**DEPARTMENT OF THE NAVY**
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
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CRANE, INDIANA 47522-5000

IN REPLY REFER TO:
5090/S4.7.1
Ser PRCR4/6050
10 FEB 2006

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Corrective Action Section
77 West Jackson Blvd.
Chicago, IL 60604

11-1-06

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center submits the Draft Resource Conservation and Recovery Act Facility Investigation Report (RFI) for the Roads and Grounds Area (R&GA), Solid Waste Management Unit 15. One copy is presented for your review and comment as enclosure (1). The permit required Certification Statement is provided as enclosure (2).

If you require any further information, my point of contact is Mr. Thomas J. Brent, Code PRCR4-TB, at 812-854-6160, email thomas.brent@navy.mil.

Sincerely,

J. M. Hunsicker

J. M. HUNSICKER
Environmental Site Manager
By direction of the Commanding Officer

Enclosures: 1. Draft R&GA RFI
2. Certification Statement

Copy to:
ADMINISTRATIVE RECORD
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I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Jason Hiersch
SIGNATURE

Manager, Environmental Protection
TITLE

2/10/06
DATE

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-94-D-0888

Rev. 0
11/17/06

# Resource Conservation and Recovery Act Facility Investigation Report
for
# Roads and Grounds Area (SWMU 15)

## VOLUME I OF II - TEXT

## Naval Surface Warfare Center Crane
## Crane, Indiana

## Contract Task Order 0331

## November 2006


NAVFAC
Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

REVISION 0
NOVEMBER 2006

# RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT FOR ROADS AND GROUNDS AREA (SWMU15)

## NAVAL SURFACE WARFARE CENTER, CRANE
## CRANE, INDIANA

## COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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**Southern Division**
**Naval Facilities Engineering Command**
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**CONTRACT TASK ORDER 0331**

**NOVEMBER 2006**


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# ACRONYMS

| | |
|---|---|
| °F | Degrees Fahrenheit |
| °C | Degrees Celsius |
| amsl | Above mean sea level |
| AOC | Area of concern |
| AST | Aboveground storage tank |
| ASTM | American Society for Testing and Materials |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| AWQC | Ambient Water Quality Criterion |
| BAF | Bioaccumulation Factor |
| BERA | Baseline Ecological Risk Assessment |
| bgs | Below ground surface |
| BSAF | Biota Sediment Accumulation Factor |
| BTOR | Below top of riser |
| Cal EPA | California Environmental Protection Agency |
| CCME | Canadian Council of Ministers of the Environment |
| CDI | Chronic daily intake |
| CEC | Cation exchange capacity |
| CSF | Cancer slope factor |
| CLEAN | Comprehensive Long-term Environmental Action Navy |
| CMS | Corrective Measures Study |
| cm | Centimeter |
| $cm^2$ | Square centimeters |
| COC | Chemical of concern |
| COPC | Chemical of potential concern |
| cPAH | Carcinogenic polycyclic aromatic hydrocarbon |
| CSF | Cancer slope factor |
| CSM | Conceptual site model |
| CTE | Central tendency exposure |
| CTO | Contract Task Order |
| $DA_{event}$ | Absorbed dose per event |
| DDT | Dichloro diphenyl-trichloroethane |
| DI | Deionized |
| DO | Dissolved oxygen |

| | |
|---|---|
| DPT | Direct Push Technology |
| DRMO | Defense Reutilization and Marketing Office |
| EC | Environment Canada |
| $EC_{10}$ | Effects Concentration for 10% of the test population |
| $EC_{20}$ | Effects Concentration for 20% of the test population |
| $EC_{25}$ | Effects Concentration for 25% of the test population |
| $EC_{50}$ | Effects concentration for 50% of the test population |
| Eco-SSL | U.S. EPA Ecological Soil Screening Level |
| EDQL | Environmental Data Quality Levels |
| EEQ | Ecological Effects 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 |
| gpm | Gallons per minute |
| HA | Hand augering |
| HASP | Health and Safety Plan |
| HEAST | Health Effects Assessment Summary Tables |
| HHRA | Human health risk assessment |
| HI | Hazard Index |
| HQ | Hazard Quotient |
| IA | Installation Assessment |
| IAS | Initial Assessment Study |
| ILCR | Incremental lifetime cancer risk |
| IDEM | Indiana Department of Environmental Management |
| IDNR | Indiana Department of Natural Resources |
| IRIS | Integrated Risk Information System |
| $K_d$ | Soil-water partition coefficient |
| $K_g$ | Kilogram |
| $K_{oc}$ | Organic matter-water partition coefficient |
| $LC_{50}$ | Lethal Concentration (for 50% of the test population) |

