kg/day)	--
				Chromium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	4.1E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.9E-05	(mg/kg/day)	--
				Cobalt	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	9.8E+00	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Iron	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Nickel	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5.5E-05					1 7
		Exposure Point Total									5.5E-05					1.7
	Exposure Medium Total										5.5E-05					17
Medium Total											3.4E-04					33
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	2.8E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.6E-09	9.7E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00002
				RDX	24.0	ug/L	3.3E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	3.6E-08	1.1E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0 004
				Aluminum	2767	ug/L	3.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0 001
				Antimony	5.8	ug/L	7.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Arsenic	1.49	ug/L	2.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.0E-08	7.1E-07	(mg/kg/day)	3 0E-04	(mg/kg/day)	0 002
				Barium	200	ug/L	2.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.5E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0 001
				Cadmium	2.25	ug/L	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0 002
				Chromium	3.67	ug/L	5.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-06	(mg/kg/day)	3 0E-03	(mg/kg/day)	0 0006
				Iron	3038	ug/L	4.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0 005
				Lead	48.4	ug/L	6.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.0E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0 003

TABLE 7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Gullies	Ingestion	Vanadium	5.29	ug/L	7.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.5E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.003
				Zinc	513	ug/L	7.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0008
			Exp. Route Total								7.0E-08					0.03
			Dermal	Trichloroethene	20.4	ug/L	3.3E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.3E-09	1.2E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00002
				RDX	24.0	ug/L	1.9E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	2.1E-09	6.8E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Aluminum	2767	ug/L	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.7E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00009
				Antimony	5.8	ug/L	5.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.8E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.003
				Arsenic	1.49	ug/L	1.3E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.0E-09	4.7E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Barium	200	ug/L	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.3E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.001
				Cadmium	2.25	ug/L	2.0E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.003
				Chromium	3.67	ug/L	6.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.003
				Iron	3038	ug/L	2.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.5E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0003
				Lead	48.4	ug/L	4.3E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.004
				Vanadium	5.29	ug/L	4.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.006
				Zinc	513	ug/L	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.6E-06	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00003
			Exp. Route Total								8.4E-09					0.02
		Exposure Point Total									7.8E-08					0.05
	Exposure Medium Total										7.8E-08					0.05
Medium Total											7.8E-08					0.05
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	5.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.5E-09	1.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Manganese (Water)	476	ug/L	6.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.3E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.009
			Exp. Route Total								7.5E-09					0.01
			Dermal	Arsenic	0.370	ug/L	3.3E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.0E-10	1.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00004
				Manganese (Water)	476	ug/L	4.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.02
			Exp. Route Total								5.0E-10					0.02
		Exposure Point Total									8.0E-09					0.03
	Exposure Medium Total										8.0E-09					0.03
Medium Total											8.0E-09					0.03
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	2.9E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.1E-09	1.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	8.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.003
				Antimony	48.7	mg/kg	3.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.03
				Arsenic	13.1	mg/kg	8.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.3E-07	3.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Barium	1662	mg/kg	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.9E-04	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.006
				Cadmium	14.5	mg/kg	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.007
				Copper	1463	mg/kg	9.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.5E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.009
				Iron	64255	mg/kg	4.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.05
				Lead	1730	mg/kg	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.1E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	8.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.004
				Mercury	0.93	mg/kg	6.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Nickel	159	mg/kg	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Vanadium	38.4	mg/kg	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.1E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.009
				Zinc	5842	mg/kg	4.0E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.005
			Exp. Route Total								1.4E-07					0.1

TABLE 7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Dermal	Benzo(a)pyrene	0.043	mg/kg	8.5E-11	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6.2E-10	3.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	6.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	9.0E-09	2.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	2.2E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.7E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0003
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								9.6E-09					0.001
		Exposure Point Total									1.5E-07					0.1
	Exposure Medium Total										1.5E-07					0.1
Medium Total											1.5E-07					0.1
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	7.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.002
				Arsenic	30.8	mg/kg	2.1E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.1E-07	7.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Iron	122000	mg/kg	8.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.9E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.10
				Manganese (Soil)	1900	mg/kg	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.006
				Vanadium	51.2	mg/kg	3.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.01
			Exp. Route Total								3.1E-07					0.1
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	1.4E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.1E-08	4.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								2.1E-08					0.002
		Exposure Point Total									3.3E-07					0.1
	Exposure Medium Total										3.3E-07					0.1
Medium Total											3.3E-07					0.1
										Total of Receptor Risks Across All Media	3.5E-04				Total of Receptor Hazards Across All Media	34

TABLE 7.8.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 16	Ingestion	Trichloroethene	0.031	mg/kg	1.4E-09	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	1.8E-11	1.4E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00000003
				Benzo(a)anthracene	2.70	mg/kg	1.2E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	9.0E-08	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.1E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	7.9E-07	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.2E-07	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	8.7E-08	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	2.1E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.5E-07	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	5.7E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4.1E-08	5.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-08	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0000006
				Aluminum	13725	mg/kg	6.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.3E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.006
				Antimony	5.15	mg/kg	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.006
				Arsenic	6.29	mg/kg	2.9E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.3E-07	2.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.010
				Copper	70.0	mg/kg	3.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.2E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0008
				Iron	21817	mg/kg	1.0E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.03
				Lead	127	mg/kg	5.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.8E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-04	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.002
				Vanadium	28.3	mg/kg	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.01
			Exp. Route Total								1.6E-06					0.07
			Dermal	Trichloroethene	0.031	mg/kg	0.0E+00	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.0E-01	(mg/kg/day)	--
				Benzo(a)anthracene	2.70	mg/kg	1.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.3E-08	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	2.36	mg/kg	1.6E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.2E-07	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.59	mg/kg	1.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1.3E-08	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.451	mg/kg	3.1E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.2E-08	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	1.24	mg/kg	8.4E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6.1E-09	8.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	0.027	mg/kg	1.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-09	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00000009
				Aluminum	13725	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	5.15	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	6.29	mg/kg	9.9E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.5E-08	9.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Copper	70.0	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	21817	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	127	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	354	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								1.9E-07					0.0003
		Exposure Point Total									1.8E-06					0.07
	Exposure Medium Total										1.8E-06					0.07
	Air	SWMU 16	Inhalation	Trichloroethene	9.6E-6	mg/m^3	1.8E-07	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	1.2E-09	1.8E-06	(mg/kg/day)	1.7E-01	(mg/kg/day)	0.00001
				Benzo(a)anthracene	2.1E-9	mg/m^3	3.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.8E-9	mg/m^3	3.3E-11	(mg/kg/day)	3.1E+00	(mg/kg/day)$^{-1}$	1.0E-10	3.3E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.0E-9	mg/m^3	3.6E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	3.4E-10	mg/m^3	6.3E-12	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.3E-11	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	9.4E-10	mg/m^3	1.7E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Naphthalene	4.9E-7	mg/m^3	8.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-08	(mg/kg/day)	8.6E-04	(mg/kg/day)	0.0001
				Aluminum	1.0E-5	mg/m^3	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.002
				Antimony	3.9E-9	mg/m^3	7.1E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.1E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	4.8E-9	mg/m^3	8.7E-11	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	1.3E-09	8.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Copper	5.3E-8	mg/m^3	9.7E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--

TABLE 7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	SWMU 16	Inhalation	Iron	1.7E-5	mg/m^3	3.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	9.7E-8	mg/m^3	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	2.7E-7	mg/m^3	4.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.9E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.004
				Vanadium	2.2E-8	mg/m^3	3.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.6E-09					0.006
		Exposure Point Total									2.6E-09					0.006
	Exposure Medium Total										2.6E-09					0.006
Medium Total											1.8E-06					0.08
Groundwater	Groundwater	SWMU 16	Ingestion	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.9E-06	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	3.9E-07	1.9E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0003
				1,1,2-Trichloroethane	18.2	ug/L	2.3E-05	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	1.3E-06	2.3E-04	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.06
				1,1-Dichloroethene	10.5	ug/L	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-04	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.003
				1,2,3-Trichloropropane	1.44	ug/L	1.8E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	3.7E-09	1.8E-05	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.003
				1,2-Dichloroethane	1.50	ug/L	1.9E-06	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	1.8E-07	1.9E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.001
				Benzene	1.70	ug/L	2.2E-06	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	1.2E-07	2.2E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.005
				Bromodichloromethane	1.45	ug/L	1.9E-06	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	1.2E-07	1.9E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0009
				Carbon Tetrachloride	2.58	ug/L	3.3E-06	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	4.3E-07	3.3E-05	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.05
				Chloroform	4.24	ug/L	5.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.4E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.005
				cis-1,2-Dichloroethene	286	ug/L	3.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-03	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.4
				Methylene Chloride	2.70	ug/L	3.5E-06	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	2.6E-08	3.5E-05	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.0006
				Tetrachloroethene	10.9	ug/L	1.4E-05	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	7.5E-06	1.4E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.01
				Toluene	19.0	ug/L	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.001
				trans-1,2-Dichloroethene	2.89	ug/L	3.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Trichloroethene	21055	ug/L	2.7E-02	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	3.5E-04	2.7E-01	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.5
				Vinyl Chloride	24.2	ug/L	3.1E-05	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.7E-05	3.1E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.1
				Pyridine	1.92	ug/L	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.02
				2-Nitrotoluene	0.172	ug/L	2.2E-07	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	5.1E-08	2.2E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0002
				2,4,6-Trinitrotoluene	0.284	ug/L	3.6E-07	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	1.1E-08	3.6E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.007
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-05	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.08
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	9.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.3E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.05
				RDX	25.1	ug/L	3.2E-05	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	3.5E-06	3.2E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.1
				Aluminum	23388	ug/L	3.0E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.3
				Antimony	0.745	ug/L	9.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.6E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.02
				Arsenic	5.29	ug/L	6.8E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.0E-05	6.8E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Barium	284	ug/L	3.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.6E-03	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.05
				Beryllium	1.88	ug/L	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-05	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.01
				Cadmium	0.455	ug/L	5.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.8E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				Chromium	32.0	ug/L	4.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.1E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.1
				Cobalt	81.7	ug/L	1.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.05
				Iron	29423	ug/L	3.8E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-01	(mg/kg/day)	3.0E-01	(mg/kg/day)	1.3
				Lead	13.6	ug/L	1.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.7E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	4.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.2E-04	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.2
				Manganese (Water)	4948	ug/L	6.3E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.3E-02	(mg/kg/day)	2.4E-02	(mg/kg/day)	2.6
				Nickel	145	ug/L	1.9E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.9E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.09
				Vanadium	29.3	ug/L	3.8E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-04	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.4
			Exp. Route Total								4.2E-04					6.8

TABLE 7.8.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 16	Dermal	1,1,2,2-Tetrachloroethane	1.52	ug/L	1.9E-07	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	3.8E-08	1.9E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00003
				1,1,2-Trichloroethane	18.2	ug/L	1.7E-06	(mg/kg/day)	5.7E-02	(mg/kg/day)$^{-1}$	9.6E-08	1.7E-05	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.004
				1,1-Dichloroethene	10.5	ug/L	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-05	(mg/kg/day)	5.0E-02	(mg/kg/day)	0.0003
				1,2,3-Trichloropropane	1.44	ug/L	1.7E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)$^{-1}$	3.4E-10	1.7E-06	(mg/kg/day)	6.0E-03	(mg/kg/day)	0.0003
				1,2-Dichloroethane	1.50	ug/L	7.2E-08	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	6.6E-09	7.2E-07	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00004
				Benzene	1.70	ug/L	2.5E-07	(mg/kg/day)	5.5E-02	(mg/kg/day)$^{-1}$	1.4E-08	2.5E-06	(mg/kg/day)	4.0E-03	(mg/kg/day)	0.0006
				Bromodichloromethane	1.45	ug/L	1.2E-07	(mg/kg/day)	6.2E-02	(mg/kg/day)$^{-1}$	7.3E-09	1.2E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.00006
				Carbon Tetrachloride	2.58	ug/L	6.9E-07	(mg/kg/day)	1.3E-01	(mg/kg/day)$^{-1}$	9.0E-08	6.9E-06	(mg/kg/day)	7.0E-04	(mg/kg/day)	0.010
				Chloroform	4.24	ug/L	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.8E-06	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.0004
				cis-1,2-Dichloroethene	286	ug/L	3.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.5E-04	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.04
				Methylene Chloride	2.70	ug/L	1.0E-07	(mg/kg/day)	7.5E-03	(mg/kg/day)$^{-1}$	7.5E-10	1.0E-06	(mg/kg/day)	6.0E-02	(mg/kg/day)	0.00002
				Tetrachloroethene	10.9	ug/L	6.5E-06	(mg/kg/day)	5.4E-01	(mg/kg/day)$^{-1}$	3.5E-06	6.5E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.006
				Toluene	19.0	ug/L	6.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.5E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0003
				trans-1,2-Dichloroethene	2.89	ug/L	2.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.5E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0001
				Trichloroethene	21055	ug/L	3.5E-03	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	4.5E-05	3.5E-02	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.07
				Vinyl Chloride	24.2	ug/L	1.2E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.8E-06	1.2E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.004
				Pyridine	1.92	ug/L	3.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0003
				2-Nitrotoluene	0.172	ug/L	2.2E-08	(mg/kg/day)	2.3E-01	(mg/kg/day)$^{-1}$	5.2E-09	2.2E-07	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.00002
				2,4,6-Trinitrotoluene	0.284	ug/L	7.1E-09	(mg/kg/day)	3.0E-02	(mg/kg/day)$^{-1}$	2.1E-10	7.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				2-Amino-4,6-Dinitrotoluene	1.18	ug/L	5.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.2E-07	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.003
				4-Amino-2,6-Dinitrotoluene	0.722	ug/L	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-06	(mg/kg/day)	2.0E-04	(mg/kg/day)	0.005
				RDX	25.1	ug/L	2.2E-07	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	2.4E-08	2.2E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0007
				Aluminum	23388	ug/L	6.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.4E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0006
				Antimony	0.745	ug/L	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.0003
				Arsenic	5.29	ug/L	1.5E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2.2E-08	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Barium	284	ug/L	7.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.8E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.002
				Beryllium	1.88	ug/L	5.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.2E-08	(mg/kg/day)	1.4E-05	(mg/kg/day)	0.004
				Cadmium	0.455	ug/L	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0005
				Chromium	32.0	ug/L	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.8E-06	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.02
				Cobalt	81.7	ug/L	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.2E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0001
				Iron	29423	ug/L	8.1E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.1E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Lead	13.6	ug/L	3.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	33.0	ug/L	4.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.5E-07	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.0002
				Manganese (Water)	4948	ug/L	1.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-04	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.1
				Nickel	145	ug/L	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.0E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.001
				Vanadium	29.3	ug/L	8.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.1E-07	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.03
			Exp. Route Total								5.1E-05					0.3
		Exposure Point Total									4.7E-04					7.2
	Exposure Medium Total										4.7E-04					7.2
	Air	SWMU 16	Inhalation	1,1,2,2-Tetrachloroethane	4.4E-4	mg/m3	2.4E-07	(mg/kg/day)	2.0E-01	(mg/kg/day)$^{-1}$	4.9E-08	8.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1,2-Trichloroethane	0.008	mg/m3	4.2E-06	(mg/kg/day)	5.6E-02	(mg/kg/day)$^{-1}$	2.3E-07	1.5E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				1,1-Dichloroethene	0.006	mg/m3	3.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-04	(mg/kg/day)	5.7E-02	(mg/kg/day)	0.002
				1,2,3-Trichloropropane	6.9E-4	mg/m3	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.01
				1,2-Dichloroethane	7.1E-4	mg/m3	3.9E-07	(mg/kg/day)	9.1E-02	(mg/kg/day)$^{-1}$	3.6E-08	1.4E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.01
				Benzene	0.001	mg/m3	5.6E-07	(mg/kg/day)	2.7E-02	(mg/kg/day)$^{-1}$	1.5E-08	1.9E-05	(mg/kg/day)	1.4E-03	(mg/kg/day)	0.01

TABLE 7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Air	SWMU 16	Inhalation	Bromodichloromethane	6.0E-4	mg/m3	3.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Carbon Tetrachloride	0.001	mg/m3	6.7E-07	(mg/kg/day)	5.3E-02	(mg/kg/day)$^{-1}$	3.6E-08	2.4E-05	(mg/kg/day)	5.7E-04	(mg/kg/day)	0.04
				Chloroform	0.002	mg/m3	1.2E-06	(mg/kg/day)	8.1E-02	(mg/kg/day)$^{-1}$	9.4E-08	4.1E-05	(mg/kg/day)	1.4E-02	(mg/kg/day)	0.003
				cis-1,2-Dichloroethene	0.156	mg/m3	8.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Methylene Chloride	0.001	mg/m3	8.2E-07	(mg/kg/day)	1.6E-03	(mg/kg/day)$^{-1}$	1.3E-09	2.9E-05	(mg/kg/day)	8.6E-01	(mg/kg/day)	0.00003
				Tetrachloroethene	0.005	mg/m3	2.7E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)$^{-1}$	5.5E-08	9.6E-05	(mg/kg/day)	1.4E-01	(mg/kg/day)	0.0007
				Toluene	0.011	mg/m3	5.9E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.1E-04	(mg/kg/day)	1.1E-01	(mg/kg/day)	0.002
				trans-1,2-Dichloroethene	0.002	mg/m3	8.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Trichloroethene	10.5	mg/m3	5.6E-03	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	4.0E-05	2.0E-01	(mg/kg/day)	1.7E-01	(mg/kg/day)	1.2
				Vinyl Chloride	0.016	mg/m3	8.8E-06	(mg/kg/day)	1.5E-02	(mg/kg/day)$^{-1}$	1.3E-07	3.1E-04	(mg/kg/day)	2.9E-02	(mg/kg/day)	0.01
				Pyridine	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Nitrotoluene	2.7E-5	mg/m3	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				2,4,6-Trinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				2-Amino-4,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4-Amino-2,6-Dinitrotoluene	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				RDX	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E-03	(mg/kg/day)	--
				Antimony	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	1.5E+01	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Beryllium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	8.4E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Cadmium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	6.3E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-05	(mg/kg/day)	--
				Chromium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	4.1E+01	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-05	(mg/kg/day)	--
				Cobalt	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	9.8E+00	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	5.7E-06	(mg/kg/day)	--
				Iron	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lead	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Lithium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Nickel	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	0.0E+0	mg/m3	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.1E-05					1.3
		Exposure Point Total									4.1E-05					1.3
	Exposure Medium Total										4.1E-05					8.4
Medium Total											5.1E-04					16
Surface Water	Surface Water	Gullies	Ingestion	Trichloroethene	20.4	ug/L	4.2E-08	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	5.4E-10	4.2E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.0000008
				RDX	24.0	ug/L	4.9E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	5.4E-09	4.9E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Aluminum	2767	ug/L	5.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.6E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00006
				Antimony	5.8	ug/L	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0003
				Arsenic	1.49	ug/L	3.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.5E-09	3.0E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00010
				Barium	200	ug/L	4.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.1E-06	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.00006
				Cadmium	2.25	ug/L	4.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.6E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00009
				Chromium	3.67	ug/L	7.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	7.5E-08	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00002
				Iron	3038	ug/L	6.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	6.2E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0002
				Lead	48.4	ug/L	9.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.6E-06	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0001

TABLE 7.8.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Gullies	Ingestion	Vanadium	5.29	ug/L	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0001
				Zinc	513	ug/L	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.0E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00003
			Exp. Route Total								1.0E-08					0.001
			Dermal	Trichloroethene	20.4	ug/L	6.8E-07	(mg/kg/day)	1.3E-02	(mg/kg/day)$^{-1}$	8.9E-09	6.8E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)	0.00001
				RDX	24.0	ug/L	4.0E-08	(mg/kg/day)	1.1E-01	(mg/kg/day)$^{-1}$	4.4E-09	4.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Aluminum	2767	ug/L	5.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.1E-05	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.00005
				Antimony	5.8	ug/L	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.1E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.002
				Arsenic	1.49	ug/L	2.8E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4.1E-09	2.8E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00009
				Barium	200	ug/L	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-06	(mg/kg/day)	4.9E-03	(mg/kg/day)	0.0008
				Cadmium	2.25	ug/L	4.2E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.2E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.002
				Chromium	3.67	ug/L	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.4E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.002
				Iron	3038	ug/L	5.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.6E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0002
				Lead	48.4	ug/L	8.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Water)	127	ug/L	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.3E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.002
				Vanadium	5.29	ug/L	9.8E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.8E-08	(mg/kg/day)	2.6E-05	(mg/kg/day)	0.004
				Zinc	513	ug/L	5.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	5.7E-06	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.00002
			Exp. Route Total								1.7E-08					0.01
		Exposure Point Total									2.8E-08					0.01
	Exposure Medium Total										2.8E-08					0.01
Medium Total											2.8E-08					0.01
Surface Water	Surface Water	Turkey Creek	Ingestion	Arsenic	0.370	ug/L	7.5E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.1E-09	7.5E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00003
				Manganese (Water)	476	ug/L	9.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.7E-06	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0004
			Exp. Route Total								1.1E-09					0.0004
			Dermal	Arsenic	0.370	ug/L	6.8E-10	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.0E-09	6.8E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00002
				Manganese (Water)	476	ug/L	8.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.8E-06	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.009
			Exp. Route Total								1.0E-09					0.009
		Exposure Point Total									2.2E-09					0.010
	Exposure Medium Total										2.2E-09					0.010
Medium Total											2.2E-09					0.010
Sediment	Sediment	Gullies	Ingestion	Benzo(a)pyrene	0.043	mg/kg	1.1E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8.0E-10	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.3E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0003
				Antimony	48.7	mg/kg	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.2E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.003
				Arsenic	13.1	mg/kg	3.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	5.0E-08	3.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Barium	1662	mg/kg	4.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.2E-05	(mg/kg/day)	7.0E-02	(mg/kg/day)	0.0006
				Cadmium	14.5	mg/kg	3.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0007
				Copper	1463	mg/kg	3.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.7E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0009
				Iron	64255	mg/kg	1.6E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.6E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.005
				Lead	1730	mg/kg	4.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.0E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0004
				Mercury	0.93	mg/kg	2.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.4E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Nickel	159	mg/kg	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.0E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Vanadium	38.4	mg/kg	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	9.8E-07	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.0010
				Zinc	5842	mg/kg	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.5E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0005
			Exp. Route Total								5.1E-08					0.01

TABLE 7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Gullies	Dermal	Benzo(a)pyrene	0.043	mg/kg	3.2E-11	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.4E-10	3.2E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12961	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	48.7	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.1	mg/kg	2.3E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.4E-09	2.3E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00008
				Barium	1662	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.9E-03	(mg/kg/day)	--
				Cadmium	14.5	mg/kg	8.4E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	8.4E-10	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00003
				Copper	1463	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	64255	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Lead	1730	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese (Soil)	1193	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Mercury	0.93	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	159	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Vanadium	38.4	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
				Zinc	5842	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								3.7E-09					0.0001
		Exposure Point Total									5.4E-08					0.01
	Exposure Medium Total										5.4E-08					0.01
Medium Total											5.4E-08					0.01
Sediment	Sediment	Turkey Creek	Ingestion	Aluminum	10500	mg/kg	2.7E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	2.7E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0003
				Arsenic	30.8	mg/kg	7.8E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.2E-07	7.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Iron	122000	mg/kg	3.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	3.1E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.01
				Manganese (Soil)	1900	mg/kg	4.8E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	4.8E-05	(mg/kg/day)	7.2E-02	(mg/kg/day)	0.0007
				Vanadium	51.2	mg/kg	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	1.3E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								1.2E-07					0.02
			Dermal	Aluminum	10500	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Arsenic	30.8	mg/kg	5.4E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8.0E-09	5.4E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Iron	122000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Manganese (Soil)	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.9E-03	(mg/kg/day)	--
				Vanadium	51.2	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	--	0.0E+00	(mg/kg/day)	2.6E-05	(mg/kg/day)	--
			Exp. Route Total								8.0E-09					0.0002
		Exposure Point Total									1.3E-07					0.02
	Exposure Medium Total										1.3E-07					0.02
Medium Total											1.3E-07					0.02
										Total of Receptor Risks Across All Media	5.2E-04				Total of Receptor Hazards Across All Media	16

RAGS Part D Table 9

Summary Of Receptor Risks And Hazards For COPCs

LIST OF TABLES
RAGS PART D TABLE 9
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

Table No.	
	REASONABLE MAXIMUM EXPOSURES
9.1.RME	Maintenance Workers
9.2.RME	Occupational Workers
9.3.RME	Adolescent Trespassers
9.4.RME	Construction Workers
9.5.RME	Child Recreational Users
9.6.RME	Adult Recreational Users
9.7.RME	Lifelong Recreational Users
9.8.RME	Child Residents
9.9.RME	Adult Residents
9.10.RME	Lifelong Residents
	CENTRAL TENDENCY EXPOSURES
9.1.CTE	Maintenance Workers
9.2.CTE	Occupational Workers
9.3.CTE	Adolescent Trespassers
9.4.CTE	Construction Workers
9.5.CTE	Child Recreational Users
9.6.CTE	Adult Recreational Users
9.7.CTE	Lifelong Recreational Users
9.8.CTE	Child Residents
9.9.CTE	Adult Residents
9.10.CTE	Lifelong Residents

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-11	--	--	--	1E-11	Liver	0.00000001	--	--	0.00000001
			Benzo(a)anthracene	7E-08	--	6E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	6E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	6E-08	--	5E-08	--	1E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-07	--	9E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	3E-08	--	6E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000001	--	0.0000001	0.0000002
			Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Antimony	--	--	--	--	--	Blood	0.001	--	--	0.001
			Arsenic	3E-07	--	6E-08	--	4E-07	Skin, CVS	0.002	--	0.0004	0.002
			Copper	--	--	--	--	--	GS	0.0002	--	--	0.0002
			Iron	--	--	--	--	--	None Reported	0.007	--	--	0.007
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0005	--	--	0.0005
			Vanadium	--	--	--	--	--	Kidney	0.003	--	--	0.003
			Chemical Total	1E-06	--	8E-07	--	2E-06		0.01	--	0.0004	0.01
		Exposure Point Total						2E-06					0.01
	Exposure Medium Total							2E-06					0.01
	Air	SWMU 16	Trichloroethene	--	5E-10	--	--	5E-10	Liver	--	0.000001	--	0.000001
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	4E-11	--	--	4E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.00001	--	0.00001
			Aluminum	--	--	--	--	--	CNS	--	0.0002	--	0.0002
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0004	--	0.0004
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-09	--	--	1E-09		--	0.0006	--	0.0006
		Exposure Point Total						1E-09					0.0006
	Exposure Medium Total							1E-09					0.0006
Medium Total								2E-06					0.02

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Gullies	Trichloroethene	--	--	1E-08	--	1E-08	Liver	--	--	0.000005	0.000005
			RDX	--	--	5E-09	--	5E-09	Prostate	--	--	0.00004	0.00004
			Aluminum	--	--	--	--	--	CNS	--	--	0.00002	0.00002
			Antimony	--	--	--	--	--	Blood	--	--	0.0006	0.0006
			Arsenic	--	--	5E-09	--	5E-09	Skin, CVS	--	--	0.00003	0.00003
			Barium	--	--	--	--	--	Kidney	--	--	0.0003	0.0003
			Cadmium	--	--	--	--	--	Kidney	--	--	0.0006	0.0006
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	--	--	0.0006	0.0006
			Iron	--	--	--	--	--	None Reported	--	--	0.00006	0.00006
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	--	--	0.0008	0.0008
			Vanadium	--	--	--	--	--	Kidney	--	--	0.001	0.001
			Zinc	--	--	--	--	--	Blood	--	--	0.000006	0.000006
			Chemical Total	--	--	2E-08	--	2E-08		--	--	0.004	0.004
		Exposure Point Total						2E-08					0.004
	Exposure Medium Total							2E-08					0.004
Medium Total								2E-08					0.004
Surface Water	Surface Water	Turkey Creek	Arsenic	--	--	1E-09	--	1E-09	Skin, CVS	--	--	0.000008	0.000008
			Manganese (Water)	--	--	--	--	--	CNS	--	--	0.003	0.003
			Chemical Total	--	--	1E-09	--	1E-09		--	--	0.003	0.003
		Exposure Point Total						1E-09					0.003
	Exposure Medium Total							1E-09					0.003
Medium Total								1E-09					0.003

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	1E-08	--	9E-09	--	2E-08	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Arsenic	7E-07	--	1E-07	--	8E-07	Skin, CVS	0.004	--	0.0008	0.005
			Barium	--	--	--	--	--	Kidney	0.002	--	--	0.002
			Cadmium	--	--	--	--	--	Kidney	0.003	--	0.0004	0.003
			Copper	--	--	--	--	--	GS	0.003	--	--	0.003
			Iron	--	--	--	--	--	None Reported	0.02	--	--	0.02
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Mercury	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Nickel	--	--	--	--	--	Body Weight	0.0007	--	--	0.0007
			Vanadium	--	--	--	--	--	Kidney	0.004	--	--	0.004
			Zinc	--	--	--	--	--	Blood	0.002	--	--	0.002
			Chemical Total	7E-07	--	1E-07	--	8E-07		0.05	--	0.001	0.05
		Exposure Point Total						8E-07					0.05
	Exposure Medium Total							8E-07					0.05
Medium Total								8E-07					0.05
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.0010	--	--	0.0010
			Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.010	--	0.002	0.01
			Iron	--	--	--	--	--	None Reported	0.04	--	--	0.04
			Manganese (Soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Vanadium	--	--	--	--	--	Kidney	0.005	--	--	0.005
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.06	--	0.002	0.06
		Exposure Point Total						2E-06					0.06
	Exposure Medium Total							2E-06					0.06
Medium Total								2E-06					0.06
Receptor Total							Receptor Risk Total	5E-06				Receptor HI Total	0.1

Total Blood HI	0.02
Total Body Weight HI	0.0007
Total CNS HI	0.01
Total CVS HI	0.02
Total GS HI	0.004
Total Kidney HI	0.02
Total Liver HI	0.000006
Total Skin HI	0.02
Total Nasal HI	0.00001
Total None Reported HI	0.07
Total Prostate HI	0.00004

4/12/2005

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-10	--	--	--	1E-10	Liver	0.00000006	--	--	0.00000006
			Benzo(a)anthracene	7E-07	--	6E-07	--	1E-06	NA	--	--	--	--
			Benzo(a)pyrene	6E-06	--	5E-06	--	1E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-07	--	6E-07	--	1E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-06	--	1E-06	--	2E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-07	--	3E-07	--	6E-07	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000001	--	0.000001	0.000002
			Aluminum	--	--	--	--	--	CNS	0.01	--	--	0.01
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Arsenic	3E-06	--	7E-07	--	4E-06	Skin, CVS	0.02	--	0.004	0.02
			Copper	--	--	--	--	--	GS	0.002	--	--	0.002
			Iron	--	--	--	--	--	None Reported	0.07	--	--	0.07
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.005	--	--	0.005
			Vanadium	--	--	--	--	--	Kidney	0.03	--	--	0.03
			Chemical Total	1E-05	--	8E-06	--	2E-05		0.2	--	0.004	0.2
		Exposure Point Total						2E-05					0.2
	Exposure Medium Total							2E-05					0.2
	Air	SWMU 16	Trichloroethene	--	5E-09	--	--	5E-09	Liver	--	0.00001	--	0.00001
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	4E-10	--	--	4E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0001	--	0.0001
			Aluminum	--	--	--	--	--	CNS	--	0.002	--	0.002
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	5E-09	--	--	5E-09	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.004	--	0.004
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-08	--	--	1E-08		--	0.006	--	0.006
		Exposure Point Total						1E-08					0.006
	Exposure Medium Total							1E-08					0.006
Medium Total								2E-05					0.2

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	1E-06	--	3E-08	--	1E-06	Liver	0.0002	--	0.000008	0.0003
			1,1,2-Trichloroethane	4E-06	--	8E-08	--	4E-06	Blood	0.04	--	0.001	0.05
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.002	--	0.00007	0.002
			1,2,3-Trichloropropane	1E-08	--	3E-10	--	1E-08	Blood	0.002	--	0.00007	0.002
			1,2-Dichloroethane	5E-07	--	6E-09	--	5E-07	None Reported	0.0007	--	0.000009	0.0007
			Benzene	3E-07	--	1E-08	--	3E-07	Blood	0.004	--	0.0002	0.004
			Bromodichloromethane	3E-07	--	6E-09	--	3E-07	Kidney	0.0007	--	0.00001	0.0007
			Carbon Tetrachloride	1E-06	--	8E-08	--	1E-06	Liver	0.04	--	0.002	0.04
			Chloroform	--	--	--	--	--	Liver	0.004	--	0.00009	0.004
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.3	--	0.008	0.3
			Methylene Chloride	7E-08	--	6E-10	--	7E-08	Liver	0.0004	--	0.000004	0.0004
			Tetrachloroethene	2E-05	--	3E-06	--	2E-05	Liver	0.01	--	0.002	0.01
			Toluene	--	--	--	--	--	Liver, Kidney	0.0009	--	0.00008	0.001
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.001	--	0.00003	0.001
			Trichloroethene	1E-03	--	4E-05	--	1E-03	Liver	0.4	--	0.02	0.4
			Vinyl Chloride	1E-04	--	2E-06	--	1E-04	Liver	0.08	--	0.001	0.08
			Pyridine	--	--	--	--	--	Liver	0.02	--	0.00007	0.02
			2-Nitrotoluene	1E-07	--	4E-09	--	1E-07	Spleen	0.0002	--	0.000005	0.0002
			2,4,6-Trinitrotoluene	3E-08	--	2E-10	--	3E-08	Liver	0.006	--	0.00003	0.006
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.06	--	0.0006	0.06
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.04	--	0.001	0.04
			RDX	1E-05	--	2E-08	--	1E-05	Prostate	0.08	--	0.0002	0.08
			Aluminum	--	--	--	--	--	CNS	0.2	--	0.0002	0.2
			Antimony	--	--	--	--	--	Blood	0.02	--	0.0001	0.02
			Arsenic	3E-05	--	2E-08	--	3E-05	Skin, CVS	0.2	--	0.0001	0.2
			Barium	--	--	--	--	--	Kidney	0.04	--	0.0005	0.04
			Beryllium	--	--	--	--	--	GS	0.009	--	0.001	0.01
			Cadmium	--	--	--	--	--	Kidney	0.009	--	0.0001	0.009
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.1	--	0.007	0.1
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.04	--	0.00003	0.04
			Iron	--	--	--	--	--	None Reported	1.0	--	0.0008	1.0
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.2	--	0.00007	0.2
			Manganese (Water)	--	--	--	--	--	CNS	2	--	0.04	2
			Nickel	--	--	--	--	--	Body Weight	0.07	--	0.0003	0.07

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--	Kidney	0.3	--	0.009	0.3
			Chemical Total	1E-03	--	4E-05	--	1E-03		5	--	0.09	5
		Exposure Point Total						1E-03					5
	Exposure Medium Total							1E-03					5
Medium Total								1E-03					5
Receptor Total							Receptor Risk Total	1E-03				Receptor HI Total	5

Total Blood HI	0.4
Total Body Weight HI	0.07
Total CNS HI	2
Total CVS HI	0.2
Total GS HI	0.12
Total Immune HI	0.04
Total Kidney HI	0.4
Total Liver HI	0.7
Total Skin HI	0.2
Total Nasal HI	0.0001
Total None Reported HI	1
Total Prostate HI	0.08
Total Spleen HI	0.0002
Total Bone HI	0.1
Total Fetoloxicity HI	0.1

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-11	--	--	--	1E-11	Liver	0.00000001	--	--	0.00000001
			Benzo(a)anthracene	5E-08	--	4E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	4E-07	--	4E-07	--	8E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-08	--	4E-08	--	9E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	9E-08	--	7E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-08	--	2E-08	--	4E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000002	--	0.0000002	0.0000004
			Aluminum	--	--	--	--	--	CNS	0.002	--	--	0.002
			Antimony	--	--	--	--	--	Blood	0.002	--	--	0.002
			Arsenic	2E-07	--	5E-08	--	3E-07	Skin, CVS	0.003	--	0.0007	0.004
			Copper	--	--	--	--	--	GS	0.0003	--	--	0.0003
			Iron	--	--	--	--	--	None Reported	0.01	--	--	0.01
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0008	--	--	0.0008
			Vanadium	--	--	--	--	--	Kidney	0.005	--	--	0.005
			Chemical Total	9E-07	--	6E-07	--	2E-06		0.03	--	0.0007	0.03
		Exposure Point Total						2E-06					0.03
	Exposure Medium Total							2E-06					0.03
	Air	SWMU 16	Trichloroethene	--	8E-11	--	--	8E-11	Liver	--	0.0000005	--	0.0000005
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	7E-12	--	--	7E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.000005	--	0.000005
			Aluminum	--	--	--	--	--	CNS	--	0.00008	--	0.00008
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	9E-11	--	--	9E-11	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0002	--	0.0002
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	2E-10	--	--	2E-10		--	0.0002	--	0.0002
		Exposure Point Total						2E-10					0.0002
	Exposure Medium Total							2E-10					0.0002
Medium Total								2E-06					0.03

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Gullies	Trichloroethene	1E-08	--	1E-08	--	3E-08	Liver	0.00001	--	0.00001	0.00003
			RDX	1E-07	--	6E-09	--	1E-07	Prostate	0.003	--	0.0001	0.003
			Aluminum	--	--	--	--	--	CNS	0.0009	--	0.00006	0.0010
			Antimony	--	--	--	--	--	Blood	0.005	--	0.002	0.007
			Arsenic	1E-07	--	8E-09	--	1E-07	Skin, CVS	0.002	--	0.0001	0.002
			Barium	--	--	--	--	--	Kidney	0.0009	--	0.0009	0.002
			Cadmium	--	--	--	--	--	Kidney	0.001	--	0.002	0.003
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.0004	--	0.002	0.003
			Iron	--	--	--	--	--	None Reported	0.003	--	0.0002	0.004
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.002	--	0.003	0.005
			Vanadium	--	--	--	--	--	Kidney	0.002	--	0.004	0.006
			Zinc	--	--	--	--	--	Blood	0.0006	--	0.00002	0.0006
			Chemical Total	3E-07	--	3E-08	--	3E-07		0.02	--	0.01	0.04
		Exposure Point Total						3E-07					0.04
	Exposure Medium Total							3E-07					0.04
Medium Total								3E-07					0.04
Surface Water	Surface Water	Turkey Creek	Arsenic	3E-08	--	2E-09	--	3E-08	Skin, CVS	0.0004	--	0.00003	0.0004
			Manganese (Water)	--	--	--	--	--	CNS	0.007	--	0.01	0.02
			Chemical Total	3E-08	--	2E-09	--	3E-08		0.007	--	0.01	0.02
		Exposure Point Total						3E-08					0.02
	Exposure Medium Total							3E-08					0.02
Medium Total								3E-08					0.02
Sediment	Sediment	Gullies	Benzo(a)pyrene	8E-09	--	7E-09	--	2E-08	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.002	--	--	0.002
			Antimony	--	--	--	--	--	Blood	0.02	--	--	0.02
			Arsenic	5E-07	--	1E-07	--	6E-07	Skin, CVS	0.007	--	0.001	0.009
			Barium	--	--	--	--	--	Kidney	0.004	--	--	0.004
			Cadmium	--	--	--	--	--	Kidney	0.005	--	0.0006	0.005
			Copper	--	--	--	--	--	GS	0.006	--	--	0.006
			Iron	--	--	--	--	--	None Reported	0.04	--	--	0.04
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.003	--	--	0.003
			Mercury	--	--	--	--	--	CNS	0.0005	--	--	0.0005
			Nickel	--	--	--	--	--	Body Weight	0.001	--	--	0.001

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Vanadium	- -	--	- -	--	- -	Kidney	0.006	- -	--	0.006
			Zinc	- -	--	- -	--	- -	Blood	0.003	- -	--	0.003
			Chemical Total	5E-07	--	1E-07	--	6E-07		0.09	- -	0.002	0.10
		Exposure Point Total						6E-07					0.10
	Exposure Medium Total							6E-07					0.10
Medium Total								6E-07					0.10
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -	CNS	0.002	- -	--	0.002
			Arsenic	1E-06	--	2E-07	--	1E-06	Skin, CVS	0.02	- -	0.003	0.02
			Iron	- -	--	- -	--	- -	None Reported	0.07	- -	--	0.07
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.004	- -	--	0.004
			Vanadium	- -	--	- -	--	- -	Kidney	0.008	- -	--	0.008
			Chemical Total	1E-06	--	2E-07	--	1E-06		0.10	- -	0.003	0.1
		Exposure Point Total						1E-06					0.1
	Exposure Medium Total							1E-06					0.1
Medium Total								1E-06					0.1
Receptor Total							Receptor Risk Total	4E-06				Receptor HI Total	0.3

Total Blood HI	0.03
Total Body Weight HI	0.001
Total CNS HI	0.04
Total CVS HI	0.04
Total GS HI	0.009
Total Kidney HI	0.04
Total Liver HI	0.00003
Total Skin HI	0.04
Total Nasal HI	0.000005
Total None Reported HI	0.1
Total Prostate HI	0.003

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	SWMU 16	Trichloroethene	1E-11	--	--	--	1E-11	Liver	0.0000001	--	--	0.0000001
			Benzo(a)anthracene	5E-08	--	2E-08	--	8E-08	NA	--	--	--	--
			Benzo(a)pyrene	5E-07	--	2E-07	--	7E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-08	--	2E-08	--	7E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	9E-08	--	4E-08	--	1E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	1E-08	--	3E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000003	--	0.000001	0.000004
			Aluminum	--	--	--	--	--	CNS	0.03	--	--	0.03
			Antimony	--	--	--	--	--	Blood	0.02	--	--	0.02
			Arsenic	3E-07	--	2E-08	--	3E-07	Skin, CVS	0.04	--	0.004	0.04
			Copper	--	--	--	--	--	GS	0.003	--	--	0.003
			Iron	--	--	--	--	--	None Reported	0.1	--	--	0.1
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.010	--	--	0.010
			Vanadium	--	--	--	--	--	Kidney	0.05	--	--	0.05
			Chemical Total	1E-06	--	3E-07	--	1E-06		0.3	--	0.004	0.3
		Exposure Point Total						1E-06					0.3
	Exposure Medium Total							1E-06					0.3
	Air	SWMU 16	Trichloroethene	--	6E-10	--	--	6E-10	Liver	--	0.00003	--	0.00003
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	8E-09	--	--	8E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0003	--	0.0003
			Aluminum	--	--	--	--	--	CNS	--	1	--	1
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	1E-07	--	--	1E-07	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	2	--	2
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-07	--	--	1E-07		--	3	--	3
		Exposure Point Total						1E-07					3
	Exposure Medium Total							1E-07					3
Medium Total								1E-06					3

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	--	--	2E-09	--	2E-09	Liver	--	--	0.00001	0.00001
			1,1,2-Trichloroethane	--	--	6E-09	--	6E-09	Blood	--	--	0.002	0.002
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	--	0.0001	0.0001
			1,2,3-Trichloropropane	--	--	2E-11	--	2E-11	Blood	--	--	0.0001	0.0001
			1,2-Dichloroethane	--	--	4E-10	--	4E-10	None Reported	--	--	0.00002	0.00002
			Benzene	--	--	1E-09	--	1E-09	Blood	--	--	0.0003	0.0003
			Bromodichloromethane	--	--	4E-10	--	4E-10	Kidney	--	--	0.00002	0.00002
			Carbon Tetrachloride	--	--	5E-09	--	5E-09	Liver	--	--	0.004	0.004
			Chloroform	--	--	--	--	--	Liver	--	--	0.0002	0.0002
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	--	--	0.02	0.02
			Methylene Chloride	--	--	5E-11	--	5E-11	Liver	--	--	0.000008	0.000008
			Tetrachloroethene	--	--	2E-07	--	2E-07	Liver	--	--	0.003	0.003
			Toluene	--	--	--	--	--	Liver, Kidney	--	--	0.0001	0.0001
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	--	--	0.00006	0.00006
			Trichloroethene	--	--	3E-06	--	3E-06	Liver	--	--	0.03	0.03
			Vinyl Chloride	--	--	1E-07	--	1E-07	Liver	--	--	0.002	0.002
			Pyridine	--	--	--	--	--	Liver	--	--	0.0001	0.0001
			2-Nitrotoluene	--	--	3E-10	--	3E-10	Spleen	--	--	0.00001	0.00001
			2,4,6-Trinitrotoluene	--	--	1E-11	--	1E-11	Liver	--	--	0.00006	0.00006
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	--	--	0.001	0.001
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	--	--	0.002	0.002
			RDX	--	--	1E-09	--	1E-09	Prostate	--	--	0.0003	0.0003
			Aluminum	--	--	--	--	--	CNS	--	--	0.0009	0.0009
			Antimony	--	--	--	--	--	Blood	--	--	0.0005	0.0005
			Arsenic	--	--	4E-09	--	4E-09	Skin, CVS	--	--	0.0007	0.0007
			Barium	--	--	--	--	--	Kidney	--	--	0.002	0.002
			Beryllium	--	--	--	--	--	GS	--	--	0.005	0.005
			Cadmium	--	--	--	--	--	Kidney	--	--	0.0007	0.0007
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	--	--	0.03	0.03
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	--	--	0.0002	0.0002
			Iron	--	--	--	--	--	None Reported	--	--	0.004	0.004
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	--	--	0.0003	0.0003
			Manganese (Water)	--	--	--	--	--	CNS	--	--	0.2	0.2
			Nickel	--	--	--	--	--	Body Weight	--	--	0.001	0.001

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -	Kidney	--	- -	0.04	0.04
			Chemical Total	- -	--	3E-06	--	3E-06		--	- -	0.4	0.4
		Exposure Point Total						3E-06					0.4
	Exposure Medium Total							3E-06					0.4
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	3E-09	--	--	3E-09	NA	- -	--	- -	--
			1,1,2-Trichloroethane	--	1E-08	--	--	1E-08	NA	- -	--	- -	--
			1,1-Dichloroethene	--	- -	--	--	- -	Liver	- -	0.0002	- -	0.0002
			1,2,3-Trichloropropane	--	- -	--	--	- -	Blood	- -	0.0009	- -	0.0009
			1,2-Dichloroethane	--	2E-09	--	--	2E-09	NA	- -	0.001	- -	0.001
			Benzene	--	8E-10	--	--	8E-10	Blood	- -	0.001	- -	0.001
			Bromodichloromethane	--	- -	--	--	- -	NA	- -	--	- -	--
			Carbon Tetrachloride	--	2E-09	--	--	2E-09	Liver	- -	0.004	- -	0.004
			Chloroform	--	5E-09	--	--	5E-09	Liver	- -	0.0003	- -	0.0003
			cis-1,2-Dichloroethene	--	- -	--	--	- -	NA	- -	--	- -	--
			Methylene Chloride	--	7E-11	--	--	7E-11	Liver	- -	0.000004	- -	0.000004
			Tetrachloroethene	--	3E-09	--	--	3E-09	Liver	- -	0.00007	- -	0.00007
			Toluene	--	- -	--	--	- -	NA	- -	0.0002	- -	0.0002
			trans-1,2-Dichloroethene	--	- -	--	--	- -	NA	- -	--	- -	--
			Trichloroethene	--	2E-06	--	--	2E-06	Liver	- -	0.1	- -	0.1
			Vinyl Chloride	--	7E-09	--	--	7E-09	Liver	- -	0.001	- -	0.001
			Pyridine	--	- -	--	--	- -	NA	- -	--	- -	--
			2-Nitrotoluene	--	- -	--	--	- -	NA	- -	--	- -	--
			2,4,6-Trinitrotoluene	--	- -	--	--	- -	NA	- -	--	- -	--
			2-Amino-4,6-Dinitrotoluene	--	- -	--	--	- -	NA	- -	--	- -	--
			4-Amino-2,6-Dinitrotoluene	--	- -	--	--	- -	NA	- -	--	- -	--
			RDX	--	- -	--	--	- -	NA	- -	--	- -	--
			Aluminum	--	- -	--	--	- -	CNS	- -	--	- -	--
			Antimony	--	- -	--	--	- -	NA	- -	--	- -	--
			Arsenic	--	- -	--	--	- -	NA	- -	--	- -	--
			Barium	--	- -	--	--	- -	Fetus	- -	--	- -	--
			Beryllium	--	- -	--	--	- -	NA	- -	--	- -	--
			Cadmium	--	- -	--	--	- -	Kidney	- -	--	- -	--
			Chromium	--	- -	--	--	- -	Lungs	- -	--	- -	--
			Cobalt	--	- -	--	--	- -	NA	- -	--	- -	--
			Iron	--	- -	--	--	- -	NA	- -	--	- -	--

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Nickel	--	--	--	--	--	NA	--	--	--	--
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	2E-06	--	--	2E-06		--	0.1	--	0.1
		Exposure Point Total						2E-06					0.1
	Exposure Medium Total							5E-06					0.5
Medium Total								5E-06					0.5
Receptor Total							Receptor Risk Total	7E-06				Receptor HI Total	4

Total Blood HI	0.05
Total Body Weight HI	0.001
Total CNS HI	3
Total CVS HI	0.05
Total GS HI	0.042
Total Immune HI	0.0002
Total Kidney HI	0.1
Total Liver HI	0.2
Total Skin HI	0.04
Total Nasal HI	0.0003
Total None Reported HI	0.1
Total Prostate HI	0.0003
Total Spleen HI	0.00001
Total Bone HI	0.03
Total Fetotoxicity HI	0.03

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	3E-11	--	--	--	3E-11	Liver	0.00000006	--	--	0.00000006
			Benzo(a)anthracene	2E-07	--	1E-07	--	3E-07	NA	--	--	--	--
			Benzo(a)pyrene	1E-06	--	1E-06	--	3E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	2E-07	--	1E-07	--	3E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-07	--	2E-07	--	5E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	7E-08	--	6E-08	--	1E-07	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000001	--	0.000001	0.000002
			Aluminum	--	--	--	--	--	CNS	0.01	--	--	0.01
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Arsenic	8E-07	--	2E-07	--	9E-07	Skin, CVS	0.02	--	0.004	0.02
			Copper	--	--	--	--	--	GS	0.002	--	--	0.002
			Iron	--	--	--	--	--	None Reported	0.07	--	--	0.07
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.005	--	--	0.005
			Vanadium	--	--	--	--	--	Kidney	0.03	--	--	0.03
			Chemical Total	3E-06	--	2E-06	--	5E-06		0.1	--	0.004	0.2
		Exposure Point Total						5E-06					0.2
	Exposure Medium Total							5E-06					0.2
	Air	SWMU 16	Trichloroethene	--	3E-10	--	--	3E-10	Liver	--	0.000003	--	0.000003
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.00003	--	0.00003
			Aluminum	--	--	--	--	--	CNS	--	0.0005	--	0.0005
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0009	--	0.0009
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	6E-10	--	--	6E-10		--	0.001	--	0.001
		Exposure Point Total						6E-10					0.001
	Exposure Medium Total							6E-10					0.001
Medium Total								5E-06					0.2

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	2E-07	--	8E-09	--	3E-07	Liver	0.0002	--	0.000007	0.0002
			1,1,2-Trichloroethane	8E-07	--	2E-08	--	9E-07	Blood	0.04	--	0.001	0.04
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.002	--	0.00006	0.002
			1,2,3-Trichloropropane	2E-09	--	7E-11	--	2E-09	Blood	0.002	--	0.00006	0.002
			1,2-Dichloroethane	1E-07	--	1E-09	--	1E-07	None Reported	0.0007	--	0.000008	0.0007
			Benzene	8E-08	--	3E-09	--	8E-08	Blood	0.004	--	0.0001	0.004
			Bromodichloromethane	7E-08	--	1E-09	--	7E-08	Kidney	0.0007	--	0.00001	0.0007
			Carbon Tetrachloride	3E-07	--	2E-08	--	3E-07	Liver	0.04	--	0.002	0.04
			Chloroform	--	--	--	--	--	Liver	0.004	--	0.00009	0.004
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.3	--	0.008	0.3
			Methylene Chloride	2E-08	--	2E-10	--	2E-08	Liver	0.0004	--	0.000004	0.0004
			Tetrachloroethene	5E-06	--	7E-07	--	5E-06	Liver	0.01	--	0.002	0.01
			Toluene	--	--	--	--	--	Liver, Kidney	0.0009	--	0.00008	0.0010
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.001	--	0.00003	0.001
			Trichloroethene	2E-04	--	9E-06	--	2E-04	Liver	0.4	--	0.02	0.4
			Vinyl Chloride	3E-05	--	4E-07	--	3E-05	Liver	0.08	--	0.0010	0.08
			Pyridine	--	--	--	--	--	Liver	0.02	--	0.00007	0.02
			2-Nitrotoluene	3E-08	--	1E-09	--	3E-08	Spleen	0.0002	--	0.000005	0.0002
			2,4,6-Trinitrotoluene	7E-09	--	4E-11	--	7E-09	Liver	0.005	--	0.00003	0.005
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.06	--	0.0006	0.06
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.03	--	0.001	0.04
			RDX	2E-06	--	5E-09	--	2E-06	Prostate	0.08	--	0.0002	0.08
			Aluminum	--	--	--	--	--	CNS	0.2	--	0.0002	0.2
			Antimony	--	--	--	--	--	Blood	0.02	--	0.0001	0.02
			Arsenic	6E-06	--	5E-09	--	6E-06	Skin, CVS	0.2	--	0.0001	0.2
			Barium	--	--	--	--	--	Kidney	0.04	--	0.0005	0.04
			Beryllium	--	--	--	--	--	GS	0.009	--	0.001	0.010
			Cadmium	--	--	--	--	--	Kidney	0.009	--	0.0001	0.009
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.1	--	0.007	0.1
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.04	--	0.00003	0.04
			Iron	--	--	--	--	--	None Reported	0.9	--	0.0008	0.9
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.2	--	0.00006	0.2
			Manganese (Water)	--	--	--	--	--	CNS	2	--	0.04	2
			Nickel	--	--	--	--	--	Body Weight	0.07	--	0.0003	0.07