| | |
|---|---|
| LCS | Laboratory control sample |
| LOAEL | Lowest observable adverse effects level |
| LOEC | Lowest observed effect concentration |
| MATC | Maximum Acceptable Toxicant Concentration |
| MCL | Maximum Contaminant Level |
| mg | milligrams |
| mg/kg | milligrams per kilogram |
| mg/L | milligram per liter |
| MI/HR | miles per hour |
| MRL | Minimal Risk Level |
| MS | Matrix Spike |
| MSCM | milliSiemens per centimeter |
| MSD | Matrix spike duplicate |
| MV | millivolts |
| NAD27 | 1927 North American Datum |
| NAVD88 | 1988 North American Vertical Datum |
| NAVFAC EFD SOUTH | Naval Facilities Engineering Field Division South |
| NCEA | National Center for Environmental Assessment |
| NECC | Nutrient and energy cycling check |
| NEESA | Naval Energy and Environmental Support Activity |
| NOAA | National Oceanic and Atmospheric Administration |
| NOAEL | No Observable Adverse Effects Level |
| NOEC | No Observed Effect Concentration |
| NSWC | Naval Surface Warfare Center |
| NTU | Nephelometric turbidity unit |
| OECD | Organization of Economic Cooperation and Development |
| OMOE | Ontario Ministry of the Environment |
| OPPTS | Office of Prevention, Pesticides, and Toxic Substances |
| ORNL | Oak Ridge National Laboratory |
| ORP | Oxidation-reduction potential |
| OSWER | Office of Solid Waste and Emergency Response |
| PAH | Polycyclic aromatic hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PEC | Probable effects concentration |
| PEF | Particulate emission factor |
| PID | Photo ionization detector |

| | |
|---|---|
| PPE | Personal protective equipment |
| ppm | Parts per million |
| PPRTV | Provisional Peer Reviewed Toxicity Value |
| PRG | Primary Remediation Goal |
| PVC | Polyvinyl chloride |
| QA | Quality assurance |
| QAPP | Quality assurance project plan |
| QC | Quality control |
| RAGS | Risk Assessment Guidance for Superfund |
| RBTL | Risk-based target level |
| RCRA | Resource Conservation and Recovery Act |
| RDA | recommended daily allowance |
| RfD | Reference dose |
| RFI | RCRA Facility investigation |
| RISC | Risk Integrated System of Closure |
| RME | Reasonable maximum exposure |
| RPD | Relative percent difference |
| RQD | Rock quality designation |
| SERA | Screening Level Ecological Risk Assessment |
| SDWA | Safe Drinking Water Act |
| SOP | Standard operating procedure |
| SQG | Soil Quality Guideline |
| SSL | Soil Screening Level |
| ST | Storm Sewer and Outfall System |
| SUF | Site Use Factor |
| SV | Screening value |
| SVOC | Semivolatile Organic Compound |
| SWMU | Solid Waste Management Unit |
| TEC | Threshold Effects Concentration |
| TOC | Total organic carbon |
| TOM | Task Order Manager |
| TRV | Toxicity Reference Value |
| TtNUS | Tetra Tech NUS, Inc. |
| µg/kg | microgram per kilogram |
| UCL | Upper confidence limit |
| U.S. EPA | United States Environmental Protection Agency |

| | |
|---|---|
| U.S. FWS | United States Fish and Wildlife Service |
| USACE | United States Army Corps of Engineers |
| UTL | Upper tolerance limit |
| VOC | Volatile Organic Compound |
| WQC | Water Quality Criteria |
| WQS | Water Quality Standard |

# EXECUTIVE SUMMARY

This report documents the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) for Solid Waste Management Unit (SWMU) 15, Roads and Grounds Area, located at the Naval Surface Warfare Center (NSWC) Crane, Crane, Indiana. Tetra Tech NUS, Inc. (TtNUS) prepared this report for the Department of the Navy, Naval Facilities Engineering Field Division South (NAVFAC EFD SOUTH) under Contract Task Order (CTO) 0331, Comprehensive Long-term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888.

## PURPOSE OF THE REPORT

This report summarizes RFI fieldwork conducted in December 2004 and January 2005, describes the nature and extent of contamination, presents the baseline human health and ecological risk assessments, and provides recommendations for future action.

## SMWU 15 DESCRIPTION

SWMU 15 is located west of Turkey Creek in the northern half of NSWC Crane. The SWMU is approximately 300 acres in size and is accessed via Highway 468. The eastern and southern edges of the SMWU include or are upgradient of drainage channels that flow ultimately toward the southeast. To the west and north are industrialized areas. The areas of most interest for the RFI are those where roads and grounds support activities occurred. These are primarily in the northern half of the SWMU.

SWMU 15 includes former Buildings 2801, 2716, 2717, 2718, 2774, and existing Buildings 2693 and 3330. There was a 5,000-gallon aboveground storage tank (AST) along the northern side of the former boiler house (Building 2801). Approximately 10,000 gallons of waste oil were removed annually from this AST. No specific information concerning historical operations at Building 2801 is available.

An Asphalt Batch Plant (see Figure 1-3) with unknown operational history was removed from the site in the early 1970s. Although there is no supporting documentation, other asphalt plants of this era are known to add mixed waste oils (vehicle crankcase oils with the potential to contain metals) and hydraulic oils (with the potential to contain PCBs) into the liquid tar. NSWC employees have stated that tar spills occurred at the plant that were attributed to boilovers and accidental discharge. One spill occurred as a result of a molten tar storage tank drain valve being left open overnight. The tar flowed approximately 150 feet south down the drainageway between Buildings 2693 and 2801.

As stated above, the types of materials present at SWMU 15 included waste oils, fuel oil, gasoline, asphalt, solvents, paints, lubricants, and pesticide and herbicide residues. General refuse, such as drums, containers, and construction debris, was dumped on the hillside south of Buildings 2716, 2717, and 2718.

Limited historical data are available for SWMU 15. In 1972, a Pilot Test Program (Kent et al., 1973) was conducted by the Navy to provide input for the development of a Navy-wide database. Testing was conducted to establish environmental baseline conditions and to provide data for pollution abatement projects. The testing included sampling wells, streams, lakes, industrial discharges, and sewage treatment plant discharges. During the pilot test, a sample was collected in Turkey Creek approximately 1,500 feet downstream from a plating shop (Building 1884) discharge pipe. The purpose of the sampling point was to assess the effects of discharge from the plating shop on the creek. The plating shop was located approximately 500 feet northwest of SWMU 15. Analytical results for the sample indicated that the average concentrations of chromium, cadmium, lead, and cyanide present in Turkey Creek exceeded drinking water Maximum Contaminant Levels (MCLs).

The Initial Assessment Study (IAS) [Naval Energy and Environmental Support Agency (NEESA, 1983)] recommended that four soil and sediment samples be collected near debris deposited at the bottom of the hill south of Building 2716 and analyzed by the Extraction Procedure (EP) Toxicity Test for heavy metals and pesticides. Accordingly, in 1985, four samples were collected; however, the exact locations of these samples are unknown. These samples did not fail the EP toxicity tests.

## CONCEPTUAL SITE MODEL

The conceptualized aspects of contaminant migration, fate, and persistence at SWMU 15 indicate that the northern storm sewer network is a moderately large source of dissolved and particulate chemicals of concern (COCs) entering the creeks. Very low concentrations of polycyclic aromatic hydrocarbons (PAHs) in water and sediment were observed emanating from the western side of SWMU 15, which includes the former Asphalt Batch Plant area. Perched groundwater is nearly devoid of PAHs, so groundwater flowing to the creeks is not transporting PAHs to the creeks in significant quantities. If COCs are actively being transported to the creeks, it is primarily via surface runoff and the storm sewer outfalls.

## RISK ASSESSMENTS

A screening level human health risk assessment and a baseline ecological risk assessment were conducted. Findings from these assessments are summarized in Table ES-1 for each receptor group and

all media to which the receptors in the groups are exposed. The findings are also described in the text below.

**Screening Level Human Health Risk Assessment**

- The potential human health risks calculated for soil and sediment were less than or within U.S. EPA goals.

- Elevated risk estimates were calculated for exposure to PAHs in surface water. However, because of significant uncertainties in the risk estimates, risks for surface water are considered to be overestimated by several orders of magnitude and it is recommended that PAHs in surface water not be considered as a COC for SWMU 15.

**Screening Level Ecological Risk Assessment**

- No chemicals initially selected as chemicals of potential concern (COPCs) in surface soil at SWMU 15 were retained as COPCs for further evaluation for risks to invertebrates or plants.

- No chemicals initially selected as COPCs in sediment at SWMU 15 were retained as COPCs for further evaluation for risks to benthic invertebrates.

- Several analytes initially selected as COPCs at SWMU 15 were retained for further evaluation for aquatic organisms, including benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, and pyrene. Concentrations of these PAHs were greater than alternate toxicity information for aquatic organisms and contamination was prevalent at several locations where surface water was present. The sediment is likely to be a source of the PAHs because many of the PAHs are not very water soluble and tend to bind to sediment. Another potential source of PAHs in the water is runoff from the paved areas because much of the area had been recently paved. Although there may be risks to aquatic organisms from PAHs in the surface water, because the PAHs in the surface water do not appear to be related to site activities, PAHs in surface water are eliminated as COPCs for further evaluation.

- Food-chain modeling risks (average exposure scenario) to herbivorous/insectivorous receptors in SWMU 15 surface soil and piscivorous receptors in SWMU 15 sediment/surface water indicated that all potential risks were determined to be acceptable.