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -	Kidney	0.3	- -	0.009	0.3
			Chemical Total	3E-04	--	1E-05	--	3E-04		5	- -	0.09	5
		Exposure Point Total						3E-04					5
	Exposure Medium Total							3E-04					5
Medium Total								3E-04					5
Surface Water	Surface Water	Gullies	Trichloroethene	4E-08	--	4E-08	--	8E-08	Liver	0.00008	- -	0.00007	0.0002
			RDX	4E-07	--	2E-08	--	4E-07	Prostate	0.02	- -	0.0006	0.02
			Aluminum	- -	--	- -	--	- -	CNS	0.005	- -	0.0003	0.006
			Antimony	- -	--	- -	--	- -	Blood	0.03	- -	0.01	0.04
			Arsenic	4E-07	--	2E-08	--	4E-07	Skin, CVS	0.009	- -	0.0006	0.010
			Barium	- -	--	- -	--	- -	Kidney	0.005	- -	0.005	0.011
			Cadmium	- -	--	- -	--	- -	Kidney	0.009	- -	0.01	0.02
			Chromium	- -	--	- -	--	- -	Fetotoxicity, GS, Bone	0.002	- -	0.01	0.01
			Iron	- -	--	- -	--	- -	None Reported	0.02	- -	0.001	0.02
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.01	- -	0.02	0.03
			Vanadium	- -	--	- -	--	- -	Kidney	0.010	- -	0.03	0.04
			Zinc	- -	--	- -	--	- -	Blood	0.003	- -	0.0001	0.003
			Chemical Total	8E-07	--	8E-08	--	9E-07		0.1	- -	0.1	0.2
		Exposure Point Total						9E-07					0.2
	Exposure Medium Total							9E-07					0.2
Medium Total								9E-07					0.2
Surface Water	Surface Water	Turkey Creek	Arsenic	9E-08	--	6E-09	--	1E-07	Skin, CVS	0.002	- -	0.0002	0.002
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.04	- -	0.06	0.10
			Chemical Total	9E-08	--	6E-09	--	1E-07		0.04	- -	0.06	0.1
		Exposure Point Total						1E-07					0.1
	Exposure Medium Total							1E-07					0.1
Medium Total								1E-07					0.1
Sediment	Sediment	Gullies	Benzo(a)pyrene	3E-08	--	2E-08	--	5E-08	NA	--	- -	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.01	- -	--	0.01
			Antimony	- -	--	- -	--	- -	Blood	0.1	- -	--	0.1
			Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.04	- -	0.008	0.05
			Barium	- -	--	- -	--	- -	Kidney	0.02	- -	--	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.03	- -	0.004	0.03
			Copper	- -	--	- -	--	- -	GS	0.03	- -	--	0.03

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	- -	--	- -	--	- -	None Reported	0.2	- -	--	0.2
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.02	- -	--	0.02
			Mercury	- -	--	- -	--	- -	CNS	0.003	- -	--	0.003
			Nickel	- -	--	- -	--	- -	Body Weight	0.008	- -	--	0.008
			Vanadium	- -	--	- -	--	- -	Kidney	0.04	- -	--	0.04
			Zinc	- -	--	- -	--	- -	Blood	0.02	- -	--	0.02
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.5	- -	0.01	0.6
		Exposure Point Total						2E-06					0.6
	Exposure Medium Total							2E-06					0.6
Medium Total								2E-06					0.6
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -	CNS	0.010	- -	--	0.010
			Arsenic	4E-06	--	7E-07	--	5E-06	Skin, CVS	0.10	- -	0.02	0.1
			Iron	- -	--	- -	--	- -	None Reported	0.4	- -	--	0.4
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.03	- -	--	0.03
			Vanadium	- -	--	- -	--	- -	Kidney	0.05	- -	--	0.05
			Chemical Total	4E-06	--	7E-07	--	5E-06		0.6	- -	0.02	0.6
		Exposure Point Total						5E-06					0.6
	Exposure Medium Total							5E-06					0.6
Medium Total								5E-06					0.6
Receptor Total							Receptor Risk Total	3E-04				Receptor HI Total	7

Total Blood HI	0.5
Total Body Weight HI	0.08
Total CNS HI	2
Total CVS HI	0.4
Total GS HI	0.17
Total Immune HI	0.04
Total Kidney HI	0.6
Total Liver HI	0.7
Total Skin HI	0.4
Total Nasal HI	0.00003
Total None Reported HI	2
Total Prostate HI	0.1
Total Spleen HI	0.0002
Total Fetotoxicity HI	0.1
Total Spleen HI	0.0002

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-11	--	--	--	1E-11	Liver	0.000000006	--	--	0.000000006
			Benzo(a)anthracene	7E-08	--	1E-07	--	2E-07	NA	--	--	--	--
			Benzo(a)pyrene	6E-07	--	1E-06	--	2E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-08	--	1E-07	--	2E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-07	--	2E-07	--	3E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	5E-08	--	8E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000001	--	0.0000002	0.0000004
			Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Antimony	--	--	--	--	--	Blood	0.001	--	--	0.001
			Arsenic	3E-07	--	1E-07	--	5E-07	Skin, CVS	0.002	--	0.0008	0.003
			Copper	--	--	--	--	--	GS	0.0002	--	--	0.0002
			Iron	--	--	--	--	--	None Reported	0.007	--	--	0.007
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0005	--	--	0.0005
			Vanadium	--	--	--	--	--	Kidney	0.003	--	--	0.003
			Chemical Total	1E-06	--	2E-06	--	3E-06		0.02	--	0.0008	0.02
		Exposure Point Total						3E-06					0.02
	Exposure Medium Total							3E-06					0.02
	Air	SWMU 16	Trichloroethene	--	3E-10	--	--	3E-10	Liver	--	0.0000007	--	0.0000007
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.000007	--	0.000007
			Aluminum	--	--	--	--	--	CNS	--	0.0001	--	0.0001
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0003	--	0.0003
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	6E-10	--	--	6E-10		--	0.0004	--	0.0004
		Exposure Point Total						6E-10					0.0004
	Exposure Medium Total							6E-10					0.0004
Medium Total								3E-06					0.02

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	2E-07	--	2E-08	--	2E-07	Liver	0.00005	--	0.000004	0.00006
			1,1,2-Trichloroethane	7E-07	--	5E-08	--	8E-07	Blood	0.009	--	0.0006	0.01
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.0004	--	0.00004	0.0005
			1,2,3-Trichloropropane	2E-09	--	2E-10	--	2E-09	Blood	0.0005	--	0.00004	0.0005
			1,2-Dichloroethane	1E-07	--	3E-09	--	1E-07	None Reported	0.0002	--	0.000005	0.0002
			Benzene	7E-08	--	7E-09	--	7E-08	Blood	0.0009	--	0.00009	0.001
			Bromodichloromethane	6E-08	--	3E-09	--	7E-08	Kidney	0.0001	--	0.000008	0.0002
			Carbon Tetrachloride	2E-07	--	4E-08	--	3E-07	Liver	0.008	--	0.001	0.009
			Chloroform	--	--	--	--	--	Liver	0.0009	--	0.00005	0.0009
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.06	--	0.005	0.06
			Methylene Chloride	1E-08	--	4E-10	--	1E-08	Liver	0.00009	--	0.000002	0.00009
			Tetrachloroethene	4E-06	--	2E-06	--	6E-06	Liver	0.002	--	0.0009	0.003
			Toluene	--	--	--	--	--	Liver, Kidney	0.0002	--	0.00004	0.0002
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.0003	--	0.00002	0.0003
			Trichloroethene	2E-04	--	2E-05	--	2E-04	Liver	0.09	--	0.010	0.1
			Vinyl Chloride	3E-05	--	9E-07	--	3E-05	Liver	0.02	--	0.0006	0.02
			Pyridine	--	--	--	--	--	Liver	0.004	--	0.00004	0.004
			2-Nitrotoluene	3E-08	--	2E-09	--	3E-08	Spleen	0.00004	--	0.000003	0.00004
			2,4,6-Trinitrotoluene	6E-09	--	1E-10	--	6E-09	Liver	0.001	--	0.00002	0.001
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.01	--	0.0004	0.01
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.007	--	0.0007	0.008
			RDX	2E-06	--	1E-08	--	2E-06	Prostate	0.02	--	0.00010	0.02
			Aluminum	--	--	--	--	--	CNS	0.05	--	0.0001	0.05
			Antimony	--	--	--	--	--	Blood	0.004	--	0.00006	0.004
			Arsenic	6E-06	--	1E-08	--	6E-06	Skin, CVS	0.04	--	0.00008	0.04
			Barium	--	--	--	--	--	Kidney	0.008	--	0.0003	0.009
			Beryllium	--	--	--	--	--	GS	0.002	--	0.0006	0.003
			Cadmium	--	--	--	--	--	Kidney	0.002	--	0.00008	0.002
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.02	--	0.004	0.03
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.008	--	0.00002	0.008
			Iron	--	--	--	--	--	None Reported	0.2	--	0.0005	0.2
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.03	--	0.00004	0.03
			Manganese (Water)	--	--	--	--	--	CNS	0.4	--	0.02	0.4
			Nickel	--	--	--	--	--	Body Weight	0.01	--	0.0002	0.01

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -	Kidney	0.06	- -	0.005	0.06
			Chemical Total	2E-04	--	2E-05	--	3E-04		1	- -	0.05	1
		Exposure Point Total						3E-04					1
	Exposure Medium Total							3E-04					1
Medium Total								3E-04					1
Surface Water	Surface Water	Gullies	Trichloroethene	7E-09	--	1E-07	--	1E-07	Liver	0.000003	- -	0.00004	0.00005
			RDX	7E-08	--	4E-08	--	1E-07	Prostate	0.0007	- -	0.0004	0.001
			Aluminum	- -	--	- -	--	- -	CNS	0.0002	- -	0.0002	0.0004
			Antimony	- -	--	- -	--	- -	Blood	0.001	- -	0.01	0.01
			Arsenic	6E-08	--	6E-08	--	1E-07	Skin, CVS	0.0004	- -	0.0004	0.0008
			Barium	- -	--	- -	--	- -	Kidney	0.0002	- -	0.003	0.003
			Cadmium	- -	--	- -	--	- -	Kidney	0.0004	- -	0.007	0.007
			Chromium	- -	--	- -	--	- -	Fetotoxicity, GS, Bone	0.0001	- -	0.007	0.007
			Iron	- -	--	- -	--	- -	None Reported	0.0008	- -	0.0007	0.002
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.0004	- -	0.01	0.01
			Vanadium	- -	--	- -	--	- -	Kidney	0.0004	- -	0.02	0.02
			Zinc	- -	--	- -	--	- -	Blood	0.0001	- -	0.00008	0.0002
			Chemical Total	1E-07	--	2E-07	--	3E-07		0.005	- -	0.05	0.06
		Exposure Point Total						3E-07					0.06
	Exposure Medium Total							3E-07					0.06
Medium Total								3E-07					0.06
Surface Water	Surface Water	Turkey Creek	Arsenic	2E-08	--	1E-08	--	3E-08	Skin, CVS	0.0001	- -	0.00009	0.0002
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.002	- -	0.04	0.04
			Chemical Total	2E-08	--	1E-08	--	3E-08		0.002	- -	0.04	0.04
		Exposure Point Total						3E-08					0.04
	Exposure Medium Total							3E-08					0.04
Medium Total								3E-08					0.04
Sediment	Sediment	Gullies	Benzo(a)pyrene	1E-08	--	2E-08	--	3E-08	NA	--	- -	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.001	- -	--	0.001
			Antimony	- -	--	- -	--	- -	Blood	0.01	- -	--	0.01
			Arsenic	7E-07	--	3E-07	--	9E-07	Skin, CVS	0.004	- -	0.002	0.006
			Barium	- -	--	- -	--	- -	Kidney	0.002	- -	--	0.002
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	- -	0.0007	0.004
			Copper	- -	--	- -	--	- -	GS	0.004	- -	--	0.004

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	- -	--	- -	--	- -	None Reported	0.02	- -	--	0.02
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.002	- -	--	0.002
			Mercury	- -	--	- -	--	- -	CNS	0.0003	- -	--	0.0003
			Nickel	- -	--	- -	--	- -	Body Weight	0.0008	- -	--	0.0008
			Vanadium	- -	--	- -	--	- -	Kidney	0.004	- -	--	0.004
			Zinc	- -	--	- -	--	- -	Blood	0.002	- -	--	0.002
			Chemical Total	7E-07	--	3E-07	--	1E-06		0.06	- -	0.002	0.06
		Exposure Point Total						1E-06					0.06
	Exposure Medium Total							1E-06					0.06
Medium Total								1E-06					0.06
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -	CNS	0.001	- -	--	0.001
			Arsenic	2E-06	--	6E-07	--	2E-06	Skin, CVS	0.01	- -	0.004	0.01
			Iron	- -	--	- -	--	- -	None Reported	0.04	- -	--	0.04
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.003	- -	--	0.003
			Vanadium	- -	--	- -	--	- -	Kidney	0.005	- -	--	0.005
			Chemical Total	2E-06	--	6E-07	--	2E-06		0.06	- -	0.004	0.06
		Exposure Point Total						2E-06					0.06
	Exposure Medium Total							2E-06					0.06
Medium Total								2E-06					0.06
Receptor Total							Receptor Risk Total	3E-04				Receptor HI Total	1

Total Blood HI	0.1
Total Body Weight HI	0.02
Total CNS HI	0.6
Total CVS HI	0.07
Total GS HI	0.039
Total Immune HI	0.008
Total Kidney HI	0.1
Total Liver HI	0.2
Total Skin HI	0.06
Total Nasal HI	0.000007
Total None Reported HI	0.3
Total Prostate HI	0.02
Total Spleen HI	0.00004
Total Bone HI	0.03
Total Fetotoxicity HI	0.03

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	5E-11	--	--	--	5E-11					
			Benzo(a)anthracene	2E-07	--	3E-07	--	5E-07					
			Benzo(a)pyrene	2E-06	--	2E-06	--	4E-06					
			Benzo(b)fluoranthene	2E-07	--	2E-07	--	5E-07					
			Dibenzo(a,h)anthracene	4E-07	--	4E-07	--	8E-07					
			Indeno(1,2,3-cd)pyrene	1E-07	--	1E-07	--	2E-07					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	1E-06	--	3E-07	--	1E-06					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	4E-06	--	4E-06	--	8E-06					
		Exposure Point Total						8E-06					
	Exposure Medium Total							8E-06					
	Air	SWMU 16	Trichloroethene	--	6E-10	--	--	6E-10					
			Benzo(a)anthracene	--	--	--	--	--					
			Benzo(a)pyrene	--	5E-11	--	--	5E-11					
			Benzo(b)fluoranthene	--	--	--	--	--					
			Dibenzo(a,h)anthracene	--	--	--	--	--					
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	--	6E-10	--	--	6E-10					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	1E-09	--	--	1E-09					
		Exposure Point Total						1E-09					
	Exposure Medium Total							1E-09					
Medium Total								8E-06					

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	5E-07	--	3E-08	--	5E-07					
			1,1,2-Trichloroethane	2E-06	--	6E-08	--	2E-06					
			1,1-Dichloroethene	- -	--	- -	--	- -					
			1,2,3-Trichloropropane	4E-09	--	2E-10	--	5E-09					
			1,2-Dichloroethane	2E-07	--	4E-09	--	2E-07					
			Benzene	1E-07	--	9E-09	--	2E-07					
			Bromodichloromethane	1E-07	--	5E-09	--	1E-07					
			Carbon Tetrachloride	5E-07	--	6E-08	--	6E-07					
			Chloroform	- -	--	- -	--	- -					
			cis-1,2-Dichloroethene	- -	--	- -	--	- -					
			Methylene Chloride	3E-08	--	5E-10	--	3E-08					
			Tetrachloroethene	9E-06	--	2E-06	--	1E-05					
			Toluene	- -	--	- -	--	- -					
			trans-1,2-Dichloroethene	- -	--	- -	--	- -					
			Trichloroethene	4E-04	--	3E-05	--	4E-04					
			Vinyl Chloride	5E-05	--	1E-06	--	6E-05					
			Pyridine	- -	--	- -	--	- -					
			2-Nitrotoluene	6E-08	--	3E-09	--	6E-08					
			2,4,6-Trinitrotoluene	1E-08	--	1E-10	--	1E-08					
			2-Amino-4,6-Dinitrotoluene	- -	--	- -	--	- -					
			4-Amino-2,6-Dinitrotoluene	- -	--	- -	--	- -					
			RDX	4E-06	--	2E-08	--	4E-06					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	1E-05	--	2E-08	--	1E-05					
			Barium	- -	--	- -	--	- -					
			Beryllium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Chromium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Lithium	- -	--	- -	--	- -					
			Manganese (Water)	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -					
			Chemical Total	5E-04	--	3E-05	--	5E-04					
		Exposure Point Total						5E-04					
	Exposure Medium Total							5E-04					
Medium Total								5E-04					
Surface Water	Surface Water	Gullies	Trichloroethene	5E-08	--	1E-07	--	2E-07					
			RDX	5E-07	--	6E-08	--	6E-07					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	4E-07	--	8E-08	--	5E-07					
			Barium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Chromium	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese (Water)	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Chemical Total	1E-06	--	3E-07	--	1E-06					
		Exposure Point Total						1E-06					
	Exposure Medium Total							1E-06					
Medium Total								1E-06					
Surface Water	Surface Water	Turkey Creek	Arsenic	1E-07	--	2E-08	--	1E-07					
			Manganese (Water)	- -	--	- -	--	- -					
			Chemical Total	1E-07	--	2E-08	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								1E-07					
Sediment	Sediment	Gullies	Benzo(a)pyrene	4E-08	--	4E-08	--	8E-08					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	2E-06	--	6E-07	--	3E-06					
			Barium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Chemical Total	2E-06	--	6E-07	--	3E-06					
		Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
Medium Total								3E-06					
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -					
			Arsenic	5E-06	--	1E-06	--	7E-06					
			Iron	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	5E-06	--	1E-06	--	7E-06					
		Exposure Point Total						7E-06					
	Exposure Medium Total							7E-06					
Medium Total								7E-06					
Receptor Total							Receptor Risk Total	5E-04					

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	4E-10	--	--	--	4E-10	Liver	0.0000008	--	--	0.0000008
			Benzo(a)anthracene	2E-06	--	8E-07	--	3E-06	NA	--	--	--	--
			Benzo(a)pyrene	2E-05	--	7E-06	--	3E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	2E-06	--	8E-07	--	3E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	4E-06	--	1E-06	--	5E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-06	--	4E-07	--	1E-06	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.00002	--	0.000006	0.00002
			Aluminum	--	--	--	--	--	CNS	0.2	--	--	0.2
			Antimony	--	--	--	--	--	Blood	0.2	--	--	0.2
			Arsenic	1E-05	--	9E-07	--	1E-05	Skin, CVS	0.3	--	0.02	0.3
			Copper	--	--	--	--	--	GS	0.02	--	--	0.02
			Iron	--	--	--	--	--	None Reported	0.9	--	--	0.9
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.06	--	--	0.06
			Vanadium	--	--	--	--	--	Kidney	0.4	--	--	0.4
			Chemical Total	4E-05	--	1E-05	--	5E-05		2	--	0.02	2
		Exposure Point Total						5E-05					2
	Exposure Medium Total							5E-05					2
	Air	SWMU 16	Trichloroethene	--	6E-09	--	--	6E-09	Liver	--	0.00005	--	0.00005
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0005	--	0.0005
			Aluminum	--	--	--	--	--	CNS	--	0.01	--	0.01
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	6E-09	--	--	6E-09	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.02	--	0.02
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-08	--	--	1E-08		--	0.03	--	0.03
		Exposure Point Total						1E-08					0.03
	Exposure Medium Total							1E-08					0.03
Medium Total								5E-05					2

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	2E-06	--	1E-07	--	3E-06	Liver	0.002	--	0.00010	0.003
			1,1,2-Trichloroethane	9E-06	--	3E-07	--	9E-06	Blood	0.4	--	0.01	0.4
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.02	--	0.0009	0.02
			1,2,3-Trichloropropane	2E-08	--	9E-10	--	2E-08	Blood	0.02	--	0.0009	0.02
			1,2-Dichloroethane	1E-06	--	2E-08	--	1E-06	None Reported	0.007	--	0.0001	0.007
			Benzene	8E-07	--	4E-08	--	8E-07	Blood	0.04	--	0.002	0.04
			Bromodichloromethane	7E-07	--	2E-08	--	8E-07	Kidney	0.007	--	0.0002	0.007
			Carbon Tetrachloride	3E-06	--	2E-07	--	3E-06	Liver	0.4	--	0.03	0.4
			Chloroform	--	--	--	--	--	Liver	0.04	--	0.001	0.04
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	3	--	0.1	3
			Methylene Chloride	2E-07	--	2E-09	--	2E-07	Liver	0.004	--	0.00005	0.004
			Tetrachloroethene	5E-05	--	9E-06	--	6E-05	Liver	0.1	--	0.02	0.1
			Toluene	--	--	--	--	--	Liver, Kidney	0.009	--	0.001	0.01
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.01	--	0.0004	0.01
			Trichloroethene	2E-03	--	1E-04	--	2E-03	Liver	4	--	0.2	4
			Vinyl Chloride	3E-04	--	5E-06	--	3E-04	Liver	0.8	--	0.01	0.8
			Pyridine	--	--	--	--	--	Liver	0.2	--	0.0009	0.2
			2-Nitrotoluene	3E-07	--	1E-08	--	3E-07	Spleen	0.002	--	0.00007	0.002
			2,4,6-Trinitrotoluene	7E-08	--	6E-10	--	7E-08	Liver	0.05	--	0.0004	0.05
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.6	--	0.008	0.6
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.3	--	0.02	0.4
			RDX	2E-05	--	6E-08	--	2E-05	Prostate	0.8	--	0.002	0.8
			Aluminum	--	--	--	--	--	CNS	2	--	0.002	2
			Antimony	--	--	--	--	--	Blood	0.2	--	0.001	0.2
			Arsenic	7E-05	--	7E-08	--	7E-05	Skin, CVS	2	--	0.002	2
			Barium	--	--	--	--	--	Kidney	0.4	--	0.006	0.4
			Beryllium	--	--	--	--	--	GS	0.09	--	0.01	0.1
			Cadmium	--	--	--	--	--	Kidney	0.09	--	0.002	0.09
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	1	--	0.09	1
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.4	--	0.0004	0.4
			Iron	--	--	--	--	--	None Reported	9	--	0.01	9
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	2	--	0.0009	2
			Manganese (Water)	--	--	--	--	--	CNS	20	--	0.5	20
			Nickel	--	--	--	--	--	Body Weight	0.7	--	0.004	0.7

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--	Kidney	3	--	0.1	3
			Chemical Total	3E-03	--	1E-04	--	3E-03		51	--	1	52
		Exposure Point Total						3E-03					52
	Exposure Medium Total							3E-03					52
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	5E-07	--	--	5E-07	NA	--	--	--	--
			1,1,2-Trichloroethane	--	3E-06	--	--	3E-06	NA	--	--	--	--
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	0.007	--	0.007
			1,2,3-Trichloropropane	--	--	--	--	--	Blood	--	0.03	--	0.03
			1,2-Dichloroethane	--	4E-07	--	--	4E-07	NA	--	0.04	--	0.04
			Benzene	--	2E-07	--	--	2E-07	Blood	--	0.05	--	0.05
			Bromodichloromethane	--	--	--	--	--	NA	--	--	--	--
			Carbon Tetrachloride	--	4E-07	--	--	4E-07	Liver	--	0.2	--	0.2
			Chloroform	--	1E-06	--	--	1E-06	Liver	--	0.01	--	0.01
			cis-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Methylene Chloride	--	1E-08	--	--	1E-08	Liver	--	0.0001	--	0.0001
			Tetrachloroethene	--	6E-07	--	--	6E-07	Liver	--	0.003	--	0.003
			Toluene	--	--	--	--	--	NA	--	0.007	--	0.007
			trans-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Trichloroethene	--	4E-04	--	--	4E-04	Liver	--	4	--	4
			Vinyl Chloride	--	1E-06	--	--	1E-06	Liver	--	0.04	--	0.04
			Pyridine	--	--	--	--	--	NA	--	--	--	--
			2-Nitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2,4,6-Trinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			RDX	--	--	--	--	--	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	--	--	--	--
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	--	--	--	--	NA	--	--	--	--
			Barium	--	--	--	--	--	Fetus	--	--	--	--
			Beryllium	--	--	--	--	--	NA	--	--	--	--
			Cadmium	--	--	--	--	--	Kidney	--	--	--	--
			Chromium	--	--	--	--	--	Lungs	--	--	--	--
			Cobalt	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Nickel	--	--	--	--	--	NA	--	--	--	--
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	4E-04	--	--	4E-04		--	5	--	5
		Exposure Point Total						4E-04					5
	Exposure Medium Total							3E-03					57
Medium Total								3E-03					57
Surface Water	Surface Water	Gullies	Trichloroethene	4E-08	--	4E-08	--	8E-08	Liver	0.00008	--	0.00007	0.0002
			RDX	4E-07	--	2E-08	--	4E-07	Prostate	0.02	--	0.0006	0.02
			Aluminum	--	--	--	--	--	CNS	0.005	--	0.0003	0.006
			Antimony	--	--	--	--	--	Blood	0.03	--	0.01	0.04
			Arsenic	4E-07	--	2E-08	--	4E-07	Skin, CVS	0.009	--	0.0006	0.010
			Barium	--	--	--	--	--	Kidney	0.005	--	0.005	0.011
			Cadmium	--	--	--	--	--	Kidney	0.009	--	0.01	0.02
			Chromium	--	--	--	--	--	Felotoxicity, GS. Bone	0.002	--	0.01	0.01
			Iron	--	--	--	--	--	None Reported	0.02	--	0.001	0.02
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.01	--	0.02	0.03
			Vanadium	--	--	--	--	--	Kidney	0.010	--	0.03	0.04
			Zinc	--	--	--	--	--	Blood	0.003	--	0.0001	0.003
			Chemical Total	8E-07	--	8E-08	--	9E-07		0.1	--	0.1	0.2
		Exposure Point Total						9E-07					0.2
	Exposure Medium Total							9E-07					0.2
Medium Total								9E-07					0.2
Surface Water	Surface Water	Turkey Creek	Arsenic	9E-08	--	6E-09	--	1E-07	Skin, CVS	0.002	--	0.0002	0.002
			Manganese (Water)	--	--	--	--	--	CNS	0.04	--	0.06	0.10
			Chemical Total	9E-08	--	6E-09	--	1E-07		0.04	--	0.06	0.1
		Exposure Point Total						1E-07					0.1
	Exposure Medium Total							1E-07					0.1
Medium Total								1E-07					0.1

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	3E-08	--	2E-08	--	4E-08	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.01	--	--	0.01
			Antimony	--	--	--	--	--	Blood	0.1	--	--	0.1
			Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.04	--	0.007	0.05
			Barium	--	--	--	--	--	Kidney	0.02	--	--	0.02
			Cadmium	--	--	--	--	--	Kidney	0.03	--	0.003	0.03
			Copper	--	--	--	--	--	GS	0.03	--	--	0.03
			Iron	--	--	--	--	--	None Reported	0.2	--	--	0.2
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.02	--	--	0.02
			Mercury	--	--	--	--	--	CNS	0.003	--	--	0.003
			Nickel	--	--	--	--	--	Body Weight	0.008	--	--	0.008
			Vanadium	--	--	--	--	--	Kidney	0.04	--	--	0.04
			Zinc	--	--	--	--	--	Blood	0.02	--	--	0.02
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.5	--	0.01	0.5
		Exposure Point Total						2E-06					0.5
	Exposure Medium Total							2E-06					0.5
Medium Total								2E-06					0.5
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.010	--	--	0.010
			Arsenic	4E-06	--	6E-07	--	4E-06	Skin, CVS	0.10	--	0.02	0.1
			Iron	--	--	--	--	--	None Reported	0.4	--	--	0.4
			Manganese (Soil)	--	--	--	--	--	CNS	0.03	--	--	0.03
			Vanadium	--	--	--	--	--	Kidney	0.05	--	--	0.05
			Chemical Total	4E-06	--	6E-07	--	4E-06		0.6	--	0.02	0.6
		Exposure Point Total						4E-06					0.6
	Exposure Medium Total							4E-06					0.6
Medium Total								4E-06					0.6
Receptor Total							Receptor Risk Total	3E-03				Receptor HI Total	60

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Total Blood HI	4
Total Body Weight HI	0.7
Total CNS HI	23
Total CVS HI	3
Total GS HI	1.3
Total Immune HI	0.4
Total Kidney HI	4
Total Liver HI	11
Total Skin HI	2
Total Nasal HI	0.0005
Total None Reported HI	13
Total Prostate HI	0.8
Total Spleen HI	0.002
Total Bone HI	1
Total Fetotoxicity HI	1

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	2E-10	--	--	--	2E-10	Liver	0.00000008	--	--	0.00000008
			Benzo(a)anthracene	9E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Benzo(a)pyrene	8E-06	--	4E-06	--	1E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	9E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-06	--	8E-07	--	2E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4E-07	--	2E-07	--	6E-07	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000002	--	0.0000010	0.000003
			Aluminum	--	--	--	--	--	CNS	0.02	--	--	0.02
			Antimony	--	--	--	--	--	Blood	0.02	--	--	0.02
			Arsenic	4E-06	--	5E-07	--	5E-06	Skin, CVS	0.03	--	0.003	0.03
			Copper	--	--	--	--	--	GS	0.002	--	--	0.002
			Iron	--	--	--	--	--	None Reported	0.1	--	--	0.1
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.007	--	--	0.007
			Vanadium	--	--	--	--	--	Kidney	0.04	--	--	0.04
			Chemical Total	2E-05	--	7E-06	--	2E-05		0.2	--	0.003	0.2
		Exposure Point Total						2E-05					0.2
	Exposure Medium Total							2E-05					0.2
	Air	SWMU 16	Trichloroethene	--	6E-09	--	--	6E-09	Liver	--	0.00002	--	0.00002
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0002	--	0.0002
			Aluminum	--	--	--	--	--	CNS	--	0.003	--	0.003
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	7E-09	--	--	7E-09	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.005	--	0.005
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-08	--	--	1E-08		--	0.008	--	0.008
		Exposure Point Total						1E-08					0.008
	Exposure Medium Total							1E-08					0.008
Medium Total								2E-05					0.2

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	3E-06	--	2E-07	--	3E-06	Liver	0.0007	--	0.00006	0.0008
			1,1,2-Trichloroethane	1E-05	--	6E-07	--	1E-05	Blood	0.1	--	0.008	0.1
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.006	--	0.0005	0.006
			1,2,3-Trichloropropane	3E-08	--	2E-09	--	3E-08	Blood	0.007	--	0.0005	0.007
			1,2-Dichloroethane	1E-06	--	4E-08	--	1E-06	None Reported	0.002	--	0.00007	0.002
			Benzene	9E-07	--	9E-08	--	1E-06	Blood	0.01	--	0.001	0.01
			Bromodichloromethane	8E-07	--	5E-08	--	9E-07	Kidney	0.002	--	0.0001	0.002
			Carbon Tetrachloride	3E-06	--	6E-07	--	4E-06	Liver	0.1	--	0.02	0.1
			Chloroform	--	--	--	--	--	Liver	0.01	--	0.0007	0.01
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.8	--	0.06	0.8
			Methylene Chloride	2E-07	--	5E-09	--	2E-07	Liver	0.001	--	0.00003	0.001
			Tetrachloroethene	6E-05	--	2E-05	--	8E-05	Liver	0.03	--	0.01	0.04
			Toluene	--	--	--	--	--	Liver, Kidney	0.003	--	0.0006	0.003
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.004	--	0.0002	0.004
			Trichloroethene	3E-03	--	3E-04	--	3E-03	Liver	1	--	0.1	1
			Vinyl Chloride	3E-04	--	1E-05	--	4E-04	Liver	0.2	--	0.008	0.2
			Pyridine	--	--	--	--	--	Liver	0.05	--	0.0005	0.05
			2-Nitrotoluene	4E-07	--	3E-08	--	4E-07	Spleen	0.0005	--	0.00004	0.0005
			2,4,6-Trinitrotoluene	8E-08	--	1E-09	--	8E-08	Liver	0.02	--	0.0003	0.02
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.2	--	0.005	0.2
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.1	--	0.01	0.1
			RDX	3E-05	--	1E-07	--	3E-05	Prostate	0.2	--	0.001	0.2
			Aluminum	--	--	--	--	--	CNS	0.6	--	0.001	0.6
			Antimony	--	--	--	--	--	Blood	0.05	--	0.0008	0.05
			Arsenic	7E-05	--	2E-07	--	7E-05	Skin, CVS	0.5	--	0.001	0.5
			Barium	--	--	--	--	--	Kidney	0.1	--	0.004	0.1
			Beryllium	--	--	--	--	--	GS	0.03	--	0.008	0.03
			Cadmium	--	--	--	--	--	Kidney	0.02	--	0.001	0.03
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.3	--	0.05	0.3
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.1	--	0.0003	0.1
			Iron	--	--	--	--	--	None Reported	3	--	0.006	3
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.5	--	0.0005	0.5
			Manganese (Water)	--	--	--	--	--	CNS	6	--	0.3	6
			Nickel	--	--	--	--	--	Body Weight	0.2	--	0.002	0.2

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--	Kidney	0.8	--	0.07	0.9
			Chemical Total	3E-03	--	3E-04	--	3E-03		15	--	0.7	15
		Exposure Point Total						3E-03					15
	Exposure Medium Total							3E-03					15
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	5E-07	--	--	5E-07	NA	--	--	--	--
			1,1,2-Trichloroethane	--	2E-06	--	--	2E-06	NA	--	--	--	--
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	0.002	--	0.002
			1,2,3-Trichloropropane	--	--	--	--	--	Blood	--	0.007	--	0.007
			1,2-Dichloroethane	--	3E-07	--	--	3E-07	NA	--	0.008	--	0.008
			Benzene	--	1E-07	--	--	1E-07	Blood	--	0.01	--	0.01
			Bromodichloromethane	--	--	--	--	--	NA	--	--	--	--
			Carbon Tetrachloride	--	3E-07	--	--	3E-07	Liver	--	0.03	--	0.03
			Chloroform	--	9E-07	--	--	9E-07	Liver	--	0.002	--	0.002
			cis-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Methylene Chloride	--	1E-08	--	--	1E-08	Liver	--	0.00003	--	0.00003
			Tetrachloroethene	--	5E-07	--	--	5E-07	Liver	--	0.0005	--	0.0005
			Toluene	--	--	--	--	--	NA	--	0.001	--	0.001
			trans-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Trichloroethene	--	4E-04	--	--	4E-04	Liver	--	0.9	--	0.9
			Vinyl Chloride	--	1E-06	--	--	1E-06	Liver	--	0.008	--	0.008
			Pyridine	--	--	--	--	--	NA	--	--	--	--
			2-Nitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2,4,6-Trinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			RDX	--	--	--	--	--	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	--	--	--	--
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	--	--	--	--	NA	--	--	--	--
			Barium	--	--	--	--	--	Fetus	--	--	--	--
			Beryllium	--	--	--	--	--	NA	--	--	--	--
			Cadmium	--	--	--	--	--	Kidney	--	--	--	--
			Chromium	--	--	--	--	--	Lungs	--	--	--	--
			Cobalt	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Nickel	--	--	--	--	--	NA	--	--	--	--
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	4E-04	--	--	4E-04		--	1	--	1
		Exposure Point Total						4E-04					1
	Exposure Medium Total							4E-03					16
Medium Total								4E-03					16
Surface Water	Surface Water	Gullies	Trichloroethene	7E-09	--	1E-07	--	1E-07	Liver	0.000003	--	0.00004	0.00005
			RDX	7E-08	--	4E-08	--	1E-07	Prostate	0.0007	--	0.0004	0.0010
			Aluminum	--	--	--	--	--	CNS	0.0002	--	0.0002	0.0004
			Antimony	--	--	--	--	--	Blood	0.001	--	0.01	0.01
			Arsenic	6E-08	--	6E-08	--	1E-07	Skin, CVS	0.0004	--	0.0004	0.0008
			Barium	--	--	--	--	--	Kidney	0.0002	--	0.003	0.003
			Cadmium	--	--	--	--	--	Kidney	0.0004	--	0.007	0.007
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.0001	--	0.007	0.007
			Iron	--	--	--	--	--	None Reported	0.0008	--	0.0007	0.002
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.0004	--	0.01	0.01
			Vanadium	--	--	--	--	--	Kidney	0.0004	--	0.02	0.02
			Zinc	--	--	--	--	--	Blood	0.0001	--	0.00008	0.0002
			Chemical Total	1E-07	--	2E-07	--	3E-07		0.005	--	0.05	0.06
		Exposure Point Total						3E-07					0.06
	Exposure Medium Total							3E-07					0.06
Medium Total								3E-07					0.06
Surface Water	Surface Water	Turkey Creek	Arsenic	2E-08	--	1E-08	--	3E-08	Skin, CVS	0.0001	--	0.00009	0.0002
			Manganese (Water)	--	--	--	--	--	CNS	0.002	--	0.04	0.04
			Chemical Total	2E-08	--	1E-08	--	3E-08		0.002	--	0.04	0.04
		Exposure Point Total						3E-08					0.04
	Exposure Medium Total							3E-08					0.04
Medium Total								3E-08					0.04

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	1E-08	--	1E-08	--	2E-08	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Arsenic	7E-07	--	2E-07	--	8E-07	Skin, CVS	0.004	--	0.001	0.006
			Barium	--	--	--	--	--	Kidney	0.002	--	--	0.002
			Cadmium	--	--	--	--	--	Kidney	0.003	--	0.0005	0.003
			Copper	--	--	--	--	--	GS	0.004	--	--	0.004
			Iron	--	--	--	--	--	None Reported	0.02	--	--	0.02
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Mercury	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Nickel	--	--	--	--	--	Body Weight	0.0008	--	--	0.0008
			Vanadium	--	--	--	--	--	Kidney	0.004	--	--	0.004
			Zinc	--	--	--	--	--	Blood	0.002	--	--	0.002
			Chemical Total	7E-07	--	2E-07	--	9E-07		0.06	--	0.002	0.06
		Exposure Point Total						9E-07					0.06
	Exposure Medium Total							9E-07					0.06
Medium Total								9E-07					0.06
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Arsenic	2E-06	--	4E-07	--	2E-06	Skin, CVS	0.01	--	0.003	0.01
			Iron	--	--	--	--	--	None Reported	0.04	--	--	0.04
			Manganese (Soil)	--	--	--	--	--	CNS	0.003	--	--	0.003
			Vanadium	--	--	--	--	--	Kidney	0.005	--	--	0.005
			Chemical Total	2E-06	--	4E-07	--	2E-06		0.06	--	0.003	0.06
		Exposure Point Total						2E-06					0.06
	Exposure Medium Total							2E-06					0.06
Medium Total								2E-06					0.06
Receptor Total							Receptor Risk Total	4E-03				Receptor HI Total	17

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Total Blood HI	1
Total Body Weight HI	0.2
Total CNS HI	7
Total CVS HI	0.6
Total GS HI	0.39
Total Immune HI	0.1
Total Kidney HI	1
Total Liver HI	3
Total Skin HI	0.5
Total Nasal HI	0.0002
Total None Reported HI	3
Total Prostate HI	0.2
Total Spleen HI	0.0005
Total Bone HI	0.4
Total Fetotoxicity HI	0.4

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	6E-10	--	--	--	6E-10					
			Benzo(a)anthracene	3E-06	--	1E-06	--	4E-06					
			Benzo(a)pyrene	3E-05	--	1E-05	--	4E-05					
			Benzo(b)fluoranthene	3E-06	--	1E-06	--	4E-06					
			Dibenzo(a,h)anthracene	5E-06	--	2E-06	--	7E-06					
			Indeno(1,2,3-cd)pyrene	1E-06	--	6E-07	--	2E-06					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	1E-05	--	1E-06	--	2E-05					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	5E-05	--	2E-05	--	7E-05					
		Exposure Point Total						7E-05					
	Exposure Medium Total							7E-05					
	Air	SWMU 16	Trichloroethene	--	1E-08	--	--	1E-08					
			Benzo(a)anthracene	--	--	--	--	--					
			Benzo(a)pyrene	--	1E-09	--	--	1E-09					
			Benzo(b)fluoranthene	--	--	--	--	--					
			Dibenzo(a,h)anthracene	--	--	--	--	--					
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	--	1E-08	--	--	1E-08					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	3E-08	--	--	3E-08					
		Exposure Point Total						3E-08					
	Exposure Medium Total							3E-08					
Medium Total								7E-05					

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	5E-06	--	3E-07	--	6E-06					
			1,1,2-Trichloroethane	2E-05	--	9E-07	--	2E-05					
			1,1-Dichloroethene	--	--	--	--	--					
			1,2,3-Trichloropropane	5E-08	--	3E-09	--	5E-08					
			1,2-Dichloroethane	2E-06	--	6E-08	--	2E-06					
			Benzene	2E-06	--	1E-07	--	2E-06					
			Bromodichloromethane	2E-06	--	7E-08	--	2E-06					
			Carbon Tetrachloride	6E-06	--	8E-07	--	7E-06					
			Chloroform	--	--	--	--	--					
			cis-1,2-Dichloroethene	--	--	--	--	--					
			Methylene Chloride	4E-07	--	7E-09	--	4E-07					
			Tetrachloroethene	1E-04	--	3E-05	--	1E-04					
			Toluene	--	--	--	--	--					
			trans-1,2-Dichloroethene	--	--	--	--	--					
			Trichloroethene	5E-03	--	4E-04	--	5E-03					
			Vinyl Chloride	6E-04	--	2E-05	--	7E-04					
			Pyridine	--	--	--	--	--					
			2-Nitrotoluene	7E-07	--	5E-08	--	7E-07					
			2,4,6-Trinitrotoluene	2E-07	--	2E-09	--	2E-07					
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--					
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--					
			RDX	5E-05	--	2E-07	--	5E-05					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	1E-04	--	2E-07	--	1E-04					
			Barium	--	--	--	--	--					
			Beryllium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Chromium	--	--	--	--	--					
			Cobalt	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Lithium	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Nickel	--	--	--	--	--					

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--					
			Chemical Total	6E-03	--	5E-04	--	6E-03					
		Exposure Point Total						6E-03					
	Exposure Medium Total							6E-03					
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	1E-06	--	--	1E-06					
			1,1,2-Trichloroethane	--	5E-06	--	--	5E-06					
			1,1-Dichloroethene	--	--	--	--	--					
			1,2,3-Trichloropropane	--	--	--	--	--					
			1,2-Dichloroethane	--	7E-07	--	--	7E-07					
			Benzene	--	3E-07	--	--	3E-07					
			Bromodichloromethane	--	--	--	--	--					
			Carbon Tetrachloride	--	7E-07	--	--	7E-07					
			Chloroform	--	2E-06	--	--	2E-06					
			cis-1,2-Dichloroethene	--	--	--	--	--					
			Methylene Chloride	--	3E-08	--	--	3E-08					
			Tetrachloroethene	--	1E-06	--	--	1E-06					
			Toluene	--	--	--	--	--					
			trans-1,2-Dichloroethene	--	--	--	--	--					
			Trichloroethene	--	8E-04	--	--	8E-04					
			Vinyl Chloride	--	3E-06	--	--	3E-06					
			Pyridine	--	--	--	--	--					
			2-Nitrotoluene	--	--	--	--	--					
			2,4,6-Trinitrotoluene	--	--	--	--	--					
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--					
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--					
			RDX	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	--	--	--	--	--					
			Barium	--	--	--	--	--					
			Beryllium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Chromium	--	--	--	--	--					
			Cobalt	--	--	--	--	--					
			Iron	--	--	--	--	--					

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--					
			Lithium	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Nickel	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	8E-04	--	--	8E-04					
		Exposure Point Total						8E-04					
	Exposure Medium Total							7E-03					
Medium Total								7E-03					
Surface Water	Surface Water	Gullies	Trichloroethene	5E-08	--	1E-07	--	2E-07					
			RDX	5E-07	--	6E-08	--	6E-07					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	4E-07	--	8E-08	--	5E-07					
			Barium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Chromium	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Zinc	--	--	--	--	--					
			Chemical Total	1E-06	--	3E-07	--	1E-06					
		Exposure Point Total						1E-06					
	Exposure Medium Total							1E-06					
Medium Total								1E-06					
Surface Water	Surface Water	Turkey Creek	Arsenic	1E-07	--	2E-08	--	1E-07					
			Manganese (Water)	--	--	--	--	--					
			Chemical Total	1E-07	--	2E-08	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								1E-07					

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	4E-08	--	3E-08	--	7E-08					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	2E-06	--	4E-07	--	3E-06					
			Barium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Chemical Total	2E-06	--	5E-07	--	3E-06					
		Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
Medium Total								3E-06					
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -					
			Arsenic	5E-06	--	1E-06	--	6E-06					
			Iron	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	5E-06	--	1E-06	--	6E-06					
		Exposure Point Total						6E-06					
	Exposure Medium Total							6E-06					
Medium Total								6E-06					
Receptor Total							Receptor Risk Total	7E-03					

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-12	--	--	--	1E-12	Liver	0.000000001	--	--	0.000000001
			Benzo(a)anthracene	6E-09	--	1E-09	--	7E-09	NA	--	--	--	--
			Benzo(a)pyrene	5E-08	--	9E-09	--	6E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	6E-09	--	1E-09	--	7E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-08	--	2E-09	--	1E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-09	--	5E-10	--	3E-09	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.00000003	--	0.000000005	0.00000004
			Aluminum	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Antimony	--	--	--	--	--	Blood	0.0003	--	--	0.0003
			Arsenic	3E-08	--	1E-09	--	3E-08	Skin, CVS	0.0005	--	0.00002	0.0005
			Copper	--	--	--	--	--	GS	0.00004	--	--	0.00004
			Iron	--	--	--	--	--	None Reported	0.002	--	--	0.002
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0001	--	--	0.0001
			Vanadium	--	--	--	--	--	Kidney	0.0007	--	--	0.0007
			Chemical Total	1E-07	--	1E-08	--	1E-07		0.004	--	0.00002	0.004
		Exposure Point Total						1E-07					0.004
	Exposure Medium Total							1E-07					0.004
	Air	SWMU 16	Trichloroethene	--	8E-11	--	--	8E-11	Liver	--	0.0000005	--	0.0000005
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	7E-12	--	--	7E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.000005	--	0.000005
			Aluminum	--	--	--	--	--	CNS	--	0.00010	--	0.00010
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	9E-11	--	--	9E-11	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0002	--	0.0002
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	2E-10	--	--	2E-10		--	0.0003	--	0.0003
		Exposure Point Total						2E-10					0.0003
	Exposure Medium Total							2E-10					0.0003
Medium Total								1E-07					0.004

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Gullies	Trichloroethene	--	--	2E-09	--	2E-09	Liver	--	--	0.000002	0.000002
			RDX	--	--	8E-10	--	8E-10	Prostate	--	--	0.00002	0.00002
			Aluminum	--	--	--	--	--	CNS	--	--	0.000006	0.000006
			Antimony	--	--	--	--	--	Blood	--	--	0.0002	0.0002
			Arsenic	--	--	7E-10	--	7E-10	Skin, CVS	--	--	0.00001	0.00001
			Barium	--	--	--	--	--	Kidney	--	--	0.00009	0.00009
			Cadmium	--	--	--	--	--	Kidney	--	--	0.0002	0.0002
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	--	--	0.0002	0.0002
			Iron	--	--	--	--	--	None Reported	--	--	0.00002	0.00002
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	--	--	0.0003	0.0003
			Vanadium	--	--	--	--	--	Kidney	--	--	0.0005	0.0005
			Zinc	--	--	--	--	--	Blood	--	--	0.000002	0.000002
			Chemical Total	--	--	3E-09	--	3E-09		--	--	0.002	0.002
		Exposure Point Total						3E-09					0.002
	Exposure Medium Total							3E-09					0.002
Medium Total								3E-09					0.002
Surface Water	Surface Water	Turkey Creek	Arsenic	--	--	2E-10	--	2E-10	Skin, CVS	--	--	0.000003	0.000003
			Manganese (Water)	--	--	--	--	--	CNS	--	--	0.001	0.001
			Chemical Total	--	--	2E-10	--	2E-10		--	--	0.001	0.001
		Exposure Point Total						2E-10					0.001
	Exposure Medium Total							2E-10					0.001
Medium Total								2E-10					0.001

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	9E-10	--	2E-10	--	1E-09	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Antimony	--	--	--	--	--	Blood	0.003	--	--	0.003
			Arsenic	6E-08	--	2E-09	--	6E-08	Skin, CVS	0.001	--	0.00004	0.001
			Barium	--	--	--	--	--	Kidney	0.0006	--	--	0.0006
			Cadmium	--	--	--	--	--	Kidney	0.0007	--	0.00002	0.0007
			Copper	--	--	--	--	--	GS	0.0009	--	--	0.0009
			Iron	--	--	--	--	--	None Reported	0.005	--	--	0.005
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0004	--	--	0.0004
			Mercury	--	--	--	--	--	CNS	0.00007	--	--	0.00007
			Nickel	--	--	--	--	--	Body Weight	0.0002	--	--	0.0002
			Vanadium	--	--	--	--	--	Kidney	0.0009	--	--	0.0009
			Zinc	--	--	--	--	--	Blood	0.0005	--	--	0.0005
			Chemical Total	6E-08	--	3E-09	--	6E-08		0.01	--	0.00006	0.01
		Exposure Point Total						6E-08					0.01
	Exposure Medium Total							6E-08					0.01
Medium Total								6E-08					0.01
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.0002	--	--	0.0002
			Arsenic	1E-07	--	6E-09	--	1E-07	Skin, CVS	0.002	--	0.00010	0.003
			Iron	--	--	--	--	--	None Reported	0.010	--	--	0.010
			Manganese (Soil)	--	--	--	--	--	CNS	0.0006	--	--	0.0006
			Vanadium	--	--	--	--	--	Kidney	0.001	--	--	0.001
			Chemical Total	1E-07	--	6E-09	--	1E-07		0.01	--	0.00010	0.01
		Exposure Point Total						1E-07					0.01
	Exposure Medium Total							1E-07					0.01
Medium Total								1E-07					0.01
Receptor Total							Receptor Risk Total	3E-07				Receptor HI Total	0.03

Total Blood HI	0.004
Total Body Weight HI	0.0002
Total CNS HI	0.004
Total CVS HI	0.004
Total GS HI	0.001
Total Kidney HI	0.005
Total Liver HI	0.000002
Total Skin HI	0.004
Total Nasal HI	0.000005
Total None Reported HI	0.02
Total Prostate HI	0.00002

4/12/2005

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	2E-11	--	--	--	2E-11	Liver	0.00000003	--	--	0.00000003
			Benzo(a)anthracene	1E-07	--	2E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	9E-07	--	2E-07	--	1E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-07	--	2E-08	--	1E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-07	--	3E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	5E-08	--	9E-09	--	6E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000006	--	0.0000001	0.0000007
			Aluminum	--	--	--	--	--	CNS	0.006	--	--	0.006
			Antimony	--	--	--	--	--	Blood	0.006	--	--	0.006
			Arsenic	5E-07	--	2E-08	--	5E-07	Skin, CVS	0.009	--	0.0004	0.009
			Copper	--	--	--	--	--	GS	0.0008	--	--	0.0008
			Iron	--	--	--	--	--	None Reported	0.03	--	--	0.03
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Vanadium	--	--	--	--	--	Kidney	0.01	--	--	0.01
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.07	--	0.0004	0.07
		Exposure Point Total						2E-06					0.07
	Exposure Medium Total							2E-06					0.07
	Air	SWMU 16	Trichloroethene	--	1E-09	--	--	1E-09	Liver	--	0.00001	--	0.00001
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0001	--	0.0001
			Aluminum	--	--	--	--	--	CNS	--	0.002	--	0.002
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.003	--	0.003
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	3E-09	--	--	3E-09		--	0.005	--	0.005
		Exposure Point Total						3E-09					0.005
	Exposure Medium Total							3E-09					0.005
Medium Total								2E-06					0.07

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	3E-07	--	8E-09	--	3E-07	Liver	0.0002	--	0.000005	0.0002
			1,1,2-Trichloroethane	1E-06	--	2E-08	--	1E-06	Blood	0.04	--	0.0007	0.04
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.002	--	0.00005	0.002
			1,2,3-Trichloropropane	3E-09	--	7E-11	--	3E-09	Blood	0.002	--	0.00005	0.002
			1,2-Dichloroethane	2E-07	--	1E-09	--	2E-07	None Reported	0.0006	--	0.000006	0.0006
			Benzene	1E-07	--	3E-09	--	1E-07	Blood	0.004	--	0.0001	0.004
			Bromodichloromethane	1E-07	--	2E-09	--	1E-07	Kidney	0.0006	--	0.00001	0.0006
			Carbon Tetrachloride	4E-07	--	2E-08	--	4E-07	Liver	0.03	--	0.002	0.03
			Chloroform	--	--	--	--	--	Liver	0.004	--	0.00007	0.004
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.2	--	0.006	0.3
			Methylene Chloride	2E-08	--	2E-10	--	2E-08	Liver	0.0004	--	0.000003	0.0004
			Tetrachloroethene	6E-06	--	8E-07	--	7E-06	Liver	0.009	--	0.001	0.01
			Toluene	--	--	--	--	--	Liver, Kidney	0.0008	--	0.00006	0.0009
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.001	--	0.00002	0.001
			Trichloroethene	3E-04	--	1E-05	--	3E-04	Liver	0.4	--	0.01	0.4
			Vinyl Chloride	4E-05	--	4E-07	--	4E-05	Liver	0.07	--	0.0007	0.07
			Pyridine	--	--	--	--	--	Liver	0.02	--	0.00005	0.02
			2-Nitrotoluene	4E-08	--	1E-09	--	4E-08	Spleen	0.0001	--	0.000004	0.0002
			2,4,6-Trinitrotoluene	9E-09	--	5E-11	--	9E-09	Liver	0.005	--	0.00002	0.005
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.05	--	0.0004	0.05
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.03	--	0.0009	0.03
			RDX	3E-06	--	5E-09	--	3E-06	Prostate	0.07	--	0.0001	0.07
			Aluminum	--	--	--	--	--	CNS	0.2	--	0.0001	0.2
			Antimony	--	--	--	--	--	Blood	0.02	--	0.00006	0.02
			Arsenic	9E-06	--	5E-09	--	9E-06	Skin, CVS	0.2	--	0.00008	0.2
			Barium	--	--	--	--	--	Kidney	0.03	--	0.0003	0.04
			Beryllium	--	--	--	--	--	GS	0.008	--	0.0006	0.009
			Cadmium	--	--	--	--	--	Kidney	0.008	--	0.00009	0.008
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.09	--	0.004	0.10
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.04	--	0.00002	0.04
			Iron	--	--	--	--	--	None Reported	0.8	--	0.0005	0.8
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.1	--	0.00004	0.1
			Manganese (Water)	--	--	--	--	--	CNS	2	--	0.02	2
			Nickel	--	--	--	--	--	Body Weight	0.06	--	0.0002	0.06

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -	Kidney	0.3	- -	0.005	0.3
			Chemical Total	4E-04	--	1E-05	--	4E-04		5	- -	0.06	5
		Exposure Point Total						4E-04					5
	Exposure Medium Total							4E-04					5
Medium Total								4E-04					5
Receptor Total							Receptor Risk Total	4E-04				Receptor HI Total	5

Total Blood HI	0.3
Total Body Weight HI	0.06
Total CNS HI	2
Total CVS HI	0.2
Total GS HI	0.105
Total Immune HI	0.04
Total Kidney HI	0.3
Total Liver HI	0.6
Total Skin HI	0.2
Total Nasal HI	0.0001
Total None Reported HI	1
Total Prostate HI	0.07
Total Spleen HI	0.0002
Total Bone HI	0.1
Total Fetotoxicity HI	0.1

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	3E-12	--	--	--	3E-12	Liver	0.000000003	--	--	0.000000003
			Benzo(a)anthracene	1E-08	--	4E-09	--	2E-08	NA	--	--	--	--
			Benzo(a)pyrene	1E-07	--	4E-08	--	1E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-08	--	4E-09	--	2E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-08	--	7E-09	--	3E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	6E-09	--	2E-09	--	8E-09	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.00000006	--	0.00000002	0.00000007
			Aluminum	--	--	--	--	--	CNS	0.0006	--	--	0.0006
			Antimony	--	--	--	--	--	Blood	0.0005	--	--	0.0005
			Arsenic	6E-08	--	5E-09	--	7E-08	Skin, CVS	0.0009	--	0.00006	0.0009
			Copper	--	--	--	--	--	GS	0.00007	--	--	0.00007
			Iron	--	--	--	--	--	None Reported	0.003	--	--	0.003
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0002	--	--	0.0002
			Vanadium	--	--	--	--	--	Kidney	0.001	--	--	0.001
			Chemical Total	2E-07	--	6E-08	--	3E-07		0.006	--	0.00006	0.006
		Exposure Point Total						3E-07					0.006
	Exposure Medium Total							3E-07					0.006
	Air	SWMU 16	Trichloroethene	--	2E-11	--	--	2E-11	Liver	--	0.0000001	--	0.0000001
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.000001	--	0.000001
			Aluminum	--	--	--	--	--	CNS	--	0.00002	--	0.00002
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.00004	--	0.00004
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	5E-11	--	--	5E-11		--	0.00006	--	0.00006
		Exposure Point Total						5E-11					0.00006
	Exposure Medium Total							5E-11					0.00006
Medium Total								3E-07					0.007

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Gullies	Trichloroethene	3E-09	--	4E-09	--	7E-09	Liver	0.000003	--	0.000004	0.000007
			RDX	3E-08	--	2E-09	--	4E-08	Prostate	0.0007	--	0.00004	0.0007
			Aluminum	--	--	--	--	--	CNS	0.0002	--	0.00001	0.0002
			Antimony	--	--	--	--	--	Blood	0.001	--	0.0005	0.002
			Arsenic	3E-08	--	2E-09	--	3E-08	Skin, CVS	0.0004	--	0.00003	0.0004
			Barium	--	--	--	--	--	Kidney	0.0002	--	0.0002	0.0004
			Cadmium	--	--	--	--	--	Kidney	0.0004	--	0.0005	0.0008
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.0001	--	0.0005	0.0006
			Iron	--	--	--	--	--	None Reported	0.0008	--	0.00005	0.0009
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.0004	--	0.0007	0.001
			Vanadium	--	--	--	--	--	Kidney	0.0004	--	0.001	0.001
			Zinc	--	--	--	--	--	Blood	0.0001	--	0.000005	0.0001
			Chemical Total	7E-08	--	8E-09	--	7E-08		0.005	--	0.004	0.009
		Exposure Point Total						7E-08					0.009
	Exposure Medium Total							7E-08					0.009
Medium Total								7E-08					0.009
Surface Water	Surface Water	Turkey Creek	Arsenic	7E-09	--	4E-10	--	8E-09	Skin, CVS	0.0001	--	0.000006	0.0001
			Manganese (Water)	--	--	--	--	--	CNS	0.002	--	0.003	0.004
			Chemical Total	7E-09	--	4E-10	--	8E-09		0.002	--	0.003	0.004
		Exposure Point Total						8E-09					0.004
	Exposure Medium Total							8E-09					0.004
Medium Total								8E-09					0.004
Sediment	Sediment	Gullies	Benzo(a)pyrene	2E-09	--	7E-10	--	3E-09	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.0005	--	--	0.0005
			Antimony	--	--	--	--	--	Blood	0.005	--	--	0.005
			Arsenic	1E-07	--	1E-08	--	1E-07	Skin, CVS	0.002	--	0.0001	0.002
			Barium	--	--	--	--	--	Kidney	0.0010	--	--	0.0010
			Cadmium	--	--	--	--	--	Kidney	0.001	--	0.00006	0.001
			Copper	--	--	--	--	--	GS	0.002	--	--	0.002
			Iron	--	--	--	--	--	None Reported	0.009	--	--	0.009
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0007	--	--	0.0007
			Mercury	--	--	--	--	--	CNS	0.0001	--	--	0.0001
			Nickel	--	--	--	--	--	Body Weight	0.0003	--	--	0.0003

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Vanadium	- -	--	- -	--	- -	Kidney	0.002	- -	--	0.002
			Zinc	- -	--	- -	--	- -	Blood	0.0008	- -	--	0.0008
			Chemical Total	1E-07	--	1E-08	--	1E-07		0.02	- -	0.0002	0.02
		Exposure Point Total						1E-07					0.02
	Exposure Medium Total							1E-07					0.02
Medium Total								1E-07					0.02
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -	CNS	0.0002	- -	--	0.0002
			Arsenic	2E-07	--	2E-08	--	2E-07	Skin, CVS	0.002	- -	0.0003	0.002
			Iron	- -	--	- -	--	- -	None Reported	0.008	- -	--	0.008
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.0005	- -	--	0.0005
			Vanadium	- -	--	- -	--	- -	Kidney	0.001	- -	--	0.001
			Chemical Total	2E-07	--	2E-08	--	2E-07		0.01	- -	0.0003	0.01
		Exposure Point Total						2E-07					0.01
	Exposure Medium Total							2E-07					0.01
Medium Total								2E-07					0.01
Receptor Total							Receptor Risk Total	7E-07				Receptor HI Total	0.06

Total Blood HI	0.008
Total Body Weight HI	0.0003
Total CNS HI	0.008
Total CVS HI	0.006
Total GS HI	0.002
Total Kidney HI	0.009
Total Liver HI	0.00001
Total Skin HI	0.006
Total Nasal HI	0.000001
Total None Reported HI	0.02
Total Prostate HI	0.0007

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	SWMU 16	Trichloroethene	6E-12	--	--	--	6E-12	Liver	0.00000006	--	--	0.00000006
			Benzo(a)anthracene	3E-08	--	7E-09	--	3E-08	NA	--	--	--	--
			Benzo(a)pyrene	2E-07	--	6E-08	--	3E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	3E-08	--	7E-09	--	3E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	5E-08	--	1E-08	--	6E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-08	--	3E-09	--	2E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000001	--	0.0000003	0.000002
			Aluminum	--	--	--	--	--	CNS	0.01	--	--	0.01
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Arsenic	1E-07	--	8E-09	--	1E-07	Skin, CVS	0.02	--	0.001	0.02
			Copper	--	--	--	--	--	GS	0.002	--	--	0.002
			Iron	--	--	--	--	--	None Reported	0.07	--	--	0.07
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.005	--	--	0.005
			Vanadium	--	--	--	--	--	Kidney	0.03	--	--	0.03
			Chemical Total	5E-07	--	1E-07	--	6E-07		0.2	--	0.001	0.2
		Exposure Point Total						6E-07					0.2
	Exposure Medium Total							6E-07					0.2
	Air	SWMU 16	Trichloroethene	--	3E-09	--	--	3E-09	Liver	--	0.0002	--	0.0002
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	8E-09	--	--	8E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.002	--	0.002
			Aluminum	--	--	--	--	--	CNS	--	1	--	1
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	1E-07	--	--	1E-07	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	2	--	2
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-07	--	--	1E-07		--	3	--	3
		Exposure Point Total						1E-07					3
	Exposure Medium Total							1E-07					3
Medium Total								7E-07					3

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	--	--	2E-09	--	2E-09	Liver	--	--	0.00001	0.00001
			1,1,2-Trichloroethane	--	--	5E-09	--	5E-09	Blood	--	--	0.002	0.002
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	--	0.0001	0.0001
			1,2,3-Trichloropropane	--	--	2E-11	--	2E-11	Blood	--	--	0.0001	0.0001
			1,2-Dichloroethane	--	--	4E-10	--	4E-10	None Reported	--	--	0.00001	0.00001
			Benzene	--	--	8E-10	--	8E-10	Blood	--	--	0.0002	0.0002
			Bromodichloromethane	--	--	4E-10	--	4E-10	Kidney	--	--	0.00002	0.00002
			Carbon Tetrachloride	--	--	5E-09	--	5E-09	Liver	--	--	0.003	0.003
			Chloroform	--	--	--	--	--	Liver	--	--	0.0001	0.0001
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	--	--	0.01	0.01
			Methylene Chloride	--	--	4E-11	--	4E-11	Liver	--	--	0.000007	0.000007
			Tetrachloroethene	--	--	2E-07	--	2E-07	Liver	--	--	0.002	0.002
			Toluene	--	--	--	--	--	Liver, Kidney	--	--	0.0001	0.0001
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	--	--	0.00005	0.00005
			Trichloroethene	--	--	2E-06	--	2E-06	Liver	--	--	0.03	0.03
			Vinyl Chloride	--	--	1E-07	--	1E-07	Liver	--	--	0.002	0.002
			Pyridine	--	--	--	--	--	Liver	--	--	0.0001	0.0001
			2-Nitrotoluene	--	--	3E-10	--	3E-10	Spleen	--	--	0.000008	0.000008
			2,4,6-Trinitrotoluene	--	--	1E-11	--	1E-11	Liver	--	--	0.00005	0.00005
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	--	--	0.0009	0.0009
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	--	--	0.002	0.002
			RDX	--	--	1E-09	--	1E-09	Prostate	--	--	0.0003	0.0003
			Aluminum	--	--	--	--	--	CNS	--	--	0.0007	0.0007
			Antimony	--	--	--	--	--	Blood	--	--	0.0004	0.0004
			Arsenic	--	--	3E-09	--	3E-09	Skin, CVS	--	--	0.0005	0.0005
			Barium	--	--	--	--	--	Kidney	--	--	0.002	0.002
			Beryllium	--	--	--	--	--	GS	--	--	0.004	0.004
			Cadmium	--	--	--	--	--	Kidney	--	--	0.0005	0.0005
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	--	--	0.02	0.02
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	--	--	0.0001	0.0001
			Iron	--	--	--	--	--	None Reported	--	--	0.003	0.003
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	--	--	0.0002	0.0002
			Manganese (Water)	--	--	--	--	--	CNS	--	--	0.1	0.1
			Nickel	--	--	--	--	--	Body Weight	--	--	0.001	0.001

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--	Kidney	--	--	0.03	0.03
			Chemical Total	--	--	3E-06	--	3E-06		--	--	0.3	0.3
		Exposure Point Total						3E-06					0.3
	Exposure Medium Total							3E-06					0.3
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	5E-10	--	--	5E-10	NA	--	--	--	--
			1,1,2-Trichloroethane	--	2E-09	--	--	2E-09	NA	--	--	--	--
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	0.00003	--	0.00003
			1,2,3-Trichloropropane	--	--	--	--	--	Blood	--	0.0001	--	0.0001
			1,2-Dichloroethane	--	3E-10	--	--	3E-10	NA	--	0.0002	--	0.0002
			Benzene	--	1E-10	--	--	1E-10	Blood	--	0.0002	--	0.0002
			Bromodichloromethane	--	--	--	--	--	NA	--	--	--	--
			Carbon Tetrachloride	--	3E-10	--	--	3E-10	Liver	--	0.0006	--	0.0006
			Chloroform	--	7E-10	--	--	7E-10	Liver	--	0.00004	--	0.00004
			cis-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Methylene Chloride	--	1E-11	--	--	1E-11	Liver	--	0.0000005	--	0.0000005
			Tetrachloroethene	--	4E-10	--	--	4E-10	Liver	--	0.00001	--	0.00001
			Toluene	--	--	--	--	--	NA	--	0.00003	--	0.00003
			trans-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Trichloroethene	--	3E-07	--	--	3E-07	Liver	--	0.02	--	0.02
			Vinyl Chloride	--	1E-09	--	--	1E-09	Liver	--	0.0002	--	0.0002
			Pyridine	--	--	--	--	--	NA	--	--	--	--
			2-Nitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2,4,6-Trinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			RDX	--	--	--	--	--	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	--	--	--	--
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	--	--	--	--	NA	--	--	--	--
			Barium	--	--	--	--	--	Fetus	--	--	--	--
			Beryllium	--	--	--	--	--	NA	--	--	--	--
			Cadmium	--	--	--	--	--	Kidney	--	--	--	--
			Chromium	--	--	--	--	--	Lungs	--	--	--	--
			Cobalt	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Nickel	--	--	--	--	--	NA	--	--	--	--
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	3E-07	--	--	3E-07		--	0.02	--	0.02
		Exposure Point Total						3E-07					0.02
	Exposure Medium Total							3E-06					0.3
Medium Total								3E-06					0.3
Receptor Total							Receptor Risk Total	4E-06				Receptor HI Total	4

Total Blood HI	0.03
Total Body Weight HI	0.001
Total CNS HI	3
Total CVS HI	0.02
Total GS HI	0.030
Total Immune HI	0.0001
Total Kidney HI	0.06
Total Liver HI	0.05
Total Skin HI	0.02
Total Nasal HI	0.002
Total None Reported HI	0.07
Total Prostate HI	0.0003
Total Spleen HI	0.000008
Total Bone HI	0.02
Total Fetotoxicity HI	0.02

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	3E-12	--	--	--	3E-12	Liver	0.00000001	--	--	0.00000001
			Benzo(a)anthracene	1E-08	--	5E-09	--	2E-08	NA	--	--	--	--
			Benzo(a)pyrene	1E-07	--	4E-08	--	2E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-08	--	4E-09	--	2E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-08	--	8E-09	--	3E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	6E-09	--	2E-09	--	8E-09	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000003	--	0.0000001	0.0000004
			Aluminum	--	--	--	--	--	CNS	0.003	--	--	0.003
			Antimony	--	--	--	--	--	Blood	0.003	--	--	0.003
			Arsenic	6E-08	--	5E-09	--	7E-08	Skin, CVS	0.005	--	0.0004	0.005
			Copper	--	--	--	--	--	GS	0.0004	--	--	0.0004
			Iron	--	--	--	--	--	None Reported	0.02	--	--	0.02
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.001	--	--	0.001
			Vanadium	--	--	--	--	--	Kidney	0.007	--	--	0.007
			Chemical Total	2E-07	--	6E-08	--	3E-07		0.04	--	0.0004	0.04
		Exposure Point Total						3E-07					0.04
	Exposure Medium Total							3E-07					0.04
	Air	SWMU 16	Trichloroethene	--	2E-11	--	--	2E-11	Liver	--	0.0000006	--	0.0000006
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.000006	--	0.000006
			Aluminum	--	--	--	--	--	CNS	--	0.0001	--	0.0001
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0002	--	0.0002
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	5E-11	--	--	5E-11		--	0.0003	--	0.0003
		Exposure Point Total						5E-11					0.0003
	Exposure Medium Total							5E-11					0.0003
Medium Total								3E-07					0.04

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	4E-08	--	1E-09	--	4E-08	Liver	0.0001	--	0.000003	0.0001
			1,1,2-Trichloroethane	1E-07	--	3E-09	--	1E-07	Blood	0.02	--	0.0004	0.02
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.001	--	0.00003	0.001
			1,2,3-Trichloropropane	4E-10	--	9E-12	--	4E-10	Blood	0.001	--	0.00003	0.001
			1,2-Dichloroethane	2E-08	--	2E-10	--	2E-08	None Reported	0.0004	--	0.000003	0.0004
			Benzene	1E-08	--	4E-10	--	1E-08	Blood	0.002	--	0.00006	0.002
			Bromodichloromethane	1E-08	--	2E-10	--	1E-08	Kidney	0.0003	--	0.000006	0.0003
			Carbon Tetrachloride	5E-08	--	2E-09	--	5E-08	Liver	0.02	--	0.0009	0.02
			Chloroform	--	--	--	--	--	Liver	0.002	--	0.00004	0.002
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.1	--	0.003	0.1
			Methylene Chloride	3E-09	--	2E-11	--	3E-09	Liver	0.0002	--	0.000002	0.0002
			Tetrachloroethene	8E-07	--	9E-08	--	9E-07	Liver	0.005	--	0.0006	0.006
			Toluene	--	--	--	--	--	Liver, Kidney	0.0005	--	0.00003	0.0005
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.0007	--	0.00001	0.0007
			Trichloroethene	4E-05	--	1E-06	--	4E-05	Liver	0.2	--	0.007	0.2
			Vinyl Chloride	5E-06	--	5E-08	--	5E-06	Liver	0.04	--	0.0004	0.04
			Pyridine	--	--	--	--	--	Liver	0.009	--	0.00003	0.009
			2-Nitrotoluene	5E-09	--	1E-10	--	6E-09	Spleen	0.00008	--	0.000002	0.00008
			2,4,6-Trinitrotoluene	1E-09	--	6E-12	--	1E-09	Liver	0.003	--	0.00001	0.003
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.03	--	0.0002	0.03
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.02	--	0.0005	0.02
			RDX	4E-07	--	6E-10	--	4E-07	Prostate	0.04	--	0.00007	0.04
			Aluminum	--	--	--	--	--	CNS	0.1	--	0.00006	0.1
			Antimony	--	--	--	--	--	Blood	0.009	--	0.00003	0.009
			Arsenic	1E-06	--	6E-10	--	1E-06	Skin, CVS	0.08	--	0.00005	0.08
			Barium	--	--	--	--	--	Kidney	0.02	--	0.0002	0.02
			Beryllium	--	--	--	--	--	GS	0.004	--	0.0004	0.005
			Cadmium	--	--	--	--	--	Kidney	0.004	--	0.00005	0.004
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.05	--	0.002	0.05
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.02	--	0.00001	0.02
			Iron	--	--	--	--	--	None Reported	0.5	--	0.0003	0.5
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.08	--	0.00002	0.08
			Manganese (Water)	--	--	--	--	--	CNS	1.0	--	0.01	1.0
			Nickel	--	--	--	--	--	Body Weight	0.03	--	0.00009	0.03

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -	Kidney	0.1	- -	0.003	0.1
			Chemical Total	4E-05	--	1E-06	--	5E-05		3	- -	0.03	3
		Exposure Point Total						5E-05					3
	Exposure Medium Total							5E-05					3
Medium Total								5E-05					3
Surface Water	Surface Water	Gullies	Trichloroethene	4E-09	--	4E-09	--	8E-09	Liver	0.00002	- -	0.00002	0.00004
			RDX	4E-08	--	2E-09	--	4E-08	Prostate	0.004	- -	0.0002	0.004
			Aluminum	- -	--	- -	--	- -	CNS	0.001	- -	0.00009	0.001
			Antimony	- -	--	- -	--	- -	Blood	0.01	- -	0.003	0.01
			Arsenic	3E-08	--	2E-09	--	3E-08	Skin, CVS	0.002	- -	0.0002	0.003
			Barium	- -	--	- -	--	- -	Kidney	0.001	- -	0.001	0.003
			Cadmium	- -	--	- -	--	- -	Kidney	0.002	- -	0.003	0.005
			Chromium	- -	--	- -	--	- -	Fetotoxicity, GS, Bone	0.0006	- -	0.003	0.004
			Iron	- -	--	- -	--	- -	None Reported	0.005	- -	0.0003	0.005
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.003	- -	0.004	0.007
			Vanadium	- -	--	- -	--	- -	Kidney	0.003	- -	0.006	0.009
			Zinc	- -	--	- -	--	- -	Blood	0.0008	- -	0.00003	0.0008
			Chemical Total	7E-08	--	8E-09	--	8E-08		0.03	- -	0.02	0.05
		Exposure Point Total						8E-08					0.05
	Exposure Medium Total							8E-08					0.05
Medium Total								8E-08					0.05
Surface Water	Surface Water	Turkey Creek	Arsenic	8E-09	--	5E-10	--	8E-09	Skin, CVS	0.0006	- -	0.00004	0.0006
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.009	- -	0.02	0.02
			Chemical Total	8E-09	--	5E-10	--	8E-09		0.01	- -	0.02	0.03
		Exposure Point Total						8E-09					0.03
	Exposure Medium Total							8E-09					0.03
Medium Total								8E-09					0.03
Sediment	Sediment	Gullies	Benzo(a)pyrene	2E-09	--	7E-10	--	3E-09	NA	--	- -	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.003	- -	--	0.003
			Antimony	- -	--	- -	--	- -	Blood	0.03	- -	--	0.03
			Arsenic	1E-07	--	1E-08	--	1E-07	Skin, CVS	0.01	- -	0.0008	0.01
			Barium	- -	--	- -	--	- -	Kidney	0.006	- -	--	0.006
			Cadmium	- -	--	- -	--	- -	Kidney	0.007	- -	0.0004	0.007
			Copper	- -	--	- -	--	- -	GS	0.009	- -	--	0.009

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	--	--	--	--	--	None Reported	0.05	--	--	0.05
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.004	--	--	0.004
			Mercury	--	--	--	--	--	CNS	0.001	--	--	0.001
			Nickel	--	--	--	--	--	Body Weight	0.002	--	--	0.002
			Vanadium	--	--	--	--	--	Kidney	0.009	--	--	0.009
			Zinc	--	--	--	--	--	Blood	0.005	--	--	0.005
			Chemical Total	1E-07	--	1E-08	--	1E-07		0.1	--	0.001	0.1
		Exposure Point Total						1E-07					0.1
	Exposure Medium Total							1E-07					0.1
Medium Total								1E-07					0.1
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.002	--	--	0.002
			Arsenic	3E-07	--	2E-08	--	3E-07	Skin, CVS	0.02	--	0.002	0.03
			Iron	--	--	--	--	--	None Reported	0.1	--	--	0.1
			Manganese (Soil)	--	--	--	--	--	CNS	0.006	--	--	0.006
			Vanadium	--	--	--	--	--	Kidney	0.01	--	--	0.01
			Chemical Total	3E-07	--	2E-08	--	3E-07		0.1	--	0.002	0.1
		Exposure Point Total						3E-07					0.1
	Exposure Medium Total							3E-07					0.1
Medium Total								3E-07					0.1
Receptor Total							Receptor Risk Total	5E-05				Receptor HI Total	3

Total Blood HI	0.2
Total Body Weight HI	0.04
Total CNS HI	1
Total CVS HI	0.1
Total GS HI	0.070
Total Immune HI	0.02
Total Kidney HI	0.2
Total Liver HI	0.3
Total Skin HI	0.1
Total Nasal HI	0.000006
Total None Reported HI	0.7
Total Prostate HI	0.04
Total Spleen HI	0.00008
Total Fetotoxicity HI	0.06
Total Spleen HI	0.00008

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-12	--	--	--	1E-12	Liver	0.000000002	--	--	0.000000002
			Benzo(a)anthracene	5E-09	--	2E-09	--	7E-09	NA	--	--	--	--
			Benzo(a)pyrene	4E-08	--	2E-08	--	6E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-09	--	2E-09	--	7E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	8E-09	--	4E-09	--	1E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-09	--	1E-09	--	3E-09	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.00000003	--	0.00000002	0.00000005
			Aluminum	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Antimony	--	--	--	--	--	Blood	0.0003	--	--	0.0003
			Arsenic	2E-08	--	3E-09	--	3E-08	Skin, CVS	0.0005	--	0.00006	0.0006
			Copper	--	--	--	--	--	GS	0.00004	--	--	0.00004
			Iron	--	--	--	--	--	None Reported	0.002	--	--	0.002
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0001	--	--	0.0001
			Vanadium	--	--	--	--	--	Kidney	0.0007	--	--	0.0007
			Chemical Total	9E-08	--	3E-08	--	1E-07		0.004	--	0.00006	0.004
		Exposure Point Total						1E-07					0.004
	Exposure Medium Total							1E-07					0.004
	Air	SWMU 16	Trichloroethene	--	2E-11	--	--	2E-11	Liver	--	0.0000002	--	0.0000002
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.000002	--	0.000002
			Aluminum	--	--	--	--	--	CNS	--	0.00003	--	0.00003
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.00006	--	0.00006
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	5E-11	--	--	5E-11		--	0.00010	--	0.0001
		Exposure Point Total						5E-11					0.0001
	Exposure Medium Total							5E-11					0.0001
Medium Total								1E-07					0.004

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	3E-08	--	2E-09	--	3E-08	Liver	0.00003	--	0.000002	0.00003
			1,1,2-Trichloroethane	1E-07	--	5E-09	--	1E-07	Blood	0.005	--	0.0002	0.005
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.0002	--	0.00002	0.0002
			1,2,3-Trichloropropane	3E-10	--	2E-11	--	3E-10	Blood	0.0002	--	0.00002	0.0003
			1,2-Dichloroethane	1E-08	--	4E-10	--	1E-08	None Reported	0.00008	--	0.000002	0.00008
			Benzene	1E-08	--	8E-10	--	1E-08	Blood	0.0004	--	0.00004	0.0005
			Bromodichloromethane	9E-09	--	4E-10	--	1E-08	Kidney	0.00007	--	0.000003	0.00008
			Carbon Tetrachloride	3E-08	--	5E-09	--	4E-08	Liver	0.004	--	0.0006	0.004
			Chloroform	--	--	--	--	--	Liver	0.0004	--	0.00002	0.0005
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.03	--	0.002	0.03
			Methylene Chloride	2E-09	--	4E-11	--	2E-09	Liver	0.00005	--	0.0000009	0.00005
			Tetrachloroethene	6E-07	--	2E-07	--	8E-07	Liver	0.001	--	0.0004	0.001
			Toluene	--	--	--	--	--	Liver, Kidney	0.00010	--	0.00002	0.0001
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.0001	--	0.000007	0.0002
			Trichloroethene	3E-05	--	3E-06	--	3E-05	Liver	0.04	--	0.004	0.05
			Vinyl Chloride	4E-06	--	1E-07	--	4E-06	Liver	0.008	--	0.0002	0.008
			Pyridine	--	--	--	--	--	Liver	0.002	--	0.00002	0.002
			2-Nitrotoluene	4E-09	--	3E-10	--	4E-09	Spleen	0.00002	--	0.000001	0.00002
			2,4,6-Trinitrotoluene	9E-10	--	1E-11	--	9E-10	Liver	0.0006	--	0.000008	0.0006
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.006	--	0.0001	0.006
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.004	--	0.0003	0.004
			RDX	3E-07	--	1E-09	--	3E-07	Prostate	0.009	--	0.00004	0.009
			Aluminum	--	--	--	--	--	CNS	0.02	--	0.00004	0.02
			Antimony	--	--	--	--	--	Blood	0.002	--	0.00002	0.002
			Arsenic	8E-07	--	1E-09	--	8E-07	Skin, CVS	0.02	--	0.00003	0.02
			Barium	--	--	--	--	--	Kidney	0.004	--	0.00009	0.004
			Beryllium	--	--	--	--	--	GS	0.0010	--	0.0002	0.001
			Cadmium	--	--	--	--	--	Kidney	0.0009	--	0.00003	0.0010
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.01	--	0.001	0.01
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.004	--	0.000006	0.004
			Iron	--	--	--	--	--	None Reported	0.10	--	0.0002	0.10
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.02	--	0.00001	0.02
			Manganese (Water)	--	--	--	--	--	CNS	0.2	--	0.008	0.2
			Nickel	--	--	--	--	--	Body Weight	0.007	--	0.00006	0.007

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -	Kidney	0.03	- -	0.002	0.03
			Chemical Total	3E-05	--	3E-06	--	4E-05		0.5	- -	0.02	0.6
		Exposure Point Total						4E-05					0.6
	Exposure Medium Total							4E-05					0.6
Medium Total								4E-05					0.6
Surface Water	Surface Water	Gullies	Trichloroethene	5E-10	--	9E-09	--	9E-09	Liver	0.0000008	- -	0.00001	0.00001
			RDX	5E-09	--	4E-09	--	1E-08	Prostate	0.0002	- -	0.0001	0.0003
			Aluminum	- -	--	- -	--	- -	CNS	0.00006	- -	0.00005	0.0001
			Antimony	- -	--	- -	--	- -	Blood	0.0003	- -	0.002	0.002
			Arsenic	5E-09	--	4E-09	--	9E-09	Skin, CVS	0.0001	- -	0.00009	0.0002
			Barium	- -	--	- -	--	- -	Kidney	0.00006	- -	0.0008	0.0008
			Cadmium	- -	--	- -	--	- -	Kidney	0.00009	- -	0.002	0.002
			Chromium	- -	--	- -	--	- -	Fetotoxicity, GS, Bone	0.00002	- -	0.002	0.002
			Iron	- -	--	- -	--	- -	None Reported	0.0002	- -	0.0002	0.0004
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.0001	- -	0.002	0.003
			Vanadium	- -	--	- -	--	- -	Kidney	0.0001	- -	0.004	0.004
			Zinc	- -	--	- -	--	- -	Blood	0.00003	- -	0.00002	0.00005
			Chemical Total	1E-08	--	2E-08	--	3E-08		0.001	- -	0.01	0.01
		Exposure Point Total						3E-08					0.01
	Exposure Medium Total							3E-08					0.01
Medium Total								3E-08					0.01
Surface Water	Surface Water	Turkey Creek	Arsenic	1E-09	--	1E-09	--	2E-09	Skin, CVS	0.00003	- -	0.00002	0.00005
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.0004	- -	0.009	0.01
			Chemical Total	1E-09	--	1E-09	--	2E-09		0.0004	- -	0.009	0.01
		Exposure Point Total						2E-09					0.01
	Exposure Medium Total							2E-09					0.01
Medium Total								2E-09					0.01
Sediment	Sediment	Gullies	Benzo(a)pyrene	8E-10	--	4E-10	--	1E-09	NA	--	- -	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.0003	- -	--	0.0003
			Antimony	- -	--	- -	--	- -	Blood	0.003	- -	--	0.003
			Arsenic	5E-08	--	5E-09	--	6E-08	Skin, CVS	0.001	- -	0.0001	0.001
			Barium	- -	--	- -	--	- -	Kidney	0.0006	- -	--	0.0006
			Cadmium	- -	--	- -	--	- -	Kidney	0.0007	- -	0.00005	0.0008
			Copper	- -	--	- -	--	- -	GS	0.0009	- -	--	0.0009

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	--	--	--	--	--	None Reported	0.005	--	--	0.005
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0004	--	--	0.0004
			Mercury	--	--	--	--	--	CNS	0.0001	--	--	0.0001
			Nickel	--	--	--	--	--	Body Weight	0.0002	--	--	0.0002
			Vanadium	--	--	--	--	--	Kidney	0.001	--	--	0.001
			Zinc	--	--	--	--	--	Blood	0.0005	--	--	0.0005
			Chemical Total	5E-08	--	6E-09	--	6E-08		0.01	--	0.0002	0.01
		Exposure Point Total						6E-08					0.01
	Exposure Medium Total							6E-08					0.01
Medium Total								6E-08					0.01
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Arsenic	1E-07	--	1E-08	--	1E-07	Skin, CVS	0.003	--	0.0003	0.003
			Iron	--	--	--	--	--	None Reported	0.01	--	--	0.01
			Manganese (Soil)	--	--	--	--	--	CNS	0.0007	--	--	0.0007
			Vanadium	--	--	--	--	--	Kidney	0.001	--	--	0.001
			Chemical Total	1E-07	--	1E-08	--	1E-07		0.02	--	0.0003	0.02
		Exposure Point Total						1E-07					0.02
	Exposure Medium Total							1E-07					0.02
Medium Total								1E-07					0.02
Receptor Total							Receptor Risk Total	4E-05				Receptor HI Total	0.6

Total Blood HI	0.04
Total Body Weight HI	0.008
Total CNS HI	0.3
Total CVS HI	0.03
Total GS HI	0.02
Total Immune HI	0.004
Total Kidney HI	0.05
Total Liver HI	0.07
Total Skin HI	0.02
Total Nasal HI	0.000002
Total None Reported HI	0.1
Total Prostate HI	0.009
Total Spleen HI	0.00002
Total Bone HI	0.01
Total Fetotoxicity HI	0.01

TABLE 9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	4E-12	--	--	--	4E-12					
			Benzo(a)anthracene	2E-08	--	7E-09	--	3E-08					
			Benzo(a)pyrene	2E-07	--	6E-08	--	2E-07					
			Benzo(b)fluoranthene	2E-08	--	7E-09	--	2E-08					
			Dibenzo(a,h)anthracene	3E-08	--	1E-08	--	4E-08					
			Indeno(1,2,3-cd)pyrene	8E-09	--	3E-09	--	1E-08					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	9E-08	--	8E-09	--	1E-07					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	3E-07	--	1E-07	--	4E-07					
		Exposure Point Total						4E-07					
	Exposure Medium Total							4E-07					
	Air	SWMU 16	Trichloroethene	--	4E-11	--	--	4E-11					
			Benzo(a)anthracene	--	--	--	--	--					
			Benzo(a)pyrene	--	4E-12	--	--	4E-12					
			Benzo(b)fluoranthene	--	--	--	--	--					
			Dibenzo(a,h)anthracene	--	--	--	--	--					
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	--	5E-11	--	--	5E-11					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	9E-11	--	--	9E-11					
		Exposure Point Total						9E-11					
	Exposure Medium Total							9E-11					
Medium Total								4E-07					

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	7E-08	--	3E-09	--	8E-08					
			1,1,2-Trichloroethane	2E-07	--	8E-09	--	3E-07					
			1,1-Dichloroethene	--	--	--	--	--					
			1,2,3-Trichloropropane	7E-10	--	3E-11	--	7E-10					
			1,2-Dichloroethane	3E-08	--	5E-10	--	3E-08					
			Benzene	2E-08	--	1E-09	--	2E-08					
			Bromodichloromethane	2E-08	--	6E-10	--	2E-08					
			Carbon Tetrachloride	8E-08	--	7E-09	--	9E-08					
			Chloroform	--	--	--	--	--					
			cis-1,2-Dichloroethene	--	--	--	--	--					
			Methylene Chloride	5E-09	--	6E-11	--	5E-09					
			Tetrachloroethene	1E-06	--	3E-07	--	2E-06					
			Toluene	--	--	--	--	--					
			trans-1,2-Dichloroethene	--	--	--	--	--					
			Trichloroethene	6E-05	--	4E-06	--	7E-05					
			Vinyl Chloride	9E-06	--	2E-07	--	9E-06					
			Pyridine	--	--	--	--	--					
			2-Nitrotoluene	9E-09	--	4E-10	--	1E-08					
			2,4,6-Trinitrotoluene	2E-09	--	2E-11	--	2E-09					
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--					
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--					
			RDX	7E-07	--	2E-09	--	7E-07					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	2E-06	--	2E-09	--	2E-06					
			Barium	--	--	--	--	--					
			Beryllium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Chromium	--	--	--	--	--					
			Cobalt	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Lithium	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Nickel	--	--	--	--	--					

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -					
			Chemical Total	8E-05	--	4E-06	--	8E-05					
		Exposure Point Total						8E-05					
	Exposure Medium Total							8E-05					
Medium Total								8E-05					
Surface Water	Surface Water	Gullies	Trichloroethene	4E-09	--	1E-08	--	2E-08					
			RDX	4E-08	--	7E-09	--	5E-08					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	3E-08	--	6E-09	--	4E-08					
			Barium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Chromium	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese (Water)	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Chemical Total	8E-08	--	3E-08	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								1E-07					
Surface Water	Surface Water	Turkey Creek	Arsenic	9E-09	--	2E-09	--	1E-08					
			Manganese (Water)	- -	--	- -	--	- -					
			Chemical Total	9E-09	--	2E-09	--	1E-08					
		Exposure Point Total						1E-08					
	Exposure Medium Total							1E-08					
Medium Total								1E-08					
Sediment	Sediment	Gullies	Benzo(a)pyrene	3E-09	--	1E-09	--	4E-09					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	2E-07	--	2E-08	--	2E-07					
			Barium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					

TABLE 9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Chemical Total	2E-07	--	2E-08	--	2E-07					
		Exposure Point Total						2E-07					
	Exposure Medium Total							2E-07					
Medium Total								2E-07					
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -					
			Arsenic	4E-07	--	4E-08	--	5E-07					
			Iron	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	4E-07	--	4E-08	--	5E-07					
		Exposure Point Total						5E-07					
	Exposure Medium Total							5E-07					
Medium Total								5E-07					
Receptor Total							Receptor Risk Total	8E-05					

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	5E-11	--	--	--	5E-11	Liver	0.0000003	--	--	0.0000003
			Benzo(a)anthracene	2E-07	--	4E-08	--	3E-07	NA	--	--	--	--
			Benzo(a)pyrene	2E-06	--	3E-07	--	2E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	2E-07	--	3E-08	--	3E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	4E-07	--	6E-08	--	5E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-07	--	2E-08	--	1E-07	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000006	--	0.0000008	0.000007
			Aluminum	--	--	--	--	--	CNS	0.06	--	--	0.06
			Antimony	--	--	--	--	--	Blood	0.06	--	--	0.06
			Arsenic	1E-06	--	4E-08	--	1E-06	Skin, CVS	0.09	--	0.003	0.09
			Copper	--	--	--	--	--	GS	0.007	--	--	0.007
			Iron	--	--	--	--	--	None Reported	0.3	--	--	0.3
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.02	--	--	0.02
			Vanadium	--	--	--	--	--	Kidney	0.1	--	--	0.1
			Chemical Total	4E-06	--	5E-07	--	5E-06		0.7	--	0.003	0.7
		Exposure Point Total						5E-06					0.7
	Exposure Medium Total							5E-06					0.7
	Air	SWMU 16	Trichloroethene	--	1E-09	--	--	1E-09	Liver	--	0.00004	--	0.00004
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0004	--	0.0004
			Aluminum	--	--	--	--	--	CNS	--	0.007	--	0.007
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.01	--	0.01
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	3E-09	--	--	3E-09		--	0.02	--	0.02
		Exposure Point Total						3E-09					0.02
	Exposure Medium Total							3E-09					0.02
Medium Total								5E-06					0.7

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	2E-07	--	2E-08	--	3E-07	Liver	0.0007	--	0.00005	0.0008
			1,1,2-Trichloroethane	8E-07	--	5E-08	--	9E-07	Blood	0.1	--	0.007	0.1
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.006	--	0.0005	0.006
			1,2,3-Trichloropropane	2E-09	--	2E-10	--	2E-09	Blood	0.007	--	0.0005	0.007
			1,2-Dichloroethane	1E-07	--	3E-09	--	1E-07	None Reported	0.002	--	0.00006	0.002
			Benzene	8E-08	--	7E-09	--	8E-08	Blood	0.01	--	0.001	0.01
			Bromodichloromethane	7E-08	--	4E-09	--	8E-08	Kidney	0.002	--	0.0001	0.002
			Carbon Tetrachloride	3E-07	--	4E-08	--	3E-07	Liver	0.1	--	0.02	0.1
			Chloroform	--	--	--	--	--	Liver	0.01	--	0.0007	0.01
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.8	--	0.06	0.9
			Methylene Chloride	2E-08	--	4E-10	--	2E-08	Liver	0.001	--	0.00003	0.001
			Tetrachloroethene	5E-06	--	2E-06	--	6E-06	Liver	0.03	--	0.01	0.04
			Toluene	--	--	--	--	--	Liver, Kidney	0.003	--	0.0006	0.003
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.004	--	0.0002	0.004
			Trichloroethene	2E-04	--	2E-05	--	2E-04	Liver	1	--	0.1	1
			Vinyl Chloride	3E-05	--	9E-07	--	3E-05	Liver	0.2	--	0.007	0.2
			Pyridine	--	--	--	--	--	Liver	0.05	--	0.0005	0.05
			2-Nitrotoluene	3E-08	--	3E-09	--	3E-08	Spleen	0.0005	--	0.00004	0.0005
			2,4,6-Trinitrotoluene	7E-09	--	1E-10	--	7E-09	Liver	0.02	--	0.0002	0.02
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.2	--	0.004	0.2
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.1	--	0.009	0.1
			RDX	2E-06	--	1E-08	--	2E-06	Prostate	0.2	--	0.001	0.2
			Aluminum	--	--	--	--	--	CNS	0.7	--	0.001	0.7
			Antimony	--	--	--	--	--	Blood	0.05	--	0.0006	0.05
			Arsenic	6E-06	--	1E-08	--	6E-06	Skin, CVS	0.5	--	0.0008	0.5
			Barium	--	--	--	--	--	Kidney	0.1	--	0.003	0.1
			Beryllium	--	--	--	--	--	GS	0.03	--	0.006	0.03
			Cadmium	--	--	--	--	--	Kidney	0.03	--	0.0009	0.03
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.3	--	0.04	0.3
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.1	--	0.0002	0.1
			Iron	--	--	--	--	--	None Reported	3	--	0.005	3
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.5	--	0.0004	0.5
			Manganese (Water)	--	--	--	--	--	CNS	6	--	0.2	6
			Nickel	--	--	--	--	--	Body Weight	0.2	--	0.002	0.2

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--	Kidney	0.8	--	0.05	0.9
			Chemical Total	3E-04	--	2E-05	--	3E-04		15	--	0.6	16
		Exposure Point Total						3E-04					16
	Exposure Medium Total							3E-04					16
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	6E-08	--	--	6E-08	NA	--	--	--	--
			1,1,2-Trichloroethane	--	3E-07	--	--	3E-07	NA	--	--	--	--
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	0.003	--	0.003
			1,2,3-Trichloropropane	--	--	--	--	--	Blood	--	0.01	--	0.01
			1,2-Dichloroethane	--	5E-08	--	--	5E-08	NA	--	0.01	--	0.01
			Benzene	--	2E-08	--	--	2E-08	Blood	--	0.02	--	0.02
			Bromodichloromethane	--	--	--	--	--	NA	--	--	--	--
			Carbon Tetrachloride	--	5E-08	--	--	5E-08	Liver	--	0.05	--	0.05
			Chloroform	--	1E-07	--	--	1E-07	Liver	--	0.004	--	0.004
			cis-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Methylene Chloride	--	2E-09	--	--	2E-09	Liver	--	0.00004	--	0.00004
			Tetrachloroethene	--	7E-08	--	--	7E-08	Liver	--	0.0009	--	0.0009
			Toluene	--	--	--	--	--	NA	--	0.002	--	0.002
			trans-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Trichloroethene	--	5E-05	--	--	5E-05	Liver	--	2	--	2
			Vinyl Chloride	--	2E-07	--	--	2E-07	Liver	--	0.01	--	0.01
			Pyridine	--	--	--	--	--	NA	--	--	--	--
			2-Nitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2,4,6-Trinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			RDX	--	--	--	--	--	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	--	--	--	--
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	--	--	--	--	NA	--	--	--	--
			Barium	--	--	--	--	--	Fetus	--	--	--	--
			Beryllium	--	--	--	--	--	NA	--	--	--	--
			Cadmium	--	--	--	--	--	Kidney	--	--	--	--
			Chromium	--	--	--	--	--	Lungs	--	--	--	--
			Cobalt	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Nickel	--	--	--	--	--	NA	--	--	--	--
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	5E-05	--	--	5E-05		--	2	--	2
		Exposure Point Total						5E-05					2
	Exposure Medium Total							3E-04					17
Medium Total								3E-04					17
Surface Water	Surface Water	Gullies	Trichloroethene	4E-09	--	4E-09	--	8E-09	Liver	0.00002	--	0.00002	0.00004
			RDX	4E-08	--	2E-09	--	4E-08	Prostate	0.004	--	0.0002	0.004
			Aluminum	--	--	--	--	--	CNS	0.001	--	0.00009	0.001
			Antimony	--	--	--	--	--	Blood	0.01	--	0.003	0.01
			Arsenic	3E-08	--	2E-09	--	3E-08	Skin, CVS	0.002	--	0.0002	0.003
			Barium	--	--	--	--	--	Kidney	0.001	--	0.001	0.003
			Cadmium	--	--	--	--	--	Kidney	0.002	--	0.003	0.005
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.0006	--	0.003	0.004
			Iron	--	--	--	--	--	None Reported	0.005	--	0.0003	0.005
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.003	--	0.004	0.007
			Vanadium	--	--	--	--	--	Kidney	0.003	--	0.006	0.009
			Zinc	--	--	--	--	--	Blood	0.0008	--	0.00003	0.0008
			Chemical Total	7E-08	--	8E-09	--	8E-08		0.03	--	0.02	0.05
		Exposure Point Total						8E-08					0.05
	Exposure Medium Total							8E-08					0.05
Medium Total								8E-08					0.05
Surface Water	Surface Water	Turkey Creek	Arsenic	8E-09	--	5E-10	--	8E-09	Skin, CVS	0.0006	--	0.00004	0.0006
			Manganese (Water)	--	--	--	--	--	CNS	0.009	--	0.02	0.02
			Chemical Total	8E-09	--	5E-10	--	8E-09		0.01	--	0.02	0.03
		Exposure Point Total						8E-09					0.03
	Exposure Medium Total							8E-09					0.03
Medium Total								8E-09					0.03

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	2E-09	--	6E-10	--	3E-09	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.003	--	--	0.003
			Antimony	--	--	--	--	--	Blood	0.03	--	--	0.03
			Arsenic	1E-07	--	9E-09	--	1E-07	Skin, CVS	0.01	--	0.0007	0.01
			Barium	--	--	--	--	--	Kidney	0.006	--	--	0.006
			Cadmium	--	--	--	--	--	Kidney	0.007	--	0.0003	0.007
			Copper	--	--	--	--	--	GS	0.009	--	--	0.009
			Iron	--	--	--	--	--	None Reported	0.05	--	--	0.05
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.004	--	--	0.004
			Mercury	--	--	--	--	--	CNS	0.001	--	--	0.001
			Nickel	--	--	--	--	--	Body Weight	0.002	--	--	0.002
			Vanadium	--	--	--	--	--	Kidney	0.009	--	--	0.009
			Zinc	--	--	--	--	--	Blood	0.005	--	--	0.005
			Chemical Total	1E-07	--	1E-08	--	1E-07		0.1	--	0.001	0.1
		Exposure Point Total						1E-07					0.1
	Exposure Medium Total							1E-07					0.1
Medium Total								1E-07					0.1
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.002	--	--	0.002
			Arsenic	3E-07	--	2E-08	--	3E-07	Skin, CVS	0.02	--	0.002	0.03
			Iron	--	--	--	--	--	None Reported	0.10	--	--	0.10
			Manganese (Soil)	--	--	--	--	--	CNS	0.006	--	--	0.006
			Vanadium	--	--	--	--	--	Kidney	0.01	--	--	0.01
			Chemical Total	3E-07	--	2E-08	--	3E-07		0.1	--	0.002	0.1
		Exposure Point Total						3E-07					0.1
	Exposure Medium Total							3E-07					0.1
Medium Total								3E-07					0.1
Receptor Total							Receptor Risk Total	3E-04				Receptor HI Total	18

TABLE 9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Total Blood HI	1
Total Body Weight HI	0.2
Total CNS HI	7
Total CVS HI	0.7
Total GS HI	0.39
Total Immune HI	0.1
Total Kidney HI	1
Total Liver HI	4
Total Skin HI	0.6
Total Nasal HI	0.0004
Total None Reported HI	4
Total Prostate HI	0.2
Total Spleen HI	0.0005
Total Bone HI	0.3
Total Fetotoxicity HI	0.3

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	2E-11	--	--	--	2E-11	Liver	0.00000003	--	--	0.00000003
			Benzo(a)anthracene	9E-08	--	1E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	8E-07	--	1E-07	--	9E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	9E-08	--	1E-08	--	1E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-07	--	2E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4E-08	--	6E-09	--	5E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000006	--	0.00000009	0.0000007
			Aluminum	--	--	--	--	--	CNS	0.006	--	--	0.006
			Antimony	--	--	--	--	--	Blood	0.006	--	--	0.006
			Arsenic	4E-07	--	1E-08	--	4E-07	Skin, CVS	0.01	--	0.0003	0.01
			Copper	--	--	--	--	--	GS	0.0008	--	--	0.0008
			Iron	--	--	--	--	--	None Reported	0.03	--	--	0.03
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Vanadium	--	--	--	--	--	Kidney	0.01	--	--	0.01
			Chemical Total	2E-06	--	2E-07	--	2E-06		0.07	--	0.0003	0.07
		Exposure Point Total						2E-06					0.07
	Exposure Medium Total							2E-06					0.07
	Air	SWMU 16	Trichloroethene	--	1E-09	--	--	1E-09	Liver	--	0.00001	--	0.00001
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0001	--	0.0001
			Aluminum	--	--	--	--	--	CNS	--	0.002	--	0.002
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.004	--	0.004
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	3E-09	--	--	3E-09		--	0.006	--	0.006
		Exposure Point Total						3E-09					0.006
	Exposure Medium Total							3E-09					0.006
Medium Total								2E-06					0.08