## CONCLUSIONS

Data collected during the Phase III RFI were adequate for developing screening level human health and baseline ecological risk assessments for SWMU 15 and for establishing the nature and extent of contamination to support the risk assessments. Results of the risk assessments are presented above. Table ES-1 summarizes receptor-specific human health risks and hazards, ecological risks, critical exposure pathways, and COCs for SWMU 15. The results of the human health risk assessment indicate that potential human health risks calculated for soil and sediment were less than or within U.S. EPA goals. The results of the ecological risk assessment determined that although there were potential risks to aquatic organisms from PAHs in the surface water, the PAHs do not appear to be related to site activities. As a result, no further action is recommended at SWMU 15.

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA

| Receptor Population | Environmental Media | Overall Carcinogenic Risk (Human Health) | Overall Hazard Index (Human Health) | Lead Exposure (Human Health) (1) | Overall Risk (Ecological) | Critical Pathways & Chemicals of Concern | Recommendations |
|---|---|---|---|---|---|---|---|
| Future Construction Worker | Surface/Subsurface Soil | 1.E-06 | 0.4 | N/A | N/A | N/A | NFA |
| Current/Future Maintenance Worker | Surface Soil, Surface Water, and Sediment | 1E-04 | 0.04 | N/A | N/A | N/A | NFA |
| Current/Future Occupational Worker | Surface Soil | 3E-05 | 0.2 | N/A | N/A | N/A | NFA |
| Current/Future Trespasser (Adolescent) | Surface Soil, Surface Water, and Sediment | 1E-04 | 0.1 | N/A | N/A | N/A | NFA |
| Future Recreational User (Child) | Surface Soil, Surface Water, and Sediment | 5E-04 | 0.6 | N/A | N/A | Dermal contact with PAHs in surface water | NFA(2) |
| Future Recreational User (Adult) | Surface Soil, Surface Water, and Sediment | 1E-03 | 0.1 | N/A | N/A | Dermal contact with PAHs in surface water | NFA(2) |
| Future Recreational User (Lifelong) | Surface Soil, Surface Water, and Sediment | 1E-03 | 0.0 | N/A | N/A | Dermal contact with PAHs in surface water | NFA(2) |
| Future On-Site Resident (Child) | Surface Soil, Surface Water, and Sediment | 5E-04 | 3 | N/A | N/A | Dermal contact with PAHs in surface water. Ingestion of iron in surface soil. | NFA(2)(3) |
| Future On-Site Resident (Adult) | Surface Soil, Surface Water, and Sediment | 1E-03 | 0.4 | N/A | N/A | Dermal contact with PAHs in surface water | NFA(2) |
| Future On-Site Resident (Lifelong) | Surface Soil, Surface Water, and Sediment | 2E-03 | NA | N/A | N/A | Dermal contact with PAHs in surface water | NFA(2) |
| Terrestrial Plants and Invertebrates | Surface Soil | NA | NA | N/A | Acceptable | N/A | NFA |
| Mammals and Birds | Surface Soil | NA | NA | N/A | Acceptable | N/A | NFA |
| | Sediment | NA | NA | N/A | Acceptable | N/A | NFA |
| Aquatic Organisms | Surface Water | NA | NA | N/A | Acceptable | N/A(4) | NFA |
| Sediment Invertebrates | Sediment | NA | NA | N/A | Acceptable | N/A | NFA |

1. Risks were not estimated for exposure to lead because lead was not identified as a COPC in any media at SWMU 15.
2. Although the estimated cancer risks exceed the U.S. EPA target risk level (1E-4), No Further Action (NFA) is recommended because of significant uncertainties in the calculated risks. The elevated risks were due to dermal contact with PAHs in surface water. However, the surface water risks are considered to be greatly overestimated by the U.S. EPA model used to estimate dermal absorption of PAHs from water. An indication of the overestimation is the fact that the risks calculated for dermal contact with surface water were approximately 3 orders or magnitude greater than risks for ingestion. In addition, studies have shown that PAHs in water do not penetrate the skin. Because of this, TtNUS has been instructed by U.S. EPA Region 4 not to evaluate risks for dermal contact with PAHs in water because risks could be overestimated by as much as a billion fold. These uncertainties are discussed in Sections 7.5 and 7.6 of the Human Health risk assessment.
3. Although the cumulative Hazard Index (HI) exceeded the U.S. EPA goal of 1, the HIs for specific target organs were less than 1. According to U.S. EPA guidelines, risks are acceptable if His are less than 1 on a target organ basis.
4. Although there were potential risks to aquatic organisms from PAHs in the surface water, the PAHs do not appear to be related to site activities.

N/A - Not Applicable
NFA - No Further Action

# 1.0 INTRODUCTION

This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Field Report for the Roads and Grounds Area 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) under Contract Task Order (CTO) 0331 for the Comprehensive Long-term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888. The Roads and Grounds Area is also known as Solid Waste Management Unit (SWMU) 15.