TABLE 9.9.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	4E-07	--	4E-08	--	4E-07	Liver	0.0003	--	0.00003	0.0004
			1,1,2-Trichloroethane	1E-06	--	1E-07	--	1E-06	Blood	0.06	--	0.004	0.06
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.003	--	0.0003	0.003
			1,2,3-Trichloropropane	4E-09	--	3E-10	--	4E-09	Blood	0.003	--	0.0003	0.003
			1,2-Dichloroethane	2E-07	--	7E-09	--	2E-07	None Reported	0.001	--	0.00004	0.0010
			Benzene	1E-07	--	1E-08	--	1E-07	Blood	0.005	--	0.0006	0.006
			Bromodichloromethane	1E-07	--	7E-09	--	1E-07	Kidney	0.0009	--	0.00006	0.0010
			Carbon Tetrachloride	4E-07	--	9E-08	--	5E-07	Liver	0.05	--	0.010	0.06
			Chloroform	--	--	--	--	--	Liver	0.005	--	0.0004	0.006
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.4	--	0.04	0.4
			Methylene Chloride	3E-08	--	8E-10	--	3E-08	Liver	0.0006	--	0.00002	0.0006
			Tetrachloroethene	8E-06	--	3E-06	--	1E-05	Liver	0.01	--	0.006	0.02
			Toluene	--	--	--	--	--	Liver, Kidney	0.001	--	0.0003	0.002
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.002	--	0.0001	0.002
			Trichloroethene	4E-04	--	5E-05	--	4E-04	Liver	0.5	--	0.07	0.6
			Vinyl Chloride	5E-05	--	2E-06	--	5E-05	Liver	0.1	--	0.004	0.1
			Pyridine	--	--	--	--	--	Liver	0.02	--	0.0003	0.02
			2-Nitrotoluene	5E-08	--	5E-09	--	6E-08	Spleen	0.0002	--	0.00002	0.0002
			2,4,6-Trinitrotoluene	1E-08	--	2E-10	--	1E-08	Liver	0.007	--	0.0001	0.007
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.08	--	0.003	0.08
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.05	--	0.005	0.05
			RDX	4E-06	--	2E-08	--	4E-06	Prostate	0.1	--	0.0007	0.1
			Aluminum	--	--	--	--	--	CNS	0.3	--	0.0006	0.3
			Antimony	--	--	--	--	--	Blood	0.02	--	0.0003	0.02
			Arsenic	1E-05	--	2E-08	--	1E-05	Skin, CVS	0.2	--	0.0005	0.2
			Barium	--	--	--	--	--	Kidney	0.05	--	0.002	0.05
			Beryllium	--	--	--	--	--	GS	0.01	--	0.004	0.02
			Cadmium	--	--	--	--	--	Kidney	0.01	--	0.0005	0.01
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.1	--	0.02	0.2
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.05	--	0.0001	0.05
			Iron	--	--	--	--	--	None Reported	1	--	0.003	1
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.2	--	0.0002	0.2
			Manganese (Water)	--	--	--	--	--	CNS	3	--	0.1	3
			Nickel	--	--	--	--	--	Body Weight	0.09	--	0.001	0.09

TABLE 9.9.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--	Kidney	0.4	--	0.03	0.4
			Chemical Total	4E-04	--	5E-05	--	5E-04		7	--	0.3	7
		Exposure Point Total						5E-04					7
	Exposure Medium Total							5E-04					7
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	5E-08	--	--	5E-08	NA	--	--	--	--
			1,1,2-Trichloroethane	--	2E-07	--	--	2E-07	NA	--	--	--	--
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	0.002	--	0.002
			1,2,3-Trichloropropane	--	--	--	--	--	Blood	--	0.01	--	0.01
			1,2-Dichloroethane	--	4E-08	--	--	4E-08	NA	--	0.01	--	0.01
			Benzene	--	2E-08	--	--	2E-08	Blood	--	0.01	--	0.01
			Bromodichloromethane	--	--	--	--	--	NA	--	--	--	--
			Carbon Tetrachloride	--	4E-08	--	--	4E-08	Liver	--	0.04	--	0.04
			Chloroform	--	9E-08	--	--	9E-08	Liver	--	0.003	--	0.003
			cis-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Methylene Chloride	--	1E-09	--	--	1E-09	Liver	--	0.00003	--	0.00003
			Tetrachloroethene	--	5E-08	--	--	5E-08	Liver	--	0.0007	--	0.0007
			Toluene	--	--	--	--	--	NA	--	0.002	--	0.002
			trans-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Trichloroethene	--	4E-05	--	--	4E-05	Liver	--	1	--	1
			Vinyl Chloride	--	1E-07	--	--	1E-07	Liver	--	0.01	--	0.01
			Pyridine	--	--	--	--	--	NA	--	--	--	--
			2-Nitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2,4,6-Trinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			RDX	--	--	--	--	--	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	--	--	--	--
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	--	--	--	--	NA	--	--	--	--
			Barium	--	--	--	--	--	Fetus	--	--	--	--
			Beryllium	--	--	--	--	--	NA	--	--	--	--
			Cadmium	--	--	--	--	--	Kidney	--	--	--	--
			Chromium	--	--	--	--	--	Lungs	--	--	--	--
			Cobalt	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Nickel	--	--	--	--	--	NA	--	--	--	--
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	4E-05	--	--	4E-05		--	1	--	1
		Exposure Point Total						4E-05					1
	Exposure Medium Total							5E-04					8
Medium Total								5E-04					8
Surface Water	Surface Water	Gullies	Trichloroethene	5E-10	--	9E-09	--	9E-09	Liver	0.0000008	--	0.00001	0.00001
			RDX	5E-09	--	4E-09	--	1E-08	Prostate	0.0002	--	0.0001	0.0003
			Aluminum	--	--	--	--	--	CNS	0.00006	--	0.00005	0.0001
			Antimony	--	--	--	--	--	Blood	0.0003	--	0.002	0.002
			Arsenic	5E-09	--	4E-09	--	9E-09	Skin, CVS	0.0001	--	0.00009	0.0002
			Barium	--	--	--	--	--	Kidney	0.00006	--	0.0008	0.0008
			Cadmium	--	--	--	--	--	Kidney	0.00009	--	0.002	0.002
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.00002	--	0.002	0.002
			Iron	--	--	--	--	--	None Reported	0.0002	--	0.0002	0.0004
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.0001	--	0.002	0.003
			Vanadium	--	--	--	--	--	Kidney	0.0001	--	0.004	0.004
			Zinc	--	--	--	--	--	Blood	0.00003	--	0.00002	0.00005
			Chemical Total	1E-08	--	2E-08	--	3E-08		0.001	--	0.01	0.01
		Exposure Point Total						3E-08					0.01
	Exposure Medium Total							3E-08					0.01
Medium Total								3E-08					0.01
Surface Water	Surface Water	Turkey Creek	Arsenic	1E-09	--	1E-09	--	2E-09	Skin, CVS	0.00003	--	0.00002	0.00005
			Manganese (Water)	--	--	--	--	--	CNS	0.0004	--	0.009	0.01
			Chemical Total	1E-09	--	1E-09	--	2E-09		0.0004	--	0.009	0.01
		Exposure Point Total						2E-09					0.01
	Exposure Medium Total							2E-09					0.01
Medium Total								2E-09					0.01

TABLE 9.9.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	8E-10	--	2E-10	--	1E-09	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Antimony	--	--	--	--	--	Blood	0.003	--	--	0.003
			Arsenic	5E-08	--	3E-09	--	5E-08	Skin, CVS	0.001	--	0.00008	0.001
			Barium	--	--	--	--	--	Kidney	0.0006	--	--	0.0006
			Cadmium	--	--	--	--	--	Kidney	0.0007	--	0.00003	0.0008
			Copper	--	--	--	--	--	GS	0.0009	--	--	0.0009
			Iron	--	--	--	--	--	None Reported	0.005	--	--	0.005
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0004	--	--	0.0004
			Mercury	--	--	--	--	--	CNS	0.0001	--	--	0.0001
			Nickel	--	--	--	--	--	Body Weight	0.0002	--	--	0.0002
			Vanadium	--	--	--	--	--	Kidney	0.001	--	--	0.001
			Zinc	--	--	--	--	--	Blood	0.0005	--	--	0.0005
			Chemical Total	5E-08	--	4E-09	--	5E-08		0.01	--	0.0001	0.01
		Exposure Point Total						5E-08					0.01
	Exposure Medium Total							5E-08					0.01
Medium Total								5E-08					0.01
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Arsenic	1E-07	--	8E-09	--	1E-07	Skin, CVS	0.003	--	0.0002	0.003
			Iron	--	--	--	--	--	None Reported	0.01	--	--	0.01
			Manganese (Soil)	--	--	--	--	--	CNS	0.0007	--	--	0.0007
			Vanadium	--	--	--	--	--	Kidney	0.001	--	--	0.001
			Chemical Total	1E-07	--	8E-09	--	1E-07		0.02	--	0.0002	0.02
		Exposure Point Total						1E-07					0.02
	Exposure Medium Total							1E-07					0.02
Medium Total								1E-07					0.02
Receptor Total							Receptor Risk Total	5E-04				Receptor HI Total	9

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Total Blood HI	0.5
Total Body Weight HI	0.09
Total CNS HI	3
Total CVS HI	0.3
Total GS HI	0.2
Total Immune HI	0.05
Total Kidney HI	0.5
Total Liver HI	2
Total Skin HI	0.2
Total Nasal HI	0.0001
Total None Reported HI	2
Total Prostate HI	0.1
Total Spleen HI	0.0002
Total Bone HI	0.2
Total Fetotoxicity HI	0.2

TABLE 9.10.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	7E-11	--	--	--	7E-11					
			Benzo(a)anthracene	3E-07	--	5E-08	--	4E-07					
			Benzo(a)pyrene	3E-06	--	4E-07	--	3E-06					
			Benzo(b)fluoranthene	3E-07	--	5E-08	--	4E-07					
			Dibenzo(a,h)anthracene	6E-07	--	8E-08	--	6E-07					
			Indeno(1,2,3-cd)pyrene	2E-07	--	2E-08	--	2E-07					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	2E-06	--	5E-08	--	2E-06					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	6E-06	--	7E-07	--	7E-06					
		Exposure Point Total						7E-06					
	Exposure Medium Total							7E-06					
	Air	SWMU 16	Trichloroethene	--	2E-09	--	--	2E-09					
			Benzo(a)anthracene	--	--	--	--	--					
			Benzo(a)pyrene	--	2E-10	--	--	2E-10					
			Benzo(b)fluoranthene	--	--	--	--	--					
			Dibenzo(a,h)anthracene	--	--	--	--	--					
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	--	3E-09	--	--	3E-09					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	5E-09	--	--	5E-09					
		Exposure Point Total						5E-09					
	Exposure Medium Total							5E-09					
Medium Total								7E-06					

TABLE 9.10.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	6E-07	--	6E-08	--	7E-07					
			1,1,2-Trichloroethane	2E-06	--	1E-07	--	2E-06					
			1,1-Dichloroethene	--	--	--	--	--					
			1,2,3-Trichloropropane	6E-09	--	5E-10	--	7E-09					
			1,2-Dichloroethane	3E-07	--	1E-08	--	3E-07					
			Benzene	2E-07	--	2E-08	--	2E-07					
			Bromodichloromethane	2E-07	--	1E-08	--	2E-07					
			Carbon Tetrachloride	7E-07	--	1E-07	--	8E-07					
			Chloroform	--	--	--	--	--					
			cis-1,2-Dichloroethene	--	--	--	--	--					
			Methylene Chloride	4E-08	--	1E-09	--	4E-08					
			Tetrachloroethene	1E-05	--	5E-06	--	2E-05					
			Toluene	--	--	--	--	--					
			trans-1,2-Dichloroethene	--	--	--	--	--					
			Trichloroethene	6E-04	--	7E-05	--	6E-04					
			Vinyl Chloride	8E-05	--	3E-06	--	8E-05					
			Pyridine	--	--	--	--	--					
			2-Nitrotoluene	8E-08	--	8E-09	--	9E-08					
			2,4,6-Trinitrotoluene	2E-08	--	3E-10	--	2E-08					
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--					
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--					
			RDX	6E-06	--	4E-08	--	6E-06					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	2E-05	--	3E-08	--	2E-05					
			Barium	--	--	--	--	--					
			Beryllium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Chromium	--	--	--	--	--					
			Cobalt	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Lithium	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Nickel	--	--	--	--	--					

TABLE 9.10.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--					
			Chemical Total	7E-04	--	8E-05	--	8E-04					
		Exposure Point Total						8E-04					
	Exposure Medium Total							8E-04					
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	1E-07	--	--	1E-07					
			1,1,2-Trichloroethane	--	5E-07	--	--	5E-07					
			1,1-Dichloroethene	--	--	--	--	--					
			1,2,3-Trichloropropane	--	--	--	--	--					
			1,2-Dichloroethane	--	8E-08	--	--	8E-08					
			Benzene	--	4E-08	--	--	4E-08					
			Bromodichloromethane	--	--	--	--	--					
			Carbon Tetrachloride	--	8E-08	--	--	8E-08					
			Chloroform	--	2E-07	--	--	2E-07					
			cis-1,2-Dichloroethene	--	--	--	--	--					
			Methylene Chloride	--	3E-09	--	--	3E-09					
			Tetrachloroethene	--	1E-07	--	--	1E-07					
			Toluene	--	--	--	--	--					
			trans-1,2-Dichloroethene	--	--	--	--	--					
			Trichloroethene	--	9E-05	--	--	9E-05					
			Vinyl Chloride	--	3E-07	--	--	3E-07					
			Pyridine	--	--	--	--	--					
			2-Nitrotoluene	--	--	--	--	--					
			2,4,6-Trinitrotoluene	--	--	--	--	--					
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--					
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--					
			RDX	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	--	--	--	--	--					
			Barium	--	--	--	--	--					
			Beryllium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Chromium	--	--	--	--	--					
			Cobalt	--	--	--	--	--					
			Iron	--	--	--	--	--					

TABLE 9.10.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--					
			Lithium	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Nickel	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	1E-04	--	--	1E-04					
		Exposure Point Total						1E-04					
	Exposure Medium Total							9E-04					
Medium Total								9E-04					
Surface Water	Surface Water	Gullies	Trichloroethene	4E-08	--	5E-08	--	9E-08					
			RDX	4E-07	--	2E-08	--	5E-07					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	4E-07	--	3E-08	--	4E-07					
			Barium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Chromium	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Zinc	--	--	--	--	--					
			Chemical Total	8E-07	--	1E-07	--	9E-07					
		Exposure Point Total						9E-07					
	Exposure Medium Total							9E-07					
Medium Total								9E-07					
Surface Water	Surface Water	Turkey Creek	Arsenic	9E-08	--	7E-09	--	1E-07					
			Manganese (Water)	--	--	--	--	--					
			Chemical Total	9E-08	--	7E-09	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								1E-07					

TABLE 9.10.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	3E-08	--	2E-08	--	5E-08					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	2E-06	--	3E-07	--	2E-06					
			Barium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Chemical Total	2E-06	--	3E-07	--	2E-06					
		Exposure Point Total						2E-06					
	Exposure Medium Total							2E-06					
Medium Total								2E-06					
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -					
			Arsenic	4E-06	--	6E-07	--	5E-06					
			Iron	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	4E-06	--	6E-07	--	5E-06					
		Exposure Point Total						5E-06					
	Exposure Medium Total							5E-06					
Medium Total								5E-06					
Receptor Total							Receptor Risk Total	9E-04					

RAGS Part D Table 10

Risk Summaries

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RISK SUMMARY

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10.4.RME	Construction Workers
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10.6.RME	Adult Recreational Users
10.7.RME	Lifelong Recreational Users
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	CENTRAL TENDENCY EXPOSURES
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10.4.CTE	Construction Workers
10.5.CTE	Child Recreational Users
10.6.CTE	Adult Recreational Users
10.7.CTE	Lifelong Recreational Users
10.8.CTE	Child Residents
10.9.CTE	Adult Residents
10.10.CTE	Lifelong Residents

TABLE 10.1.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)pyrene	6E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Chemical Total	6E-07	--	5E-07	--	1E-06		--	--	--	--
		Exposure Point Total						1E-06					--
	Exposure Medium Total							1E-06					--
	Air	SWMU 16	Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								1E-06					--
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Turkey Creek	Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.01	--	0.002	0.01
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.01	--	0.002	0.01
		Exposure Point Total						2E-06					0.01
	Exposure Medium Total							2E-06					0.01
Medium Total								2E-06					0.01
Receptor Total							Receptor Risk Total	3E-06				Receptor HI Total	0.01

Total CVS HI	0.01
Total Skin HI	0.01

TABLE 10.2.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)anthracene	7E-07	--	6E-07	--	1E-06	NA	--	--	--	--
			Benzo(a)pyrene	6E-06	--	5E-06	--	1E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-07	--	6E-07	--	1E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-06	--	1E-06	--	2E-06	NA	--	--	--	--
			Arsenic	3E-06	--	7E-07	--	4E-06	Skin, CVS	0.02	--	0.004	0.02
			Chemical Total	1E-05	--	8E-06	--	2E-05		0.02	--	0.004	0.02
		Exposure Point Total						2E-05					0.02
	Exposure Medium Total							2E-05					0.02
	Air	SWMU 16	Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	4E-10	--	--	4E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	5E-09	--	--	5E-09	NA	--	--	--	--
			Chemical Total	--	5E-09	--	--	5E-09		--	--	--	--
		Exposure Point Total						5E-09					--
	Exposure Medium Total							5E-09					--
Medium Total								2E-05					--
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	1E-06	--	3E-08	--	1E-06	Liver	0.0002	--	0.000008	0.0003
			1,1,2-Trichloroethane	4E-06	--	8E-08	--	4E-06	Blood	0.04	--	0.001	0.05
			Carbon Tetrachloride	1E-06	--	8E-08	--	1E-06	Liver	0.04	--	0.002	0.04
			Tetrachloroethene	2E-05	--	3E-06	--	2E-05	Liver	0.01	--	0.002	0.01
			Trichloroethene	1E-03	--	4E-05	--	1E-03	Liver	0.4	--	0.02	0.4
			Vinyl Chloride	1E-04	--	2E-06	--	1E-04	Liver	0.08	--	0.001	0.08
			RDX	1E-05	--	2E-08	--	1E-05	Prostate	0.08	--	0.0002	0.08
			Arsenic	3E-05	--	2E-08	--	3E-05	Skin, CVS	0.2	--	0.0001	0.2
			Manganese (Water)	--	--	--	--	--	CNS	2	--	0.04	2
			Chemical Total	1E-03	--	4E-05	--	1E-03		3	--	0.06	3
		Exposure Point Total						1E-03					3
	Exposure Medium Total							1E-03					3
Medium Total								1E-03					3
Receptor Total							Receptor Risk Total	1E-03				Receptor HI Total	3

Total Blood HI	0.05
Total CNS HI	2
Total CVS HI	0.2
Total Liver HI	0.6
Total Skin HI	0.2
Total Prostate HI	0.08

TABLE 10.3.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
	Air	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Receptor Total							Receptor Risk Total	--				Receptor HI Total	--

TABLE 10.4.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	SWMU 16	Aluminum	- -	--	- -	--	- -	CNS	0.03	- -	--	0.03
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.01	- -	--	0.01
			Chemical Total	- -	--	- -	--	- -		0.04	--	--	0.04
		Exposure Point Total						- -					0.04
	Exposure Medium Total							- -					0.04
	Air	SWMU 16	Aluminum	--	- -	--	--	- -	CNS	- -	1	- -	1
			Manganese (Soil)	--	- -	--	--	- -	CNS	- -	2	- -	2
			Chemical Total	--	- -	--	--	- -		- -	3	- -	3
		Exposure Point Total						- -					3
	Exposure Medium Total							- -					3
Medium Total								- -					3
Groundwater	Groundwater	SWMU 16	Trichloroethene	- -	--	3E-06	--	3E-06	Liver	--	- -	0.03	0.03
			Chemical Total	- -	--	3E-06	--	3E-06		--	- -	0.03	0.03
		Exposure Point Total						3E-06					0.03
	Exposure Medium Total							3E-06					0.03
	Air	SWMU 16	Trichloroethene	--	2E-06	--	--	2E-06	Liver	- -	0.1	- -	0.1
			Chemical Total	--	2E-06	--	--	2E-06		- -	0.1	- -	0.1
		Exposure Point Total						2E-06					0.1
	Exposure Medium Total							5E-06					0.1
Medium Total								5E-06					0.1
Receptor Total							Receptor Risk Total	5E-06				Receptor HI Total	3

Total CNS HI	3
Total Liver HI	0.1

TABLE 10.5.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)pyrene	1E-06	--	1E-06	--	3E-06	NA	--	--	--	--
			Chemical Total	1E-06	--	1E-06	--	3E-06		--	--	--	--
		Exposure Point Total						3E-06					--
	Exposure Medium Total							3E-06					--
	Air	SWMU 16	Benzo(a)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Chemical Total	--	2E-11	--	--	2E-11		--	--	--	--
		Exposure Point Total						2E-11					--
	Exposure Medium Total							2E-11					--
Medium Total								3E-06					--
Groundwater	Groundwater	SWMU 16	Tetrachloroethene	5E-06	--	7E-07	--	5E-06	Liver	0.01	--	0.002	0.01
			Trichloroethene	2E-04	--	9E-06	--	2E-04	Liver	0.4	--	0.02	0.4
			Vinyl Chloride	3E-05	--	4E-07	--	3E-05	Liver	0.08	--	0.0010	0.08
			RDX	2E-06	--	5E-09	--	2E-06	Prostate	0.08	--	0.0002	0.08
			Arsenic	6E-06	--	5E-09	--	6E-06	Skin, CVS	0.2	--	0.0001	0.2
			Manganese (Water)	--	--	--	--	--	CNS	2	--	0.04	2
			Chemical Total	3E-04	--	1E-05	--	3E-04		3	--	0.06	3
		Exposure Point Total						3E-04					3
	Exposure Medium Total							3E-04					3
Medium Total								3E-04					3
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies	Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.04	--	0.008	0.05
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.04	--	0.008	0.05
		Exposure Point Total						2E-06					0.05
	Exposure Medium Total							2E-06					0.05
Medium Total								2E-06					0.05

TABLE 10.5.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Turkey Creek	Arsenic	4E-06	--	7E-07	--	5E-06	Skin, CVS	0.10	- -	0.02	0.1
			Chemical Total	4E-06	--	7E-07	--	5E-06		0.1	- -	0.02	0.1
		Exposure Point Total						5E-06					0.1
	Exposure Medium Total							5E-06					0.1
Medium Total								5E-06					0.1
Receptor Total							Receptor Risk Total	3E-04				Receptor HI Total	3

Total CNS HI	2
Total CVS HI	0.3
Total Liver HI	0.5
Total Skin HI	0.3
Total Prostate HI	0.08

TABLE 10.6.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)pyrene	6E-07	--	1E-06	--	2E-06	NA	--	--	--	--
			Chemical Total	6E-07	--	1E-06	--	2E-06		--	--	--	--
		Exposure Point Total						2E-06					--
	Exposure Medium Total							2E-06					--
	Air	SWMU 16	Benzo(a)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Chemical Total	--	2E-11	--	--	2E-11		--	--	--	--
		Exposure Point Total						2E-11					--
	Exposure Medium Total							2E-11					--
Medium Total								2E-06					--
Groundwater	Groundwater	SWMU 16	Tetrachloroethene	4E-06	--	2E-06	--	6E-06	Liver	0.002	--	0.0009	0.003
			Trichloroethene	2E-04	--	2E-05	--	2E-04	Liver	0.09	--	0.01	0.1
			Vinyl Chloride	3E-05	--	9E-07	--	3E-05	Liver	0.02	--	0.0006	0.02
			RDX	2E-06	--	1E-08	--	2E-06	Prostate	0.02	--	0.00010	0.02
			Arsenic	6E-06	--	1E-08	--	6E-06	Skin, CVS	0.04	--	0.00008	0.04
			Chemical Total	2E-04	--	2E-05	--	3E-04		0.2	--	0.01	0.2
		Exposure Point Total						3E-04					0.2
	Exposure Medium Total							3E-04					0.2
Medium Total								3E-04					0.2
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--

TABLE 10.6.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Turkey Creek	Arsenic	2E-06	--	6E-07	--	2E-06	Skin, CVS	0.01	- -	0.004	0.01
			Chemical Total	2E-06	--	6E-07	--	2E-06		0.01	- -	0.004	0.01
		Exposure Point Total						2E-06					0.01
	Exposure Medium Total							2E-06					0.01
Medium Total								2E-06					0.01
Receptor Total							Receptor Risk Total	3E-04				Receptor HI Total	0.2

Total CVS HI	0.05
Total Liver HI	0.1
Total Skin HI	0.05
Total Prostate HI	0.02

TABLE 10.7.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)pyrene	2E-06	--	2E-06	--	4E-06					
			Arsenic	1E-06	--	3E-07	--	1E-06					
			Chemical Total	3E-06	--	2E-06	--	6E-06					
		Exposure Point Total						6E-06					
	Exposure Medium Total							6E-06					
	Air	SWMU 16	Benzo(a)pyrene	--	5E-11	--	--	5E-11					
			Arsenic	--	6E-10	--	--	6E-10					
			Chemical Total	--	7E-10	--	--	7E-10					
		Exposure Point Total						7E-10					
	Exposure Medium Total							7E-10					
Medium Total								6E-06					
Groundwater	Groundwater	SWMU 16	1,1,2-Trichloroethane	2E-06	--	6E-08	--	2E-06					
			Tetrachloroethene	9E-06	--	2E-06	--	1E-05					
			Trichloroethene	4E-04	--	3E-05	--	4E-04					
			Vinyl Chloride	5E-05	--	1E-06	--	6E-05					
			RDX	4E-06	--	2E-08	--	4E-06					
			Arsenic	1E-05	--	2E-08	--	1E-05					
			Chemical Total	5E-04	--	3E-05	--	5E-04					
		Exposure Point Total						5E-04					
	Exposure Medium Total							5E-04					
Medium Total								5E-04					
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels									
			Chemical Total	- -	--	- -	--	- -					
		Exposure Point Total						- -					
	Exposure Medium Total							- -					
Medium Total								- -					
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels									
			Chemical Total	- -	--	- -	--	- -					
		Exposure Point Total						- -					
	Exposure Medium Total							- -					
Medium Total								- -					
Sediment	Sediment	Gullies	Arsenic	2E-06	--	6E-07	--	3E-06					
			Chemical Total	2E-06	--	6E-07	--	3E-06					
		Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
Medium Total								3E-06					

TABLE 10.7.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Turkey Creek	Arsenic	5E-06	--	1E-06	--	7E-06					
			Chemical Total	5E-06	--	1E-06	--	7E-06					
		Exposure Point Total						7E-06					
	Exposure Medium Total							7E-06					
Medium Total								7E-06					
Receptor Total							Receptor Risk Total	5E-04					

TABLE 10.8.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)anthracene	2E-06	--	8E-07	--	3E-06	NA	--	--	--	--
			Benzo(a)pyrene	2E-05	--	7E-06	--	3E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	2E-06	--	8E-07	--	3E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	4E-06	--	1E-06	--	5E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-06	--	4E-07	--	1E-06	NA	--	--	--	--
			Arsenic	1E-05	--	9E-07	--	1E-05	Skin, CVS	0.3	--	0.02	0.3
			Chemical Total	4E-05	--	1E-05	--	5E-05		0.3	--	0.02	0.3
		Exposure Point Total						5E-05					0.3
	Exposure Medium Total							5E-05					0.3
	Air	SWMU 16	Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	6E-09	--	--	6E-09	NA	--	--	--	--
			Chemical Total	--	6E-09	--	--	6E-09		--	--	--	--
		Exposure Point Total						6E-09					--
	Exposure Medium Total							6E-09					--
Medium Total								5E-05					0.3
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	2E-06	--	1E-07	--	3E-06	Liver	0.002	--	0.00010	0.003
			1,1,2-Trichloroethane	9E-06	--	3E-07	--	9E-06	Blood	0.4	--	0.01	0.4
			1,2-Dichloroethane	1E-06	--	2E-08	--	1E-06	None Reported	0.007	--	0.0001	0.007
			Carbon Tetrachloride	3E-06	--	2E-07	--	3E-06	Liver	0.4	--	0.03	0.4
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	3	--	0.1	3
			Tetrachloroethene	5E-05	--	9E-06	--	6E-05	Liver	0.1	--	0.02	0.1
			Trichloroethene	2E-03	--	1E-04	--	2E-03	Liver	4	--	0.2	4
			Vinyl Chloride	3E-04	--	5E-06	--	3E-04	Liver	0.8	--	0.01	0.8
			RDX	2E-05	--	6E-08	--	2E-05	Prostate	0.8	--	0.002	0.8
			Aluminum	--	--	--	--	--	CNS	2	--	0.002	2
			Arsenic	7E-05	--	7E-08	--	7E-05	Skin, CVS	2	--	0.002	2
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	1	--	0.09	1
			Iron	--	--	--	--	--	None Reported	9	--	0.01	9
			Lithium	--	--	--	--	--	None Reported	2	--	0.0009	2
			Manganese (Water)	--	--	--	--	--	CNS	20	--	0.5	20
			Vanadium	--	--	--	--	--	Kidney	3	--	0.1	3
			Chemical Total	3E-03	--	1E-04	--	3E-03		48	--	1	49
		Exposure Point Total						3E-03					49
	Exposure Medium Total							3E-03					49

TABLE 10.8.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	1,1,2-Trichloroethane	--	3E-06	--	--	3E-06	NA	--	--	--	--
			Chloroform	--	1E-06	--	--	1E-06	Liver	--	0.01	--	0.01
			Trichloroethene	--	4E-04	--	--	4E-04	Liver	--	4	--	4
			Vinyl Chloride	--	1E-06	--	--	1E-06	Liver	--	0.04	--	0.04
			Chemical Total	--	4E-04	--	--	4E-04		--	4	--	4
		Exposure Point Total						4E-04					4
	Exposure Medium Total							3E-03					53
Medium Total								3E-03					53
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies	Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.04	--	0.007	0.05
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.04	--	0.01	0.05
		Exposure Point Total						2E-06					0.05
	Exposure Medium Total							2E-06					0.05
Medium Total								2E-06					0.05
Sediment	Sediment	Turkey Creek	Arsenic	4E-06	--	6E-07	--	4E-06	Skin, CVS	0.1	--	0.02	0.1
			Chemical Total	4E-06	--	6E-07	--	4E-06		0.1	--	0.02	0.1
		Exposure Point Total						4E-06					0.1
	Exposure Medium Total							4E-06					0.1
Medium Total								4E-06					0.1
Receptor Total							Receptor Risk Total	3E-03				Receptor HI Total	54

Total Blood HI	3
Total CNS HI	23
Total CVS HI	2
Total Kidney HI	3
Total Liver HI	10
Total Skin HI	2
Total None Reported HI	11
Total Prostate HI	0.8
Total Bone HI	1
Total Fetotoxicity HI	1

4/12/2005

TABLE 10.9.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)anthracene	9E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Benzo(a)pyrene	8E-06	--	4E-06	--	1E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	9E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-06	--	8E-07	--	2E-06	NA	--	--	--	--
			Arsenic	4E-06	--	5E-07	--	5E-06	Skin, CVS	0.03	--	0.003	0.03
			Chemical Total	2E-05	--	6E-06	--	2E-05		0.03	--	0.003	0.03
		Exposure Point Total						2E-05					0.03
	Exposure Medium Total							2E-05					0.03
	Air	SWMU 16	Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	7E-09	--	--	7E-09	NA	--	--	--	--
			Chemical Total	--	7E-09	--	--	7E-09		--	--	--	--
		Exposure Point Total						7E-09					--
	Exposure Medium Total							7E-09					--
Medium Total								2E-05					--
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	3E-06	--	2E-07	--	3E-06	Liver	0.0007	--	0.00006	0.0008
			1,1,2-Trichloroethane	1E-05	--	6E-07	--	1E-05	Blood	0.1	--	0.008	0.1
			1,2-Dichloroethane	1E-06	--	4E-08	--	1E-06	None Reported	0.002	--	0.00007	0.002
			Carbon Tetrachloride	3E-06	--	6E-07	--	4E-06	Liver	0.1	--	0.02	0.1
			Tetrachloroethene	6E-05	--	2E-05	--	8E-05	Liver	0.03	--	0.01	0.04
			Trichloroethene	3E-03	--	3E-04	--	3E-03	Liver	1	--	0.1	1
			Vinyl Chloride	3E-04	--	1E-05	--	4E-04	Liver	0.2	--	0.008	0.2
			RDX	3E-05	--	1E-07	--	3E-05	Prostate	0.2	--	0.001	0.2
			Arsenic	7E-05	--	2E-07	--	7E-05	Skin, CVS	0.5	--	0.001	0.5
			Iron	--	--	--	--	--	None Reported	3	--	0.006	3
			Manganese (Water)	--	--	--	--	--	CNS	6	--	0.3	6
			Chemical Total	3E-03	--	3E-04	--	3E-03		11	--	0.5	11
		Exposure Point Total						3E-03					11
	Exposure Medium Total							3E-03					11
	Air	SWMU 16	1,1,2-Trichloroethane	--	2E-06	--	--	2E-06	NA	--	--	--	--
			Trichloroethene	--	4E-04	--	--	4E-04	Liver	--	0.9	--	0.9
			Vinyl Chloride	--	1E-06	--	--	1E-06	Liver	--	0.008	--	0.008
			Chemical Total	--	4E-04	--	--	4E-04		--	0.9	--	0.9
		Exposure Point Total						4E-04					0.9
	Exposure Medium Total							4E-03					12
Medium Total								4E-03					12

TABLE 10.9.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	- -	--	- -	--	- -		--	- -	--	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								- -					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	- -	--	- -	--	- -		--	- -	--	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								- -					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	- -	--	- -	--	- -		--	- -	--	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								- -					--
Sediment	Sediment	Turkey Creek	Arsenic	2E-06	--	4E-07	--	2E-06	Skin, CVS	0.01	- -	0.003	0.01
			Chemical Total	2E-06	--	4E-07	--	2E-06		0.01	- -	0.003	0.01
		Exposure Point Total						2E-06					0.01
	Exposure Medium Total							2E-06					0.01
Medium Total								2E-06					0.01
Receptor Total							Receptor Risk Total	4E-03				Receptor HI Total	12

Total Blood HI	0.1
Total CNS HI	6
Total CVS HI	0.5
Total Liver HI	3
Total Skin HI	0.5
Total None Reported HI	3
Total Prostate HI	0.2

TABLE 10.10.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)anthracene	3E-06	--	1E-06	--	4E-06					
			Benzo(a)pyrene	3E-05	--	1E-05	--	4E-05					
			Benzo(b)fluoranthene	3E-06	--	1E-06	--	4E-06					
			Dibenzo(a,h)anthracene	5E-06	--	2E-06	--	7E-06					
			Indeno(1,2,3-cd)pyrene	1E-06	--	6E-07	--	2E-06					
			Arsenic	1E-05	--	1E-06	--	2E-05					
			Chemical Total	5E-05	--	2E-05	--	7E-05					
		Exposure Point Total						7E-05					
	Exposure Medium Total							7E-05					
	Air	SWMU 16	Benzo(a)anthracene	--	--	--	--	--					
			Benzo(a)pyrene	--	1E-09	--	--	1E-09					
			Benzo(b)fluoranthene	--	--	--	--	--					
			Dibenzo(a,h)anthracene	--	--	--	--	--					
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--					
			Arsenic	--	1E-08	--	--	1E-08					
			Chemical Total	--	1E-08	--	--	1E-08					
		Exposure Point Total						1E-08					
	Exposure Medium Total							1E-08					
Medium Total								7E-05					
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	5E-06	--	3E-07	--	6E-06					
			1,1,2-Trichloroethane	2E-05	--	9E-07	--	2E-05					
			1,2-Dichloroethane	2E-06	--	6E-08	--	2E-06					
			Benzene	2E-06	--	1E-07	--	2E-06					
			Bromodichloromethane	2E-06	--	7E-08	--	2E-06					
			Carbon Tetrachloride	6E-06	--	8E-07	--	7E-06					
			Tetrachloroethene	1E-04	--	3E-05	--	1E-04					
			Trichloroethene	5E-03	--	4E-04	--	5E-03					
			Vinyl Chloride	6E-04	--	2E-05	--	7E-04					
			RDX	5E-05	--	2E-07	--	5E-05					
			Arsenic	1E-04	--	2E-07	--	1E-04					
			Chemical Total	6E-03	--	5E-04	--	6E-03					
		Exposure Point Total						6E-03					
	Exposure Medium Total							6E-03					

TABLE 10.10.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	1,1,2-Trichloroethane	--	5E-06	--	--	5E-06					
			Chloroform	--	2E-06	--	--	2E-06					
			Tetrachloroethene	--	1E-06	--	--	1E-06					
			Trichloroethene	--	8E-04	--	--	8E-04					
			Vinyl Chloride	--	3E-06	--	--	3E-06					
			Chemical Total	--	8E-04	--	--	8E-04					
		Exposure Point Total						8E-04					
	Exposure Medium Total							7E-03					
Medium Total								7E-03					
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels									
			Chemical Total	--	--	--	--	--					
		Exposure Point Total						--					
	Exposure Medium Total							--					
Medium Total								--					
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels									
			Chemical Total	--	--	--	--	--					
		Exposure Point Total						--					
	Exposure Medium Total							--					
Medium Total								--					
Sediment	Sediment	Gullies	Arsenic	2E-06	--	4E-07	--	3E-06					
			Chemical Total	2E-06	--	4E-07	--	3E-06					
		Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
Medium Total								3E-06					
Sediment	Sediment	Turkey Creek	Arsenic	5E-06	--	1E-06	--	6E-06					
			Chemical Total	5E-06	--	1E-06	--	6E-06					
		Exposure Point Total						6E-06					
	Exposure Medium Total							6E-06					
Medium Total								6E-06					
Receptor Total							Receptor Risk Total	7E-03					

TABLE 10.1.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
	Air	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Receptor Total							Receptor Risk Total	--				Receptor HI Total	--

TABLE 10.2.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)pyrene	9E-07	--	2E-07	--	1E-06	NA	--	--	--	--
			Chemical Total	9E-07	--	2E-07	--	1E-06		--	--	--	--
		Exposure Point Total						1E-06					--
	Exposure Medium Total							1E-06					--
	Air	SWMU 16	Benzo(a)pyrene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Chemical Total	--	1E-10	--	--	1E-10		--	--	--	--
		Exposure Point Total						1E-10					--
	Exposure Medium Total							1E-10					--
Medium Total								1E-06					--
Groundwater	Groundwater	SWMU 16	1,1,2-Trichloroethane	1E-06	--	2E-08	--	1E-06	Blood	0.04	--	0.0007	0.04
			Tetrachloroethene	6E-06	--	8E-07	--	7E-06	Liver	0.009	--	0.001	0.01
			Trichloroethene	3E-04	--	1E-05	--	3E-04	Liver	0.4	--	0.01	0.4
			Vinyl Chloride	4E-05	--	4E-07	--	4E-05	Liver	0.07	--	0.0007	0.07
			RDX	3E-06	--	5E-09	--	3E-06	Prostate	0.07	--	0.0001	0.07
			Arsenic	9E-06	--	5E-09	--	9E-06	Skin, CVS	0.2	--	0.00008	0.2
			Manganese (Water)	--	--	--	--	--	CNS	2	--	0.02	2
			Chemical Total	4E-04	--	1E-05	--	4E-04		2	--	0.04	3
		Exposure Point Total						4E-04					3
	Exposure Medium Total							4E-04					3
Medium Total								4E-04					3
Receptor Total							Receptor Risk Total	4E-04				Receptor HI Total	3

Total Blood HI	0.04
Total CNS HI	2
Total CVS HI	0.2
Total Liver HI	0.5
Total Skin HI	0.2
Total Prostate HI	0.07

TABLE 10.3.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
	Air	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Receptor Total							Receptor Risk Total	--				Receptor HI Total	--

TABLE 10.4.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	SWMU 16	Aluminum	- -	--	- -	--	- -	CNS	0.01	- -	--	0.01
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.005	- -	--	0.005
			Chemical Total	- -	--	- -	--	- -		0.02	- -	--	0.02
		Exposure Point Total						- -					0.02
	Exposure Medium Total							- -					0.02
	Air	SWMU 16	Aluminum	--	- -	--	--	- -	CNS	- -	1	- -	1
			Manganese (Soil)	--	- -	--	--	- -	CNS	- -	2	- -	2
			Chemical Total	--	- -	--	--	- -		- -	3	- -	3
		Exposure Point Total						- -					3
	Exposure Medium Total							- -					3
Medium Total								- -					3
Groundwater	Groundwater	SWMU 16	Trichloroethene	- -	--	2E-06	--	2E-06	Liver	--	- -	0.03	0.03
			Chemical Total	- -	--	2E-06	--	2E-06		--	- -	0.03	0.03
		Exposure Point Total						2E-06					0.03
	Exposure Medium Total							2E-06					0.03
	Air	SWMU 16	Trichloroethene	--	3E-07	--	--	3E-07	Liver	- -	0.02	- -	0.02
			Chemical Total	--	3E-07	--	--	3E-07		- -	0.02	- -	0.02
		Exposure Point Total						3E-07					0.02
	Exposure Medium Total							3E-06					0.04
Medium Total								3E-06					0.04
Receptor Total							Receptor Risk Total	3E-06				Receptor HI Total	3

Total CNS HI	3
Total Liver HI	0.04

TABLE 10.5.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
	Air	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Groundwater	Groundwater	SWMU 16	Trichloroethene	4E-05	--	1E-06	--	4E-05	Liver	0.2	--	0.007	0.2
			Vinyl Chloride	5E-06	--	5E-08	--	5E-06	Liver	0.04	--	0.0004	0.04
			Arsenic	1E-06	--	6E-10	--	1E-06	Skin, CVS	0.08	--	0.00005	0.08
			Chemical Total	4E-05	--	1E-06	--	4E-05		0.3	--	0.007	0.3
		Exposure Point Total						4E-05					0.3
	Exposure Medium Total							4E-05					0.3
Medium Total								4E-05					0.3
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--

TABLE 10.5.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Receptor Total							Receptor Risk Total	4E-05				Receptor HI Total	0.3

Total CVS HI	0.08
Total Liver HI	0.2
Total Skin HI	0.08

TABLE 10.6.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
	Air	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Groundwater	Groundwater	SWMU 16	Trichloroethene	3E-05	--	3E-06	--	3E-05	Liver	0.04	--	0.004	0.05
			Vinyl Chloride	4E-06	--	1E-07	--	4E-06	Liver	0.008	--	0.0002	0.008
			Chemical Total	3E-05	--	3E-06	--	3E-05		0.05	--	0.004	0.06
		Exposure Point Total						3E-05					0.06
	Exposure Medium Total							3E-05					0.06
Medium Total								3E-05					0.06
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients WIthin Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Receptor Total							Receptor Risk Total	3E-05				Receptor HI Total	0.06

4/12/2005

TABLE 10.7.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)pyrene	2E-06	--	2E-06	--	4E-06					
			Arsenic	1E-06	--	3E-07	--	1E-06					
			Chemical Total	3E-06	--	2E-06	--	6E-06					
		Exposure Point Total						6E-06					
	Exposure Medium Total							6E-06					
	Air	SWMU 16	Benzo(a)pyrene	--	5E-11	--	--	5E-11					
			Arsenic	--	6E-10	--	--	6E-10					
			Chemical Total	--	7E-10	--	--	7E-10					
		Exposure Point Total						7E-10					
	Exposure Medium Total							7E-10					
Medium Total								6E-06					
Groundwater	Groundwater	SWMU 16	1,1,2-Trichloroethane	2E-06	--	6E-08	--	2E-06					
			Tetrachloroethene	9E-06	--	2E-06	--	1E-05					
			Trichloroethene	4E-04	--	3E-05	--	4E-04					
			Vinyl Chloride	5E-05	--	1E-06	--	6E-05					
			RDX	4E-06	--	2E-08	--	4E-06					
			Arsenic	1E-05	--	2E-08	--	1E-05					
			Chemical Total	5E-04	--	3E-05	--	5E-04					
		Exposure Point Total						5E-04					
	Exposure Medium Total							5E-04					
Medium Total								5E-04					
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels									
			Chemical Total	- -	--	- -	--	- -					
		Exposure Point Total						- -					
	Exposure Medium Total							- -					
Medium Total								- -					
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels									
			Chemical Total	- -	--	- -	--	- -					
		Exposure Point Total						- -					
	Exposure Medium Total							- -					
Medium Total								- -					
Sediment	Sediment	Gullies	Arsenic	2E-06	--	6E-07	--	3E-06					
			Chemical Total	2E-06	--	6E-07	--	3E-06					
		Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
Medium Total								3E-06					

TABLE 10.7.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Turkey Creek	Arsenic	5E-06	--	1E-06	--	7E-06					
			Chemical Total	5E-06	--	1E-06	--	7E-06					
		Exposure Point Total						7E-06					
	Exposure Medium Total							7E-06					
Medium Total								7E-06					
Receptor Total							Receptor Risk Total	5E-04					

TABLE 10.8.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)pyrene	2E-06	--	3E-07	--	2E-06	NA	--	--	--	--
			Arsenic	1E-06	--	4E-08	--	1E-06	Skin, CVS	0.09	--	0.003	0.09
			Chemical Total	3E-06	--	3E-07	--	4E-06		0.09	--	0.003	0.09
		Exposure Point Total						4E-06					0.09
	Exposure Medium Total							4E-06					0.09
	Air	SWMU 16	Benzo(a)pyrene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Arsenic	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Chemical Total	--	1E-09	--	--	1E-09		--	--	--	--
		Exposure Point Total						1E-09					--
	Exposure Medium Total							1E-09					--
Medium Total								4E-06					0.09
Groundwater	Groundwater	SWMU 16	Tetrachloroethene	5E-06	--	2E-06	--	6E-06	Liver	0.03	--	0.01	0.04
			Trichloroethene	2E-04	--	2E-05	--	2E-04	Liver	1	--	0.1	1
			Vinyl Chloride	3E-05	--	9E-07	--	3E-05	Liver	0.2	--	0.007	0.2
			RDX	2E-06	--	1E-08	--	2E-06	Prostate	0.2	--	0.001	0.2
			Arsenic	6E-06	--	1E-08	--	6E-06	Skin, CVS	0.5	--	0.0008	0.5
			Iron	--	--	--	--	--	None Reported	3	--	0.005	3
			Manganese (Water)	--	--	--	--	--	CNS	6	--	0.2	6
			Chemical Total	3E-04	--	2E-05	--	3E-04		11	--	0.4	11
		Exposure Point Total						3E-04					11
	Exposure Medium Total							3E-04					11
	Air	SWMU 16	Tetrachloroethene	--	7E-08	--	--	7E-08	Liver	--	0.0009	--	0.0009
			Trichloroethene	--	5E-05	--	--	5E-05	Liver	--	2	--	2
			Vinyl Chloride	--	2E-07	--	--	2E-07	Liver	--	0.01	--	0.01
			RDX	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	5E-05	--	--	5E-05		--	2	--	2
		Exposure Point Total						5E-05					2
	Exposure Medium Total							3E-04					13
Medium Total								3E-04					13
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--

TABLE 10.8.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Receptor Total							Receptor Risk Total	3E-04				Receptor HI Total	13

Total CNS HI	6
Total CVS HI	0.6
Total Liver HI	3
Total Skin HI	0.6
Total None Reported HI	3
Total Prostate HI	0.2

TABLE 10.9.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	- -	--	- -	--	- -		--	- -	--	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
	Air	SWMU 16		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	- -	--	--	- -		--	- -	--	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								- -					--
Groundwater	Groundwater	SWMU 16	1,1,2-Trichloroethane	1E-06	--	1E-07	--	1E-06	Blood	0.06	- -	0.004	0.06
			Tetrachloroethene	8E-06	--	3E-06	--	1E-05	Liver	0.01	- -	0.006	0.02
			Trichloroethene	4E-04	--	5E-05	--	4E-04	Liver	0.5	- -	0.07	0.6
			Vinyl Chloride	5E-05	--	2E-06	--	5E-05	Liver	0.1	- -	0.004	0.1
			RDX	4E-06	--	2E-08	--	4E-06	Prostate	0.1	- -	0.0007	0.1
			Arsenic	1E-05	--	2E-08	--	1E-05	Skin, CVS	0.2	- -	0.0005	0.2
			Iron	- -	--	- -	--	- -	None Reported	1	- -	0.003	1
			Manganese (Water)	- -	--	- -	--	- -	CNS	3	- -	0.1	3
			Chemical Total	4E-04	--	5E-05	--	5E-04		5	- -	0.2	5
		Exposure Point Total						5E-04					5
	Exposure Medium Total							5E-04					5
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	5E-08	--	--	5E-08	NA	- -	--	- -	--
			Tetrachloroethene	--	5E-08	--	--	5E-08	Liver	- -	0.0007	- -	0.0007
			Trichloroethene	--	4E-05	--	--	4E-05	Liver	- -	1	- -	1
			Vinyl Chloride	--	1E-07	--	--	1E-07	Liver	- -	0.01	- -	0.01
			RDX	--	- -	--	--	- -	NA	- -	--	- -	--
			Arsenic	--	- -	--	--	- -	NA	- -	--	- -	--
			Iron	--	- -	--	--	- -	NA	- -	--	- -	--
			Manganese (Water)	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	4E-05	--	--	4E-05		- -	1	- -	1
		Exposure Point Total						4E-05					1
	Exposure Medium Total							5E-04					6
Medium Total								5E-04					6
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	- -	--	- -	--	- -		--	- -	--	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								- -					--

TABLE 10.9.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Gullies		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Sediment	Sediment	Turkey Creek		All Cancer Risks Within Acceptable Levels					All Hazard Quotients Within Acceptable Levels				
			Chemical Total	--	--	--	--	--		--	--	--	--
		Exposure Point Total						--					--
	Exposure Medium Total							--					--
Medium Total								--					--
Receptor Total							Receptor Risk Total	5E-04				Receptor HI Total	6

Total Blood HI	0.06
Total CNS HI	3
Total CVS HI	0.2
Total Liver HI	2
Total Skin HI	0.2
Total None Reported HI	1
Total Prostate HI	0.1

TABLE 10.10.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Benzo(a)pyrene	3E-06	--	4E-07	--	3E-06					
			Arsenic	2E-06	--	5E-08	--	2E-06					
			Chemical Total	4E-06	--	5E-07	--	5E-06					
		Exposure Point Total						5E-06					
	Exposure Medium Total							5E-06					
	Air	SWMU 16	Benzo(a)pyrene	--	2E-10	--	--	2E-10					
			Arsenic	--	3E-09	--	--	3E-09					
			Chemical Total	--	3E-09	--	--	3E-09					
		Exposure Point Total						3E-09					
	Exposure Medium Total							3E-09					
Medium Total								5E-06					
Groundwater	Groundwater	SWMU 16	1,1,2-Trichloroethane	2E-06	--	1E-07	--	2E-06					
			Tetrachloroethene	1E-05	--	5E-06	--	2E-05					
			Trichloroethene	6E-04	--	7E-05	--	6E-04					
			Vinyl Chloride	8E-05	--	3E-06	--	8E-05					
			RDX	6E-06	--	4E-08	--	6E-06					
			Arsenic	2E-05	--	3E-08	--	2E-05					
			Chemical Total	7E-04	--	8E-05	--	8E-04					
		Exposure Point Total						8E-04					
	Exposure Medium Total							8E-04					
	Air	SWMU 16	Trichloroethene	--	9E-05	--	--	9E-05					
			Chemical Total	--	9E-05	--	--	9E-05					
		Exposure Point Total						9E-05					
	Exposure Medium Total							9E-04					
Medium Total								9E-04					
Surface Water	Surface Water	Gullies		All Cancer Risks Within Acceptable Levels									
			Chemical Total	--	--	--	--	--					
		Exposure Point Total						--					
	Exposure Medium Total							--					
Medium Total								--					
Surface Water	Surface Water	Turkey Creek		All Cancer Risks Within Acceptable Levels									
			Chemical Total	--	--	--	--	--					
		Exposure Point Total						--					
	Exposure Medium Total							--					
Medium Total								--					

TABLE 10.10.CTE
RISK SUMMARY
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Arsenic	2E-06	--	3E-07	--	2E-06					
			Chemical Total	2E-06	--	3E-07	--	2E-06					
		Exposure Point Total						2E-06					
	Exposure Medium Total							2E-06					
Medium Total								2E-06					
Sediment	Sediment	Turkey Creek	Arsenic	4E-06	--	6E-07	--	5E-06					
			Chemical Total	4E-06	--	6E-07	--	5E-06					
		Exposure Point Total						5E-06					
	Exposure Medium Total							5E-06					
Medium Total								5E-06					
Receptor Total							Receptor Risk Total	9E-04					

APPENDIX I.2

SAMPLE CALCULATIONS

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FUTURE ON-SITE ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface soil.

EQUATION:

$$IEX = \frac{CS \times IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
IR	=	incidental ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	6.29	mg/kg	Chemical: Arsenic
IR	=	100	mg/day	
EF	=	350	days/year	
ED	=	24	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	8760	days	
CSFo	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FUTURE ON-SITE ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{6.29 \text{ mg/kg} \times 100 \text{ mg/day} \times 350 \text{ days/year} \times 24 \text{ years} \times 1 \times 1.0E\text{-}06 \text{ kg/mg}}{70 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 2.95E-06 mg/kg/day

ILCR = 2.95E-06 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 4.4E-06

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{6.29 \text{ mg/kg} \times 100 \text{ mg/day} \times 350 \text{ days/year} \times 24 \text{ years} \times 1 \times 1.0E\text{-}06 \text{ kg/mg}}{70 \text{ kg} \times 8760 \text{ days}}$$

IEXnc = 8.62E-06 mg/kg/day

HQ = 8.62E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 2.9E-02

CLIENT: NCWS CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FUTURE ON-SITE ADULT RESIDENT		
BASED ON: U.S. EPA, JULY 2004		
BY: R. JUPIN	CHECKED BY: D. Bohler	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with surface soil.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
CF	=	conversion factor (1.0E-6 kg/mg)
SA	=	skin surface available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDd (mg/kg/day)

ASSUMPTIONS:

Cs	=	6.29	mg/kg	Chemical: Arsenic
CF	=	1.0E-06	kg/mg	
SA	=	5700	cm^2/day	
AF	=	0.07	mg/cm^2	
ABS	=	0.03		
EF	=	350	days/year	
ED	=	24	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	8760	days	
CSFd	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDd	=	3.0E-04	(mg/kg/day)	

CLIENT: NCWS CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FUTURE ON-SITE ADULT RESIDENT		
BASED ON: U.S. EPA, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{6.29 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 5700 \text{ cm2/day} \times 0.07 \text{ mg/cm2} \times 0.03 \times 350 \text{ days/year} \times 24 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$$

DEXc = 3.54E-07 mg/kg/day

ILCR = 3.54E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 5.3E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{6.29 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 5700 \text{ cm2/day} \times 0.07 \text{ mg/cm2} \times 0.03 \times 350 \text{ days/year} \times 24 \text{ years}}{70 \text{ kg} \times 8760 \text{ days}}$$

DEXnc = 1.03E-06 mg/kg/day

HQ = 1.03E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 3.4E-03

CLIENT: NSWC CRANE, INDIANA		**JOB NUMBER:** 7448
SUBJECT: ESTIMATION OF AMBIENT AIR CONCENTRATIONS RESULTING FROM FUGITIVE DUST EMISSIONS AND VOLATILIZATION FROM SOIL		
BASED ON: U.S. EPA 1996		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** 03/15/2005

PURPOSE: To calculate ambient air concentrations resulting from fugitive dust and volatilization from surface soil.

RELEVANT EQUATIONS:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA}$$

$$DA = \frac{(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/\theta_T^{\ 2}}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

Where:

Cair	=	Chemical concentration in air (mg/m^3)
Cs	=	Chemical concentration in soil (mg/kg)
PEF	=	Particulate emission factor (m^3/kg)
VF	=	Volatilization factor (m^3/kg)
Q/C	=	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T	=	Exposure interval (seconds).
pb	=	Dry soil bulk density (g/cm^3).
ps	=	soil particle density (g/cm^3).
θ_T	=	Total soil porosity (Lpore/Lsoil).
θw	=	Water-filled soil porosity (Lpore/Lsoil).
θa	=	Air-filled soil porosity (Lair/Lsoil).
Di	=	Diffusivity in air (cm^2/sec).
H	=	Dimensionless Henry's Law Constant.
S	=	Solubility limit (mg/L)
Dw	=	Diffusivity in water (cm^2/sec).
DA	=	Apparent diffusivity (cm^2/sec).
Kd	=	Soil-water partition coefficient (cm^3/g).
Koc	=	Soil organic carbon partition coefficient (cm^3/g).
foc	=	Fraction organic carbon in soil (g/g).

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: ESTIMATION OF AMBIENT AIR CONCENTRATIONS RESULTING FROM FUGITIVE DUST EMISSIONS AND VOLATILIZATION FROM SOIL		
BASED ON: U.S. EPA 1996		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

ASSUMPTIONS:

Cs	=	0.031	mg/kg	Chemical: Trichloroethene
PEF	=	1.32E+09	m3/kg	
Q/C	=	68.81	g/m2-s per kg/m3	
T	=	9.46E+08	sec	
pb	=	1.5	g/cm3	
ps	=	2.65	g/cm3	
θ_T	=	0.434	Lpore/Lsoil	
θw	=	0.15	Lpore/Lsoil	
θa	=	0.284	Lair/Lsoil	
Di	=	7.90E-02	cm2/sec	
H	=	4.22E-01	Uniltess	
S	=	1.10E+03	mg/L	
Dw	=	9.10E-06	cm2/sec	
Koc	=	1.66E+02	cm3/g	
foc	=	0.006	g/g	
Kd	=	0.996	cm3/g	

EXAMPLE CALCULATIONS

$$DA = \frac{[(0.284^{10/3}) \times (0.079\ cm2/sec) \times (4.22E\text{-}01) + (0.15^{10/3}) \times (9.10E\text{-}06\ cm2/sec)]/(0.434^2)}{(1.5\ g/cm3 \times 0.996\ cm3/g) + (0.15 + 0.284 \times 0.422)}$$

DA = 1.51E-03 cm^2/sec

$$VF = \frac{(68.81\ g/m2\text{-}s\ per\ kg/m3) \times [(3.14) \times (1.51E\text{-}03\ cm2/sec) \times (9.46E+08\ sec)]^{1/2} \times (1E\text{-}4\ m2/cm2)}{2 \times 1.5g/cm3 \times 1.51E\text{-}03\ cm2/sec}$$

VF = 3.22E+03 m^3/kg

Csat = (1.10E+03 mg/L)/(1.5 g/cm3) x [(0.996 cm3/g) x (1.5 g/cm3) + (0.15 + 4.22E-01 x 0.284)]

Csat = 1.29E+03 mg/kg

Csat is greater than Cs, therfore use Cs in calculation of air concentration.

Cair = 0.031 mg/kg x [(1/1.32E+09 m3/kg) + (1/3.22E+03 m3/kg)]

Cair = 9.64E-06 mg/m^3

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS AND VOLATILES BY A ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY: D. Schlor	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from inhalation of fugitive dust and volatiles.

EQUATION:

$$IEX = \frac{Ca \times IR \times ET \times EF \times ED}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Ca	=	exposure point concentration in air (mg/m3)
IR	=	inhlation rate (m3/hr)
ET	=	exposure time (hrs/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFi	=	inhalation carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDi	=	inhalation noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFi (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDi (mg/kg/day)

ASSUMPTIONS:

Ca	=	9.64E-06	mg/m3	Chemical: Trichloroethene
IR	=	0.83	m3/hr	
ET	=	24	hr/day	
EF	=	350	days/year	
ED	=	24	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	8760	days	
CSFi	=	7.0E-03	$(mg/kg/day)^{-1}$	
RfDi	=	1.70E-01	(mg/kg/day)	

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS AND VOLATILES BY A ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY: D. Sellon	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{9.64E\text{-}06 \text{ mg/m3} \times 0.83 \text{ m3/hr} \times 24 \text{ hr/day} \times 350 \text{ days/year} \times 24 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 9.02E-07 mg/kg/day

ILCR = 9.02E-07 mg/kg/day x 7.00E-03 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 6.3E-09

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{9.64E\text{-}06 \text{ mg/m3} \times 0.83 \text{ m3/hr} \times 24 \text{ hr/day} \times 350 \text{ days/year} \times 24 \text{ years}}{70 \text{ kg} \times 8760 \text{ days}}$$

IEXnc = 2.63E-06 mg/kg/day

HQ = 2.63E-06 mg/kg/day / 1.70E-01 (mg/kg/day) = Hazard Quotient

HQ **1.5E-05**

CLIENT:	JOB NUMBER:
NSWC CRANE, INDIANA	7448

SUBJECT:
CALCULATION OF PARTICUALATE EMISSION FACTOR FOR CONSTRUCTION WORKERS

BASED ON:
Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA, December 2002)

BY:	CHECKED BY:	DATE:
R. JUPIN		03/15/2005

Equation 5-5
Derivation of the Particulate Emission Factor
Construction Scenario - Construction Worker

$$PEF_{sc} = Q/C_{sr} \times \frac{1}{F_D} \times \left[\frac{T \times A_R}{556 \times (W/3)^{0.4} \times \frac{(365d/yr - p)}{365d/yr} \times \Sigma VKT} \right]$$

Parameter/Definition (units)	Default
PEF_{co}/subchronic road particulate emission factor (m^3/kg)	site-specific
Q/C_{sr}/ inverse of the ratio of the 1-h geometric mean air concentration to the emission flux along a straight road segment bisecting a square site (g/m^2-s per kg/m^3)	23.02[a] (Equation 5-6)
F_D/dispersion correction factor (unitless)	0.185 (Appendix E)
T/total time over which construction occurs (s)	site-specific
A_R/surface area of contaminated road segment (m^2) L_R/length of road segment (ft) W_R/width of road segment (ft)	274.213 ($A_R = L_R \times W_R \times 0.092903 m^2/ft^2$)
W/mean vehicle weight (tons)	site-specific
p/number of days with at least 0.01 inches of precipitation (days/year)	site-specific (Exhibit 5-2)
ΣVKT/sum of fleet vehicle kilometers traveled during the exposure duration (km)	site-specific

[a] Assumes a 0.5 acre site

Q/C	23.02	(g/m2-s per kg/m3)	
Fd	0.185	dispersion correction factor (unitless)	
T	4.32E+06	sec	3600 sec/hr x 8hr/day x 150days/yr
Area (A)	274.213	m^2	
W	8	tons	
p	115	day/year	
VKT	175.5	km	

PEF = 1.49E+06 m^3/kg

CLIENT: NSWC CRANE, INDIANA		**JOB NUMBER:** 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF GROUNDWATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	**CHECKED BY:** D. Schlosser	**DATE:** 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from ingestion of groundwater.

EQUATION:

$$IEX = \frac{Cgw \times CF \times IF \times EF \times ED}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cgw	=	exposure point concentration in groundwater (ug/L)
CF	=	conversion factor (1.0E-3 mg/ug)
IR	=	ingestion rate (L/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cgw	=	21055	ug/L	Chemical: Trichloroethene
IR	=	2	L/day	
CF	=	1.0E-03	mg/ug	
EF	=	350	days/year	
ED	=	24	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	8760	days	
CSFo	=	1.3E-02	$(mg/kg/day)^{-1}$	
RfDo	=	5.0E-01	(mg/kg/day)	

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF GROUNDWATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{21055\ ug/L \times 0.001\ mg/ug \times 2\ L/day \times 350\ days/year \times 24\ years}{70\ kg \times 25550\ days}$$

IEXc = 1.98E-01 mg/kg/day

ILCR = 1.98E-01 mg/kg/day x 1.30E-02 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 2.6E-03

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{21055\ ug/L \times 0.001\ mg/ug \times 2\ L/day \times 350\ days/year \times 24\ years}{70\ kg \times 8760\ days}$$

IEXnc = 5.77E-01 mg/kg/day

$$HQ = \frac{5.77E\text{-}01\ mg/kg/day}{5.00E\text{-}01\ (mg/kg/day)} = \text{Hazard Quotient}$$

HQ = 1.2E+00

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with groundwater.

EQUATION:

$$DAD = \frac{DAevent \times EV \times ED \times EF \times A}{BW \times AT}$$

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed does per event (mg/cm^2/event)
EV	=	event frequency (events/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
A	=	skin surface available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = DAD (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = DAD (mg/kg/day) / RFDd (mg/kg/day)

EQUATIONS for DAevent:

For Inorganics:

DAevent = Kp x Cw x CF x tevent

For Organics:

$$\text{If } tevent \le t^{*}, \text{ then: } DAevent = 2 \times FA \times Kp \times Cw \times CF \times \sqrt{\frac{6 \times tau \times tevent}{\pi}}$$

$$\text{If } tevent > t^{*}, \text{ then: } DAevent = FA \times Kp \times Cw \times CF \times \left[\frac{tevent}{1+B} + 2 \times tau \times \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

Where:

Kp	=	permeability coefficient from water (cm/hr)
Cgw	=	concentration of chemical in groundwater (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
t*	=	time it takes to reach steady-state (hr/event)
τ	=	lag time (hr/event)
B	=	Bunge Model Constant (dimensionless)

EXAMPLE CALCULATION OF DAevent

ASSUMPTIONS:

Cgw	=	21.055	mg/L	Chemical: Trichloroethene
Kp	=	1.16E-02	cm/hr	
FA	=	1	unitless	
tevent	=	0.25	hr/event	
CF	=	0.001	L/cm^3	
t*	=	1.39	hr/event	
τ	=	0.58	hr/event	
B	=	0.051		

tevent < t*, therefore,

$$DAevent = (2 \times 0.0116 \text{ cm/hr})\ (1)\ (21.055 \text{ mg/L})\ (0.001 \text{ L/cm3}) \times \sqrt{\frac{6 \times 0.581 \text{ hr/event} \times 0.25 \text{ hr/event}}{\pi}}$$

DAevent = 2.57E-04 mg/cm^2-event

RISK CALCULATIONS

ASSUMPTIONS:

A	=	18000	cm^2/day
EV	=	1	event/day
ED	=	24	years
EF	=	350	days/year
BW	=	70	kg
ATc	=	25550	days
ATnc	=	8760	days
CSFd	=	1.3E-02	(mg/kg/day)$^{-1}$
RfDd	=	5.0E-01	(mg/kg/day)

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$DADc = \frac{2.57E\text{-}04 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 24 \text{ years} \times 350 \text{ days/year} \times 18000 \text{ cm2/day}}{70 \text{ kg} \times 25550 \text{ days}}$$

DADc = 2.18E-02 mg/kg/day

DADc = 2.18E-02 mg/kg/day x 1.30E-02 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 2.83E-04

EXAMPLE NONCARCINOGENIC CALCULATION

$$DADnc = \frac{2.57E\text{-}04 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 24 \text{ years} \times 350 \text{ days/year} \times 18000 \text{ cm2/day}}{70 \text{ kg} \times 8760 \text{ days}}$$

DADnc = 6.34E-02 mg/kg/day

HQ = 6.34E-02 mg/kg/day / 5.00E-01 (mg/kg/day) = Hazard Quotient

HQ = 1.3E-01

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF VOLATILES WHILE SHOWERING BY AN ADULT RESIDENT		
BASED ON: U.S. EPA, 1989 AND FOSTER AND CHROSTOWSKI, 1987		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from inhalation of volatiles while showering by an adult resident.

EQUATIONS:

$$\text{Intake} = \frac{S \times IRsh \times K \times EF \times ED}{BW \times AT \times Ra \times CF}$$

Where:

$$K = Ds + \frac{\exp(-Ra \times Dt) - \exp[Ra \times (Ds - Dt)]}{Ra}$$

$S = Cwd \times FR/SV$ $\quad$ $Cwd = Cw \times [1-\exp(-Kal \times ts/60d)]$

$Kal = Kl \times [(T1 \times Us)/(Ts \times U1)^{-0.5}$ $\quad$ $Kl = 1/[1/k1 + RT/(H \times kg)]$

$k1 = 20\ cm/hr \times (44/MW)^{0.5}$ $\quad$ $kg = 3000\ cm/hr \times (18/MW)^{0.5}$

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFi (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDi (mg/kg/day)

Where:

Intake	=	estimated exposure intake (mg/kg/day)
S	=	volatile chemical generation rate (mg/m3-min - shower)
IRsh	=	inhalation rate (m3/hr)
EF	=	exposure frequency (showers/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
Ra	=	air exchange rate (1/min)
Ds	=	shower duration (min)
Dt	=	total time in bathroom (min)
FR	=	shower water flow rate (L/min)
SV	=	shower room air volume (m3)
ts	=	shower droplet drop time (sec)
d	=	shower droplet diameter (mm)
MW	=	molecular weight of compound (g/mole)
H	=	Henry's Law constant (atm-m3/mole)
T1	=	calibration water temperature (K)
Ts	=	shower water temperature (K)
U1	=	water viscosity at T1 (cp)
Us	=	water viscosity at Ts (cp)
CSFi	=	inhalation carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDi	=	inhalation noncarcinogenic reference dose (mg/kg/day)

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF VOLATILES WHILE SHOWERING BY AN ADULT RESIDENT		
BASED ON: U.S. EPA, 1989 AND FOSTER AND CHROSTOWSKI, 1987		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

ASSUMPTIONS: Chemical: Trichloroethene

IRsh	=	0.6	m3/hr
EF	=	350	showers/year
ED	=	24	years
BW	=	70	kg
ATc	=	25550	days
Atn	=	8760	days
Ra	=	0.0167	1/min
CF	=	60	min/hr
Ds	=	15	min
Dt	=	20	min
FR	=	10	L/min
SV	=	12	m3
Cw	=	21.055	mg/L
ts	=	2	sec
d	=	1	mm
MW	=	131.4	g/mole
H	=	1.03E-02	atm-m3/mole
RT	=	2.40E-02	atm-m3/mole
T1	=	293	K
Ts	=	320	K
U1	=	0.982	centipoise
Us	=	0.616	centipoise
CSFi	=	7.00E-03	(mg/kg/day)-1
RfDi	=	1.70E-01	(mg/kg/day)

EXAMPLE CALCULATION:

k1 = 20 cm/hr x (44 g/mole / 131.4 g/mole)^0.5

k1 = **11.57 cm/hr**

kg = 3000 cm/hr x (18 g/mole / 131.4 g/mole)^0.5

kg = **1110.35 cm/hr**

Kl = 1/[1/11.6 cm/hr + 2.40E-02 atm-m3/mole/(1.03E-02 atm-m3/mole x 1110.3 cm/hr)]

Kl = **1.13E+01 cm/hr**

CLIENT: NSWC CRANE, INDIANA		**JOB NUMBER:** 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF VOLATILES WHILE SHOWERING BY AN ADULT RESIDENT		
BASED ON: U.S. EPA, 1989 AND FOSTER AND CHROSTOWSKI, 1987		
BY: R. JUPIN	**CHECKED BY:** D Schlen	**DATE:** 03/15/2005

Kal = 1.13E+01 cm/hr x [(293 K x 0.616 centipoise)/(320 K x 0.982 centipoise)]^-0.5

Kal = **14.9 cm/hr**

Cwd = 21.055 mg/L x [1 - exp((-14.9 cm/hr x 2 sec)/(60 x 1 mm))]

Cwd = **8.25E+00 mg/L**

S = 8.25E+00 mg/L x 10 L/min / 12 m3

S = **6.87E+00 mg/m3-min-shower**

$$K = 15\text{ min} + \frac{\exp(-0.0167\text{ 1/min} \times 20\text{ min}) - \exp[0.0167\text{ 1/min} \times (15\text{ min} - 20\text{ min})]}{0.0167\text{ 1/min}}$$

K = **2.79 min**

CARCINOGENIC INTAKE:

$$\text{Intake} = \frac{6.87\text{E+00 mg/m3-min-shower} \times 0.6\text{ m3/hr} \times 2.79\text{ min} \times 350\text{ showers/year} \times 24\text{ years}}{70\text{ kg} \times 25550\text{ days} \times 0.0167\text{ 1/min} \times 60\text{ min/hr}}$$

intake = **5.40E-02 mg/kg-day**

Risk = 0.007 (mg/kg/day)-1 x 5.40E-02 mg/kg-day

Risk = **3.8E-04**

NONCARCINOGENIC INTAKE:

$$\text{Intake} = \frac{6.87\text{E+00 mg/m3-min-shower} \times 0.6\text{ m3/hr} \times 2.79\text{ min} \times 350\text{ showers/year} \times 24\text{ years}}{70\text{ kg} \times 8760\text{ days} \times 0.0167\text{ 1/min} \times 60\text{ min/hr}}$$

intake = **1.57E-01 mg/kg-day**

HQ = 1.57E-01 mg/kg-day / 1.70E-01 (mg/kg/day)

HQ = **9.3E-01**

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: ESTIMATION OF AMBIENT AIR CONCENTRATIONS IN A TRENCH RESULTING FROM VOLATILE EMISSIONS FROM GROUNDWATER.		
BASED ON: VDEQ, 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

PURPOSE: To calculate ambient air concentrations resulting from volatilization of chemicals from groundwater.

Ctrench = CGW x VF

Where:

Ctrench = concentration of contaminant in the trench $\mu g/m^3$
CGW = concentration of contaminant in groundwater µg/L
VF = volatilization factor L/m^3

1. Calculate kiG (gas-phase mass transfer coefficient of component i)

$kiG = (MWH2O/MWi)^{0.335} \times (T/298)^{1.005} \times kG, H2O$

Where:

kiG = gas-phase mass transfer coefficient of component i cm/s
MW_{H2O} = molecular weight of water = 18 g/mol
MW_{TCE} = molecular weight of TCE = 131.39 g/mol
kG,H_2O = gas-phase mass transfer coefficient of water vapor at 25°C cm/s = 0.833 cm/s
T = average system absolute temperature = 298
The value of kG, H_2O is 0.833 cm/s (Superfund Exposure Assessment Manual, U. S. EPA, April 1988)

$kiG = (18/131.39)^{0.335} \times (298/298)^{1.005} \times 0.833$ cm/s = 4.28E-01 cm/s

2. Calculate kiL (liquid-phase mass transfer coefficient of component i)

$kiL = (MWO_2/MWi)^{0.5} \times (T/298) \times kL, O_2$

Where:
kiL = liquid-phase mass transfer coefficient of component i cm/s
MW_{O2} = molecular weight of O_2 = 32 g/mol
MW_{TCE} = molecular weight of TCE = 131.39 g/mol
T = average system absolute temperature = 298
kL, O_2 = liquid-phase mass transfer coefficient of oxygen at 25°C cm/s = 0.002 cm/s

$kiL = (32/131.39)^{0.5} \times (298/298) \times 0.002$ cm/s = 9.87E-04 cm/s

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: ESTIMATION OF AMBIENT AIR CONCENTRATIONS IN A TRENCH RESULTING FROM VOLATILE EMISSIONS FROM GROUNDWATER.		
BASED ON: VDEQ, 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

3. Calculate Ki (overall mass transfer coefficient of contaminant)

Ki = 1 / {(1/kiL) + [(RT) / (Hi x kiG)]}

Where:

kiL = liquid-phase mass transfer coefficient of i cm/s =	9.87E-04
R = ideal gas constant atm-m^3/mole-°K =	8.20E-05
T = average system absolute temperature =	298
Hi = Henry's Law constant of TCE (atm-m^3/mol) =	1.03E-02
KiG = gas-phase mass transfer coefficient of i cm/s	4.28E-01

Ki = 1 / {(1/9.78E-4) + [(298 x 8.2E-5) / (1.03E-2 x 0.428]} = 9.82E-04 cm/s

4. Calculation of VF (Volatilization Factor)

VF = (Ki x A x F x 10^{-3} x 10^4 x 3,600) / (ACH x V)

Where:

VF = volatilization factor (L/m^3)		
Ki = overall mass transfer coefficient of contaminant =		9.82E-04 cm/s
A = area of the trench =		8.18 m^2
F = fraction of floor through which contaminant can enter (unitless) =		1
ACH = air changes per hour =		360 h^{-1}
V = volume of trench =		24.92 m^3
10^{-3} = conversion factor L/cm^3	0.001	
10^4 = conversion factor cm^2/m^2	10000	
3,600 = conversion factor seconds/hr	3600	

VF = (9.82E-4 x 8.18 x 1 x 10^{-3} x 10^4 x 3,600) / (360 x 24.92) = 3.22E-02 L/m^3

5. Calculation of C_{trench} (concentration of contaminant in the trench)

C_{trench} = C_{GW} x VF

Where:

C_{trench} = concentration of contaminant in the trench (µg/m^3)	
C_{GW} = concentration of TCE in groundwater =	21055 µg/L
VF = volatilization factor =	3.22E-02 L/m^3

C_{trench} = 21055 µg/L x 3.22E-02 L/m3 = **6.78E+02 µg/m^3**

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface water.

EQUATION:

$$IEX = \frac{Csw \times CF \times CRsw \times ET \times EF \times ED}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Csw	=	exposure point concentration in surface water (ug/L)
CF	=	conversion factor (1.0E-3 mg/ug)
CRsw	=	contact rate (L/hour)
ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Csw	=	20.4	ug/L	Chemical: Trichloroethene in gully surface water
CRsw	=	0.01	L/hr	
CF	=	1.0E-03	mg/ug	
ET	=	4	hours	
EF	=	52	days/year	
ED	=	24	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	8760	days	
CSFo	=	1.3E-02	$(mg/kg/day)^{-1}$	
RfDo	=	5.0E-01	(mg/kg/day)	

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY: D. Selvon	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{20.4\ ug/L \times 1.0E\text{-}03\ mg/ug \times 0.01\ L/hr \times 4\ hours \times 52\ days/year \times 24\ years}{70\ kg \times 25550\ days}$$

IEXc = 5.69E-07 mg/kg/day

ILCR = 5.69E-07 mg/kg/day x 1.30E-02 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 7.4E-09

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{20.4\ ug/L \times 1.0E\text{-}03\ mg/ug \times 0.01\ L/hr \times 4\ hours \times 52\ days/year \times 24\ years}{70\ kg \times 8760\ days}$$

IEXnc = 1.66E-06 mg/kg/day

$$HQ = \frac{1.66E\text{-}06\ mg/kg/day}{5.00E\text{-}01\ (mg/kg/day)} = \text{Hazard Quotient}$$

HQ = 3.32E-06

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with surface water.

EQUATION:

$$DAD = \frac{DAevent \times EV \times ED \times EF \times A}{BW \times AT}$$

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed does per event (mg/cm^2/event)
EV	=	event frequency (events/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
A	=	skin surface available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = DAD (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = DAD (mg/kg/day) / RFDd (mg/kg/day)

EQUATIONS for DAevent:

For Inorganics:

DAevent = Kp x Cw x CF x tevent

For Organics:

$$\text{If } tevent \le t^*, \text{ then: } DAevent = 2 \times FA \times Kp \times Cw \times CF \times \sqrt{\frac{6 \times tau \times tevent}{\pi}}$$

$$\text{If } tevent > t^*, \text{ then: } DAevent = FA \times Kp \times Cw \times CF \times \left[\frac{tevent}{1+B} + 2 \times tau \times \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	CHECKED BY: D. Schlor	DATE: 03/15/2005

Where:

Kp	=	permeability coefficient from water (cm/hr)
Cgw	=	concentration of chemical in groundwater (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
t*	=	time it takes to reach steady-state (hr/event)
τ	=	lag time (hr/event)
B	=	Bunge Model Constant (dimensionless)

EXAMPLE CALCULATION OF DAevent

ASSUMPTIONS:

Cgw	=	0.0204	mg/L	Chemical: Trichloroethene in gully surface water
Kp	=	1.16E-02	cm/hr	
FA	=	1	unitless	
tevent	=	4	hr/event	
CF	=	0.001	L/cm^3	
t*	=	1.39	hr/event	
τ	=	0.58	hr/event	
B	=	0.051		

tevent > t*, therefore,

$$DAevent = (0.0116\ cm/hr)\ (0.0204\ mg/L)\ (0.001\ L/cm3)\ x \left[\frac{4\ hr/event}{1 + 0.051} + 2 \times 0.581\ hr/event \times \frac{[1 + 3 \times 0.051 + 3 \times 0.051 \times (0.051)^2]}{(1 + 0.051)^2}\right]$$

DAevent = 1.19E-06 mg/cm^2-event

RISK CALCULATIONS

ASSUMPTIONS:

A	=	9070	cm^2/day
EV	=	1	event/day
ED	=	24	years
EF	=	52	days/year
BW	=	70	kg
ATc	=	25550	days
ATnc	=	8760	days
CSFd	=	1.3E-02	$(mg/kg/day)^{-1}$
RfDd	=	5.0E-01	(mg/kg/day)

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with surface water.

EQUATION:

$$DAD = \frac{DAevent \times EV \times ED \times EF \times A}{BW \times AT}$$

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed does per event (mg/cm^2/event)
EV	=	event frequency (events/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
A	=	skin surface available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = DAD (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = DAD (mg/kg/day) / RFDd (mg/kg/day)

EQUATIONS for DAevent:

For Inorganics:

DAevent = Kp x Cw x CF x tevent

For Organics:

$$\text{If } tevent \le t^*, \text{ then: } DAevent = 2 \times FA \times Kp \times Cw \times CF \times \sqrt{\frac{6 \times tau \times tevent}{\pi}}$$

$$\text{If } tevent > t^*, \text{ then: } DAevent = FA \times Kp \times Cw \times CF \times \left[\frac{tevent}{1+B} + 2 \times tau \times \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$DADc = \frac{1.19E\text{-}06 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 24 \text{ years} \times 52 \text{ days/year} \times 9070 \text{ cm2/day}}{70 \text{ kg} \times 25550 \text{ days}}$$

DADc = 7.53E-06 mg/kg/day

DADc = 7.53E-06 mg/kg/day x 1.30E-02 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 9.8E-08

EXAMPLE NONCARCINOGENIC CALCULATION

$$DADnc = \frac{1.19E\text{-}06 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 24 \text{ years} \times 52 \text{ days/year} \times 9070 \text{ cm2/day}}{70 \text{ kg} \times 8760 \text{ days}}$$

DADnc = 2.20E-05 mg/kg/day

HQ = 2.20E-05 mg/kg/day / 5.00E-01 (mg/kg/day) = Hazard Quotient

HQ = 4.4E-05

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY: D. Schloen	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of sediment.

EQUATION:

$$IEX = \frac{CS \times IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in sediment (mg/kg)
IR	=	incidental ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	13.1	mg/kg	Chemical: Arsenic in gully sediment
IR	=	50	mg/day	
EF	=	52	days/year	
ED	=	24	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	8760	days	
CSFo	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CLIENT: NSWC CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT ADULT RESIDENT		
BASED ON: U.S. EPA, DECEMBER 1989		
BY: R. JUPIN	CHECKED BY: D. Sullan	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{13.1 \text{ mg/kg} \times 50 \text{ mg/day} \times 52 \text{ days/year} \times 24 \text{ years} \times 1.0E\text{-}06 \text{ kg/mg}}{70 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 4.57E-07 mg/kg/day

ILCR = 4.57E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 6.9E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{13.1 \text{ mg/kg} \times 50 \text{ mg/day} \times 52 \text{ days/year} \times 24 \text{ years} \times 1.0E\text{-}06 \text{ kg/mg}}{70 \text{ kg} \times 8760 \text{ days}}$$

IEXnc = 1.33E-06 mg/kg/day

HQ = 1.33E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 4.4E-03

CLIENT: NCWS CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT ADULT RESIDENT		
BASED ON: U.S. EPA, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with sediment.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in sediment (mg/kg)
CF	=	conversion factor (1.0E-6 kg/mg)
SA	=	skin surface available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDd (mg/kg/day)

ASSUMPTIONS:

Cs	=	13.1	mg/kg	Chemical: Arsenic in gully sediment
CF	=	1.0E-06	kg/mg	
SA	=	5700	cm^2/day	
AF	=	0.07	mg/cm^2	
ABS	=	0.03		
EF	=	52	days/year	
ED	=	24	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	8760	days	
CSFd	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDd	=	3.0E-04	(mg/kg/day)	

CLIENT: NCWS CRANE, INDIANA		JOB NUMBER: 7448
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT ADULT RESIDENT		
BASED ON: U.S. EPA, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 03/15/2005

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{13.1\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 5700\ cm2/day \times 0.07\ mg/cm2 \times 0.03 \times 52\ days/year \times 24\ years}{70\ kg \times 25550\ days}$$

DEXc = 1.09E-07 mg/kg/day

ILCR = 1.09E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 1.6E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{13.1\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 5700\ cm2/day \times 0.07\ mg/cm2 \times 0.03 \times 52\ days/year \times 24\ years}{70\ kg \times 8760\ days}$$

DEXnc = 3.19E-07 mg/kg/day

HQ = 3.19E-07 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 1.1E-03

APPENDIX I.3

LEAD MODELING RESULTS

LEAD MODEL FOR WINDOWS Version 1.0

==========
Model Version: 1.0 Build 261 (Page 1 of 3)
Location: NSWC Crane, Crane, Indiana
Site Name: SWMU 16
Date: 4/12/2005
Run Mode: Site Risk Assessment

Soil/Dust Data
Average weighted concentration of lead in surface soil and sediments
from the gullies = 242 mg/kg.
Water Data
Average concentration of lead in groundwater = 13.6 ug/L.
==========
The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 13.600 ug Pb/L

Location: NSWC Crane, Crane, Indiana
Site Name: SWMU 16
Date: 4/12/2005
Run Mode: Site Risk Assessment

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 179.400 ug/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	242.000	179.400
1-2	242.000	179.400
2-3	242.000	179.400
3-4	242.000	179.400
4-5	242.000	179.400
5-6	242.000	179.400
6-7	242.000	179.400

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

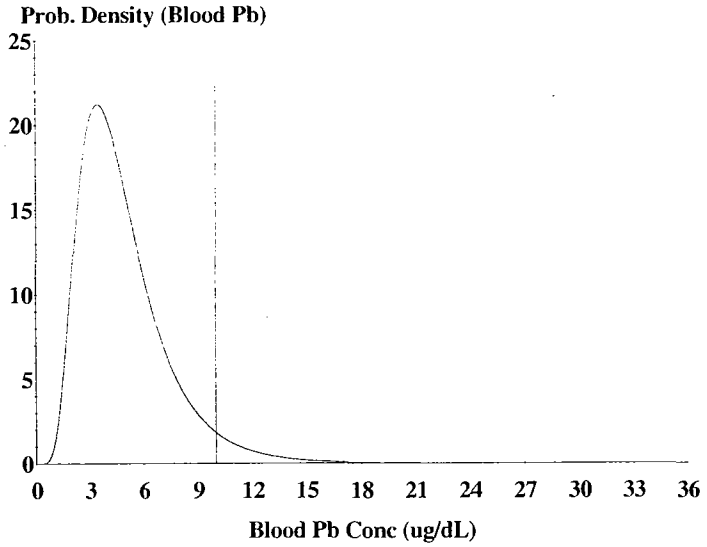
Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/day)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.507	0.000	1.233
1-2	0.034	2.574	0.000	3.028
2-3	0.062	2.928	0.000	3.190
3-4	0.067	2.855	0.000	3.298
4-5	0.067	2.811	0.000	3.498
5-6	0.093	2.990	0.000	3.720
6-7	0.093	3.315	0.000	3.800

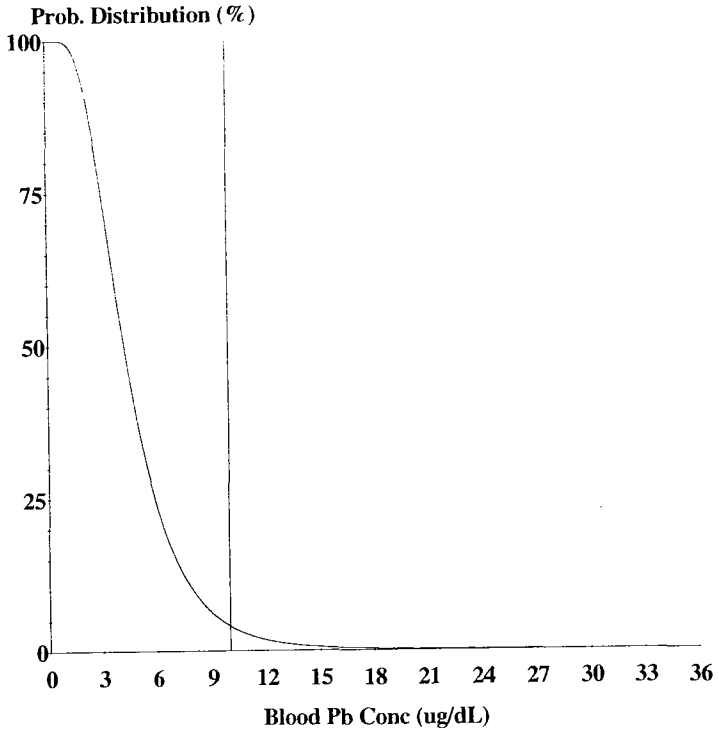
Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	4.799	8.560	4.6
1-2	7.486	13.122	5.4
2-3	7.584	13.764	5.1
3-4	7.693	13.913	4.9
4-5	5.825	12.201	4.2
5-6	5.286	12.089	3.8
6-7	5.014	12.223	3.5

Location: NSWC Crane, Crane, Indiana
Site Name: SWMU 16
Date: 4/12/2005
Run Mode: Site Risk Assessment



Cutoff = 10.000 ug/dl
Geo Mean = 4.461
GSD = 1.600
% Above = 4.293
% Below = 95.707

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Site Risk Assessment
Comment = SWMU 16 - EF = 1 day/Week



Cutoff = 10.000 ug/dl
Geo Mean = 4.461
GSD = 1.600
% Above = 4.293

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Site Risk Assessment
Comment = SWMU 16 - EF = 1 day/Week

LEAD MODEL FOR WINDOWS Version 1.0

==========
Model Version: 1.0 Build 261 (Page 1 of 3)
Location: NSWC Crane, Crane, Indiana
Site Name: SWMU 16
Date: 4/12/2005
Run Mode: Site Risk Assessment

Soil/Dust Data
Average weighted concentration of lead in surface soil and sediment
from the gullies = 356 mg/kg.
Water Data
Average concentration of lead in groundwater = 13.6 ug/L.
==========
The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 13.600 ug Pb/L

Location: NSWC Crane, Crane, Indiana
Site Name: SWMU 16
Date: 4/12/2005
Run Mode: Site Risk Assessment

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 259.200 ug/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	356.000	259.200
1-2	356.000	259.200
2-3	356.000	259.200
3-4	356.000	259.200
4-5	356.000	259.200
5-6	356.000	259.200
6-7	356.000	259.200

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

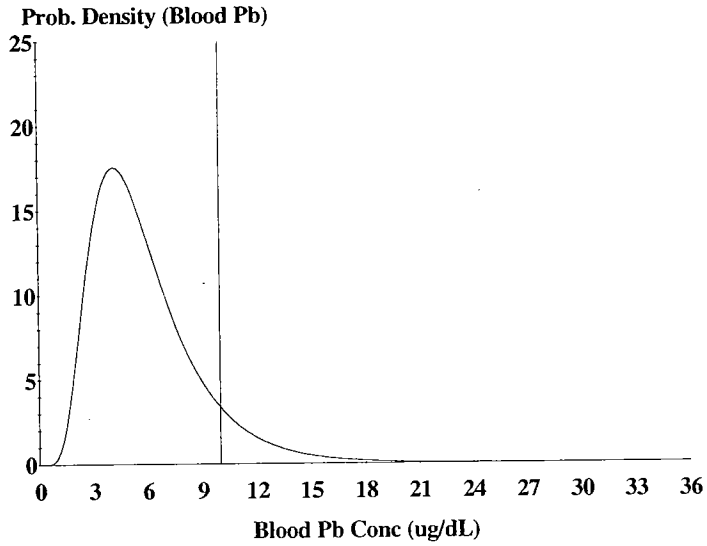
Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/day)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.450	0.000	1.205
1-2	0.034	2.504	0.000	2.946
2-3	0.062	2.859	0.000	3.115
3-4	0.067	2.797	0.000	3.230
4-5	0.067	2.772	0.000	3.450
5-6	0.093	2.957	0.000	3.678
6-7	0.093	3.283	0.000	3.763

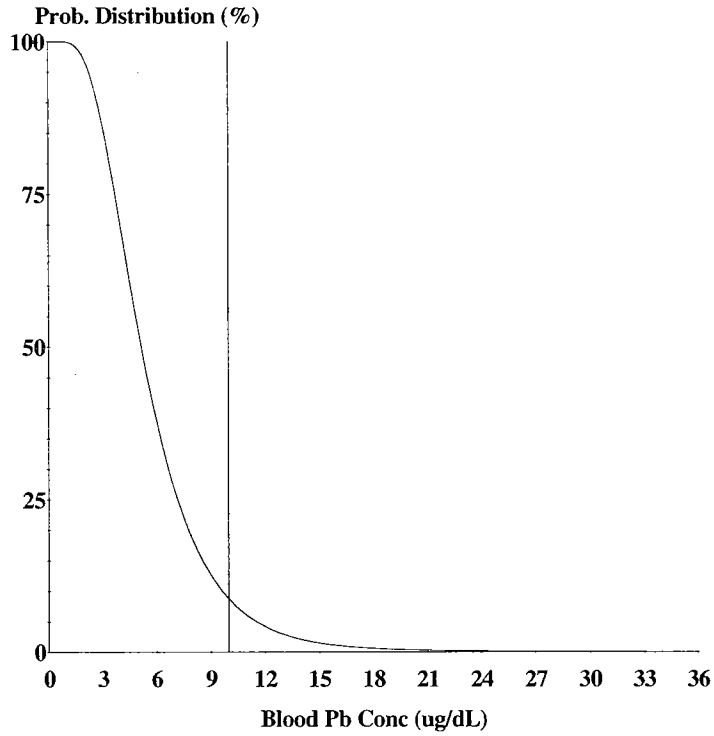
Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	6.841	10.517	5.6
1-2	10.626	16.111	6.6
2-3	10.803	16.839	6.2
3-4	10.991	17.084	5.9
4-5	8.379	14.669	5.1
5-6	7.624	14.353	4.5
6-7	7.242	14.381	4.1

Location: NSWC Crane, Crane, Indiana
Site Name: SWMU 16
Date: 4/12/2005
Run Mode: Site Risk Assessment



Cutoff = 10.000 ug/dl
Geo Mean = 5.393
GSD = 1.600
% Above = 9.448
% Below = 90.552

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Site Risk Assessment
Comment = SWMU 16 - EF = 2 days/week



Cutoff = 10.000 ug/dl
Geo Mean = 5.393
GSD = 1.600
% Above = 9.448

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Site Risk Assessment
Comment = SWMU 16 - EF = 2 days/week

Calculations of Preliminary Remediation Goals (PRGs)

SITE NAME: SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
LOCATION: NSWC CRANE, CRANE, INDIANA
RECEPTOR: CONSTRUCTION WORKER
MEDIA: SURFACE/SUBSURFACE SOIL
DATE: APRIL 12, 2005

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 Construction Worker	Using Equation 1	Using Equation 2 Construction Worker	Using Equation 2
PbS	X	X	Soil lead concentration	ug/g or ppm	82.2		82.2	
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.18	2.18	2.18	2.18
PbB_0	X	X	Baseline PbB	ug/dL	1.53	1.53	1.53	1.53
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.100	0.050
W_S		X	Weighting factor: fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	150	219	150	219
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	180	365	180	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.9**	**1.5**	**1.9**	**1.5**
$PbB_{fetal,0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**6.0**	**5.0**	**6.0**	**5.0**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**1.1%**	**0.5%**	**1.1%**	**0.5%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

*Equation 1, based on Eq. 1, 2 in USEPA (1996).

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

**Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Preliminary Remediation Goals (PRGs)

SITE NAME: SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
LOCATION: NSWC CRANE, CRANE, INDIANA
RECEPTOR: OCCUPATIONAL WORKER AND ADULT TRESPASSER
MEDIA: SURFACE SOIL/GULLY SEDIMENT
DATE: APRIL 12, 2005

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 – Occupational Worker	Using Equation 1 – Adult Trespasser	Using Equation 2 – Occupational Worker	Using Equation 2 – Adult Trespasser
PbS	X	X	Soil lead concentration	ug/g or ppm	242	242	242	242
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.18	2.18	2.18	2.18
PbB_0	X	X	Baseline PbB	ug/dL	1.53	1.53	1.53	1.53
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	52	219	52
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.9**	**1.6**	**1.9**	**1.6**
$PbB_{fetal,0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**6.1**	**5.2**	**6.1**	**5.2**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**1.1%**	**0.7%**	**1.1%**	**0.7%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

APPENDIX I.4

BUILDING 146 INDOOR AIR EVALUATION

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - BUILDING 146 INDOOR AIR
SWMU 16 (CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Indoor Air

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Concentrations[4]	ORNL RSL Air (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Building 146	**Volatile Organic Compounds**														
	79-01-6	Trichloroethene	4.46 J	11.3	ug/m^3	146ASIN04	6/10	4.73 - 5.37	11.3	NA	1.2 C	1.2	IDEM	Yes	ASL

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - No upgradient or background air samples were collected.
5 - Oak Ridge National Laboratory (ORNL) Regional Screening Level (RSL). Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (ORNL, September 12, 2008).
6 - IDEM Draft Vapor Intrusion Pilot Plant Guidance Appendix VIII, Table 2 - 30 year chronic action levels (IDEM, 2006).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level .
Chemicals selected as COPCs are indicated by shaded chemical names.

Associated Samples
146ASIN01
146ASIN02
146ASIN03
146ASIN04
146ASIN05
146ASIN06
146ASIN06
146ASIN06-D
146ASIN07
146ASIN08
146ASOT01

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
NA = Not Applicable/Not Available

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BSL = Below Screening Level

TABLE 3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Indoor Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Building 146	Trichloroethene	ug/m3	5.83	7.68 (N)	11.28	7.68	ug/m3	Student-t UCL	W-Test (1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
N = Normal
1 - The Shapiro-Wilks W test indicates that the data are normally distributed. The ProUCL guidance recommends that the 95% Student-t UCL be used as the exposure point concentration.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Indoor Air
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Occupational Workers	Adult	Building 146	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1993	
				ET	Exposure Time	8	hours/day	(1)	CA x IR x ET x EF x ED
				EF	Exposure Frequency	250	days/year	U.S. EPA, 1993	BW x AT
				ED	Exposure Duration	25	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	U.S. EPA, 1989	

Notes:

1 - Length of typical work day.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 6.99E-02 Noncancer Inhalation Intake = 1.96E-01

TABLE 4.1.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Indoor Air
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Occupational Workers	Adult	Building 146	CA	Chemical concentration in air	Calculated	mg/m3	U.S. EPA, 2002	Intake (mg/kg/day) =
				IR	Inhalation Rate	2.5	m3/hour	U.S. EPA, 1993	
				ET	Exposure Time	8	hours/day	(1)	CA x IR x ET x EF x ED
				EF	Exposure Frequency	219	days/year	U.S. EPA, 1993	BW x AT
				ED	Exposure Duration	9	years	U.S. EPA, 1993	
				BW	Body Weight	70	kg	U.S. EPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	U.S. EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	U.S. EPA, 1989	

Notes:

1 - Length of typical work day.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. U.S. EPA/540/1-86/060.

U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

U.S. EPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

Unit Intake Calculations

Inhalation Intake = (IR x ET x EF x ED)/(BW x AT)

Cancer Inhalation Intake = 2.20E-02 Noncancer Inhalation Intake = 1.71E-01

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	Building 146	Inhalation	Trichloroethene	0.008	mg/m^3	5.4E-04	(mg/kg/day)	7.0E-03	$(mg/kg/day)^{-1}$	3.8E-06	1.5E-03	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3.8E-06					--
		Exposure Point Total									3.8E-06					--
	Exposure Medium Total										3.8E-06					--
Medium Total											3.8E-06					--
										Total of Receptor Risks Across All Media	3.8E-06				Total of Receptor Hazards Across All Media	--

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe:
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Air	Building 146	Inhalation	Trichloroethene	0.008	mg/m^3	1.7E-04	(mg/kg/day)	7.0E-03	(mg/kg/day)$^{-1}$	1.2E-06	1.3E-03	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.2E-06					--
		Exposure Point Total									1.2E-06					--
	Exposure Medium Total										1.2E-06					--
Medium Total											1.2E-06					--
										Total of Receptor Risks Across All Media	1.2E-06				Total of Receptor Hazards Across All Media	--

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Air	Building 146	Trichloroethene	--	4E-06	--	--	4E-06	Liver	--	--	--	--
			Chemical Total	--	4E-06	--	--	4E-06		--	--	--	--
		Exposure Point Total						4E-06					--
	Exposure Medium Total							4E-06					--
Medium Total								4E-06					--
Receptor Total							Receptor Risk Total	4E-06				Receptor HI Total	--

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Air	Building 146	Trichloroethene	--	1E-06	--	--	1E-06	Liver	- -	--	- -	--
			Chemical Total	--	1E-06	--	--	1E-06		- -	--	- -	--
		Exposure Point Total						1E-06					--
	Exposure Medium Total							1E-06					--
Medium Total								1E-06					--
Receptor Total							Receptor Risk Total	1E-06				Receptor HI Total	--

APPENDIX I.5

BACKGROUND ANALYSIS

LIST OF TABLES
RAGS PART D TABLE 9
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

Table No.	REASONABLE MAXIMUM EXPOSURES
9.1.RME	Maintenance Workers
9.2.RME	Occupational Workers
9.3.RME	Adolescent Trespassers
9.4.RME	Construction Workers
9.5.RME	Child Recreational Users
9.6.RME	Adult Recreational Users
9.7.RME	Lifelong Recreational Users
9.8.RME	Child Residents
9.9.RME	Adult Residents
9.10.RME	Lifelong Residents

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-11	--	--	--	1E-11	Liver	0.00000001	--	--	0.00000001
			Benzo(a)anthracene	7E-08	--	6E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	6E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	6E-08	--	5E-08	--	1E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-07	--	9E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	3E-08	--	6E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000001	--	0.0000001	0.0000002
			Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Antimony	--	--	--	--	--	Blood	0.001	--	--	0.001
			Arsenic	3E-07	--	6E-08	--	4E-07	Skin, CVS	0.002	--	0.0004	0.002
			Copper	--	--	--	--	--	GS	0.0002	--	--	0.0002
			Iron	--	--	--	--	--	None Reported	0.007	--	--	0.007
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0005	--	--	0.0005
			Vanadium	--	--	--	--	--	Kidney	0.003	--	--	0.003
			Chemical Total	1E-06	--	8E-07	--	2E-06		0.01	--	0.0004	0.01
		Exposure Point Total						2E-06					0.01
	Exposure Medium Total							2E-06					0.01
	Air	SWMU 16	Trichloroethene	--	5E-10	--	--	5E-10	Liver	--	0.000001	--	0.000001
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	4E-11	--	--	4E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.00001	--	0.00001
			Aluminum	--	--	--	--	--	CNS	--	0.0002	--	0.0002
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0004	--	0.0004
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-09	--	--	1E-09		--	0.0006	--	0.0006
		Exposure Point Total						1E-09					0.0006
	Exposure Medium Total							1E-09					0.0006
Medium Total								2E-06					0.02

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Gullies	Trichloroethene	- -	--	1E-08	--	1E-08	Liver	--	- -	0.000005	0.000005
			RDX	- -	--	5E-09	--	5E-09	Prostate	--	- -	0.00004	0.00004
			Aluminum	- -	--	- -	--	- -	CNS	--	- -	0.00002	0.00002
			Antimony	- -	--	- -	--	- -	Blood	--	- -	0.0006	0.0006
			Arsenic	- -	--	5E-09	--	5E-09	Skin, CVS	--	- -	0.00003	0.00003
			Barium	- -	--	- -	--	- -	Kidney	--	- -	0.0003	0.0003
			Cadmium	- -	--	- -	--	- -	Kidney	--	- -	0.0006	0.0006
			Chromium	- -	--	- -	--	- -	Fetotoxicity, GS, Bone	--	- -	0.0006	0.0006
			Iron	- -	--	- -	--	- -	None Reported	--	- -	0.00006	0.00006
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Water)	- -	--	- -	--	- -	CNS	--	- -	0.0008	0.0008
			Vanadium	- -	--	- -	--	- -	Kidney	--	- -	0.001	0.001
			Zinc	- -	--	- -	--	- -	Blood	--	- -	0.000006	0.000006
			Chemical Total	- -	--	2E-08	--	2E-08		--	- -	0.004	0.004
		Exposure Point Total						2E-08					0.004
	Exposure Medium Total							2E-08					0.004
Medium Total								2E-08					0.004
Surface Water	Surface Water	Turkey Creek	Arsenic	- -	--	1E-09	--	1E-09	Skin, CVS	--	- -	0.000008	0.000008
			Manganese (Water)	- -	--	- -	--	- -	CNS	--	- -	0.003	0.003
			Chemical Total	- -	--	1E-09	--	1E-09		--	- -	0.003	0.003
		Exposure Point Total						1E-09					0.003
	Exposure Medium Total							1E-09					0.003
Medium Total								1E-09					0.003

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	1E-08	--	9E-09	--	2E-08	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Arsenic	7E-07	--	1E-07	--	8E-07	Skin, CVS	0.004	--	0.0008	0.005
			Barium	--	--	--	--	--	Kidney	0.002	--	--	0.002
			Cadmium	--	--	--	--	--	Kidney	0.003	--	0.0004	0.003
			Copper	--	--	--	--	--	GS	0.003	--	--	0.003
			Iron	--	--	--	--	--	None Reported	0.02	--	--	0.02
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Mercury	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Nickel	--	--	--	--	--	Body Weight	0.0007	--	--	0.0007
			Vanadium	--	--	--	--	--	Kidney	0.004	--	--	0.004
			Zinc	--	--	--	--	--	Blood	0.002	--	--	0.002
			Chemical Total	7E-07	--	1E-07	--	8E-07		0.05	--	0.001	0.05
		Exposure Point Total						8E-07					0.05
	Exposure Medium Total							8E-07					0.05
Medium Total								8E-07					0.05
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.0010	--	--	0.0010
			Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.010	--	0.002	0.01
			Iron	--	--	--	--	--	None Reported	0.04	--	--	0.04
			Manganese (Soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Vanadium	--	--	--	--	--	Kidney	0.005	--	--	0.005
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.06	--	0.002	0.06
		Exposure Point Total						2E-06					0.06
	Exposure Medium Total							2E-06					0.06
Medium Total								2E-06					0.06
Receptor Total							Receptor Risk Total	5E-06				Receptor HI Total	0.1

Total Blood HI	0.02
Total Body Weight HI	0.0007
Total CNS HI	0.01
Total CVS HI	0.02
Total GS HI	0.004
Total Kidney HI	0.02
Total Liver HI	0.000006
Total Skin HI	0.02
Total Nasal HI	0.00001
Total None Reported HI	0.07
Total Prostate HI	0.00004