Although a description of historical activities is not available, it is believed that road and ground maintenance activities took place at SWMU 15. It is known that materials and wastes stored and handled at this SWMU included waste oils, fuel oils, gasoline, asphalt, antifreeze, hydraulic oils, pesticides, herbicides, paints, lubricant, solvents, and general refuse (e.g., drums, containers, construction debris). An asphalt batch plant with unknown operational history and no supporting documentation was removed from the SWMU in the early 1970s. Other asphalt plants of this era are known to have mixed waste oils such as vehicle crankcase oils with the potential to contain metals and hydraulic oils with the potential to contain polychlorinated biphenyls (PCBs) into the liquid tar.

## 1.1 PURPOSE

The purpose of this RFI Report is to describe the site investigation activities conducted at SWMU 15 and to present the results and interpretation thereof for the Roads and Grounds Area. This report provides information regarding concentrations of organic and inorganic chemicals in surface soils, subsurface soils, sediment, surface water, and groundwater at SWMU 15. In addition, human health and ecological risks associated with SWMU 15 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 investigations in 2004 and 2005. However, previous investigation results are presented, as appropriate, to provide perspective on current data.

## 1.2 SITE BACKGROUND

### 1.2.1 Site Locations and Descriptions

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 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 15 is located west of Turkey Creek in the northern half of NSWC Crane (see Figure 1-2). The SWMU is approximately 44.5 acres in size and is accessed via Highway 468. A parking area and a Pyrotechnics Production Area are located west of the SWMU. Site features for SWMU 15 are included in Figure 1-3. The eastern and southern edges of the SMWU include or are upgradient of drainage channels that flow ultimately toward the southeast. To the west and north are industrialized areas. The areas of most interest for this investigation are those where roads and grounds support activities occurred. These are primarily in the northern half of the SWMU.

### 1.2.2 Site History

SWMU 15 includes former Buildings 2801, 2716, 2717, 2718, 2774, and existing Buildings 2693 and 3330. There was a 5,000-gallon aboveground storage tank (AST) along the northern side of the former boiler house (Building 2801). Approximately, 10,000 gallons of waste oil were removed annually from this AST. No specific information concerning historical operations at Building 2801 is available.

An asphalt batch plant (see Figure 1-3) with unknown operational history was removed in the early 1970s. Although there is no supporting documentation, other asphalt plants of this era are known to have mixed waste oils such as vehicle crankcase oils with the potential to contain metals and hydraulic oils with the potential to contain PCBs into the liquid tar. NSWC employees have stated that tar spills occurred at the plant that were attributed to boilovers and accidental discharge. One spill occurred as a result of a molten tar storage tank drain valve being left open overnight. The tar flowed approximately 150 feet south down the drainageway between Buildings 2693 and 2801.

As stated above, the types of materials present at SWMU 15 included waste oils, fuel oil, gasoline, asphalt, solvents, paints, lubricants, and pesticide and herbicide residues. General refuse such as drums, containers, and construction debris was dumped on the hillside south of Buildings 2716, 2717, and 2718.

## 1.3 PREVIOUS INVESTIGATIONS

Limited historical data are available for SWMU 15. In 1972, a Pilot Test Program (Kent et al., 1973) was conducted by the Navy to provide input for the development of a Navy-wide database. Testing was conducted to establish environmental baseline conditions and to provide data for pollution abatement

projects. The testing included sampling wells, streams, lakes, industrial discharges, and sewage treatment plant discharges. During the Pilot test, a sample was collected in Turkey Creek approximately 1,500 feet downstream from a plating shop (Building 1884) discharge pipe. The purpose of the sampling point was to assess the effects of discharge from the plating shop on the creek. The plating shop was located approximately 500 feet northwest of SWMU 15. Analytical results for the sample indicated that the average concentrations of chromium, cadmium, lead, and cyanide present in Turkey Creek exceeded drinking water Maximum Contaminant Levels (MCLs).

The Initial Assessment Study (IAS) [Naval Energy and Environmental Support Agency (NEESA, 1983)] recommended that four soil and sediment samples be collected near debris deposited at the bottom of the hill south of Building 2716 and analyzed by the Extraction Procedure (EP) Toxicity Test for heavy metals and pesticides. Accordingly, in 1985, four samples were collected; however, the exact locations of these samples are unknown. These samples did not fail the EP toxicity tests.

## 1.4 REPORT ORGANIZATION

Section 1.0 of this 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 data collection. Section 3.0 discusses data presentation and data quality review. Section 4.0 describes the physical characteristics of SWMU 15. Section 5.0 presents an evaluation of the nature and extent of contamination detected at SWMU 15 during this field investigation. Section 6.0 presents a discussion on the fate and transport of the contaminants and the conceptual site model. Section 7.0 identifies the chemicals of concern (COCs) and presents the results of the HHRA. Section 8.0 presents the results of the SERA. Supporting documentation for this report is attached as Appendices A through J. The information included in each appendix is as follows:

- Appendix A - Field Investigation Photos
- Appendix B - Boring Logs, Well Construction Logs, etc.
- Appendix C - Sample Log Sheets
- Appendix D - Miscellaneous Field Documentation (log books)
- Appendix E - Land Survey Data
- Appendix F - Health and Safety Forms
- Appendix G - Analytical Data
- Appendix H - Data Quality Review

- Appendix I - Human Health Risk Assessment Calculations
- Appendix J - Supporting Materials for the Ecological Risk Assessment

**LEGEND**

SWMU Boundary

Major Surface Drainage Basins

I Furst Creek Drainage Basin

II Indian 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.