4/12/2005

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-10	--	--	--	1E-10	Liver	0.00000006	--	--	0.00000006
			Benzo(a)anthracene	7E-07	--	6E-07	--	1E-06	NA	--	--	--	--
			Benzo(a)pyrene	6E-06	--	5E-06	--	1E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-07	--	6E-07	--	1E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-06	--	1E-06	--	2E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-07	--	3E-07	--	6E-07	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000001	--	0.000001	0.000002
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Copper	--	--	--	--	--	GS	0.002	--	--	0.002
			Iron	--	--	--	--	--	None Reported	0.07	--	--	0.07
			Lead	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	9E-06	--	8E-06	--	2E-05		0.09	--	0.000001	0.09
		Exposure Point Total						2E-05					0.09
	Exposure Medium Total							2E-05					0.09
	Air	SWMU 16	Trichloroethene	--	5E-09	--	--	5E-09	Liver	--	0.00001	--	0.00001
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	4E-10	--	--	4E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0001	--	0.0001
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	5E-09	--	--	5E-09		--	0.0001	--	0.0001
		Exposure Point Total						5E-09					0.0001
	Exposure Medium Total							5E-09					0.0001
Medium Total								2E-05					0.09
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	1E-06	--	3E-08	--	1E-06	Liver	0.0002	--	0.000008	0.0003
			1,1,2-Trichloroethane	4E-06	--	8E-08	--	4E-06	Blood	0.04	--	0.001	0.05
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.002	--	0.00007	0.002
			1,2,3-Trichloropropane	1E-08	--	3E-10	--	1E-08	Blood	0.002	--	0.00007	0.002
			1,2-Dichloroethane	5E-07	--	6E-09	--	5E-07	None Reported	0.0007	--	0.000009	0.0007
			Benzene	3E-07	--	1E-08	--	3E-07	Blood	0.004	--	0.0002	0.004
			Bromodichloromethane	3E-07	--	6E-09	--	3E-07	Kidney	0.0007	--	0.00001	0.0007
			Carbon Tetrachloride	1E-06	--	8E-08	--	1E-06	Liver	0.04	--	0.002	0.04
			Chloroform	--	--	--	--	--	Liver	0.004	--	0.00009	0.004

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	cis-1,2-Dichloroethene	- -	--	- -	--	- -	Blood	0.3	- -	0.008	0.3
			Methylene Chloride	7E-08	--	6E-10	--	7E-08	Liver	0.0004	- -	0.000004	0.0004
			Tetrachloroethene	2E-05	--	3E-06	--	2E-05	Liver	0.01	- -	0.002	0.01
			Toluene	- -	--	- -	--	- -	Liver, Kidney	0.0009	- -	0.00008	0.001
			trans-1,2-Dichloroethene	- -	--	- -	--	- -	Blood	0.001	- -	0.00003	0.001
			Trichloroethene	1E-03	--	4E-05	--	1E-03	Liver	0.4	- -	0.02	0.4
			Vinyl Chloride	1E-04	--	2E-06	--	1E-04	Liver	0.08	- -	0.0010	0.08
			Pyridine	- -	--	- -	--	- -	Liver	0.02	- -	0.00007	0.02
			2-Nitrotoluene	1E-07	--	4E-09	--	1E-07	Spleen	0.0002	- -	0.000005	0.0002
			2,4,6-Trinitrotoluene	3E-08	--	2E-10	--	3E-08	Liver	0.006	- -	0.00003	0.006
			2-Amino-4,6-Dinitrotoluene	- -	--	- -	--	- -	Liver	0.06	- -	0.0006	0.06
			4-Amino-2,6-Dinitrotoluene	- -	--	- -	--	- -	Liver	0.04	- -	0.001	0.04
			RDX	1E-05	--	2E-08	--	1E-05	Prostate	0.08	- -	0.0002	0.08
			Antimony	- -	--	- -	--	- -	Blood	0.02	- -	0.0001	0.02
			Iron	- -	--	- -	--	- -	None Reported	1.0	- -	0.0008	1.0
			Chemical Total	1E-03	--	4E-05	--	1E-03		2	- -	0.03	2
		Exposure Point Total						1E-03					2
	Exposure Medium Total							1E-03					2
Medium Total								1E-03					2
Receptor Total							Receptor Risk Total	1E-03				Receptor HI Total	2

Total Blood HI	0.4
Total Body Weight HI	0.000002
Total GS HI	0.002
Total Kidney HI	0.002
Total Liver HI	0.7
Total Nasal HI	0.0001
Total None Reported HI	1
Total Prostate HI	0.08
Total Spleen HI	0.0002

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-11	--	--	--	1E-11	Liver	0.00000001	--	--	0.00000001
			Benzo(a)anthracene	5E-08	--	4E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	4E-07	--	4E-07	--	8E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-08	--	4E-08	--	9E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	9E-08	--	7E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-08	--	2E-08	--	4E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000002	--	0.0000002	0.0000004
			Antimony	--	--	--	--	--	Blood	0.002	--	--	0.002
			Copper	--	--	--	--	--	GS	0.0003	--	--	0.0003
			Iron	--	--	--	--	--	None Reported	0.01	--	--	0.01
			Lead	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	7E-07	--	6E-07	--	1E-06		0.01	--	0.0000002	0.01
		Exposure Point Total						1E-06					0.01
	Exposure Medium Total							1E-06					0.01
	Air	SWMU 16	Trichloroethene	--	8E-11	--	--	8E-11	Liver	--	0.0000005	--	0.0000005
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	7E-12	--	--	7E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.000005	--	0.000005
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	9E-11	--	--	9E-11		--	0.000005	--	0.000005
		Exposure Point Total						9E-11					0.000005
	Exposure Medium Total							9E-11					0.000005
Medium Total								1E-06					0.01
Surface Water	Surface Water	Gullies	Trichloroethene	1E-08	--	1E-08	--	3E-08	Liver	0.00001	--	0.00001	0.00003
			RDX	1E-07	--	6E-09	--	1E-07	Prostate	0.003	--	0.0001	0.003
			Antimony	--	--	--	--	--	Blood	0.005	--	0.002	0.007
			Barium	--	--	--	--	--	Kidney	0.0009	--	0.0009	0.002
			Cadmium	--	--	--	--	--	Kidney	0.001	--	0.002	0.003
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.0004	--	0.002	0.003
			Iron	--	--	--	--	--	None Reported	0.003	--	0.0002	0.004
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.002	--	0.003	0.005

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Gullies	Zinc	- -	--	- -	--	- -	Blood	0.0006	- -	0.00002	0.0006
			Chemical Total	2E-07	--	2E-08	--	2E-07		0.02	- -	0.010	0.03
		Exposure Point Total						2E-07					0.03
	Exposure Medium Total							2E-07					0.03
Medium Total								2E-07					0.03
Surface Water	Surface Water	Turkey Creek	Manganese (Water)	- -	--	- -	--	- -	CNS	0.007	- -	0.01	0.02
			Chemical Total	- -	--	- -	--	- -		0.007	- -	0.01	0.02
		Exposure Point Total						- -					0.02
	Exposure Medium Total							- -					0.02
Medium Total								- -					0.02
Sediment	Sediment	Gullies	Benzo(a)pyrene	8E-09	--	7E-09	--	2E-08	NA	--	- -	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.02	- -	--	0.02
			Barium	- -	--	- -	--	- -	Kidney	0.004	- -	--	0.004
			Cadmium	- -	--	- -	--	- -	Kidney	0.005	- -	0.0006	0.005
			Copper	- -	--	- -	--	- -	GS	0.006	- -	--	0.006
			Iron	- -	--	- -	--	- -	None Reported	0.04	- -	--	0.04
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.003	- -	--	0.003
			Mercury	- -	--	- -	--	- -	CNS	0.0005	- -	--	0.0005
			Nickel	- -	--	- -	--	- -	Body Weight	0.001	- -	--	0.001
			Zinc	- -	--	- -	--	- -	Blood	0.003	- -	--	0.003
			Chemical Total	8E-09	--	7E-09	--	2E-08		0.08	- -	0.0006	0.08
		Exposure Point Total						2E-08					0.08
	Exposure Medium Total							2E-08					0.08
Medium Total								2E-08					0.08
Sediment	Sediment	Turkey Creek	Iron	- -	--	- -	--	- -	None Reported	0.07	- -	--	0.07
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.004	- -	--	0.004
			Chemical Total	- -	--	- -	--	- -		0.07	- -	--	0.07
		Exposure Point Total						- -					0.07
	Exposure Medium Total							- -					0.07
Medium Total								- -					0.07
Receptor Total							Receptor Risk Total	1E-06				Receptor HI Total	0.2

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Total Blood HI	0.03
Total Body Weight HI	0.001
Total CNS HI	0.03
Total GS HI	0.009
Total Kidney HI	0.01
Total Liver HI	0.00003
Total Nasal HI	0.000005
Total None Reported HI	0.1
Total Prostate HI	0.003

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	SWMU 16	Trichloroethene	1E-11	--	--	--	1E-11	Liver	0.0000001	--	--	0.0000001
			Benzo(a)anthracene	5E-08	--	2E-08	--	8E-08	NA	--	--	--	--
			Benzo(a)pyrene	5E-07	--	2E-07	--	7E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-08	--	2E-08	--	7E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	9E-08	--	4E-08	--	1E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	1E-08	--	3E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000003	--	0.000001	0.000004
			Antimony	--	--	--	--	--	Blood	0.02	--	--	0.02
			Copper	--	--	--	--	--	GS	0.003	--	--	0.003
			Iron	--	--	--	--	--	None Reported	0.1	--	--	0.1
			Lead	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	7E-07	--	3E-07	--	1E-06		0.2	--	0.000001	0.2
		Exposure Point Total						1E-06					0.2
	Exposure Medium Total							1E-06					0.2
	Air	SWMU 16	Trichloroethene	--	6E-10	--	--	6E-10	Liver	--	0.00003	--	0.00003
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	8E-09	--	--	8E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0003	--	0.0003
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	9E-09	--	--	9E-09		--	0.0004	--	0.0004
		Exposure Point Total						9E-09					0.0004
	Exposure Medium Total							9E-09					0.0004
Medium Total								1E-06					0.2
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	--	--	2E-09	--	2E-09	Liver	--	--	0.00001	0.00001
			1,1,2-Trichloroethane	--	--	6E-09	--	6E-09	Blood	--	--	0.002	0.002
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	--	0.0001	0.0001
			1,2,3-Trichloropropane	--	--	2E-11	--	2E-11	Blood	--	--	0.0001	0.0001
			1,2-Dichloroethane	--	--	4E-10	--	4E-10	None Reported	--	--	0.00002	0.00002
			Benzene	--	--	1E-09	--	1E-09	Blood	--	--	0.0003	0.0003
			Bromodichloromethane	--	--	4E-10	--	4E-10	Kidney	--	--	0.00002	0.00002
			Carbon Tetrachloride	--	--	5E-09	--	5E-09	Liver	--	--	0.004	0.004
			Chloroform	--	--	--	--	--	Liver	--	--	0.0002	0.0002

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	cis-1,2-Dichloroethene	--	--	--	--	--	Blood	--	--	0.02	0.02
			Methylene Chloride	--	--	5E-11	--	5E-11	Liver	--	--	0.000008	0.000008
			Tetrachloroethene	--	--	2E-07	--	2E-07	Liver	--	--	0.003	0.003
			Toluene	--	--	--	--	--	Liver, Kidney	--	--	0.0001	0.0001
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	--	--	0.00006	0.00006
			Trichloroethene	--	--	3E-06	--	3E-06	Liver	--	--	0.03	0.03
			Vinyl Chloride	--	--	1E-07	--	1E-07	Liver	--	--	0.002	0.002
			Pyridine	--	--	--	--	--	Liver	--	--	0.0001	0.0001
			2-Nitrotoluene	--	--	3E-10	--	3E-10	Spleen	--	--	0.000010	0.000010
			2,4,6-Trinitrotoluene	--	--	1E-11	--	1E-11	Liver	--	--	0.00006	0.00006
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	--	--	0.001	0.001
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	--	--	0.002	0.002
			RDX	--	--	1E-09	--	1E-09	Prostate	--	--	0.0003	0.0003
			Iron	--	--	--	--	--	None Reported	--	--	0.004	0.004
			Chemical Total	--	--	3E-06	--	3E-06		--	--	0.07	0.07
		Exposure Point Total						3E-06					0.07
	Exposure Medium Total							3E-06					0.07
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	3E-09	--	--	3E-09	NA	--	--	--	--
			1,1,2-Trichloroethane	--	1E-08	--	--	1E-08	NA	--	--	--	--
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	0.0002	--	0.0002
			1,2,3-Trichloropropane	--	--	--	--	--	Blood	--	0.0009	--	0.0009
			1,2-Dichloroethane	--	2E-09	--	--	2E-09	NA	--	0.001	--	0.001
			Benzene	--	8E-10	--	--	8E-10	Blood	--	0.001	--	0.001
			Bromodichloromethane	--	--	--	--	--	NA	--	--	--	--
			Carbon Tetrachloride	--	2E-09	--	--	2E-09	Liver	--	0.004	--	0.004
			Chloroform	--	5E-09	--	--	5E-09	Liver	--	0.0003	--	0.0003
			cis-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Methylene Chloride	--	7E-11	--	--	7E-11	Liver	--	0.000004	--	0.000004
			Tetrachloroethene	--	3E-09	--	--	3E-09	Liver	--	0.00007	--	0.00007
			Toluene	--	--	--	--	--	NA	--	0.0002	--	0.0002
			trans-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Trichloroethene	--	2E-06	--	--	2E-06	Liver	--	0.1	--	0.1
			Vinyl Chloride	--	7E-09	--	--	7E-09	Liver	--	0.001	--	0.001
			Pyridine	--	--	--	--	--	NA	--	--	--	--
			2-Nitrotoluene	--	--	--	--	--	NA	--	--	--	--

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	2,4,6-Trinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			RDX	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	2E-06	--	--	2E-06		--	0.1	--	0.1
		Exposure Point Total						2E-06					0.1
	Exposure Medium Total							5E-06					0.2
Medium Total								5E-06					0.2
Receptor Total							Receptor Risk Total	6E-06				Receptor HI Total	0.4

Total Blood HI	0.05
Total Body Weight HI	0.000004
Total GS HI	0.003
Total Kidney HI	0.0002
Total Liver HI	0.2
Total Nasal HI	0.0003
Total None Reported HI	0.1
Total Prostate HI	0.0003
Total Spleen HI	0.000010

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	3E-11	--	--	--	3E-11	Liver	0.00000006	--	--	0.00000006
			Benzo(a)anthracene	2E-07	--	1E-07	--	3E-07	NA	--	--	--	--
			Benzo(a)pyrene	1E-06	--	1E-06	--	3E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	2E-07	--	1E-07	--	3E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-07	--	2E-07	--	5E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	7E-08	--	6E-08	--	1E-07	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000001	--	0.000001	0.000002
			Aluminum	--	--	--	--	--	CNS	0.01	--	--	0.01
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Arsenic	8E-07	--	2E-07	--	9E-07	Skin, CVS	0.02	--	0.004	0.02
			Copper	--	--	--	--	--	GS	0.002	--	--	0.002
			Iron	--	--	--	--	--	None Reported	0.07	--	--	0.07
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.005	--	--	0.005
			Vanadium	--	--	--	--	--	Kidney	0.03	--	--	0.03
			Chemical Total	3E-06	--	2E-06	--	5E-06		0.1	--	0.004	0.2
		Exposure Point Total						5E-06					0.2
	Exposure Medium Total							5E-06					0.2
	Air	SWMU 16	Trichloroethene	--	3E-10	--	--	3E-10	Liver	--	0.000003	--	0.000003
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.00003	--	0.00003
			Aluminum	--	--	--	--	--	CNS	--	0.0005	--	0.0005
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0009	--	0.0009
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	6E-10	--	--	6E-10		--	.0.001	--	0.001
		Exposure Point Total						6E-10					0.001
	Exposure Medium Total							6E-10					0.001
Medium Total								5E-06					0.2

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	2E-07	--	8E-09	--	3E-07	Liver	0.0002	--	0.000007	0.0002
			1,1,2-Trichloroethane	8E-07	--	2E-08	--	9E-07	Blood	0.04	--	0.001	0.04
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.002	--	0.00006	0.002
			1,2,3-Trichloropropane	2E-09	--	7E-11	--	2E-09	Blood	0.002	--	0.00006	0.002
			1,2-Dichloroethane	1E-07	--	1E-09	--	1E-07	None Reported	0.0007	--	0.000008	0.0007
			Benzene	8E-08	--	3E-09	--	8E-08	Blood	0.004	--	0.0001	0.004
			Bromodichloromethane	7E-08	--	1E-09	--	7E-08	Kidney	0.0007	--	0.00001	0.0007
			Carbon Tetrachloride	3E-07	--	2E-08	--	3E-07	Liver	0.04	--	0.002	0.04
			Chloroform	--	--	--	--	--	Liver	0.004	--	0.00009	0.004
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.3	--	0.008	0.3
			Methylene Chloride	2E-08	--	2E-10	--	2E-08	Liver	0.0004	--	0.000004	0.0004
			Tetrachloroethene	5E-06	--	7E-07	--	5E-06	Liver	0.01	--	0.002	0.01
			Toluene	--	--	--	--	--	Liver, Kidney	0.0009	--	0.00008	0.0010
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.001	--	0.00003	0.001
			Trichloroethene	2E-04	--	9E-06	--	2E-04	Liver	0.4	--	0.02	0.4
			Vinyl Chloride	3E-05	--	4E-07	--	3E-05	Liver	0.08	--	0.0010	0.08
			Pyridine	--	--	--	--	--	Liver	0.02	--	0.00007	0.02
			2-Nitrotoluene	3E-08	--	1E-09	--	3E-08	Spleen	0.0002	--	0.000005	0.0002
			2,4,6-Trinitrotoluene	7E-09	--	4E-11	--	7E-09	Liver	0.005	--	0.00003	0.005
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.06	--	0.0006	0.06
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.03	--	0.001	0.04
			RDX	2E-06	--	5E-09	--	2E-06	Prostate	0.08	--	0.0002	0.08
			Aluminum	--	--	--	--	--	CNS	0.2	--	0.0002	0.2
			Antimony	--	--	--	--	--	Blood	0.02	--	0.0001	0.02
			Arsenic	6E-06	--	5E-09	--	6E-06	Skin, CVS	0.2	--	0.0001	0.2
			Barium	--	--	--	--	--	Kidney	0.04	--	0.0005	0.04
			Beryllium	--	--	--	--	--	GS	0.009	--	0.001	0.010
			Cadmium	--	--	--	--	--	Kidney	0.009	--	0.0001	0.009
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.1	--	0.007	0.1
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.04	--	0.00003	0.04
			Iron	--	--	--	--	--	None Reported	0.9	--	0.0008	0.9
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.2	--	0.00006	0.2
			Manganese (Water)	--	--	--	--	--	CNS	2	--	0.04	2
			Nickel	--	--	--	--	--	Body Weight	0.07	--	0.0003	0.07

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -	Kidney	0.3	- -	0.009	0.3
			Chemical Total	3E-04	--	1E-05	--	3E-04		5	- -	0.09	5
		Exposure Point Total						3E-04					5
	Exposure Medium Total							3E-04					5
Medium Total								3E-04					5
Surface Water	Surface Water	Gullies	Trichloroethene	4E-08	--	4E-08	--	8E-08	Liver	0.00008	- -	0.00007	0.0002
			RDX	4E-07	--	2E-08	--	4E-07	Prostate	0.02	- -	0.0006	0.02
			Aluminum	- -	--	- -	--	- -	CNS	0.005	- -	0.0003	0.006
			Antimony	- -	--	- -	--	- -	Blood	0.03	- -	0.01	0.04
			Arsenic	4E-07	--	2E-08	--	4E-07	Skin, CVS	0.009	- -	0.0006	0.010
			Barium	- -	--	- -	--	- -	Kidney	0.005	- -	0.005	0.011
			Cadmium	- -	--	- -	--	- -	Kidney	0.009	- -	0.01	0.02
			Chromium	- -	--	- -	--	- -	Fetotoxicity, GS, Bone	0.002	- -	0.01	0.01
			Iron	- -	--	- -	--	- -	None Reported	0.02	- -	0.001	0.02
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.01	- -	0.02	0.03
			Vanadium	- -	--	- -	--	- -	Kidney	0.010	- -	0.03	0.04
			Zinc	- -	--	- -	--	- -	Blood	0.003	- -	0.0001	0.003
			Chemical Total	8E-07	--	8E-08	--	9E-07		0.1	- -	0.1	0.2
		Exposure Point Total						9E-07					0.2
	Exposure Medium Total							9E-07					0.2
Medium Total								9E-07					0.2
Surface Water	Surface Water	Turkey Creek	Arsenic	9E-08	--	6E-09	--	1E-07	Skin, CVS	0.002	- -	0.0002	0.002
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.04	- -	0.06	0.10
			Chemical Total	9E-08	--	6E-09	--	1E-07		0.04	- -	0.06	0.1
		Exposure Point Total						1E-07					0.1
	Exposure Medium Total							1E-07					0.1
Medium Total								1E-07					0.1
Sediment	Sediment	Gullies	Benzo(a)pyrene	3E-08	--	2E-08	--	5E-08	NA	--	- -	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.01	- -	--	0.01
			Antimony	- -	--	- -	--	- -	Blood	0.1	- -	--	0.1
			Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.04	- -	0.008	0.05
			Barium	- -	--	- -	--	- -	Kidney	0.02	- -	--	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.03	- -	0.004	0.03
			Copper	- -	--	- -	--	- -	GS	0.03	- -	--	0.03

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	- -	--	- -	--	- -	None Reported	0.2	- -	--	0.2
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.02	- -	--	0.02
			Mercury	- -	--	- -	--	- -	CNS	0.003	- -	--	0.003
			Nickel	- -	--	- -	--	- -	Body Weight	0.008	- -	--	0.008
			Vanadium	- -	--	- -	--	- -	Kidney	0.04	- -	--	0.04
			Zinc	- -	--	- -	--	- -	Blood	0.02	- -	--	0.02
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.5	- -	0.01	0.6
		Exposure Point Total						2E-06					0.6
	Exposure Medium Total							2E-06					0.6
Medium Total								2E-06					0.6
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -	CNS	0.010	- -	--	0.010
			Arsenic	4E-06	--	7E-07	--	5E-06	Skin, CVS	0.10	- -	0.02	0.1
			Iron	- -	--	- -	--	- -	None Reported	0.4	- -	--	0.4
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.03	- -	--	0.03
			Vanadium	- -	--	- -	--	- -	Kidney	0.05	- -	--	0.05
			Chemical Total	4E-06	--	7E-07	--	5E-06		0.6	- -	0.02	0.6
		Exposure Point Total						5E-06					0.6
	Exposure Medium Total							5E-06					0.6
Medium Total								5E-06					0.6
Receptor Total							Receptor Risk Total	3E-04				Receptor HI Total	7

Total Blood HI	0.5
Total Body Weight HI	0.08
Total CNS HI	2
Total CVS HI	0.4
Total GS HI	0.17
Total Immune HI	0.04
Total Kidney HI	0.6
Total Liver HI	0.7
Total Skin HI	0.4
Total Nasal HI	0.00003
Total None Reported HI	2
Total Prostate HI	0.1
Total Spleen HI	0.0002
Total Fetotoxicity HI	0.1
Total Spleen HI	0.0002

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	1E-11	--	--	--	1E-11	Liver	0.000000006	--	--	0.000000006
			Benzo(a)anthracene	7E-08	--	1E-07	--	2E-07	NA	--	--	--	--
			Benzo(a)pyrene	6E-07	--	1E-06	--	2E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-08	--	1E-07	--	2E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-07	--	2E-07	--	3E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	5E-08	--	8E-08	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.0000001	--	0.0000002	0.0000004
			Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Antimony	--	--	--	--	--	Blood	0.001	--	--	0.001
			Arsenic	3E-07	--	1E-07	--	5E-07	Skin, CVS	0.002	--	0.0008	0.003
			Copper	--	--	--	--	--	GS	0.0002	--	--	0.0002
			Iron	--	--	--	--	--	None Reported	0.007	--	--	0.007
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.0005	--	--	0.0005
			Vanadium	--	--	--	--	--	Kidney	0.003	--	--	0.003
			Chemical Total	1E-06	--	2E-06	--	3E-06		0.02	--	0.0008	0.02
		Exposure Point Total						3E-06					0.02
	Exposure Medium Total							3E-06					0.02
	Air	SWMU 16	Trichloroethene	--	3E-10	--	--	3E-10	Liver	--	0.0000007	--	0.0000007
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.000007	--	0.000007
			Aluminum	--	--	--	--	--	CNS	--	0.0001	--	0.0001
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.0003	--	0.0003
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	6E-10	--	--	6E-10		--	0.0004	--	0.0004
		Exposure Point Total						6E-10					0.0004
	Exposure Medium Total							6E-10					0.0004
Medium Total								3E-06					0.02

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	2E-07	--	2E-08	--	2E-07	Liver	0.00005	--	0.000004	0.00006
			1,1,2-Trichloroethane	7E-07	--	5E-08	--	8E-07	Blood	0.009	--	0.0006	0.01
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.0004	--	0.00004	0.0005
			1,2,3-Trichloropropane	2E-09	--	2E-10	--	2E-09	Blood	0.0005	--	0.00004	0.0005
			1,2-Dichloroethane	1E-07	--	3E-09	--	1E-07	None Reported	0.0002	--	0.000005	0.0002
			Benzene	7E-08	--	7E-09	--	7E-08	Blood	0.0009	--	0.00009	0.001
			Bromodichloromethane	6E-08	--	3E-09	--	7E-08	Kidney	0.0001	--	0.000008	0.0002
			Carbon Tetrachloride	2E-07	--	4E-08	--	3E-07	Liver	0.008	--	0.001	0.009
			Chloroform	--	--	--	--	--	Liver	0.0009	--	0.00005	0.0009
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.06	--	0.005	0.06
			Methylene Chloride	1E-08	--	4E-10	--	1E-08	Liver	0.00009	--	0.000002	0.00009
			Tetrachloroethene	4E-06	--	2E-06	--	6E-06	Liver	0.002	--	0.0009	0.003
			Toluene	--	--	--	--	--	Liver, Kidney	0.0002	--	0.00004	0.0002
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.0003	--	0.00002	0.0003
			Trichloroethene	2E-04	--	2E-05	--	2E-04	Liver	0.09	--	0.010	0.1
			Vinyl Chloride	3E-05	--	9E-07	--	3E-05	Liver	0.02	--	0.0006	0.02
			Pyridine	--	--	--	--	--	Liver	0.004	--	0.00004	0.004
			2-Nitrotoluene	3E-08	--	2E-09	--	3E-08	Spleen	0.00004	--	0.000003	0.00004
			2,4,6-Trinitrotoluene	6E-09	--	1E-10	--	6E-09	Liver	0.001	--	0.00002	0.001
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.01	--	0.0004	0.01
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.007	--	0.0007	0.008
			RDX	2E-06	--	1E-08	--	2E-06	Prostate	0.02	--	0.00010	0.02
			Aluminum	--	--	--	--	--	CNS	0.05	--	0.0001	0.05
			Antimony	--	--	--	--	--	Blood	0.004	--	0.00006	0.004
			Arsenic	6E-06	--	1E-08	--	6E-06	Skin, CVS	0.04	--	0.00008	0.04
			Barium	--	--	--	--	--	Kidney	0.008	--	0.0003	0.009
			Beryllium	--	--	--	--	--	GS	0.002	--	0.0006	0.003
			Cadmium	--	--	--	--	--	Kidney	0.002	--	0.00008	0.002
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.02	--	0.004	0.03
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.008	--	0.00002	0.008
			Iron	--	--	--	--	--	None Reported	0.2	--	0.0005	0.2
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.03	--	0.00004	0.03
			Manganese (Water)	--	--	--	--	--	CNS	0.4	--	0.02	0.4
			Nickel	--	--	--	--	--	Body Weight	0.01	--	0.0002	0.01

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -	Kidney	0.06	- -	0.005	0.06
			Chemical Total	2E-04	--	2E-05	--	3E-04		1	- -	0.05	1
		Exposure Point Total						3E-04					1
	Exposure Medium Total							3E-04					1
Medium Total								3E-04					1
Surface Water	Surface Water	Gullies	Trichloroethene	7E-09	--	1E-07	--	1E-07	Liver	0.000003	- -	0.00004	0.00005
			RDX	7E-08	--	4E-08	--	1E-07	Prostate	0.0007	- -	0.0004	0.001
			Aluminum	- -	--	- -	--	- -	CNS	0.0002	- -	0.0002	0.0004
			Antimony	- -	--	- -	--	- -	Blood	0.001	- -	0.01	0.01
			Arsenic	6E-08	--	6E-08	--	1E-07	Skin, CVS	0.0004	- -	0.0004	0.0008
			Barium	- -	--	- -	--	- -	Kidney	0.0002	- -	0.003	0.003
			Cadmium	- -	--	- -	--	- -	Kidney	0.0004	- -	0.007	0.007
			Chromium	- -	--	- -	--	- -	Fetotoxicity, GS, Bone	0.0001	- -	0.007	0.007
			Iron	- -	--	- -	--	- -	None Reported	0.0008	- -	0.0007	0.002
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.0004	- -	0.01	0.01
			Vanadium	- -	--	- -	--	- -	Kidney	0.0004	- -	0.02	0.02
			Zinc	- -	--	- -	--	- -	Blood	0.0001	- -	0.00008	0.0002
			Chemical Total	1E-07	--	2E-07	--	3E-07		0.005	- -	0.05	0.06
		Exposure Point Total						3E-07					0.06
	Exposure Medium Total							3E-07					0.06
Medium Total								3E-07					0.06
Surface Water	Surface Water	Turkey Creek	Arsenic	2E-08	--	1E-08	--	3E-08	Skin, CVS	0.0001	- -	0.00009	0.0002
			Manganese (Water)	- -	--	- -	--	- -	CNS	0.002	- -	0.04	0.04
			Chemical Total	2E-08	--	1E-08	--	3E-08		0.002	- -	0.04	0.04
		Exposure Point Total						3E-08					0.04
	Exposure Medium Total							3E-08					0.04
Medium Total								3E-08					0.04
Sediment	Sediment	Gullies	Benzo(a)pyrene	1E-08	--	2E-08	--	3E-08	NA	--	- -	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.001	- -	--	0.001
			Antimony	- -	--	- -	--	- -	Blood	0.01	- -	--	0.01
			Arsenic	7E-07	--	3E-07	--	9E-07	Skin, CVS	0.004	- -	0.002	0.006
			Barium	- -	--	- -	--	- -	Kidney	0.002	- -	--	0.002
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	- -	0.0007	0.004
			Copper	- -	--	- -	--	- -	GS	0.004	- -	--	0.004

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	- -	--	- -	--	- -	None Reported	0.02	- -	--	0.02
			Lead	- -	--	- -	--	- -	NA	--	- -	--	--
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.002	- -	--	0.002
			Mercury	- -	--	- -	--	- -	CNS	0.0003	- -	--	0.0003
			Nickel	- -	--	- -	--	- -	Body Weight	0.0008	- -	--	0.0008
			Vanadium	- -	--	- -	--	- -	Kidney	0.004	- -	--	0.004
			Zinc	- -	--	- -	--	- -	Blood	0.002	- -	--	0.002
			Chemical Total	7E-07	--	3E-07	--	1E-06		0.06	- -	0.002	0.06
		Exposure Point Total						1E-06					0.06
	Exposure Medium Total							1E-06					0.06
Medium Total								1E-06					0.06
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -	CNS	0.001	- -	--	0.001
			Arsenic	2E-06	--	6E-07	--	2E-06	Skin, CVS	0.01	- -	0.004	0.01
			Iron	- -	--	- -	--	- -	None Reported	0.04	- -	--	0.04
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.003	- -	--	0.003
			Vanadium	- -	--	- -	--	- -	Kidney	0.005	- -	--	0.005
			Chemical Total	2E-06	--	6E-07	--	2E-06		0.06	- -	0.004	0.06
		Exposure Point Total						2E-06					0.06
	Exposure Medium Total							2E-06					0.06
Medium Total								2E-06					0.06
Receptor Total							Receptor Risk Total	3E-04				Receptor HI Total	1

Total Blood HI	0.1
Total Body Weight HI	0.02
Total CNS HI	0.6
Total CVS HI	0.07
Total GS HI	0.039
Total Immune HI	0.008
Total Kidney HI	0.1
Total Liver HI	0.2
Total Skin HI	0.06
Total Nasal HI	0.000007
Total None Reported HI	0.3
Total Prostate HI	0.02
Total Spleen HI	0.00004
Total Bone HI	0.03
Total Feotoxicity HI	0.03

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	5E-11	--	--	--	5E-11					
			Benzo(a)anthracene	2E-07	--	3E-07	--	5E-07					
			Benzo(a)pyrene	2E-06	--	2E-06	--	4E-06					
			Benzo(b)fluoranthene	2E-07	--	2E-07	--	5E-07					
			Dibenzo(a,h)anthracene	4E-07	--	4E-07	--	8E-07					
			Indeno(1,2,3-cd)pyrene	1E-07	--	1E-07	--	2E-07					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	1E-06	--	3E-07	--	1E-06					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	4E-06	--	4E-06	--	8E-06					
		Exposure Point Total						8E-06					
	Exposure Medium Total							8E-06					
	Air	SWMU 16	Trichloroethene	--	6E-10	--	--	6E-10					
			Benzo(a)anthracene	--	--	--	--	--					
			Benzo(a)pyrene	--	5E-11	--	--	5E-11					
			Benzo(b)fluoranthene	--	--	--	--	--					
			Dibenzo(a,h)anthracene	--	--	--	--	--					
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	--	6E-10	--	--	6E-10					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	1E-09	--	--	1E-09					
		Exposure Point Total						1E-09					
	Exposure Medium Total							1E-09					
Medium Total								8E-06					

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	5E-07	--	3E-08	--	5E-07					
			1,1,2-Trichloroethane	2E-06	--	6E-08	--	2E-06					
			1,1-Dichloroethene	- -	--	- -	--	- -					
			1,2,3-Trichloropropane	4E-09	--	2E-10	--	5E-09					
			1,2-Dichloroethane	2E-07	--	4E-09	--	2E-07					
			Benzene	1E-07	--	9E-09	--	2E-07					
			Bromodichloromethane	1E-07	--	5E-09	--	1E-07					
			Carbon Tetrachloride	5E-07	--	6E-08	--	6E-07					
			Chloroform	- -	--	- -	--	- -					
			cis-1,2-Dichloroethene	- -	--	- -	--	- -					
			Methylene Chloride	3E-08	--	5E-10	--	3E-08					
			Tetrachloroethene	9E-06	--	2E-06	--	1E-05					
			Toluene	- -	--	- -	--	- -					
			trans-1,2-Dichloroethene	- -	--	- -	--	- -					
			Trichloroethene	4E-04	--	3E-05	--	4E-04					
			Vinyl Chloride	5E-05	--	1E-06	--	6E-05					
			Pyridine	- -	--	- -	--	- -					
			2-Nitrotoluene	6E-08	--	3E-09	--	6E-08					
			2,4,6-Trinitrotoluene	1E-08	--	1E-10	--	1E-08					
			2-Amino-4,6-Dinitrotoluene	- -	--	- -	--	- -					
			4-Amino-2,6-Dinitrotoluene	- -	--	- -	--	- -					
			RDX	4E-06	--	2E-08	--	4E-06					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	1E-05	--	2E-08	--	1E-05					
			Barium	- -	--	- -	--	- -					
			Beryllium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Chromium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Lithium	- -	--	- -	--	- -					
			Manganese (Water)	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -					
			Chemical Total	5E-04	--	3E-05	--	5E-04					
		Exposure Point Total						5E-04					
	Exposure Medium Total							5E-04					
Medium Total								5E-04					
Surface Water	Surface Water	Gullies	Trichloroethene	5E-08	--	1E-07	--	2E-07					
			RDX	5E-07	--	6E-08	--	6E-07					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	4E-07	--	8E-08	--	5E-07					
			Barium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Chromium	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese (Water)	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Chemical Total	1E-06	--	3E-07	--	1E-06					
		Exposure Point Total						1E-06					
	Exposure Medium Total							1E-06					
Medium Total								1E-06					
Surface Water	Surface Water	Turkey Creek	Arsenic	1E-07	--	2E-08	--	1E-07					
			Manganese (Water)	- -	--	- -	--	- -					
			Chemical Total	1E-07	--	2E-08	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								1E-07					
Sediment	Sediment	Gullies	Benzo(a)pyrene	4E-08	--	4E-08	--	8E-08					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	2E-06	--	6E-07	--	3E-06					
			Barium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Chemical Total	2E-06	--	6E-07	--	3E-06					
		Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
Medium Total								3E-06					
Sediment	Sediment	Turkey Creek	Aluminum	- -	--	- -	--	- -					
			Arsenic	5E-06	--	1E-06	--	7E-06					
			Iron	- -	--	- -	--	- -					
			Manganese (Soil)	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	5E-06	--	1E-06	--	7E-06					
		Exposure Point Total						7E-06					
	Exposure Medium Total							7E-06					
Medium Total								7E-06					
Receptor Total							Receptor Risk Total	5E-04					

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	4E-10	--	--	--	4E-10	Liver	0.0000008	--	--	0.0000008
			Benzo(a)anthracene	2E-06	--	8E-07	--	3E-06	NA	--	--	--	--
			Benzo(a)pyrene	2E-05	--	7E-06	--	3E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	2E-06	--	8E-07	--	3E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	4E-06	--	1E-06	--	5E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-06	--	4E-07	--	1E-06	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.00002	--	0.000006	0.00002
			Aluminum	--	--	--	--	--	CNS	0.2	--	--	0.2
			Antimony	--	--	--	--	--	Blood	0.2	--	--	0.2
			Arsenic	1E-05	--	9E-07	--	1E-05	Skin, CVS	0.3	--	0.02	0.3
			Copper	--	--	--	--	--	GS	0.02	--	--	0.02
			Iron	--	--	--	--	--	None Reported	0.9	--	--	0.9
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.06	--	--	0.06
			Vanadium	--	--	--	--	--	Kidney	0.4	--	--	0.4
			Chemical Total	4E-05	--	1E-05	--	5E-05		2	--	0.02	2
		Exposure Point Total						5E-05					2
	Exposure Medium Total							5E-05					2
	Air	SWMU 16	Trichloroethene	--	6E-09	--	--	6E-09	Liver	--	0.00005	--	0.00005
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0005	--	0.0005
			Aluminum	--	--	--	--	--	CNS	--	0.01	--	0.01
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	6E-09	--	--	6E-09	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.02	--	0.02
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-08	--	--	1E-08		--	0.03	--	0.03
		Exposure Point Total						1E-08					0.03
	Exposure Medium Total							1E-08					0.03
Medium Total								5E-05					2

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	2E-06	--	1E-07	--	3E-06	Liver	0.002	--	0.00010	0.003
			1,1,2-Trichloroethane	9E-06	--	3E-07	--	9E-06	Blood	0.4	--	0.01	0.4
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.02	--	0.0009	0.02
			1,2,3-Trichloropropane	2E-08	--	9E-10	--	2E-08	Blood	0.02	--	0.0009	0.02
			1,2-Dichloroethane	1E-06	--	2E-08	--	1E-06	None Reported	0.007	--	0.0001	0.007
			Benzene	8E-07	--	4E-08	--	8E-07	Blood	0.04	--	0.002	0.04
			Bromodichloromethane	7E-07	--	2E-08	--	8E-07	Kidney	0.007	--	0.0002	0.007
			Carbon Tetrachloride	3E-06	--	2E-07	--	3E-06	Liver	0.4	--	0.03	0.4
			Chloroform	--	--	--	--	--	Liver	0.04	--	0.001	0.04
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	3	--	0.1	3
			Methylene Chloride	2E-07	--	2E-09	--	2E-07	Liver	0.004	--	0.00005	0.004
			Tetrachloroethene	5E-05	--	9E-06	--	6E-05	Liver	0.1	--	0.02	0.1
			Toluene	--	--	--	--	--	Liver, Kidney	0.009	--	0.001	0.01
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.01	--	0.0004	0.01
			Trichloroethene	2E-03	--	1E-04	--	2E-03	Liver	4	--	0.2	4
			Vinyl Chloride	3E-04	--	5E-06	--	3E-04	Liver	0.8	--	0.01	0.8
			Pyridine	--	--	--	--	--	Liver	0.2	--	0.0009	0.2
			2-Nitrotoluene	3E-07	--	1E-08	--	3E-07	Spleen	0.002	--	0.00007	0.002
			2,4,6-Trinitrotoluene	7E-08	--	6E-10	--	7E-08	Liver	0.05	--	0.0004	0.05
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.6	--	0.008	0.6
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.3	--	0.02	0.4
			RDX	2E-05	--	6E-08	--	2E-05	Prostate	0.8	--	0.002	0.8
			Aluminum	--	--	--	--	--	CNS	2	--	0.002	2
			Antimony	--	--	--	--	--	Blood	0.2	--	0.001	0.2
			Arsenic	7E-05	--	7E-08	--	7E-05	Skin, CVS	2	--	0.002	2
			Barium	--	--	--	--	--	Kidney	0.4	--	0.006	0.4
			Beryllium	--	--	--	--	--	GS	0.09	--	0.01	0.1
			Cadmium	--	--	--	--	--	Kidney	0.09	--	0.002	0.09
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	1	--	0.09	1
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.4	--	0.0004	0.4
			Iron	--	--	--	--	--	None Reported	9	--	0.01	9
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	2	--	0.0009	2
			Manganese (Water)	--	--	--	--	--	CNS	20	--	0.5	20
			Nickel	--	--	--	--	--	Body Weight	0.7	--	0.004	0.7

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--	Kidney	3	--	0.1	3
			Chemical Total	3E-03	--	1E-04	--	3E-03		51	--	1	52
		Exposure Point Total						3E-03					52
	Exposure Medium Total							3E-03					52
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	5E-07	--	--	5E-07	NA	--	--	--	--
			1,1,2-Trichloroethane	--	3E-06	--	--	3E-06	NA	--	--	--	--
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	0.007	--	0.007
			1,2,3-Trichloropropane	--	--	--	--	--	Blood	--	0.03	--	0.03
			1,2-Dichloroethane	--	4E-07	--	--	4E-07	NA	--	0.04	--	0.04
			Benzene	--	2E-07	--	--	2E-07	Blood	--	0.05	--	0.05
			Bromodichloromethane	--	--	--	--	--	NA	--	--	--	--
			Carbon Tetrachloride	--	4E-07	--	--	4E-07	Liver	--	0.2	--	0.2
			Chloroform	--	1E-06	--	--	1E-06	Liver	--	0.01	--	0.01
			cis-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Methylene Chloride	--	1E-08	--	--	1E-08	Liver	--	0.0001	--	0.0001
			Tetrachloroethene	--	6E-07	--	--	6E-07	Liver	--	0.003	--	0.003
			Toluene	--	--	--	--	--	NA	--	0.007	--	0.007
			trans-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Trichloroethene	--	4E-04	--	--	4E-04	Liver	--	4	--	4
			Vinyl Chloride	--	1E-06	--	--	1E-06	Liver	--	0.04	--	0.04
			Pyridine	--	--	--	--	--	NA	--	--	--	--
			2-Nitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2,4,6-Trinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			RDX	--	--	--	--	--	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	--	--	--	--
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	--	--	--	--	NA	--	--	--	--
			Barium	--	--	--	--	--	Fetus	--	--	--	--
			Beryllium	--	--	--	--	--	NA	--	--	--	--
			Cadmium	--	--	--	--	--	Kidney	--	--	--	--
			Chromium	--	--	--	--	--	Lungs	--	--	--	--
			Cobalt	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Nickel	--	--	--	--	--	NA	--	--	--	--
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	4E-04	--	--	4E-04		--	5	--	5
		Exposure Point Total						4E-04					5
	Exposure Medium Total							3E-03					57
Medium Total								3E-03					57
Surface Water	Surface Water	Gullies	Trichloroethene	4E-08	--	4E-08	--	8E-08	Liver	0.00008	--	0.00007	0.0002
			RDX	4E-07	--	2E-08	--	4E-07	Prostate	0.02	--	0.0006	0.02
			Aluminum	--	--	--	--	--	CNS	0.005	--	0.0003	0.006
			Antimony	--	--	--	--	--	Blood	0.03	--	0.01	0.04
			Arsenic	4E-07	--	2E-08	--	4E-07	Skin, CVS	0.009	--	0.0006	0.010
			Barium	--	--	--	--	--	Kidney	0.005	--	0.005	0.011
			Cadmium	--	--	--	--	--	Kidney	0.009	--	0.01	0.02
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.002	--	0.01	0.01
			Iron	--	--	--	--	--	None Reported	0.02	--	0.001	0.02
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.01	--	0.02	0.03
			Vanadium	--	--	--	--	--	Kidney	0.010	--	0.03	0.04
			Zinc	--	--	--	--	--	Blood	0.003	--	0.0001	0.003
			Chemical Total	8E-07	--	8E-08	--	9E-07		0.1	--	0.1	0.2
		Exposure Point Total						9E-07					0.2
	Exposure Medium Total							9E-07					0.2
Medium Total								9E-07					0.2
Surface Water	Surface Water	Turkey Creek	Arsenic	9E-08	--	6E-09	--	1E-07	Skin, CVS	0.002	--	0.0002	0.002
			Manganese (Water)	--	--	--	--	--	CNS	0.04	--	0.06	0.10
			Chemical Total	9E-08	--	6E-09	--	1E-07		0.04	--	0.06	0.1
		Exposure Point Total						1E-07					0.1
	Exposure Medium Total							1E-07					0.1
Medium Total								1E-07					0.1

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	3E-08	--	2E-08	--	4E-08	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.01	--	--	0.01
			Antimony	--	--	--	--	--	Blood	0.1	--	--	0.1
			Arsenic	2E-06	--	3E-07	--	2E-06	Skin, CVS	0.04	--	0.007	0.05
			Barium	--	--	--	--	--	Kidney	0.02	--	--	0.02
			Cadmium	--	--	--	--	--	Kidney	0.03	--	0.003	0.03
			Copper	--	--	--	--	--	GS	0.03	--	--	0.03
			Iron	--	--	--	--	--	None Reported	0.2	--	--	0.2
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.02	--	--	0.02
			Mercury	--	--	--	--	--	CNS	0.003	--	--	0.003
			Nickel	--	--	--	--	--	Body Weight	0.008	--	--	0.008
			Vanadium	--	--	--	--	--	Kidney	0.04	--	--	0.04
			Zinc	--	--	--	--	--	Blood	0.02	--	--	0.02
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.5	--	0.01	0.5
		Exposure Point Total						2E-06					0.5
	Exposure Medium Total							2E-06					0.5
Medium Total								2E-06					0.5
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.010	--	--	0.010
			Arsenic	4E-06	--	6E-07	--	4E-06	Skin, CVS	0.10	--	0.02	0.1
			Iron	--	--	--	--	--	None Reported	0.4	--	--	0.4
			Manganese (Soil)	--	--	--	--	--	CNS	0.03	--	--	0.03
			Vanadium	--	--	--	--	--	Kidney	0.05	--	--	0.05
			Chemical Total	4E-06	--	6E-07	--	4E-06		0.6	--	0.02	0.6
		Exposure Point Total						4E-06					0.6
	Exposure Medium Total							4E-06					0.6
Medium Total								4E-06					0.6
Receptor Total							Receptor Risk Total	3E-03				Receptor HI Total	60

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Total Blood HI	4
Total Body Weight HI	0.7
Total CNS HI	23
Total CVS HI	3
Total GS HI	1.3
Total Immune HI	0.4
Total Kidney HI	4
Total Liver HI	11
Total Skin HI	2
Total Nasal HI	0.0005
Total None Reported HI	13
Total Prostate HI	0.8
Total Spleen HI	0.002
Total Bone HI	1
Total Fetotoxicity HI	1

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	2E-10	--	--	--	2E-10	Liver	0.00000008	--	--	0.00000008
			Benzo(a)anthracene	9E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Benzo(a)pyrene	8E-06	--	4E-06	--	1E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	9E-07	--	5E-07	--	1E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-06	--	8E-07	--	2E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4E-07	--	2E-07	--	6E-07	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Body Weight	0.000002	--	0.0000010	0.000003
			Aluminum	--	--	--	--	--	CNS	0.02	--	--	0.02
			Antimony	--	--	--	--	--	Blood	0.02	--	--	0.02
			Arsenic	4E-06	--	5E-07	--	5E-06	Skin, CVS	0.03	--	0.003	0.03
			Copper	--	--	--	--	--	GS	0.002	--	--	0.002
			Iron	--	--	--	--	--	None Reported	0.1	--	--	0.1
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.007	--	--	0.007
			Vanadium	--	--	--	--	--	Kidney	0.04	--	--	0.04
			Chemical Total	2E-05	--	7E-06	--	2E-05		0.2	--	0.003	0.2
		Exposure Point Total						2E-05					0.2
	Exposure Medium Total							2E-05					0.2
	Air	SWMU 16	Trichloroethene	--	6E-09	--	--	6E-09	Liver	--	0.00002	--	0.00002
			Benzo(a)anthracene	--	--	--	--	--	NA	--	--	--	--
			Benzo(a)pyrene	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	--	--	--	--	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	--	--	--	--	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	NA	--	--	--	--
			Naphthalene	--	--	--	--	--	Nasal	--	0.0002	--	0.0002
			Aluminum	--	--	--	--	--	CNS	--	0.003	--	0.003
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	7E-09	--	--	7E-09	NA	--	--	--	--
			Copper	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	--	0.005	--	0.005
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	1E-08	--	--	1E-08		--	0.008	--	0.008
		Exposure Point Total						1E-08					0.008
	Exposure Medium Total							1E-08					0.008
Medium Total								2E-05					0.2

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	3E-06	--	2E-07	--	3E-06	Liver	0.0007	--	0.00006	0.0008
			1,1,2-Trichloroethane	1E-05	--	6E-07	--	1E-05	Blood	0.1	--	0.008	0.1
			1,1-Dichloroethene	--	--	--	--	--	Liver	0.006	--	0.0005	0.006
			1,2,3-Trichloropropane	3E-08	--	2E-09	--	3E-08	Blood	0.007	--	0.0005	0.007
			1,2-Dichloroethane	1E-06	--	4E-08	--	1E-06	None Reported	0.002	--	0.00007	0.002
			Benzene	9E-07	--	9E-08	--	1E-06	Blood	0.01	--	0.001	0.01
			Bromodichloromethane	8E-07	--	5E-08	--	9E-07	Kidney	0.002	--	0.0001	0.002
			Carbon Tetrachloride	3E-06	--	6E-07	--	4E-06	Liver	0.1	--	0.02	0.1
			Chloroform	--	--	--	--	--	Liver	0.01	--	0.0007	0.01
			cis-1,2-Dichloroethene	--	--	--	--	--	Blood	0.8	--	0.06	0.8
			Methylene Chloride	2E-07	--	5E-09	--	2E-07	Liver	0.001	--	0.00003	0.001
			Tetrachloroethene	6E-05	--	2E-05	--	8E-05	Liver	0.03	--	0.01	0.04
			Toluene	--	--	--	--	--	Liver, Kidney	0.003	--	0.0006	0.003
			trans-1,2-Dichloroethene	--	--	--	--	--	Blood	0.004	--	0.0002	0.004
			Trichloroethene	3E-03	--	3E-04	--	3E-03	Liver	1	--	0.1	1
			Vinyl Chloride	3E-04	--	1E-05	--	4E-04	Liver	0.2	--	0.008	0.2
			Pyridine	--	--	--	--	--	Liver	0.05	--	0.0005	0.05
			2-Nitrotoluene	4E-07	--	3E-08	--	4E-07	Spleen	0.0005	--	0.00004	0.0005
			2,4,6-Trinitrotoluene	8E-08	--	1E-09	--	8E-08	Liver	0.02	--	0.0003	0.02
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	Liver	0.2	--	0.005	0.2
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	Liver	0.1	--	0.01	0.1
			RDX	3E-05	--	1E-07	--	3E-05	Prostate	0.2	--	0.001	0.2
			Aluminum	--	--	--	--	--	CNS	0.6	--	0.001	0.6
			Antimony	--	--	--	--	--	Blood	0.05	--	0.0008	0.05
			Arsenic	7E-05	--	2E-07	--	7E-05	Skin, CVS	0.5	--	0.001	0.5
			Barium	--	--	--	--	--	Kidney	0.1	--	0.004	0.1
			Beryllium	--	--	--	--	--	GS	0.03	--	0.008	0.03
			Cadmium	--	--	--	--	--	Kidney	0.02	--	0.001	0.03
			Chromium	--	--	--	--	--	Fetotoxicity, GS, Bone	0.3	--	0.05	0.3
			Cobalt	--	--	--	--	--	CVS, Immune, CNS	0.1	--	0.0003	0.1
			Iron	--	--	--	--	--	None Reported	3	--	0.006	3
			Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	None Reported	0.5	--	0.0005	0.5
			Manganese (Water)	--	--	--	--	--	CNS	6	--	0.3	6
			Nickel	--	--	--	--	--	Body Weight	0.2	--	0.002	0.2

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	--	--	--	--	--	Kidney	0.8	--	0.07	0.9
			Chemical Total	3E-03	--	3E-04	--	3E-03		15	--	0.7	15
		Exposure Point Total						3E-03					15
	Exposure Medium Total							3E-03					15
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	5E-07	--	--	5E-07	NA	--	--	--	--
			1,1,2-Trichloroethane	--	2E-06	--	--	2E-06	NA	--	--	--	--
			1,1-Dichloroethene	--	--	--	--	--	Liver	--	0.002	--	0.002
			1,2,3-Trichloropropane	--	--	--	--	--	Blood	--	0.007	--	0.007
			1,2-Dichloroethane	--	3E-07	--	--	3E-07	NA	--	0.008	--	0.008
			Benzene	--	1E-07	--	--	1E-07	Blood	--	0.01	--	0.01
			Bromodichloromethane	--	--	--	--	--	NA	--	--	--	--
			Carbon Tetrachloride	--	3E-07	--	--	3E-07	Liver	--	0.03	--	0.03
			Chloroform	--	9E-07	--	--	9E-07	Liver	--	0.002	--	0.002
			cis-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Methylene Chloride	--	1E-08	--	--	1E-08	Liver	--	0.00003	--	0.00003
			Tetrachloroethene	--	5E-07	--	--	5E-07	Liver	--	0.0005	--	0.0005
			Toluene	--	--	--	--	--	NA	--	0.001	--	0.001
			trans-1,2-Dichloroethene	--	--	--	--	--	NA	--	--	--	--
			Trichloroethene	--	4E-04	--	--	4E-04	Liver	--	0.9	--	0.9
			Vinyl Chloride	--	1E-06	--	--	1E-06	Liver	--	0.008	--	0.008
			Pyridine	--	--	--	--	--	NA	--	--	--	--
			2-Nitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2,4,6-Trinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			2-Amino-4,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	NA	--	--	--	--
			RDX	--	--	--	--	--	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	--	--	--	--
			Antimony	--	--	--	--	--	NA	--	--	--	--
			Arsenic	--	--	--	--	--	NA	--	--	--	--
			Barium	--	--	--	--	--	Fetus	--	--	--	--
			Beryllium	--	--	--	--	--	NA	--	--	--	--
			Cadmium	--	--	--	--	--	Kidney	--	--	--	--
			Chromium	--	--	--	--	--	Lungs	--	--	--	--
			Cobalt	--	--	--	--	--	NA	--	--	--	--
			Iron	--	--	--	--	--	NA	--	--	--	--

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--	NA	--	--	--	--
			Lithium	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	NA	--	--	--	--
			Nickel	--	--	--	--	--	NA	--	--	--	--
			Vanadium	--	--	--	--	--	NA	--	--	--	--
			Chemical Total	--	4E-04	--	--	4E-04		--	1	--	1
		Exposure Point Total						4E-04					1
	Exposure Medium Total							4E-03					16
Medium Total								4E-03					16
Surface Water	Surface Water	Gullies	Trichloroethene	7E-09	--	1E-07	--	1E-07	Liver	0.000003	--	0.00004	0.00005
			RDX	7E-08	--	4E-08	--	1E-07	Prostate	0.0007	--	0.0004	0.0010
			Aluminum	--	--	--	--	--	CNS	0.0002	--	0.0002	0.0004
			Antimony	--	--	--	--	--	Blood	0.001	--	0.01	0.01
			Arsenic	6E-08	--	6E-08	--	1E-07	Skin, CVS	0.0004	--	0.0004	0.0008
			Barium	--	--	--	--	--	Kidney	0.0002	--	0.003	0.003
			Cadmium	--	--	--	--	--	Kidney	0.0004	--	0.007	0.007
			Chromium	--	--	--	--	--	Fetotoxicity, GS. Bone	0.0001	--	0.007	0.007
			Iron	--	--	--	--	--	None Reported	0.0008	--	0.0007	0.002
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Water)	--	--	--	--	--	CNS	0.0004	--	0.01	0.01
			Vanadium	--	--	--	--	--	Kidney	0.0004	--	0.02	0.02
			Zinc	--	--	--	--	--	Blood	0.0001	--	0.00008	0.0002
			Chemical Total	1E-07	--	2E-07	--	3E-07		0.005	--	0.05	0.06
		Exposure Point Total						3E-07					0.06
	Exposure Medium Total							3E-07					0.06
Medium Total								3E-07					0.06
Surface Water	Surface Water	Turkey Creek	Arsenic	2E-08	--	1E-08	--	3E-08	Skin, CVS	0.0001	--	0.00009	0.0002
			Manganese (Water)	--	--	--	--	--	CNS	0.002	--	0.04	0.04
			Chemical Total	2E-08	--	1E-08	--	3E-08		0.002	--	0.04	0.04
		Exposure Point Total						3E-08					0.04
	Exposure Medium Total							3E-08					0.04
Medium Total								3E-08					0.04

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	1E-08	--	1E-08	--	2E-08	NA	--	--	--	--
			Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Antimony	--	--	--	--	--	Blood	0.01	--	--	0.01
			Arsenic	7E-07	--	2E-07	--	8E-07	Skin, CVS	0.004	--	0.001	0.006
			Barium	--	--	--	--	--	Kidney	0.002	--	--	0.002
			Cadmium	--	--	--	--	--	Kidney	0.003	--	0.0005	0.003
			Copper	--	--	--	--	--	GS	0.004	--	--	0.004
			Iron	--	--	--	--	--	None Reported	0.02	--	--	0.02
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (Soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Mercury	--	--	--	--	--	CNS	0.0003	--	--	0.0003
			Nickel	--	--	--	--	--	Body Weight	0.0008	--	--	0.0008
			Vanadium	--	--	--	--	--	Kidney	0.004	--	--	0.004
			Zinc	--	--	--	--	--	Blood	0.002	--	--	0.002
			Chemical Total	7E-07	--	2E-07	--	9E-07		0.06	--	0.002	0.06
		Exposure Point Total						9E-07					0.06
	Exposure Medium Total							9E-07					0.06
Medium Total								9E-07					0.06
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--	CNS	0.001	--	--	0.001
			Arsenic	2E-06	--	4E-07	--	2E-06	Skin, CVS	0.01	--	0.003	0.01
			Iron	--	--	--	--	--	None Reported	0.04	--	--	0.04
			Manganese (Soil)	--	--	--	--	--	CNS	0.003	--	--	0.003
			Vanadium	--	--	--	--	--	Kidney	0.005	--	--	0.005
			Chemical Total	2E-06	--	4E-07	--	2E-06		0.06	--	0.003	0.06
		Exposure Point Total						2E-06					0.06
	Exposure Medium Total							2E-06					0.06
Medium Total								2E-06					0.06
Receptor Total							Receptor Risk Total	4E-03				Receptor HI Total	17

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Total Blood HI	1
Total Body Weight HI	0.2
Total CNS HI	7
Total CVS HI	0.6
Total GS HI	0.39
Total Immune HI	0.1
Total Kidney HI	1
Total Liver HI	3
Total Skin HI	0.5
Total Nasal HI	0.0002
Total None Reported HI	3
Total Prostate HI	0.2
Total Spleen HI	0.0005
Total Bone HI	0.4
Total Fetotoxicity HI	0.4

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 16	Trichloroethene	6E-10	--	--	--	6E-10					
			Benzo(a)anthracene	3E-06	--	1E-06	--	4E-06					
			Benzo(a)pyrene	3E-05	--	1E-05	--	4E-05					
			Benzo(b)fluoranthene	3E-06	--	1E-06	--	4E-06					
			Dibenzo(a,h)anthracene	5E-06	--	2E-06	--	7E-06					
			Indeno(1,2,3-cd)pyrene	1E-06	--	6E-07	--	2E-06					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	1E-05	--	1E-06	--	2E-05					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	5E-05	--	2E-05	--	7E-05					
		Exposure Point Total						7E-05					
	Exposure Medium Total							7E-05					
	Air	SWMU 16	Trichloroethene	--	1E-08	--	--	1E-08					
			Benzo(a)anthracene	--	--	--	--	--					
			Benzo(a)pyrene	--	1E-09	--	--	1E-09					
			Benzo(b)fluoranthene	--	--	--	--	--					
			Dibenzo(a,h)anthracene	--	--	--	--	--					
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--					
			Naphthalene	--	--	--	--	--					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	--	1E-08	--	--	1E-08					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	3E-08	--	--	3E-08					
		Exposure Point Total						3E-08					
	Exposure Medium Total							3E-08					
Medium Total								7E-05					

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	1,1,2,2-Tetrachloroethane	5E-06	--	3E-07	--	6E-06					
			1,1,2-Trichloroethane	2E-05	--	9E-07	--	2E-05					
			1,1-Dichloroethene	- -	--	- -	--	- -					
			1,2,3-Trichloropropane	5E-08	--	3E-09	--	5E-08					
			1,2-Dichloroethane	2E-06	--	6E-08	--	2E-06					
			Benzene	2E-06	--	1E-07	--	2E-06					
			Bromodichloromethane	2E-06	--	7E-08	--	2E-06					
			Carbon Tetrachloride	6E-06	--	8E-07	--	7E-06					
			Chloroform	- -	--	- -	--	- -					
			cis-1,2-Dichloroethene	- -	--	- -	--	- -					
			Methylene Chloride	4E-07	--	7E-09	--	4E-07					
			Tetrachloroethene	1E-04	--	3E-05	--	1E-04					
			Toluene	- -	--	- -	--	- -					
			trans-1,2-Dichloroethene	- -	--	- -	--	- -					
			Trichloroethene	5E-03	--	4E-04	--	5E-03					
			Vinyl Chloride	6E-04	--	2E-05	--	7E-04					
			Pyridine	- -	--	- -	--	- -					
			2-Nitrotoluene	7E-07	--	5E-08	--	7E-07					
			2,4,6-Trinitrotoluene	2E-07	--	2E-09	--	2E-07					
			2-Amino-4,6-Dinitrotoluene	- -	--	- -	--	- -					
			4-Amino-2,6-Dinitrotoluene	- -	--	- -	--	- -					
			RDX	5E-05	--	2E-07	--	5E-05					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	1E-04	--	2E-07	--	1E-04					
			Barium	- -	--	- -	--	- -					
			Beryllium	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Chromium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Lithium	- -	--	- -	--	- -					
			Manganese (Water)	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 16	Vanadium	- -	--	- -	--	- -					
			Chemical Total	6E-03	--	5E-04	--	6E-03					
		Exposure Point Total						6E-03					
	Exposure Medium Total							6E-03					
	Air	SWMU 16	1,1,2,2-Tetrachloroethane	--	1E-06	--	--	1E-06					
			1,1,2-Trichloroethane	--	5E-06	--	--	5E-06					
			1,1-Dichloroethene	--	- -	--	--	- -					
			1,2,3-Trichloropropane	--	- -	--	--	- -					
			1,2-Dichloroethane	--	7E-07	--	--	7E-07					
			Benzene	--	3E-07	--	--	3E-07					
			Bromodichloromethane	--	- -	--	--	- -					
			Carbon Tetrachloride	--	7E-07	--	--	7E-07					
			Chloroform	--	2E-06	--	--	2E-06					
			cis-1,2-Dichloroethene	--	- -	--	--	- -					
			Methylene Chloride	--	3E-08	--	--	3E-08					
			Tetrachloroethene	--	1E-06	--	--	1E-06					
			Toluene	--	- -	--	--	- -					
			trans-1,2-Dichloroethene	--	- -	--	--	- -					
			Trichloroethene	--	8E-04	--	--	8E-04					
			Vinyl Chloride	--	3E-06	--	--	3E-06					
			Pyridine	--	- -	--	--	- -					
			2-Nitrotoluene	--	- -	--	--	- -					
			2,4,6-Trinitrotoluene	--	- -	--	--	- -					
			2-Amino-4,6-Dinitrotoluene	--	- -	--	--	- -					
			4-Amino-2,6-Dinitrotoluene	--	- -	--	--	- -					
			RDX	--	- -	--	--	- -					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	- -	--	--	- -					
			Barium	--	- -	--	--	- -					
			Beryllium	--	- -	--	--	- -					
			Cadmium	--	- -	--	--	- -					
			Chromium	--	- -	--	--	- -					
			Cobalt	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	SWMU 16	Lead	--	--	--	--	--					
			Lithium	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Nickel	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	--	8E-04	--	--	8E-04					
		Exposure Point Total						8E-04					
	Exposure Medium Total							7E-03					
Medium Total								7E-03					
Surface Water	Surface Water	Gullies	Trichloroethene	5E-08	--	1E-07	--	2E-07					
			RDX	5E-07	--	6E-08	--	6E-07					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	4E-07	--	8E-08	--	5E-07					
			Barium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Chromium	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Water)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Zinc	--	--	--	--	--					
			Chemical Total	1E-06	--	3E-07	--	1E-06					
		Exposure Point Total						1E-06					
	Exposure Medium Total							1E-06					
Medium Total								1E-06					
Surface Water	Surface Water	Turkey Creek	Arsenic	1E-07	--	2E-08	--	1E-07					
			Manganese (Water)	--	--	--	--	--					
			Chemical Total	1E-07	--	2E-08	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								1E-07					

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Gullies	Benzo(a)pyrene	4E-08	--	3E-08	--	7E-08					
			Aluminum	--	--	--	--	--					
			Antimony	--	--	--	--	--					
			Arsenic	2E-06	--	4E-07	--	3E-06					
			Barium	--	--	--	--	--					
			Cadmium	--	--	--	--	--					
			Copper	--	--	--	--	--					
			Iron	--	--	--	--	--					
			Lead	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Mercury	--	--	--	--	--					
			Nickel	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Zinc	--	--	--	--	--					
			Chemical Total	2E-06	--	5E-07	--	3E-06					
		Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
Medium Total								3E-06					
Sediment	Sediment	Turkey Creek	Aluminum	--	--	--	--	--					
			Arsenic	5E-06	--	1E-06	--	6E-06					
			Iron	--	--	--	--	--					
			Manganese (Soil)	--	--	--	--	--					
			Vanadium	--	--	--	--	--					
			Chemical Total	5E-06	--	1E-06	--	6E-06					
		Exposure Point Total						6E-06					
	Exposure Medium Total							6E-06					
Medium Total								6E-06					
Receptor Total							Receptor Risk Total	7E-03					

APPENDIX J

SUPPORTING DOCUMENTATION FOR THE ECOLOGICAL RISK ASSESSMENT SWMU 16

APPENDIX J.1

U.S. FISH AND WILDLIFE SERVICE
LETTER REGARDING POSSIBLE IMPACTS TO
FEDERALLY ENDANGERED INDIANA BAT AND
FEDERALLY THREATENED BALD EAGLE

United States Department of the Interior
Fish and Wildlife Service

Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

18 October 2005

James M. Hunsicker
Manager, Environmental Protection
Crane Division, Naval Surface Warfare Center
300 Highway 361
Crane, IN 47522-5001

RE: Ongoing RCRA Corrective Action projects at Solid Waste Management Units (SWMU) at Crane Division, Naval Surface Warfare Center (NSWC) (5090/S4.7, Ser RP3/5148)

Dear Mr. Hunsicker:

The Bloomington Field Office of the U.S. Fish and Wildlife Service (Service) received your letter detailing the ongoing RCRA projects referenced above and requesting informal consultation on possible impacts to the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened bald eagle (*Haliaeetus leucocephalus*). This letter serves as the Service's response for these ongoing actions. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the U. S. Fish and Wildlife Service's Mitigation Policy.

We have reviewed the descriptions and general locations of the 33 SWMUs and the two Areas of Concern (AOCs) summarized in your letter. My staff had previously reviewed most of these SWMUs in the past and therefore had some familiarity with the contaminant issues associated with each one.

The Service concurs that the ongoing RCRA Corrective Action projects at Crane individually or cumulatively are not likely to adversely affect Indiana bats nor bald eagles and therefore may continue or proceed as planned. After base-wide mist net surveys were completed on Crane in 1998 and again in the summer of 2005, it appears that Crane primarily provides summer habitat for scattered male Indiana bats and possibly one or more currently undocumented maternity colonies (no reproductive adult females or juveniles were captured in 2005, but evidence of a maternity colony was present in 1998. Also, maternity colonies were documented just north of Crane during 2004 surveys for I-69). Crane also has consistently had one or two pairs of nesting bald eagles. The likelihood of Indiana bats or bald eagles at Crane being exposed to contaminants from the SWMUs is very remote (i.e, discountable) and if some exposure were to occur, it is anticipated that it would not rise to the level of take (i.e., insignificant).

This precludes the need for further consultation on these RCRA Corrective Action projects as required under section 7 of the Endangered Species Act of 1973, as amended. If, however, new information on endangered species within the proposed project areas becomes available or if significant changes/additions are made to the proposed projects (e.g., other associated actions, or if tree clearing will occur or will need to occur as part of a remedial action), then please contact Andy King at (812) 334-4261 ext. 216 or Andrew_King@fws.gov for further consultation.

Sincerely,

Scott E. Pruitt
Field Supervisor

cc: Steve Andrews, Crane NSWC - Natural Resources (via e-mail)

Checklist for Ecological Assessment/Sampling

I. SITE DESCRIPTION

1. Site Name: NSWC CRANE

   Location: SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR

   County: MARTIN City: CRANE State: INDIANA

2. Latitude: 38.87465 Longitude: -86.80189

3. What is the approximate area of the site? SWUU = 15.1 ACRES
   ACTIVE SITE = 6.4 ACRES

4. Is this the first site visit? ☒ yes ☐ no If no, attach trip report of previous site visit(s), if available.

   Date(s) of previous site visit(s): 1st Site Visit FOR ECO. ASSESSMENT
   Other site visits were made for ENVIRONMENTAL SAMPLING.

5. Please attach to the checklist USGS topographic map(s) of the site, if available.
   Attached FIGURE 3-3 OF THE QAPP (July 2002) + FEB (2003)

6. Are aerial or other site photographs available? ☒ yes ☐ no If yes, please attach any available photo(s) to the site map at the conclusion of this section.

   Reproduction must be w/ Navy Approval

7. The land use on the site is:

_____% Urban

_____% Rural

_____% Residential

21 % Industrial (☒ light ☐ heavy)

_____% Agricultural

(Crops:_____)

_____% Recreational

(Describe; note if it is a park, etc.)

_____

_____

The area surrounding the site is:
_____ mile radius

_____% Urban

_____% Rural

_____% Residential

~10 % ~~Industrial (☐ light ☐ heavy)~~

_____% Agricultural

(Crops:_____)

_____% Recreational

(Describe; note if it is a park, etc.)

_____

_____

49 % ~~Undisturbed~~ Forested

21 % ~~Other~~ Maintained Grass
9 % SHRUBBY

~90 % ~~Undisturbed~~ Forested

_____% Other

8. Has any movement of soil taken place at the site? ☐ yes ☒ no. If yes, please identify the most likely cause of this disturbance:

_____ Agricultural Use _____ Heavy Equipment _____ Mining

_____ Natural Events _____ Erosion _____ Other

Please describe: Not recently, however ash piles were removed south of Active site area.

9. Do any potentially sensitive environmental areas exist adjacent to or in proximity to the site, e.g., Federal and State parks, National and State monuments, wetlands, prairie potholes? *Remember, flood plains and wetlands are not always obvious; do not answer "no" without confirming information.*

No

Please provide the source(s) of information used to identify these sensitive areas, and indicate their general location on the site map.

NA

10. What type of facility is located at the site?

☐ Chemical ☐ Manufacturing ☐ Mixing ☐ Waste disposal

☐ Other (specify) Demilitarization & Storage

11. What are the suspected contaminants of concern at the site? If known, what are the maximum concentration levels?

VOCs, SVOCs, metals & Explosives

12. Check any potential routes of off-site migration of contaminants observed at the site:

☒ Swales ☐ Depressions ☒ Drainage ditches

☒ Runoff ☐ Windblown particulates ☐ Vehicular traffic

☐ Other (specify)_____

13. If known, what is the approximate depth to the water table? 9 – 30' (MAX)

14. Is the direction of surface runoff apparent from site observations? ☒ yes ☐ no If yes, to which of the following does the surface runoff discharge? Indicate all that apply.

☒ Surface water ☒ Groundwater ☐ Sewer ☐ Collection impoundment

15. Is there a navigable waterbody or tributary to a navigable waterbody? ☐ yes ☒ no

16. Is there a waterbody anywhere on or in the vicinity of the site? If yes, also complete Section III: Aquatic Habitat Checklist -- Non-Flowing Systems and/or Section IV: Aquatic Habitat Checklist -- Flowing Systems.

☐ yes (approx. distance_____) ☒ no

17. Is there evidence of flooding? ☐ yes ☒ no *Wetlands and flood plains are not always obvious; do not answer "no" without confirming information.* If yes, complete Section V: Wetland Habitat Checklist.
Site conditions very poor for wetland plants (Martin Co. Soil Survey)

18. If a field guide was used to aid any of the identifications, please provide a reference. Also, estimate the time spent identifying fauna. [Use a blank sheet if additional space is needed for text.]

NA

19. Are any threatened and/or endangered species (plant or animal) known to inhabit the area of the site? ☐ yes ☒ no
If yes, you are required to verify this information with the U.S. Fish and Wildlife Service. If species' identities are known, please list them next.

The Indiana Bat has been observed on N/SWC Crane Although not @ SWMU 16.

20. Record weather conditions at the time this checklist was prepared:

DATE: 5-11-03

(Source Martin Co. Soil Survey)

70's	Temperature (°C/°F)	75.8	Normal daily high temperature
W → E	Wind (direction/speed)	NO	Precipitation (rain, snow)
> 50%	Cloud cover		

IA. SUMMARY OF OBSERVATIONS AND SITE SETTING

Light industry comprises 21% (3.2 acres) of SWMU 16, as well as, half of the active area within the site fence. Light industry consists of several buildings (with Building 146 being the largest), three magazines, railroad spur R-170, asphalt and gravel roads, and asphalt and gravel storage lay down areas. Approximately 21% (3.2 acres) of SWMU 16 and the other half of the active area within the site fence is vegetated with maintained grass. Outside the southern portion of the site fence lies a shrubby area making up approximately 9% (1.3 acres) of SWMU 16. This area formerly contained the incinerator ash piles; however, it is now a transitional area composed mainly of grasses with multifora rose, brambles (Rubus spp.), flowering dogwood and black locust. The remaining 49% (7.4 acres) of SWMU 16 is forested. For the spacial distribution of land use see the cover type as shown on Proposed Sample Locations Map (Figure 3-3) of the QAPP attached to this ecological assessment checklist.

The forested area, although it makes up a large portion of the SWMU, only occurs along the perimeter of the active site. Maples and oaks make up the dominant species in the tree canopy, with yellow poplar and sassafras as associated species. Sassafras and flowering dogwood are common species in the understory. Additionally, black locust is a very common invader species in disturbed areas along the outside of the fence line.

The active portion of SWMU 16 is relatively flat but drains to the east, west and south. There are three main drainage systems that divert the SWMU's surface water run-off away from the site. They are as follows: one drainage ditch east of Bldg.146 runs north to south and contains sediment sampling location 16SD03 (see attached photograph Figure 1-4l), the second drainage ditch runs west to east just south of Bldg. 146 and contains sediment sampling location 16SD05 (see attached photograph Figure 1-4n), and the third drainage ditch runs east to west just southwest of Bldg.146 and contains sediment sampling location 16SD06 (see attached photograph Figure 1-4o). Once drainage leaves the active site area via relatively flat drainage ditches the surface water run off would be diverted into rather steeply sloped intermittent streams.

All SWMU 16 drainage flows into tributaries that feed Turkey Creek. Turkey Creek flows into Boggs Creek which flows into Lake Gallimore near the southern boundary of NSWC Crane then continues to flow out of Lake Gallimore until it ultimately discharges into the East Fork of White River.

At the time of this assessment no flow was observed on site. The occurrence of aquatic receptors (i.e. fish, and sediment invertebrates) would be unlikely. Surface water flow would probably only occur during extended periods of heavy rain and spring thaw. Furthermore, this site is an upland site well outside of FEMAs flood hazard area (Zone A). Additionally, Martin County soil survey considers this a very poor site for wetland plants.

White-tailed deer tracks were observed outside of fenced area and spring peepers were observed inside the north sump (see attached photograph Figure 1-4k). Eastern cottontail rabbits were also observed within the active portion of SWMU 16.

See attached SWMU 16 photographs, cover type map and photograph direction map to enhance site familiarity.

Completed by TERRY ROJAHN Affiliation T+ NUS

Additional Preparers

Site Manager RALPH BASINSKI

Date 6-19-03

II. TERRESTRIAL HABITAT CHECKLIST

IIA. WOODED

1. Are there any wooded areas at the site? ☒ yes ☐ no If no, go to Section IIB: Shrub/Scrub.
   HOWEVER, NONE within the active area of the site.
2. What percentage or area of the site is wooded? (49 % 7.4 acres). Indicate the wooded area on the site map which is attached to a copy of this checklist. Please identify what information was used to determine the wooded area of the site.

   0% wooded within the active portion of the SWMU.
3. What is the dominant type of vegetation in the wooded area? (Circle one: Evergreen/Deciduous/Mixed) Provide a photograph, if available.

   Dominant plant, if known: SEE QUESTION 1A
4. What is the predominant size of the trees at the site? Use diameter at breast height.

   ☐ 0-6 in. ☑ 6-12 in. ☐ > 12 in.
   ↳ Estimate
5. Specify type of understory present, if known. Provide a photograph, if available.

   Flowering dogwood, sassafras, maples (mostly red) & oaks.

IIB. SHRUB/SCRUB

1. Is shrub/scrub vegetation present at the site? ☒ yes ☐ no If no, go to Section IIC: Open Field.
2. What percentage of the site is covered by scrub/shrub vegetation? (9 % 1.3 acres). Indicate the areas of shrub/scrub on the site map. Please identify what information was used to determine this area.

   HOWEVER, no shrub/scrub within the confines of the active site (inside site fence)
3. What is the dominant type of scrub/shrub vegetation, if known? Provide a photograph, if available.

   Black locust
4. What is the approximate average height of the scrub/shrub vegetation?

   ☐ 0-2 ft. ☐ 2-5 ft. ☑ > 5 ft.

5. Based on site observations, how dense is the scrub/shrub vegetation?

☐ Dense ☑ Patchy ☐ Sparse

IIC. OPEN FIELD

1. Are there open (bare, barren) field areas present at the site? ☐ yes ☑ no If yes, please indicate the type below:

☐ Prairie/plains ☐ Savannah ☐ Old field ☐ Other (specify)_____

2. What percentage of the site is open field? (_____% _____ acres). Indicate the open fields on the site map.

3. What is/are the dominant plant(s)? Provide a photograph, if available.

4. What is the approximate average height of the dominant plant?_____

5. Describe the vegetation cover: ☐ Dense ☐ Sparse ☐ Patchy

IID. MISCELLANEOUS

1. Are other types of terrestrial habitats present at the site, other than woods, scrub/shrub, and open field? ☑ yes ☐ no If yes, identify and describe them below.

Maintained grass 21% (3.2 Acres) of the SWMU.

2. Describe the terrestrial miscellaneous habitat(s) and identify these area(s) on the site map.

Dense maintained grass ~3"-6" in height.

3. What observations, if any, were made at the site regarding the presence and/or absence of insects, fish, birds, mammals, etc.?

SEE QUESTION 1A.

4. Review the questions in Section I to determine if any additional habitat checklists should be completed for this site.

III. AQUATIC HABITAT CHECKLIST – NON-FLOWING SYSTEMS NA

Note: Aquatic systems are often associated with wetland habitats. Please refer to Section V, Wetland Habitat Checklist.

1. What type of open-water, non-flowing system is present at the site?

   ☐ Natural (pond, lake)
   ☐ Artificially created (lagoon, reservoir, canal, impoundment)

2. If known, what is the name(s) of the waterbody(ies) on or adjacent to the site?

   _____

3. If a waterbody is present, what are its known uses (e.g.: recreation, navigation, etc.)?

4. What is the approximate size of the waterbody(ies)? _____ acre(s).

5. Is any aquatic vegetation present? ☐ yes ☐ no If yes, please identify the type of vegetation present if known.

   ☐ Emergent ☐ Submergent ☐ Floating

6. If known, what is the depth of the water? _____

7. What is the general composition of the substrate? Check all that apply.

   ☐ Bedrock ☐ Sand (coarse) ☐ Muck (fine/black)
   ☐ Boulder (>10 in.) ☐ Silt (fine) ☐ Debris
   ☐ Cobble (2.5-10 in.) ☐ Marl (shells) ☐ Detritus
   ☐ Gravel (0.1-2.5 in.) ☐ Clay (slick) ☐ Concrete
   ☐ Other (specify)_____

8. What is the source of water in the waterbody?

   ☐ River/Stream/Creek ☐ Groundwater ☐ Other (specify)_____
   ☐ Industrial discharge ☐ Surface runoff

9. Is there a discharge from the site to the waterbody? ☐ yes ☐ no If yes, please describe this discharge and its path.

10. Is there a discharge from the waterbody? ☐ yes ☐ no If yes, and the information is available, identify from the list below the environment into which the waterbody discharges.

☐ River/Stream/Creek	☐ onsite	☐ offsite	Distance_____
☐ Groundwater	☐ onsite	☐ offsite	
☐ Wetland	☐ onsite	☐ offsite	Distance_____
☐ Impoundment	☐ onsite	☐ offsite	

11. Identify any field measurements and observations of water quality that were made. For those parameters for which data were collected provide the measurement and the units of measure below:

_____ Area

_____ Depth (average)

_____ ~~Temperature (depth of the water at which the reading was taken)~~ _____

_____ pH

_____ Dissolved oxygen

_____ Salinity

_____ Turbidity (clear, slightly turbid, turbid, opaque) (Secchi disk depth _____)

_____ Other (specify)

12. Describe observed color and area of coloration.

13. Mark the open-water, non-flowing system on the site map attached to this checklist.

14. What observations, if any, were made at the waterbody regarding the presence and/or absence of benthic macroinvertebrates, fish, birds, mammals, etc.?

IV. AQUATIC HABITAT CHECKLIST – FLOWING SYSTEMS

Note: Aquatic systems are often associated with wetland habitats. Please refer to Section V, Wetland Habitat Checklist.

1. What type(s) of flowing water system(s) is (are) present at the site?

☐ River	☐ Stream	☐ Creek
☐ Dry wash	☐ Arroyo	☐ Brook
☑ Artificially created (ditch, etc.)	☑ Intermittent Stream	☐ Channeling
	☐ Other (specify)_____	

Inside Active Site Area

Only outside Active Site Area but within the confines of the SMU

2. If known, what is the name of the waterbody? Unnamed but flow into Turkey Creek

3. For natural systems, are there any indicators of physical alteration (e.g., channeling, debris, etc.)?
☐ yes ☑ no If yes, please describe indicators that were observed.

4. What is the general composition of the substrate? Check all that apply.

☐ Bedrock	☑ Sand (coarse)	☐ Muck (fine/black)
☑ Boulder (>10 in.)	☑ Silt (fine)	☐ Debris
☑ Cobble (2.5-10 in.)	☐ Marl (shells)	☑ Detritus
☑ Gravel (0.1-2.5 in.)	☑ Clay (slick)	☐ Concrete
☐ Other (specify)_____		

5. What is the condition of the bank (e.g., height, slope, extent of vegetative cover)?

Steep slopes, veg. very sparce to none.
Ht. varied.

6. Is the system influenced by tides? ☐ yes ☑ no What information was used to make this determination?

7. Is the flow intermittent? ☑ yes ☐ no If yes, please note the information that was used in making this determination.

Dry @ time of this ASSESSMENT.
All stream leading away from the site are intermittent and would only be flowing during periods of prolonged heavy rain or spring thaw.

8. Is there a discharge from the site to the waterbody? ☑ yes ☐ no If yes, please describe the discharge and its path.

SEE IA - No flow at the time of this ASSESSMENT.

9. Is there a discharge from the waterbody? ☐ yes ☐ no If yes, and the information is available, please identify what the waterbody discharges to and whether the discharge is on site or off site.

SEE IA

10. Identify any field measurements and observations of water quality that were made. For those parameters for which data were collected, provide the measurement and the units of measure in the appropriate space below:

NA Width (ft.)

___ Depth (ft.)

___ Velocity (specify units):_____

___ Temperature (depth of the water at which the reading was taken_____)

___ pH

___ Dissolved oxygen

___ Salinity

___ Turbidity (clear, slightly turbid, turbid, opaque)
(Secchi disk depth _____)

___ Other (specify)_____

11. Describe observed color and area of coloration.

NA

12. Is any aquatic vegetation present? ☐ yes ☑ no If yes, please identify the type of vegetation present, if known.

☐ Emergent ☐ Submergent ☐ Floating

13. Mark the flowing water system on the attached site map.

14. What observations were made at the waterbody regarding the presence and/or absence of benthic macroinvertebrates, fish, birds, mammals, etc.?

NA

V. WETLAND HABITAT CHECKLIST

1. Based on observations and/or available information, are designated or known wetlands definitely present at the site?
   ☐ yes ☑ no

   Please note the sources of observations and information used (e.g., USGS Topographic Maps, National Wetland Inventory, Federal or State Agency, etc.) to make this determination.

2. Based on the location of the site (e.g., along a waterbody, in a floodplain) and site conditions (e.g., standing water; dark, wet soils; mud cracks; debris line; water marks), are wetland habitats suspected?
   ☐ yes ☐ no If yes, proceed with the remainder of the wetland habitat identification checklist.

3. What type(s) of vegetation are present in the wetland?

   ☐ Submergent ☐ Emergent
   ☐ Scrub/Shrub ☐ Wooded

   ☐ Other (specify)_____

4. Provide a general description of the vegetation present in and around the wetland (height, color, etc.). Provide a photograph of the known or suspected wetlands, if available.

5. Is standing water present? ☐ yes ☐ no If yes, is this water: ☐ Fresh ☐ Brackish
   What is the approximate area of the water (sq. ft.)?_____
   Please complete questions 4, 11, 12 in Checklist III - Aquatic Habitat -- Non-Flowing Systems.

6. Is there evidence of flooding at the site? What observations were noted?

   ☐ Buttressing ☐ Water marks ☐ Mud cracks

   ☐ Debris line ☐ Other (describe below)

7. If known, what is the source of the water in the wetland?

☐ Stream/River/Creek/Lake/Pond ☐ Groundwater

☐ Flooding ☐ Surface Runoff

8. Is there a discharge from the site to a known or suspected wetland? ☐ yes ☐ no If yes, please describe.

9. Is there a discharge from the wetland? ☐ yes ☐ no. If yes, to what waterbody is discharge released?

☐ Surface Stream/River ☐ Groundwater ☐ Lake/Pond ☐ Marine

10. If a soil sample was collected, describe the appearance of the soil in the wetland area. Circle or write in the best response.

Color (blue/gray, brown, black, mottled) _____

Water content (dry, wet, saturated/unsaturated) _____

11. Mark the observed wetland area(s) on the attached site map.

ATTACHMENTS

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE 1 OF 1

CLIENT	JOB NUMBER
NAVY	N9060 CTO 0279

SUBJECT: NSWC CRANE SWMU 16

BASED ON	DRAWING NUMBER
ACREAGE CALCULATIONS	FIGURE 3-3

BY	CHECKED BY	APPROVED BY	DATE
TR			6-18-03

	# Dots	sq. ft.	ACRES	% of SWMU Area
Industry	= 225	= 140625	= 3.2	= 21
Grass	= 226	= 141250	= 3.2	= 21
Shrub	= 90	= 56250	= 1.3	= 9
Wooded	= 519	= 324375	= 7.4	= 49
Total	= 1068		15.1	100 %

		ACRES
FENCED IN AREA =	50% Light Industry =	3.2
	50% Grassy =	3.2
		6.4 ACRES

SCALE = 1" = 100'

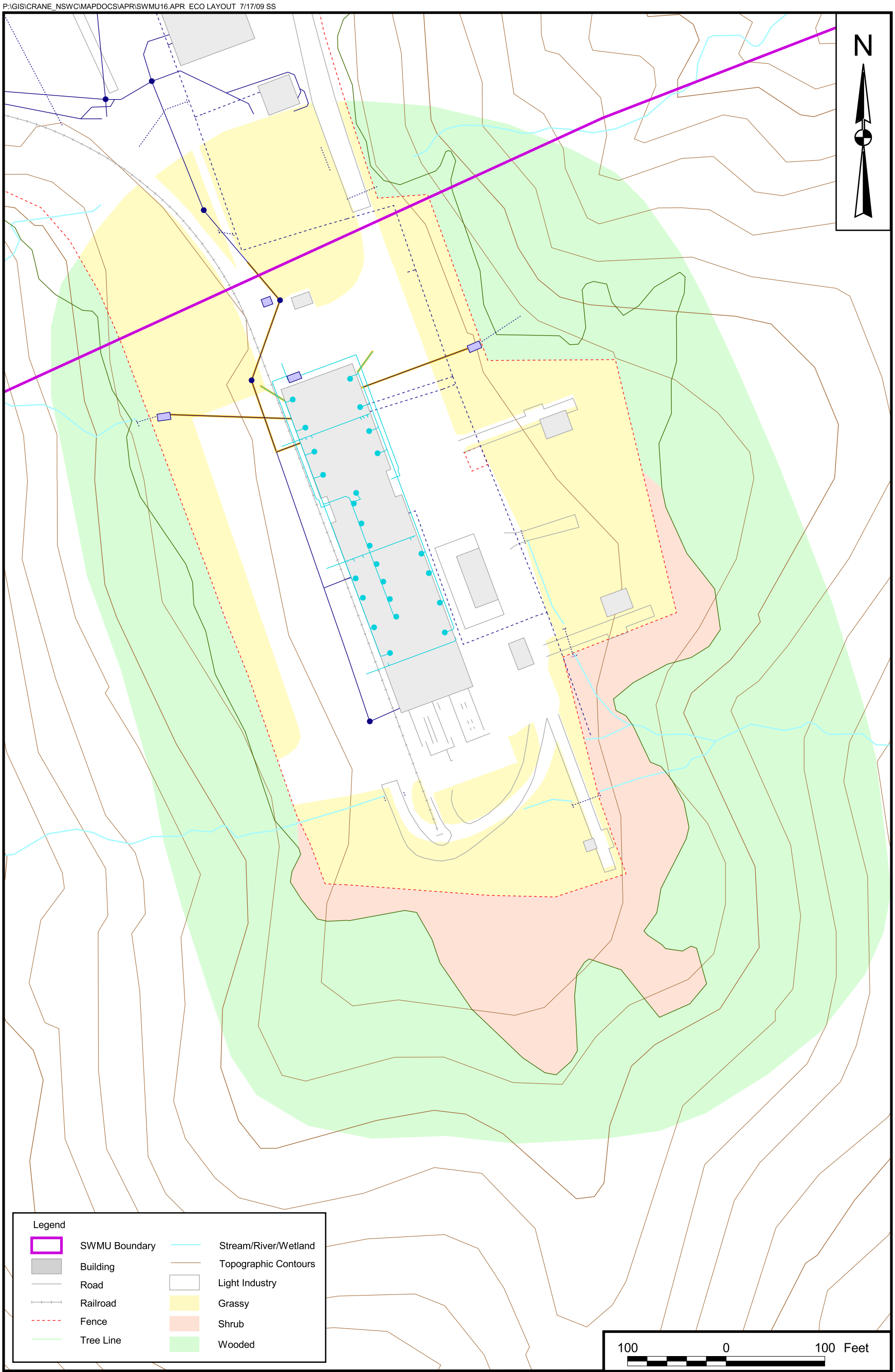
1 sq 1" = 10,000 sq ft

1 dot = 625 sq ft

APPENDIX J.2

CHECKLIST FOR ECOLOGICAL RISK ASSESSMENT/SAMPLING

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU16.APR ECO LAYOUT 7/17/09 SS



DRAWN BY C. FOSTER	DATE 4/8/05	ECOLOGICAL HABITAT MAP SWMU 16 CAST HIGH EXPLOSIVES FILL/ BUILDING 146 INCINERATOR NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 7448
CHECKED BY J. LUCAS	DATE 7/17/09		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE J.2-1 REV 0

APPENDIX J.3

PHYSICAL AND CHEMICAL CHARACTERISTICS OF ECOLOGICAL COPC CLASSES

APPENDIX J.3

This appendix presents a discussion of the different chemical classes that were detected in environmental media in SWMU 16, including toxicity information, potential food chain and trophic transfer, and bioaccumulation potential. Appendix Table J.2-1 presents the bioaccumulation factors (BAFs) that will be used in the surrogate species' food-chain models for the individual constituents that are detected at SWMU 16. The sources for most of the BAFs are presented in section 8.4.2.1 of the Ecological Risk Assessment (ERA), while the text below discusses some additional sources of the BAFs, where necessary. Note that dry weight BAFs were used for this ERA.

Volatile Organic Compounds

VOCs are usually very mobile in the environment because they are poorly adsorbed to soil and sediment particles. Also, because they are very volatile, they typically are only detected in surface water, surface soil, and sediment at low concentrations.

Most VOCs have very little potential to bioaccumulate in ecological receptors; therefore, biomagnification through the food chain does not appear to be significant. VOCs are not expected to biomagnify in plants and are typically only toxic to ecological receptors at relatively high concentrations.

Semivolatile Organic Compounds

The most common semivolatile organic compounds that are found at naval facilities include polynuclear aromatic hydocarbons (PAHs) and phthalates. PAHs are a diverse group of compounds consisting of two or more substituted and unsubstituted polynuclear aromatic rings formed by the incomplete combustion of carbonaceous materials. PAHs are ubiquitous in the modern environment and are common constituents of coal tar, soot, vehicle exhaust, cigarette smoke, certain petroleum products, road tar, mineral oils, creosote, and many cooked foods. PAHs also are released to the environment through natural sources such as volcanoes and forest fires.

PAHs are transferred from surface water by volatilization and sorption to settling particles. The compounds are transformed in surface water by photooxidation, chemical oxidation, and microbial metabolism (ATSDR, 1989a). In soil and sediments, microbial metabolism is the major process for degradation of PAHs (ATSDR, 1989a). Although PAHs accumulate in terrestrial and aquatic plants, many organisms are able to metabolize and eliminate these compounds.

Vertebrates can readily metabolize PAHs, but lower forms (insects and worms) cannot metabolize PAHs as quickly. However, food chain uptake does not appear to be a major exposure source to PAHs for aquatic animals (ATSDR, 1989a).

PAHs vary substantially in their toxicity to aquatic organisms. In general, toxicity increases as molecular weight increases, with the exception of some high molecular weight PAHs that have low acute toxicity. Most species of aquatic organisms rapidly accumulate PAHs that occur at low concentrations in the ambient medium. However, uptake of PAHs is highly species-specific, it is higher in algae, mollusks, and other species that are incapable of metabolizing PAHs (Eisler, 1987). The ability of fish to metabolize PAHs may explain why benzo(a)pyrene is frequently not detected or is found at only very low levels in fish from environments heavily contaminated with PAHs (ATSDR, 1989a).

Phthalates are semivolatile organic compounds that are used in production of plastics (ATSDR, 1993). Most phthalates are expected to sorb to soil or sediment particles after their release because of their high Log K_{OC} values (Howard, 1989). Some phthalates may bioconcentrate in aquatic organisms [Spectrum Laboratories, 1999; Howard, 1989; ATSDR, 1989a].

Dioxins

Dioxin and dioxin-like compounds consist of the following chemical classes: polychlorinated dibenzo-p-dioxins (PCDDs or CDDs), polychlorinated dibenzofurans (PCDFs of CDFs), polybrominated dibenzodioxins (PBDDs or BDDs), polybrominated dibenzofurans (PBDFs or BDFs), and PCBs (USEPA, 1998). The CDDs and BDDs each include 75 individual compounds, and the CDFs BDFs each include 135 different compounds (USEPA, 1998). Of all these compounds, only 7 of the 75 congeners of CDDs or BDDs are thought to have dioxin-like toxicity, as are 10 of the 135 congeners of CDFs, or BDFs (USEPA, 1998). These are the ones with chlorine/bromine substitutions in, at least, the 2, 3, 7, and 8 positions (USEPA, 1998). Of the 209 PCB congeners, 13 are thought to have dioxin-like toxicity, which include the PCBs with four or more chlorines with just one or no substitution in the ortho position (USEPA, 1998).

There are very few toxicity data for dioxins except for 2,3,7,8-TCDD, which has been associated with lethal, carcinogenic, teratogenic, reproductive, mutagenic, histopathologic, and immunotoxic effects (Eisler, 1986b). 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) is the most toxic congener within these groups of compounds (Van den Berg et al., 1998). Because of this, toxicity equivalency factors (developed to estimate the relative toxicity of the dioxin and dioxin-like compounds to 2,3,7,8-TCDD (Van den Berg et al., 1998). There are substantial inter- and intraspecific differences in sensitivity and toxic responses to 2,3,7,8-TCDD (Eisler, 1986b). Two

species of earthworms showed no adverse effects at soil concentrations of 5 mg/kg; however, they died at 10 mg/kg of 2,3,7,8-TCDD (Eisler, 1986b). This indicates that terrestrial invertebrates may be resistant to 2,3,7,8-TCDD.

Although there presently is no evidence of biomagnification of PCDDs in birds, it is suspected that piscivorous birds have a greater potential to accumulate PCDDs than the fish that they eat (Eisler, 1986b).

Explosives

Some of the more common explosives include nitroaromatic compounds such as 2,4,6-trinitrotoluene, hexahydro-1,3,5-trinitro-1,3,5-triazine, octahydro-1,3,5,7-tetranitro-1,3,5-tetrazocine, N-methyl-N,2,4,6-tetranitroaniline, and associated by-products and degradation products that may have been released to the environment during manufacturing and load, assembly, and pack processes at military facilities (Talmage et al., 1999). These explosives are moderately to highly toxic to freshwater organisms, with chronic screening values less than 1 mg/L, although some of the screening values are low because of the conservative methods used to develop them based on an absence of data (Talmage et al., 1999). Available data indicate that none of the compounds are expected to bioconcentrate (Talmage et al., 1999). Most of the explosives do not appear to be highly toxic to mammals. Terrestrial reference values (TRVs) are greater than 1 mg/kg-day.

Explosives have little to moderate potential to adsorb to soil and sediment (Talmage et al., 1999). Therefore, explosives will have moderate to high mobility in soils and sediment, and most of the explosives will be found in the water column (Talmage et al., 1999).

Metals

Many metals occur naturally at various concentrations in the surface water and sediment primarily to chemical weathering of rocks and fallout from volcanoes. Most metals are toxic to aquatic (i.e., fish, invertebrates) and terrestrial (i.e., plants, invertebrates, vertebrates) ecological receptors above certain concentrations, with some metals being more toxic at lower concentrations than others. Also, different chemical forms of the metals may be more toxic than others. For example, hexavalent chromium is typically more toxic than trivalent chromium, and methylmercury is more toxic than inorganic mercury. In addition, the toxicity of several metals (cadmium, chromium, copper, lead, nickel, silver, and zinc) to aquatic receptors in freshwater systems decreases with increasing water hardness.

Many factors (e.g., pH, Eh, clay content, organic matter content) influence the bioavailability of metals to invertebrates in sediment. One way to estimate the bioavailable portion of certain divalent metals (cadmium, copper, lead, nickel, and zinc) in sediment is to measure the amount of acid volatile sulfides (AVS) and simultaneously extracted metals (SEM) in a sediment sample. If the molar concentration of AVS is higher than the molar concentration of SEM, then the SEM metals are expected to be unavailable and non-toxic to aquatic invertebrates. AVS plays little or no role in determining interstitial water concentrations of metals in aerobic systems or those with low productivity (i.e., where the absence of organic carbon limits sulfate reduction) (Ankley et al., 1995), or when ingestion of sediments is the primary exposure route (Lee et al., 2000).

For several metals, the Eco SSL Guidance referenced a document prepared by Sample et al., (1998), which presented soil to biota BAFs (see Appendix Table J.2-1). These BAFs were used to predict the tissue concentrations in the small mammals from the chemical concentrations in the soil. The 90 percentile BAF from Sample et al., (1998) were used for the conservative food chain model and the median BAF were used for the average food chain model.

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TABLE J.3-1

DRY WEIGHT BAFS FOR PLANTS AND EARTHWORMS
NSWC CRANE
CRANE, INDIANA

	Plant BAFs[1,2]		Earthworm BAFs[3]	
Chemicals	**Conservative**	**Average**	**Conservative**	**Average**
Semivolatile Organics				
Anthracene	1.10E-01	1.10E-01	6.69E-01	2.56E-01
Benzo(a)anthracene	1.90E-02	1.90E-02	6.69E-01	2.56E-01
Benzo(a)pyrene	1.10E-02	1.10E-02	6.69E-01	2.56E-01
Benzo(b)fluoranthene	1.10E-02	1.10E-02	6.69E-01	2.56E-01
Benzo(g,h,i)perylene	5.60E-03	5.60E-03	6.69E-01	2.56E-01
Benzo(k)Fluoranthene	4.30E-03	4.30E-03	6.69E-01	2.56E-01
Chrysene	1.90E-02	1.90E-02	6.69E-01	2.56E-01
Dibenzo(a,h)Anthracene	4.30E-03	4.30E-03	6.69E-01	2.56E-01
Fluoranthene	5.50E-02	5.50E-02	6.69E-01	2.56E-01
Indeno(1,2,3-cd)pyrene	5.60E-03	5.60E-03	6.69E-01	2.56E-01
Phenanthrene	8.20E-02	8.20E-02	6.69E-01	2.56E-01
Pyrene	5.50E-02	5.50E-02	6.69E-01	2.56E-01
Explosives				
HMX	1.70E+01	1.70E+01	1.00E+00	1.00E+00
Dioxins				
TEQ Bird	4.30E-03	4.30E-03	2.22E+01	1.10E+01
TEQ Mammal	4.30E-03	4.30E-03	2.22E+01	1.10E+01
Inorganics				
Arsenic	1.10E+00	3.75E-02	5.23E-01	2.24E-01
Cadmium	3.25E+00	5.86E-01	4.07E+01	7.71E+00
Chromium	8.39E-02	4.10E-02	3.16E+00	3.06E-01
Copper	6.25E-01	1.24E-01	1.53E+00	5.15E-01
Lead	4.68E-01	3.89E-02	1.52E+00	2.66E-01
Mercury	5.00E+00	6.52E-01	2.06E+01	1.69E+00
Nickel	1.41E+00	1.80E-02	4.73E+00	1.06E+00
Selenium	3.01E+00	6.72E-01	1.34E+00	9.85E-01
Zinc	1.82E+00	3.66E-01	1.29E+01	3.20E+00

Notes:
BAF - Bioaccumulation Factor
Conservative and average refers to the exposure scenarios for which the uptake factors are used.
Default value of 1 is assigned to parameters without uptake factors

Footnotes:
1 - ORNL (2001) for organics; only one value is available for conservative and average exposures
2 - Sample et al., (1997) for inorganics; conservative value is 90th percentile; average value is median value
3 - ORNL (September, 1998) for all chemicals; conservative value is 90th percentile; average value is median value

APPENDIX J.4

SURROGATE TERRESTRIAL RECEPTOR PROFILES

APPENDIX J.4

The following sections present the receptor profiles for the short-tailed shrew, meadow vole, northern bobwhite quail, and American woodcock. The majority of the information for the profiles was obtained from the Wildlife Exposure Factors Handbook (USEPA, 1993). The data for the incidental soil ingestion rates were obtained from the Estimates of Soil Ingestion by Wildlife (Beyer, 1994) or the draft USEPA Ecological Soil Screening Guidance (USEPA, July 2000).

The food and water ingestion rates are listed in g/g (of body weight)-day on a wet weight basis but were converted to dry weight for the ERA. The home ranges are presented in hectares in USEPA (1993) but were converted to acres by multiplying the number of hectares by 2.471. Also note that the estimated percent of soil in the diets are listed in dry weight. The attached table presents the calculation of the exposure parameters and how the calculations were done.

Short-Tailed Shrew (*Blarina brevicauda*)

Shrews inhabit a wide variety of habitats and are common in areas with abundant vegetative cover. They need cool, moist habitats because of their high metabolic and water-loss rates. The short-tailed shrew is primarily carnivorous, eating insects such as earthworms, slugs, and snails.

The adult body weight for the short-tailed shrew in various habitats ranged from 0.015 to 0.01921 kg with an average of 0.0169 kg. The listed food ingestion rates for shrews are between 0.43 and 0.96 g/g-day (wet-weight). The water ingestion rate was listed as 0.223 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown on Table 8-9. The food ingestion rates were then multiplied by 0.16, which is the percent solids of worms (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 3% for conservative food chain model and 1.5% for the average food chain model) from USEPA (July 2000). 3% is the 90th percentile value and 1.5% is the 50th percentile value from USEPA (July 2000). The home range for the shrew (0. 9699 acres) was calculated using data from a tamarek bog in Manitoba (only value available).

American Woodcock (*Scolopax minor*)

Woodcocks inhabit both woodlands and abandoned fields, particularly those with risk and moderately to poorly drained loamy soils, which tend to support abundant earthworm populations. They feed primarily on invertebrates found in moist upland soils by probing the soil with their long prehensile-tipped bill. Earthworms are their preferred diet, but seeds and other plant matter may also be consumed.

The adult body weight for the woodcock ranges from 0.166 to 0.213 kg with an average of 0.190 kg. The

listed food ingestion rates for the woodcock are between 0.73 and 1.0 g/g-day (wet-weight). The water ingestion rate is listed as 0.1 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in Table 8-9. The food ingestion rates were then multiplied by 0.16, which is the percent solids of worms (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 11.74% for conservative food chain model and 6.68% for the average food chain model) from USEPA (July 2000). 11.74% is the 90th percentile value and 6.68% is the 50th percentile value from USEPA (July 2000).