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| DRAWN BY K. PEILA | DATE 9/19/05 | Tetra Tech NUS, Inc. | CONTRACT NUMBER N1245 | OWNER NO. CTO 0331 |
| CHECKED BY J. LUCAS | DATE 9/19/05 | SWMU 15 - ROADS AND GROUNDS AREA<br>LOCATION AND MAJOR SURFACE DRAINAGE BASINS<br>NAVAL SURFACE WARFARE CENTER<br>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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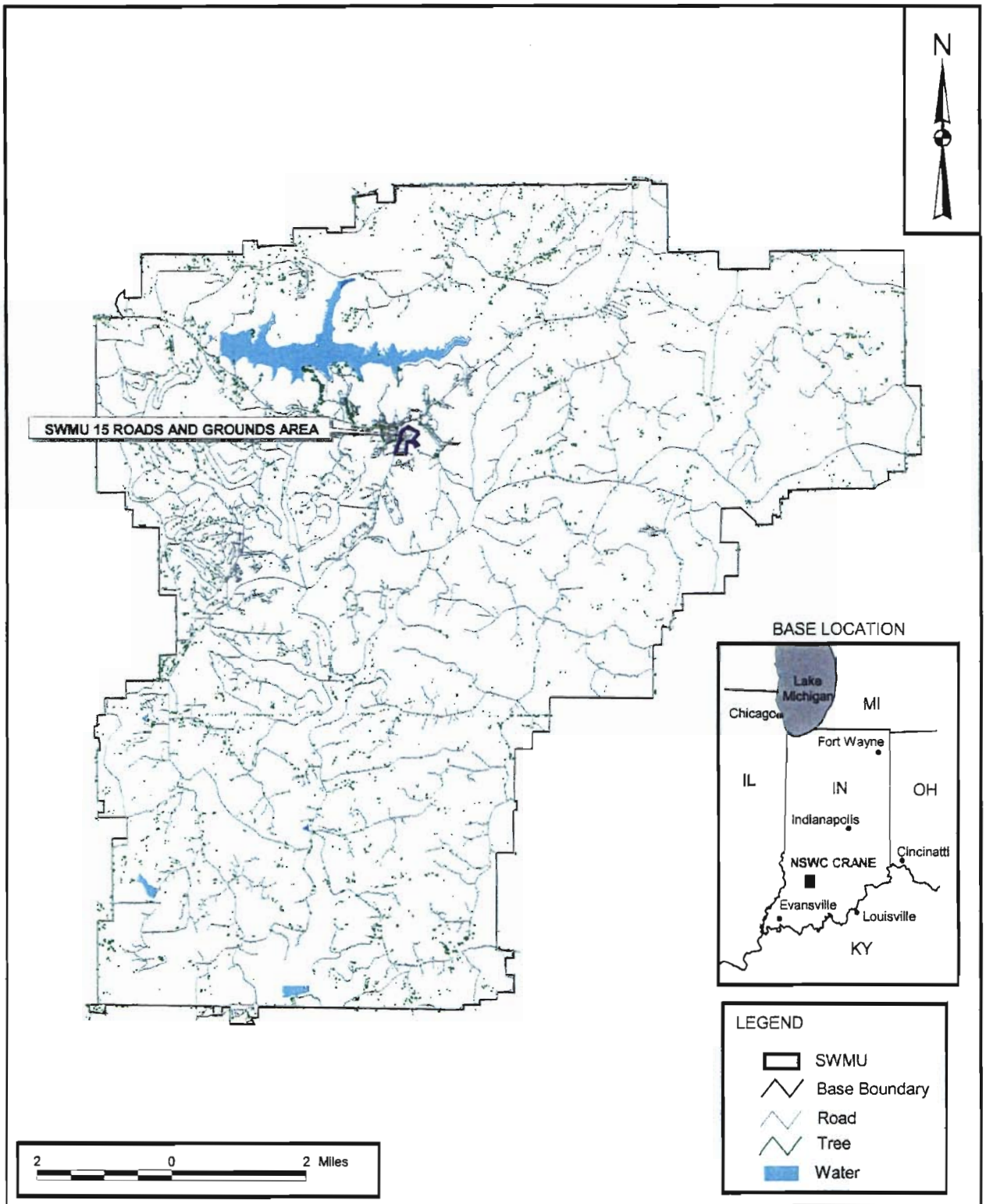


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| DRAWN BY K. PEILA — DATE 9/19/05 | Tetra Tech NUS, Inc. | CONTRACT NUMBER N1245 | OWNER NO. CTO 0331 |
| CHECKED BY J. LUCAS — DATE 9/19/05 | BASE AND SITE LOCATION MAP | APPROVED BY — | DATE — |
| COST/SCHEDULE-AREA | SWMU 15 ROADS AND GROUNDS AREA | APPROVED BY — | DATE — |
| SCALE AS NOTED | NSWC CRANE CRANE, INDIANA | DRAWING NO. FIGURE 1 - 1 | REV 0 |

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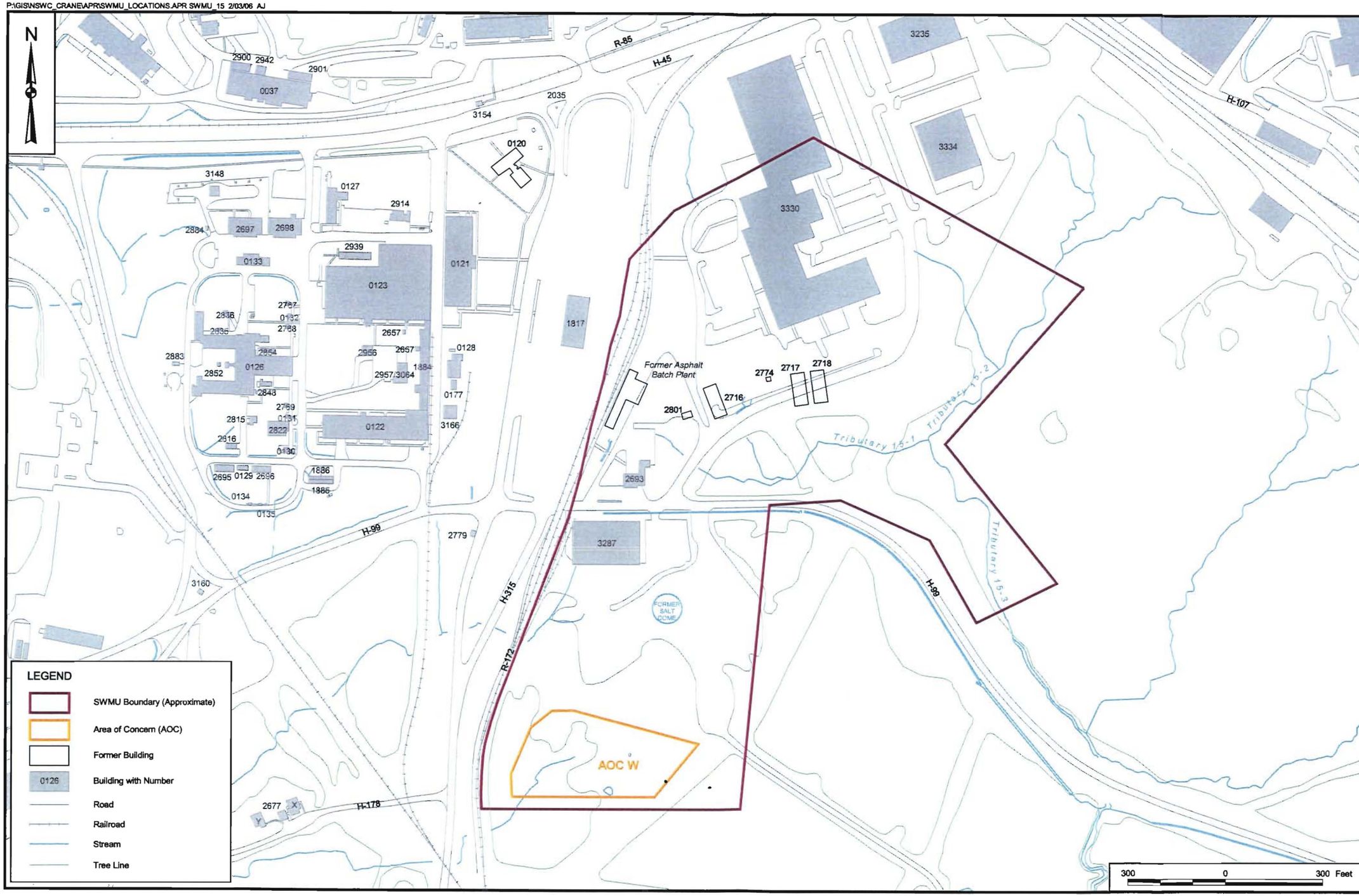


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SITE FEATURES
SWMU 15 ROADS AND GROUNDS AREA
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

NAVFAC

DRAWN BY K. PEILA DATE 9/19/05

CHECKED BY J. LUCAS DATE 2/03/06

COST/SCHED-AREA

SCALE AS NOTED

# 2.0 FIELD INVESTIGATION

This section presents the sampling activities and procedures utilized during field operations performed for NSWC Crane SWMU 15.