The range of home range sizes for the woodcock is 7.66 to 182 acres with an average home range of 61 acres.

Meadow Vole (*Microtus pennsylvanicus*)

Meadow voles inhabit grassy fields, marshes, and bogs; however, they prefer fields with more grass, more cover, and fewer woody plants. They typically consume green succulent vegetation, sedges, seeds, roots, bark, fungi, insects, and animal matter. However, green succulent vegetation makes up the majority of their diet.

The adult body weight for the vole ranges from 0.0329 to 0.0391 kg with an average of 0.0366 kg. The only listed food ingestion rates for voles range from 0.30 to 0.35 g/g-day (wet-weight), with an average of 0.325 g/g-day. The water ingestion rates are 0.14 (estimated) and 0.21 g/g-day, with an average of 0.175 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in Table 8-9. The food ingestion rates were then multiplied by 0.30, which is the percent solids of young grass (Sample et al., 1997), to convert the ingestion rate from a wet-weight value to a dry-weight value. Finally, the incidental soil ingestion rate is calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (2.4 percent) from Beyer (1994). The home range for the meadow vole ranges from 0.0297 to 1.06 acres with an average home range of 0.16 acres.

Northern Bobwhite Quail (*Colinus virginianus*)

Quails inhabit grasslands, idle fields, pastures, and large clumps of grasses. Bobwhite quails forage in areas with open vegetation, some bare ground, and light litter. Seeds from weeds, woody plants, and grasses comprise the majority of an adult's diet, although green vegetation has been found to dominate the diet of this species in winter in the southern areas of the United States.

The adult body weight for the bobwhite quail ranges from 0.162 to 0.186 kg with an average of 0.177 kg. The listed food ingestion rates for quails range from 0.067 to 0.093 g/g-day (wet-weight), with an average of 0.082

g/g-day. The water ingestion rate ranges from 0.086 to 0.131 g/g-day, with an average water ingestion rate of 0.104 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown on Table 8-9. The food ingestion rates were then multiplied by 0.30, which is the percent solids of young grass (Sample et al., 1997), to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate is calculated by multiplying the food ingestion rate by the percentage of soil that is incidentally ingested (8.2 percent). The 8.2 percent is based on the incidental sediment ingestion rate of a Canada goose (Beyer, 1994), which also consumes terrestrial vegetation, because an incidental soil ingestion rate was not available for the quail.

The home range for the quail ranges from 16 to 41 acres with an average home range of 29 acres.

References:

Beyer, N., E. Connor, and S. Gerould. 1994. Estimates of Soil Ingestion by Wildlife. Journal of Wildlife Management 58(2) pp. 375-382.

Sample, B.E., M.S. Aplin, R.A. Efroymson, G.W., Suter II, and C.J.E. Welsh. 1997. Methods and Tools for Estimation of the Exposure of Terrestrial Wildlife to Contaminants. Oak Ridge National Laboratory. October. ORNL/TM-13391.

USEPA (U.S. Environmental Protection Agency), 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency. Office of Research and Development. Washington, D.C. December 1993. EPA/600/R-93/187a.

USEPA (U.S. Environmental Protection Agency), 2000. Ecological Soil Screening Level Guidance, Draft. Office of Emergency and Remedial Response. July.

TABLE J.4-1

EXPOSURE PARAMETERS FOR TEST SPECIES AND SURROGATE WILDLIFE SPECIES
NAVAL SURFACE WARFARE CENTER, CRANE, INDIANA

Species	Body Weight (kg)			Food Ingestion Rate (kg/day)		Water Ingestion Rate (L/day)		Soil Ingestion Rate (kg/day)		Home Range (acres)		
	Avg.	Min.	Max.	Avg.	Conserv.	Avg.	Conserv.	Avg.	Conserv.	Avg.	Min.	Max.
Potential Test Species[1]												
Rat[2]	0.35	NA	NA	NA		NA		NA		NA		
Old field mouse[3]	0.014	NA	NA	NA		NA		NA		NA		
Mouse[2]	0.03	NA	NA	NA		NA		NA		NA		
Rabbit	3.8	NA	NA	NA		NA		NA		NA		
Mink[4]	1	NA	NA	NA		NA		NA		NA		
Rhesus monkey[4]	5	NA	NA	NA		NA		NA		NA		
Beagle[2]	10	NA	NA	NA		NA		NA		NA		
Surrogate Wildlife Species [5]												
Short-Tailed Shrew	0.0169	0.0153	0.0192	0.0103	0.0162	0.0038	0.0043	0.0002142	0.000337	0.97	0.97	0.97
Meadow Vole	0.0366	0.0329	0.0391	0.0119	0.0128	0.0064	0.0077	0.00008568	0.00009216	0.16	0.03	1.06

Notes:
See Table 8-9 for the exposure factors.
NA - Not Applicable
1 - Only one value was provided so it was placed in the average column and some generic body weights may have been replaced by study-specific body weights.
2 - U.S. EPA, 1998
3 - Silva and Downing, 1996
4 - U.S. EPA 1993
5 - Source is U.S. EPA, 1993 for all factors except soil ingestion; Beyer (1993).

APPENDIX J.5

TOXICITY REFERENCE VALUES

TABLE J.5-1

CALCULATION OF EXPOSURE PARAMETERS FOR SURROGATE WILDLIFE RECEPTORS
NSWC CRANE
CRANE, INDIANA

Exposure Parameters	Meadow Vole		Short-Tailed Shrew		American Woodcock	Bobwhite Quail	
Body Weights (g)	32.9		17.61	16.87	168	180	181
	39.1		17.33	15.58	209	168	183
	35.5		19.21	15.7	166	162	179
	39		17.4	15.25	212	175	175
					169	178	183.2
					213	179	185.5
						180	173
						162.8	180.4
Minimum	***32.9***		***15.25***		***166***	***162***	
Maximum	***39.1***		***19.21***		***213***	***186***	
Average	***36.6***		***16.87***		***190***	***177***	
Food Ingestion Rate (g/g-day) (1)	0.3		0.49	0.77	1.0	0.067	0.079
	0.35		0.62	0.55	0.77	0.072	0.093
			0.43	0.96	0.73	0.09	0.089
			0.52	0.54			
Minimum	***0.3***		***0.43***		***0.73***	***0.067***	
Maximum	***0.35***		***0.96***		***1.0***	***0.093***	
Average	***0.325***		***0.61***		***0.8***	***0.082***	
Food Ingestion Rate (kg/day)							
Conservative	***1.28E-02***		***1.62E-02***		***1.90E-01***	***1.64E-02***	
Average	***1.19E-02***		***1.03E-02***		***1.58E-01***	***1.44E-02***	
Water Ingestion Rate (g/g-day) (1)	0.14	0.21	0.223		0.1	0.115	0.1
					0.1	0.106	0.131
						0.093	0.101
						0.086	0.102
						0.11	0.1
Minimum	***0.14***		***0.223***		***0.1***	***0.086***	
Maximum	***0.21***		***0.223***		***0.1***	***0.131***	
Average	***0.175***		***0.223***		***0.1***	***0.104***	
Water Ingestion Rate (L/day)							
Conservative	***7.69E-03***		***4.28E-03***		***1.90E-02***	***2.31E-02***	
Average	***6.41E-03***		***3.76E-03***		***1.90E-02***	***1.84E-02***	
Home Range (Ha)	0.43	0.1	0.3925		4.5	7.6	
	0.02	0.04			32.4	16.7	
	0.01	0.03			3.1	6.4	
	0.01	0.01			73.6	15.6	
	0.04	0.06			10.5		
	0.02	0.03					
	0.05	0.08					
	0.06	0.06					
Minimum (acres)	***0.0297***		***0.97***		***7.7***	***16***	
Maximum (acres)	***1.06***		***0.97***		***182***	***41***	
Average (acres)	***0.16***		***0.97***		***61***	***29***	

Notes:
Source of data is U.S. EPA (1993).

Footnotes:
(1) - Ingestion Rates (kg/day or L/day) (if more than 1 ingestion rate is available)
- Conservative value = Max Ingestion Rate (g/g-day) * Avg. Body Weight
- Average value = Avg. Ingestion Rate (g/g-day) * Avg. Body Weight

Ingestion Rates (L/day) (if only 1 ingestion rate is available)
- Conservative value = Ingestion Rate (g/g-day) * Max. Body Weight
- Average value = Ingestion Rate (g/g-day) * Avg. Body Weight

TABLE J.5-2

DERIVATION OF MAMMAL TRVS BASED ON MAXIMUM BODY WEIGHTS
NSWC CRANE
CRANE, INDIANA

Parameter	Mammals				Short-tailed Shrew		Meadow Vole	
	NOAEL	LOAEL	Test Species	Body Weight (kg)	NOAEL	LOAEL	NOAEL	LOAEL
SEMIVOLATILES (mg/kg)								
Anthracene	100	1000	mouse	0.03	156	1562	77	767.3
Benzo(a)anthracene	1	10	mouse	0.03	1.6	15.6	0.77	7.7
Benzo(a)pyrene	1	10	mouse	0.03	1.6	15.6	0.77	7.7
Benzo(b)fluoranthene	1	10	mouse	0.03	1.6	15.6	0.77	7.7
Benzo(g,h,i)perylene	1	10	mouse	0.03	1.6	15.6	0.77	7.7
Benzo(k)fluoranthene	1	10	mouse	0.03	1.6	15.6	0.77	7.7
Chrysene	1	10	mouse	0.03	1.6	15.6	0.77	7.7
Dibenzo(a,h)anthracene	1	10	mouse	0.03	1.6	15.6	0.77	7.7
Fluoranthene	12.5	25	mouse	0.03	19.5	39.0	9.6	19.2
Indeno(1,2,3-cd)pyrene	1	10	mouse	0.03	1.6	15.6	0.77	7.7
Phenanthrene	1	10	mouse	0.03	1.6	15.6	0.8	7.7
Pyrene	7.5	12.5	mouse	0.03	11.7	19.5	5.8	9.6
DIOXINS AND FURANS (mg/kg)					0.000	0.000	0.000	0.000
TEQ Mammal	1.0E-06	1.0E-05	rat	0.35	1.8E-05	1.8E-04	9.0E-06	9.0E-05
INORGANICS (mg/kg)					0.000	0.000	0.000	0.000
Arsenic	0.126	1.26	mouse	0.03	0.20	2.0	0.10	1.0
Cadmium	1	10	rat	0.303	15.77	157.7	7.7	77.5
Chromium	3.28	13.14	rat	0.35	59.8	239.4	29.4	117.6
Copper	11.71	15.14	mink	1	609.6	788.1	299.5	387.2
Lead	8	80	rat	0.35	145.8	1458	71.6	716.1
Mercury	0.015	0.025	mink	1	0.8	1.3	0.4	0.6
Nickel	40	80	rat	0.35	728.8	1458	358.1	716.1
Selenium	0.2	0.33	rat	0.35	3.6	6.0	1.8	3.0
Zinc	160	320	rat	0.35	2915.1	5830	1432	2864.5

Acronyms:
NA = Not Applicable or Not Available
NV = No value available
NOAEL = No Observed Adverse Effect Level
LOAEL = Lowest Observed Adverse Effect Level

Maximum Body Weights (kg)
Shrew: 0.01921
Vole: 0.0391

Derivation NOAEL/LOAEL Equation:
Derived NOAEL = NOAEL*(test species body weight/surrogate species maximum body weight
Derived LOAEL = LOAEL*(test species body weight/surrogate species maximum body weight)

TABLE J.5-3

DERIVATION OF MAMMAL TRVS BASED ON AVERAGE BODY WEIGHTS
NSWC CRANE
CRANE, INDIANA

Parameter	Mammals				Short-tailed Shrew		Meadow Vole	
	NOAEL	LOAEL	Test Species	Body Weight (kg)	NOAEL	LOAEL	NOAEL	LOAEL
SEMIVOLATILES (mg/kg)								
Anthracene	100	1000	mouse	0.03	178	1778	82	819
Benzo(a)anthracene	1	10	mouse	0.03	1.8	17.8	0.82	8.2
Benzo(a)pyrene	1	10	mouse	0.03	1.8	17.8	0.82	8.2
Benzo(b)fluoranthene	1	10	mouse	0.03	1.8	17.8	0.82	8.2
Benzo(g,h,i)perylene	1	10	mouse	0.03	1.8	17.8	0.82	8.2
Benzo(k)fluoranthene	1	10	mouse	0.03	1.8	17.8	0.82	8.2
Chrysene	1	10	mouse	0.03	1.8	17.8	0.82	8.2
Dibenzo(a,h)anthracene	1	10	mouse	0.03	1.8	17.8	0.82	8.2
Fluoranthene	12.5	25	mouse	0.03	22.2	44.5	10.2	20.5
Indeno(1,2,3-cd)pyrene	1	10	mouse	0.03	1.8	17.8	0.8	8.2
Phenanthrene	1	10	mouse	0.03	1.8	17.8	0.8	8.2
Pyrene	7.5	12.5	mouse	0.03	13.3	22.2	6.1	10.2
DIOXINS AND FURANS (mg/kg)								
TEQ Mammal	0.000001	0.00001	rat	0.35	2.1E-05	2.1E-04	9.56E-06	9.6E-05
INORGANICS (mg/kg)								
Arsenic	0.126	1.26	mouse	0.03	0.22	2.2	0.10	1.0
Cadmium	1	10	rat	0.303	18.0	179.6	8.3	82.7
Chromium	3.28	13.14	rat	0.35	68.0	272.6	31.3	125.6
Copper	11.71	15.14	mink	1	694.1	897.5	319.7	413.3
Lead	8	80	rat	0.35	166.0	1660	76.4	764
Mercury	0.015	0.025	mink	1	0.89	1.48	0.41	0.68
Nickel	40	80	rat	0.35	829.9	1660	382.2	764
Selenium	0.2	0.33	rat	0.35	4.15	6.85	1.91	3.15
Zinc	160	320	rat	0.35	3320	6639	1529	3058

Acronyms:
NA = Not Applicable or Not Available
NV = No value available
NOAEL = No Observed Adverse Effect Level
LOAEL = Lowest Observed Adverse Effect Level

Average Body Weights (kg)
Shrew: 0.01687
Vole: 0.03663

Derivation NOAEL/LOAEL Equation:
Derived NOAEL = NOAEL*(test species body weight/surrogate species average body weight)
Derived LOAEL = LOAEL*(test species body weight/surrogate species average body weight)

TABLE J.5-4

NOAELS AND LOAELS FOR BIRDS
NAVAL SURFACE WARFARE CENTER CRANE, INDIANA

Parameter	NOAEL[1] (mg/kg-day)	LOAEL[1] (mg/kg-day)
SEMIVOLATILES		
Anthracene	2	20
Benzo(a)anthracene	2	20
Benzo(a)pyrene	2	20
Benzo(b)fluoranthene	2	20
Benzo(g,h,i)perylene	2	20
Benzo(k)fluoranthene	2	20
Chrysene	2	20
Dibenzo(a,h)anthracene	2	20
Fluoranthene	2	20
Indeno(1,2,3-cd)pyrene	2	20
Phenanthrene	2	20
Pyrene	2	20
DIOXINS		
TEQ Bird	0.000014	0.00014
INORGANICS		
Arsenic	2.46	7.38
Cadmium	1.45	20
Chromium	1	5
Copper	46.97	61.72
Lead	1.13	11.3
Mercury	0.0064	0.064
Nickel	77.4	107
Selenium	0.4	0.8
Zinc	14.49	130.9

Footnotes:
1 - The sources of these NOAELS and LOAELS are presented in the table J.4-5.
The NOAELS and LOAELS in the source table were divided by 10 if a subchronic study was the basis for the value.
Also, if only a NOAEL was available, the value was multiplied by 10 to estimate the LOAEL and if only a LOAEL was available, the value was divided by 10 to estimate the NOAEL.

Acronyms:
NOAEL = No Observed Adverse Effect Level
LOAEL = Lowest Observed Adverse Effect Level
NV = No value available

TABLE J.5-5

SOURCES AND ENDPOINTS FOR NOAELS AND LOAELS FOR TERRESTRIAL WILDLIFE
NSWC CRANE
CRANE, INDIANA

Parameters	Concentration (mg/kg-day)	Endpoint	Effect	Chronic/ Subchronic	Species	Primary Reference	Source of Reference
Semivolatiles Organics							
Anthracene	1000	NOAEL	systemic	subchronic	mouse	USEPA, 1989b	IRIS, 2002
Anthracene	1000	NOAEL	reproductive	Subchronic	mouse	USEPA, 1989b	IT Corp, 1997
Benzo(a)anthracene	17.1	NOAEL	carcinogenic	acute	mouse	Clayson et al., 1968	PRC, 1996
Benzo(a)pyrene	10	LOAEL	reproductive	chronic	mouse	Mackenzie and Angevine, 1981	Sample et.al., 1996
Benzo(b)fluoranthene	40	LOAEL	carcinogenic	chronic	rodent	Lo and Sandi, 1978	PRC, 1996
Benzo(g,h,I)perylene	72	LOAEL	carcinogenic	chronic	rodent	Simms and Overcash, 1983	PRC, 1996
Benzo(k)fluoranthene	72	LOAEL	carcinogenic	chronic	rodent	Lo and Sandi, 1978	PRC, 1996
Chrysene	17.1	NOAEL	carcinogenic	acute	mouse	Clayson et al., 1968	PRC, 1996
Dibenzo(a,h)anthracene	13.3	LOAEL	carcinogenic	chronic	mouse	Lorenz and Stewart, 1948	PRC, 1996
Fluoranthene	125	NOAEL	systemic	subchronic	mouse	USEPA, 1988	IRIS, 2002
Fluoranthene	250	LOAEL	systemic	subchronic	mouse	USEPA, 1988	IRIS, 2002
Indeno(1,2,3-cd)pyrene	72	LOAEL	carcinogenic	chronic	rodent	Simms and Overcash, 1983	PRC, 1996
Pyrene	75	NOAEL	systemic	subchronic	mouse	USEPA, 1989c	IRIS, 2002
Pyrene	125	LOAEL	systemic	subchronic	mouse	USEPA, 1989c	IRIS, 2002
Dioxins/Furans							
2,3,7,8-TCDD	0.000001	NOAEL	reproduction	chronic	rat	Murray et al., 1979	Sample et.al., 1996
2,3,7,8-TCDD	0.00001	LOAEL	reproduction	chronic	rat	Murray et al., 1979	Sample et.al., 1996
2,3,7,8-TCDD	0.000014	NOAEL	reproduction	chronic	pheasant	Nosek et al., 1992	Sample et.al., 1996
2,3,7,8-TCDD	0.00014	LOAEL	reproduction	chronic	pheasant	Nosek et al., 1992	Sample et.al., 1996
Inorganics							
Arsenic	1.261	LOAEL	reproductive	chronic	mouse	Schroeder and Mitchner, 1971	Sample et.al., 1996
Arsenic	2.46	NOAEL	mortality	chronic	brown-headed cowbird	USFWS, 1969	Sample et.al., 1996
Arsenic	7.38	LOAEL	mortality	chronic	brown-headed cowbird	USFWS, 1969	Sample et.al., 1996
Cadmium	1	NOAEL	reproductive	chronic	rat	Sutou et al., 1980	Sample et.al., 1996
Cadmium	10	LOAEL	reproductive	chronic	rat	Sutou et al., 1980	Sample et.al., 1996
Cadmium	1.45	NOAEL	reproductive	chronic	mallard duck	White and Finely, 1978	Sample et.al., 1996
Cadmium	20	LOAEL	reproductive	chronic	mallard duck	White and Finely, 1978	Sample et.al., 1996
Chromium(III)	1	NOAEL	reproductive	chronic	black duck	Haseltine et al., 1985	Sample et.al., 1996
Chromium(III)	5	LOAEL	reproductive	chronic	black duck	Haseltine et al., 1985	Sample et.al., 1996
Copper	11.71	NOAEL	reproductive	chronic	mink	Aulerich et al., 1982	ATSDR, 1989
Copper	15.14	LOAEL	reproductive	chronic	mink	Aulerich et al., 1982	ATSDR, 1989
Copper	46.97	NOAEL	mortality	chronic	chicks	Mehring et al., 1960	Sample et.al., 1996
Copper	61.72	LOAEL	mortality	chronic	chicks	Mehring et al., 1960	Sample et.al., 1996
Lead	8	NOAEL	reproductive	chronic	rat	Azar et al., 1973	Sample et.al., 1996
Lead	80	LOAEL	reproductive	chronic	rat	Azar et al., 1973	Sample et.al., 1996
Lead	1.13	NOAEL	reproductive	chronic	Japanese quail	Edens et al., 1976	Sample et.al., 1996
Lead	11.3	LOAEL	reproductive	chronic	Japanese quail	Edens et al., 1976	Sample et.al., 1996
Mercury	0.064	LOAEL	reproductive	chronic	mallard duck	Heinz, 1979	Sample et.al., 1996
Mercury	0.032	NOAEL	reproductive	chronic	rat	Verschuuren et al., 1976	Sample et.al., 1996
Mercury	0.16	LOAEL	reproductive	chronic	rat	Verschuuren et al., 1976	Sample et.al., 1996
Nickel	40	NOAEL	reproductive	chronic	rat	Ambrose et al., 1976	Sample et.al., 1996
Nickel	80	LOAEL	reproductive	chronic	rat	Ambrose et al., 1976	Sample et.al., 1996
Nickel	77.4	NOAEL	mortality	chronic	mallard duck	Cain and Pafford, 1981	Sample et.al., 1996
Nickel	107	LOAEL	mortality	chronic	mallard duck	Cain and Pafford, 1981	Sample et.al., 1996
Selenium	0.4	NOAEL	reproductive	chronic	mallard duck	Heinz et al., 1989	Sample et.al., 1996
Selenium	0.8	LOAEL	reproductive	chronic	mallard duck	Heinz et al., 1989	Sample et.al., 1996
Selenium	0.2	NOAEL	reproductive	chronic	rat	Rosenfeld and Beath, 1954	Sample et.al., 1996
Selenium	0.33	LOAEL	reproductive	chronic	rat	Rosenfeld and Beath, 1954	Sample et.al., 1996
Zinc	160	NOAEL	reproductive	chronic	rat	Schlicker and Cox, 1968	Sample et.al., 1996
Zinc	320	LOAEL	reproductive	chronic	rat	Schlicker and Cox, 1968	Sample et.al., 1996
Zinc	14.49	NOAEL	reproductive	chronic	white leghorn hen	Stahl et al., 1990	Sample et.al., 1996
Zinc	130.9	LOAEL	reproductive	chronic	white leghorn hen	Stahl et al., 1990	Sample et.al., 1996

Notes: The NOAELS and LOAELS for the PAHs that do not have values are based on the benzo(a)pyrene values
The NOAELS and LOAELS for the PAHs for birds were based on 7,12-dimethylbenz(a)anthracene.

NOAEL = No Observed Adverse Effect Level
LOAEL = Lowest Observed Adverse Effect Level

APPENDIX J.6

FOOD-CHAIN MODEL CALCULATIONS

MEADOW VOLE - CONSERVATIVE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR
NSWC CRANE, INDIANA

Parameter	Max Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to veg.)	Vegetation Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Vegetation	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Dioxins												
TEQ MAMMAL	3.30E-06	0.00E+00	4.30E-03	1.42E-08	9.24E-09	0.00E+00	1.66E-09	1.09E-08	8.95E-06	8.95E-05	1.22E-03	1.22E-04
Energetics												
HMX	0.00E+00	3.20E-04	1.70E+01	0.00E+00	0.00E+00	7.49E-05	0.00E+00	7.49E-05	2.30E+00	5.75E+00	3.25E-05	1.30E-05
Semivolatile Organics												
ANTHRACENE	5.00E-03	0.00E+00	1.10E-01	5.50E-04	1.40E-05	0.00E+00	6.42E-05	7.82E-05	7.67E+01	7.67E+02	1.02E-06	1.02E-07
BENZO(A)ANTHRACENE	2.80E-02	0.00E+00	1.90E-02	5.32E-04	7.84E-05	0.00E+00	6.21E-05	1.41E-04	7.67E-01	7.67E+00	1.83E-04	1.83E-05
BENZO(A)PYRENE	3.20E-02	0.00E+00	1.10E-02	3.52E-04	8.96E-05	0.00E+00	4.11E-05	1.31E-04	7.67E-01	7.67E+00	1.70E-04	1.70E-05
BENZO(B)FLUORANTHENE	5.00E-02	0.00E+00	1.10E-02	5.50E-04	1.40E-04	0.00E+00	6.42E-05	2.04E-04	7.67E-01	7.67E+00	2.66E-04	2.66E-05
BENZO(G,H,I)PERYLENE	2.80E-02	0.00E+00	5.60E-03	1.57E-04	7.84E-05	0.00E+00	1.83E-05	9.67E-05	7.67E-01	7.67E+00	1.26E-04	1.26E-05
BENZO(K)FLUORANTHENE	2.20E-02	0.00E+00	4.30E-03	9.46E-05	6.16E-05	0.00E+00	1.10E-05	7.27E-05	7.67E-01	7.67E+00	9.47E-05	9.47E-06
CHRYSENE	3.60E-02	0.00E+00	1.90E-02	6.84E-04	1.01E-04	0.00E+00	7.98E-05	1.81E-04	7.67E-01	7.67E+00	2.35E-04	2.35E-05
DIBENZO(A,H)ANTHRACENE	8.00E-03	0.00E+00	4.30E-03	3.44E-05	2.24E-05	0.00E+00	4.02E-06	2.64E-05	7.67E-01	7.67E+00	3.44E-05	3.44E-06
FLUORANTHENE	6.40E-02	0.00E+00	5.50E-02	3.52E-03	1.79E-04	0.00E+00	4.11E-04	5.90E-04	9.59E+00	1.92E+01	6.15E-05	3.08E-05
INDENO(1,2,3-CD)PYRENE	2.30E-02	0.00E+00	5.60E-03	1.29E-04	6.44E-05	0.00E+00	1.50E-05	7.95E-05	7.67E-01	7.67E+00	1.04E-04	1.04E-05
PHENANTHRENE	2.80E-02	0.00E+00	8.20E-02	2.30E-03	7.84E-05	0.00E+00	2.68E-04	3.46E-04	7.67E-01	7.67E+00	4.51E-04	4.51E-05
PYRENE	6.00E-02	0.00E+00	5.50E-02	3.30E-03	1.68E-04	0.00E+00	3.85E-04	5.53E-04	5.75E+00	9.59E+00	9.61E-05	5.77E-05
Herbicides												
PENTACHLOROPHENOL	8.00E-03	0.00E+00	1.40E-02	1.12E-04	2.24E-05	0.00E+00	1.31E-05	3.55E-05	NV	NV	NA	NA
Inorganics												
ARSENIC	1.27E+01	0.00E+00	1.10E+00	1.40E+01	3.56E-02	0.00E+00	1.63E+00	1.67E+00	9.67E-02	9.67E-01	1.73E+01	1.73E+00
CADMIUM	2.80E+00	1.40E-03	3.25E+00	9.10E+00	7.84E-03	3.28E-04	1.06E+00	1.07E+00	7.75E+00	7.75E+01	1.38E-01	1.38E-02
CHROMIUM	3.82E+01	0.00E+00	8.39E-02	3.20E+00	1.07E-01	0.00E+00	3.74E-01	4.81E-01	2.94E+01	1.18E+02	1.64E-02	4.09E-03
COPPER	4.13E+02	3.90E-03	6.25E-01	2.58E+02	1.16E+00	9.13E-04	3.01E+01	3.13E+01	2.99E+02	3.87E+02	1.04E-01	8.08E-02
LEAD	1.24E+03	0.00E+00	4.68E-01	5.80E+02	3.47E+00	0.00E+00	6.77E+01	7.12E+01	7.16E+01	7.16E+02	9.94E-01	9.94E-02
MERCURY	1.60E-01	0.00E+00	5.00E+00	8.00E-01	4.48E-04	0.00E+00	9.34E-02	9.38E-02	3.84E-01	6.39E-01	2.45E-01	1.47E-01
NICKEL	4.13E+01	0.00E+00	1.41E+00	5.83E+01	1.16E-01	0.00E+00	6.80E+00	6.92E+00	3.58E+02	7.16E+02	1.93E-02	9.66E-03
SELENIUM	1.60E-01	0.00E+00	3.01E+00	4.82E-01	4.48E-04	0.00E+00	5.62E-02	5.67E-02	1.79E+00	2.95E+00	3.17E-02	1.92E-02
ZINC	1.84E+03	0.00E+00	1.82E+00	3.35E+03	5.15E+00	0.00E+00	3.91E+02	3.96E+02	1.43E+03	2.86E+03	2.77E-01	1.38E-01

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	3.290E-02	kg
Food Ingestion Rate = (If)	3.840E-03	kg/day
Water Ingestion Rate = (Iw)	7.700E-03	L/day
Soil Ingestion Rate = (Is)	9.216E-05	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

H=HR/CA (Assume = to 1 for maximum exposure)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (vegetation)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs - Contaminant concentration in soil
Cw - Contaminant concentration in water
Cv - Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)
NV - No Value Available
NA - Not Applicable

MEADOW VOLE - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR
NSWC CRANE, INDIANA

Parameter	Avg Soil Concentration (mg/kg)	Avg SW Concentration (mg/L)	Biotransfer Factor (soil to veg.)	Vegetation Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Vegetation	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Inorganics												
ARSENIC	5.91E+00	0.00E+00	3.75E-02	2.22E-01	1.38E-02	0.00E+00	2.16E-02	3.54E-02	1.03E-01	1.03E+00	3.43E-01	3.43E-02

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	3.663E-02	kg
Food Ingestion Rate = (If)	3.570E-03	kg/day
Water Ingestion Rate = (Iw)	6.400E-03	L/day
Soil Ingestion Rate = (Is)	8.568E-05	kg/day
Home Range = (HR)	1.640E-01	acres
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs - Contaminant concentration in soil
Cw - Contaminant concentration in water
Cv - Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (vegetation)

SHORT-TAILED SHREW - CONSERVATIVE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR
NSWC CRANE, INDIANA

Parameter	Max Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to inv.)	Invertebrate Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Inverts.	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Dioxins												
TEQ MAMMAL	3.30E-06	0.00E+00	2.22E+01	7.33E-05	7.29E-08	0.00E+00	1.25E-05	1.25E-05	1.82E-05	1.82E-04	6.88E-01	6.88E-02
Energetics												
HMX	0.00E+00	3.20E-04	1.00E+00	0.00E+00	0.00E+00	9.02E-05	0.00E+00	9.02E-05	4.69E+00	1.17E+01	1.93E-05	7.70E-06
Semivolatile Organics												
ANTHRACENE	5.00E-03	0.00E+00	6.69E-01	3.35E-03	1.10E-04	0.00E+00	5.69E-04	6.79E-04	1.56E+02	1.56E+03	4.35E-06	4.35E-07
BENZO(A)ANTHRACENE	2.80E-02	0.00E+00	6.69E-01	1.87E-02	6.19E-04	0.00E+00	3.18E-03	3.80E-03	1.56E+00	1.56E+01	2.43E-03	2.43E-04
BENZO(A)PYRENE	3.20E-02	0.00E+00	6.69E-01	2.14E-02	7.07E-04	0.00E+00	3.64E-03	4.35E-03	1.56E+00	1.56E+01	2.78E-03	2.78E-04
BENZO(B)FLUORANTHENE	5.00E-02	0.00E+00	6.69E-01	3.35E-02	1.10E-03	0.00E+00	5.69E-03	6.79E-03	1.56E+00	1.56E+01	4.35E-03	4.35E-04
BENZO(G,H,I)PERYLENE	2.80E-02	0.00E+00	6.69E-01	1.87E-02	6.19E-04	0.00E+00	3.18E-03	3.80E-03	1.56E+00	1.56E+01	2.43E-03	2.43E-04
BENZO(K)FLUORANTHENE	2.20E-02	0.00E+00	6.69E-01	1.47E-02	4.86E-04	0.00E+00	2.50E-03	2.99E-03	1.56E+00	1.56E+01	1.91E-03	1.91E-04
CHRYSENE	3.60E-02	0.00E+00	6.69E-01	2.41E-02	7.95E-04	0.00E+00	4.09E-03	4.89E-03	1.56E+00	1.56E+01	3.13E-03	3.13E-04
DIBENZO(A,H)ANTHRACENE	8.00E-03	0.00E+00	6.69E-01	5.35E-03	1.77E-04	0.00E+00	9.10E-04	1.09E-03	1.56E+00	1.56E+01	6.96E-04	6.96E-05
FLUORANTHENE	6.40E-02	0.00E+00	6.69E-01	4.28E-02	1.41E-03	0.00E+00	7.28E-03	8.69E-03	1.95E+01	3.90E+01	4.45E-04	2.23E-04
INDENO(1,2,3-CD)PYRENE	2.30E-02	0.00E+00	6.69E-01	1.54E-02	5.08E-04	0.00E+00	2.62E-03	3.12E-03	1.56E+00	1.56E+01	2.00E-03	2.00E-04
PHENANTHRENE	2.80E-02	0.00E+00	6.69E-01	1.87E-02	6.19E-04	0.00E+00	3.18E-03	3.80E-03	1.56E+00	1.56E+01	2.43E-03	2.43E-04
PYRENE	6.00E-02	0.00E+00	6.69E-01	4.01E-02	1.33E-03	0.00E+00	6.82E-03	8.15E-03	1.17E+01	1.95E+01	6.96E-04	4.17E-04
Herbicides												
PENTACHLOROPHENOL	8.00E-03	0.00E+00	1.00E+00	8.00E-03	1.77E-04	0.00E+00	1.36E-03	1.54E-03	NV	NV	NA	NA
Inorganics												
ARSENIC	1.27E+01	0.00E+00	5.23E-01	6.64E+00	2.81E-01	0.00E+00	1.13E+00	1.41E+00	1.97E-01	1.97E+00	7.16E+00	7.16E-01
CADMIUM	2.80E+00	1.40E-03	4.07E+01	1.14E+02	6.19E-02	3.95E-04	1.94E+01	1.94E+01	1.58E+01	1.58E+02	1.23E+00	1.23E-01
CHROMIUM	3.82E+01	0.00E+00	3.16E+00	1.21E+02	8.44E-01	0.00E+00	2.05E+01	2.14E+01	5.98E+01	2.39E+02	3.58E-01	8.93E-02
COPPER	4.13E+02	3.90E-03	1.53E+00	6.32E+02	9.13E+00	1.10E-03	1.07E+02	1.17E+02	6.10E+02	7.88E+02	1.91E-01	1.48E-01
LEAD	1.24E+03	0.00E+00	1.52E+00	1.89E+03	2.74E+01	0.00E+00	3.21E+02	3.48E+02	1.46E+02	1.46E+03	2.39E+00	2.39E-01
MERCURY	1.60E-01	0.00E+00	2.06E+01	3.30E+00	3.54E-03	0.00E+00	5.61E-01	5.64E-01	7.81E-01	1.30E+00	7.23E-01	4.34E-01
NICKEL	4.13E+01	0.00E+00	4.73E+00	1.95E+02	9.13E-01	0.00E+00	3.32E+01	3.41E+01	7.29E+02	1.46E+03	4.68E-02	2.34E-02
SELENIUM	1.60E-01	0.00E+00	1.34E+00	2.14E-01	3.54E-03	0.00E+00	3.64E-02	4.00E-02	3.64E+00	6.01E+00	1.10E-02	6.65E-03
ZINC	1.84E+03	0.00E+00	1.29E+01	2.37E+04	4.07E+01	0.00E+00	4.03E+03	4.07E+03	2.92E+03	5.83E+03	1.40E+00	6.98E-01

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	1.525E-02	kg
Food Ingestion Rate = (If)	2.592E-03	kg/day
Water Ingestion Rate = (Iw)	4.300E-03	L/day
Soil Ingestion Rate = (Is)	3.370E-04	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

H=HR/CA (Assume = to 1 for maximum exposure)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (invertebrates) = (Ci * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (invertebrates)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs - Contaminant concentration in soil
Cw - Contaminant concentration in water
Cv - Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)
NV - No Value Available
NA - Not Applicable

SHORT-TAILED SHREW - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR
NSWC CRANE, INDIANA

Parameter	Avg Soil Concentration (mg/kg)	Avg SW Concentration (mg/L)	Biotransfer Factor (soil to inv.)	Invertebrate Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Inverts.	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Inorganics												
ARSENIC	5.91E+00	0.00E+00	2.24E-01	1.32E+00	7.50E-02	0.00E+00	1.29E-01	2.04E-01	2.24E-01	2.24E+00	9.12E-01	9.12E-02
CADMIUM	6.24E-01	4.80E-04	7.71E+00	4.81E+00	7.92E-03	1.08E-04	4.70E-01	4.78E-01	1.80E+01	1.80E+02	2.66E-02	2.66E-03
LEAD	1.65E+02	0.00E+00	2.66E-01	4.40E+01	2.10E+00	0.00E+00	4.30E+00	6.40E+00	1.66E+02	1.66E+03	3.86E-02	3.86E-03
ZINC	4.18E+02	0.00E+00	3.20E+00	1.34E+03	5.30E+00	0.00E+00	1.31E+02	1.36E+02	3.32E+03	6.64E+03	4.09E-02	2.05E-02

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	1.687E-02	kg
Food Ingestion Rate = (If)	1.648E-03	kg/day
Water Ingestion Rate = (Iw)	3.800E-03	L/day
Soil Ingestion Rate = (Is)	2.142E-04	kg/day
Home Range = (HR)	9.700E-01	acres
Contaminated Area = (CA)	Assume equal to home range	

H=HR/CA (Assume = to 1 for maximum exposure)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (invertebrates) = (Ci * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (invertebrates)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs - Contaminant concentration in soil
Cw - Contaminant concentration in water
Cv - Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)

BOBWHITE QUAIL - CONSERVATIVE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR
NSWC CRANE, INDIANA

Parameter	Max Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to veg.)	Vegetation Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Vegetation	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Dioxins												
TEQ BIRD	2.86E-06	0.00E+00	4.30E-03	1.23E-08	7.11E-09	0.00E+00	3.73E-10	7.48E-09	1.40E-05	1.40E-04	5.35E-04	5.35E-05
Energetics												
HMX	0.00E+00	3.20E-04	1.70E+01	0.00E+00	0.00E+00	4.56E-05	0.00E+00	4.56E-05	NV	NV	NA	NA
Semivolatile Organics												
ANTHRACENE	5.00E-03	0.00E+00	1.10E-01	5.50E-04	1.25E-05	0.00E+00	1.67E-05	2.92E-05	2.00E+00	2.00E+01	1.46E-05	1.46E-06
BENZO(A)ANTHRACENE	2.80E-02	0.00E+00	1.90E-02	5.32E-04	6.97E-05	0.00E+00	1.62E-05	8.59E-05	2.00E+00	2.00E+01	4.29E-05	4.29E-06
BENZO(A)PYRENE	3.20E-02	0.00E+00	1.10E-02	3.52E-04	7.97E-05	0.00E+00	1.07E-05	9.04E-05	2.00E+00	2.00E+01	4.52E-05	4.52E-06
BENZO(B)FLUORANTHENE	5.00E-02	0.00E+00	1.10E-02	5.50E-04	1.25E-04	0.00E+00	1.67E-05	1.41E-04	2.00E+00	2.00E+01	7.06E-05	7.06E-06
BENZO(G,H,I)PERYLENE	2.80E-02	0.00E+00	5.60E-03	1.57E-04	6.97E-05	0.00E+00	4.76E-06	7.45E-05	2.00E+00	2.00E+01	3.72E-05	3.72E-06
BENZO(K)FLUORANTHENE	2.20E-02	0.00E+00	4.30E-03	9.46E-05	5.48E-05	0.00E+00	2.87E-06	5.77E-05	2.00E+00	2.00E+01	2.88E-05	2.88E-06
CHRYSENE	3.60E-02	0.00E+00	1.90E-02	6.84E-04	8.97E-05	0.00E+00	2.08E-05	1.10E-04	2.00E+00	2.00E+01	5.52E-05	5.52E-06
DIBENZO(A,H)ANTHRACENE	8.00E-03	0.00E+00	4.30E-03	3.44E-05	1.99E-05	0.00E+00	1.04E-06	2.10E-05	2.00E+00	2.00E+01	1.05E-05	1.05E-06
FLUORANTHENE	6.40E-02	0.00E+00	5.50E-02	3.52E-03	1.59E-04	0.00E+00	1.07E-04	2.66E-04	2.00E+00	2.00E+01	1.33E-04	1.33E-05
INDENO(1,2,3-CD)PYRENE	2.30E-02	0.00E+00	5.60E-03	1.29E-04	5.73E-05	0.00E+00	3.91E-06	6.12E-05	2.00E+00	2.00E+01	3.06E-05	3.06E-06
PHENANTHRENE	2.80E-02	0.00E+00	8.20E-02	2.30E-03	6.97E-05	0.00E+00	6.97E-05	1.39E-04	2.00E+00	2.00E+01	6.97E-05	6.97E-06
PYRENE	6.00E-02	0.00E+00	5.50E-02	3.30E-03	1.49E-04	0.00E+00	1.00E-04	2.50E-04	2.00E+00	2.00E+01	1.25E-04	1.25E-05
Herbicides												
PENTACHLOROPHENOL	8.00E-03	0.00E+00	1.40E-02	1.12E-04	1.99E-05	0.00E+00	3.40E-06	2.33E-05	NV	NV	NA	NA
Inorganics												
ARSENIC	1.27E+01	0.00E+00	1.10E+00	1.40E+01	3.16E-02	0.00E+00	4.25E-01	4.57E-01	2.46E+00	7.38E+00	1.86E-01	6.19E-02
CADMIUM	2.80E+00	1.40E-03	3.25E+00	9.10E+00	6.97E-03	2.00E-04	2.76E-01	2.84E-01	1.45E+00	2.00E+01	1.96E-01	1.42E-02
CHROMIUM	3.82E+01	0.00E+00	8.39E-02	3.20E+00	9.51E-02	0.00E+00	9.73E-02	1.92E-01	1.00E+00	5.00E+00	1.92E-01	3.85E-02
COPPER	4.13E+02	3.90E-03	6.25E-01	2.58E+02	1.03E+00	5.56E-04	7.84E+00	8.87E+00	4.70E+01	6.17E+01	1.89E-01	1.44E-01
LEAD	1.24E+03	0.00E+00	4.68E-01	5.80E+02	3.09E+00	0.00E+00	1.76E+01	2.07E+01	1.13E+00	1.13E+01	1.83E+01	1.83E+00
MERCURY	1.60E-01	0.00E+00	5.00E+00	8.00E-01	3.98E-04	0.00E+00	2.43E-02	2.47E-02	6.40E-03	6.40E-02	3.86E+00	3.86E-01
NICKEL	4.13E+01	0.00E+00	1.41E+00	5.83E+01	1.03E-01	0.00E+00	1.77E+00	1.87E+00	7.74E+01	1.07E+02	2.42E-02	1.75E-02
SELENIUM	1.60E-01	0.00E+00	3.01E+00	4.82E-01	3.98E-04	0.00E+00	1.46E-02	1.50E-02	4.00E-01	8.00E-01	3.76E-02	1.88E-02
ZINC	1.84E+03	0.00E+00	1.82E+00	3.35E+03	4.58E+00	0.00E+00	1.02E+02	1.06E+02	1.45E+01	1.31E+02	7.34E+00	8.12E-01

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	1.620E-01	kg
Food Ingestion Rate = (If)	4.920E-03	kg/day
Water Ingestion Rate = (Iw)	2.310E-02	L/day
Soil Ingestion Rate = (Is)	4.034E-04	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

H=HR/CA (Assume = to 1 for maximum exposure)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (vegetation)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs - Contaminant concentration in soil
Cw - Contaminant concentration in water
Cv - Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)
NV - No Value Available
NA - Not Applicable

BOBWHITE QUAIL - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR
NSWC CRANE, INDIANA

Parameter	Avg Soil Concentration (mg/kg)	Avg SW Concentration (mg/L)	Biotransfer Factor (soil to veg.)	Vegetation Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Vegetation	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Inorganics												
LEAD	1.65E+02	0.00E+00	3.89E-02	6.44E+00	3.31E-01	0.00E+00	1.57E-01	4.88E-01	1.13E+00	1.13E+01	4.32E-01	4.32E-02
MERCURY	3.56E-02	0.00E+00	6.52E-01	2.32E-02	7.12E-05	0.00E+00	5.67E-04	6.38E-04	6.40E-03	6.40E-02	9.96E-02	9.96E-03
ZINC	4.18E+02	0.00E+00	3.66E-01	1.53E+02	8.36E-01	0.00E+00	3.73E+00	4.57E+00	1.45E+01	1.31E+02	3.15E-01	3.49E-02

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	1.770E-01	kg
Food Ingestion Rate = (If)	4.320E-03	kg/day
Water Ingestion Rate = (Iw)	1.840E-02	L/day
Soil Ingestion Rate = (Is)	3.542E-04	kg/day
Home Range = (HR)	2.860E+01	acres
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs - Contaminant concentration in soil
Cw - Contaminant concentration in water
Cv - Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (vegetation)

AMERICAN WOODCOCK - CONSERVATIVE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR
NSWC CRANE, INDIANA

Parameter	Max Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to inv.)	Invertebrate Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Inverts.	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Dioxins												
TEQ BIRD	2.86E-06	0.00E+00	2.22E+01	6.35E-05	6.12E-08	0.00E+00	1.16E-05	1.17E-05	1.40E-05	1.40E-04	8.33E-01	8.33E-02
Energetics												
HMX	0.00E+00	3.20E-04	1.00E+00	0.00E+00	0.00E+00	3.66E-05	0.00E+00	3.66E-05	NV	NV	NA	NA
Semivolatile Organics												
ANTHRACENE	5.00E-03	0.00E+00	6.69E-01	3.35E-03	1.07E-04	0.00E+00	6.11E-04	7.18E-04	2.00E+00	2.00E+01	3.59E-04	3.59E-05
BENZO(A)ANTHRACENE	2.80E-02	0.00E+00	6.69E-01	1.87E-02	6.00E-04	0.00E+00	3.42E-03	4.02E-03	2.00E+00	2.00E+01	2.01E-03	2.01E-04
BENZO(A)PYRENE	3.20E-02	0.00E+00	6.69E-01	2.14E-02	6.86E-04	0.00E+00	3.91E-03	4.60E-03	2.00E+00	2.00E+01	2.30E-03	2.30E-04
BENZO(B)FLUORANTHENE	5.00E-02	0.00E+00	6.69E-01	3.35E-02	1.07E-03	0.00E+00	6.11E-03	7.18E-03	2.00E+00	2.00E+01	3.59E-03	3.59E-04
BENZO(G,H,I)PERYLENE	2.80E-02	0.00E+00	6.69E-01	1.87E-02	6.00E-04	0.00E+00	3.42E-03	4.02E-03	2.00E+00	2.00E+01	2.01E-03	2.01E-04
BENZO(K)FLUORANTHENE	2.20E-02	0.00E+00	6.69E-01	1.47E-02	4.72E-04	0.00E+00	2.69E-03	3.16E-03	2.00E+00	2.00E+01	1.58E-03	1.58E-04
CHRYSENE	3.60E-02	0.00E+00	6.69E-01	2.41E-02	7.72E-04	0.00E+00	4.40E-03	5.17E-03	2.00E+00	2.00E+01	2.59E-03	2.59E-04
DIBENZO(A,H)ANTHRACENE	8.00E-03	0.00E+00	6.69E-01	5.35E-03	1.72E-04	0.00E+00	9.78E-04	1.15E-03	2.00E+00	2.00E+01	5.75E-04	5.75E-05
FLUORANTHENE	6.40E-02	0.00E+00	6.69E-01	4.28E-02	1.37E-03	0.00E+00	7.82E-03	9.19E-03	2.00E+00	2.00E+01	4.60E-03	4.60E-04
INDENO(1,2,3-CD)PYRENE	2.30E-02	0.00E+00	6.69E-01	1.54E-02	4.93E-04	0.00E+00	2.81E-03	3.30E-03	2.00E+00	2.00E+01	1.65E-03	1.65E-04
PHENANTHRENE	2.80E-02	0.00E+00	6.69E-01	1.87E-02	6.00E-04	0.00E+00	3.42E-03	4.02E-03	2.00E+00	2.00E+01	2.01E-03	2.01E-04
PYRENE	6.00E-02	0.00E+00	6.69E-01	4.01E-02	1.29E-03	0.00E+00	7.33E-03	8.62E-03	2.00E+00	2.00E+01	4.31E-03	4.31E-04
Herbicides												
PENTACHLOROPHENOL	8.00E-03	0.00E+00	1.00E+00	8.00E-03	1.72E-04	0.00E+00	1.46E-03	1.63E-03	NV	NV	NA	NA
Inorganics												
ARSENIC	1.27E+01	0.00E+00	5.23E-01	6.64E+00	2.72E-01	0.00E+00	1.21E+00	1.49E+00	2.46E+00	7.38E+00	6.04E-01	2.01E-01
CADMIUM	2.80E+00	1.40E-03	4.07E+01	1.14E+02	6.00E-02	1.60E-04	2.08E+01	2.09E+01	1.45E+00	2.00E+01	1.44E+01	1.04E+00
CHROMIUM	3.82E+01	0.00E+00	3.16E+00	1.21E+02	8.19E-01	0.00E+00	2.21E+01	2.29E+01	1.00E+00	5.00E+00	2.29E+01	4.58E+00
COPPER	4.13E+02	3.90E-03	1.53E+00	6.32E+02	8.86E+00	4.46E-04	1.15E+02	1.24E+02	4.70E+01	6.17E+01	2.65E+00	2.01E+00
LEAD	1.24E+03	0.00E+00	1.52E+00	1.89E+03	2.66E+01	0.00E+00	3.45E+02	3.71E+02	1.13E+00	1.13E+01	3.29E+02	3.29E+01
MERCURY	1.60E-01	0.00E+00	2.06E+01	3.30E+00	3.43E-03	0.00E+00	6.03E-01	6.06E-01	6.40E-03	6.40E-02	9.47E+01	9.47E+00
NICKEL	4.13E+01	0.00E+00	4.73E+00	1.95E+02	8.86E-01	0.00E+00	3.57E+01	3.66E+01	7.74E+01	1.07E+02	4.72E-01	3.42E-01
SELENIUM	1.60E-01	0.00E+00	1.34E+00	2.14E-01	3.43E-03	0.00E+00	3.92E-02	4.26E-02	4.00E-01	8.00E-01	1.06E-01	5.32E-02
ZINC	1.84E+03	0.00E+00	1.29E+01	2.37E+04	3.95E+01	0.00E+00	4.33E+03	4.37E+03	1.45E+01	1.31E+02	3.02E+02	3.34E+01

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	1.660E-01	kg
Food Ingestion Rate = (If)	3.032E-02	kg/day
Water Ingestion Rate = (Iw)	1.900E-02	L/day
Soil Ingestion Rate = (Is)	3.560E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

H=HR/CA (Assume = to 1 for maximum exposure)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (invertebrates) = (Ci * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (invertebrates)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs - Contaminant concentration in soil
Cw - Contaminant concentration in water
Cv - Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)
NV - No Value Available
NA - Not Applicable

AMERICAN WOODCOCK - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 16 - CAST HIGH EXPLOSIVES FILL/B-146 INCINERATOR
NSWC CRANE, INDIANA

Parameter	Avg Soil Concentration (mg/kg)	Avg SW Concentration (mg/L)	Biotransfer Factor (soil to inv.)	Invertebrate Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Inverts.	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Inorganics												
CADMIUM	6.24E-01	4.80E-04	7.71E+00	4.81E+00	5.55E-03	4.81E-05	6.41E-01	6.47E-01	1.45E+00	2.00E+01	4.46E-01	3.23E-02
CHROMIUM	1.82E+01	0.00E+00	3.06E-01	5.55E+00	1.62E-01	0.00E+00	7.41E-01	9.02E-01	1.00E+00	5.00E+00	9.02E-01	1.80E-01
COPPER	6.60E+01	1.49E-03	5.15E-01	3.40E+01	5.87E-01	1.49E-04	4.53E+00	5.12E+00	4.70E+01	6.17E+01	1.09E-01	8.29E-02
LEAD	1.65E+02	0.00E+00	2.66E-01	4.40E+01	1.47E+00	0.00E+00	5.87E+00	7.34E+00	1.13E+00	1.13E+01	6.50E+00	6.50E-01
MERCURY	3.56E-02	0.00E+00	1.69E+00	6.03E-02	3.17E-04	0.00E+00	8.04E-03	8.35E-03	6.40E-03	6.40E-02	1.31E+00	1.31E-01
ZINC	4.18E+02	0.00E+00	3.20E+00	1.34E+03	3.72E+00	0.00E+00	1.78E+02	1.82E+02	1.45E+01	1.31E+02	1.26E+01	1.39E+00

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	1.895E-01	kg
Food Ingestion Rate = (If)	2.526E-02	kg/day
Water Ingestion Rate = (Iw)	1.900E-02	L/day
Soil Ingestion Rate = (Is)	1.688E-03	kg/day
Home Range = (HR)	6.133E+01	acres
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs - Contaminant concentration in soil
Cw - Contaminant concentration in water
Cv - Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (invertebrates) = (Ci * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (invertebrates)