## 2.1 OVERVIEW

RFI field activities were conducted in December 2004 and January 2005. All work performed was conducted in accordance with the procedures and methodologies described in the United States Environmental Protection Agency (U.S. EPA)-approved Quality Assurance Project Plan (QAPP) (TtNUS, 2004). Standard operating procedures (SOPs) that governed the field work are included in Appendix E of the approved QAPP (TtNUS, 2004). Select photographs of SWMU 15, copies of all field forms, records, field logbooks, and health and safety documentation associated with the field investigation are provided in Appendices A through D of this document.

## 2.2 MOBILIZATION/DEMOBILIZATION

Following approval of the QAPP (TtNUS, 2004), TtNUS began mobilization activities. All field team members reviewed the approved QAPP, 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 to ensure that personnel were familiar with the scope of the field activities. Health and safety documentation is contained in Appendix B.3.

Prior to the initiation of fieldwork, 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 the field activities, the FOL completed 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 CTO331-04 and logged in accordance with SOP CTO331-07. Boring logs can be found in Appendix B.1. Drilling methods, boring dates, boring depths, and depth intervals for soil sampling are included in Table 2-1. Figure 2-1 shows the locations of all soil

borings completed at various areas of concern (AOC) as part of the RFI at SWMU 15. The AOCs are discussed in the approved QAPP.

#### 2.3.1.1 Direct-Push Technology Borings

Direct-Push Technology (DPT) involves pushing small-diameter sampling tools hydraulically and/or mechanically downward into the ground to the desired depth. During the RFI, soil samples were collected from DPT 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 (Appendix B.1). Soil sample collection information is provided in Section 2.5.1.

DPT was used to complete 55 soil borings at SWMU 15. DPT soil borings were advanced to total depths of 20 feet, to the water table, or to refusal. Actual sample depths for SWMU 15 soil samples are listed in Table 2-1.

#### 2.3.1.2 Hand Augering

Hand augering (HA) equipment consisted of a stainless steel bucket auger (6½ inches long and 3¼ inches in diameter) and a stainless steel extension rod with a cross handle. HA was typically used at locations not accessible by other drilling methods or at isolated locations where its use was more practical. The borings were augered to the desired depth or until refusal was encountered (see Table 2-1 for actual total depths). 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.

HA was used to complete seven soil borings at SWMU 15. Figure 2-1 shows the locations of all soil borings completed as part of the RFI at SWMU 15. Most HA soil borings were advanced to total depths of 2 feet, although one boring was advanced to 6 feet below ground surface (bgs). Actual depths for SWMU 15 soil samples are listed in Table 2-1.

### 2.3.2 Borehole and Sample Logging

A TtNUS geologist maintained a log for each boring in accordance with SOP CTO331-07 (Borehole and Soil Sample Logging). The boring logs for each round can be found in Appendix B.1 and contain the following information as appropriate:

- 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
- Date(s) of drilling
- Screening instrument readings

In addition, depths of changes in lithology, sample moisture observations, depth to water, 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 soil borings at SWMU 15 were backfilled with bentonite chips and hydrated in accordance with the manufacturer's specifications. The ground surface at each boring location was restored to its original condition.

## 2.4 TEMPORARY MONITORING WELL INSTALLATION AND DEVELOPMENT

### 2.4.1 Well Installation

Temporary monitoring wells were installed during field operations at SWMU 15 at eight soil boring locations where water was encountered (15SB002, 15SB006, 15SB009, 15SB031, 15SB035, 15SB046, 15SB048, and 15SB062). A temporary well was initially installed in soil boring 15SB61 located in AOC W [landfill south of the former salt dome (see Figure 1-3)]; however, because no visible signs of contamination were found in any of the borings at AOC W, the temporary well was not sampled and the boring was backfilled with bentonite chips and hydrated in accordance with the manufacturer's

specifications. After the soil boring was drilled to the desired depth and groundwater was encountered, 1-inch-diameter Schedule 40 polyvinyl chloride (PVC) well screen and riser pipe was lowered into the boring. Well screens ranged in length from 5 to 10 feet, depending on well depth, with a slot size of 0.20 inch. A cap or duct tape was placed on the top of each riser pipe.

Temporary monitoring well construction information and water-level measurements are presented in Table 2-2. Well construction logs were completed for each temporary well and are presented in Appendix B.1. Refer to Section 2.3.1 for the drilling method.

## 2.5 SAMPLING OPERATIONS

This section discusses the methodology for soil, surface water, sediment, and groundwater sampling activities at SWMU 15. Table 2-3 provides a summary of all proposed samples, actual samples, and analyses performed. Table 2-4 provides the reasoning as to why an omitted sample was not collected.

### 2.5.1 Soil Sample Collection

During the RFI, 102 soil samples were collected from 62 soil borings in accordance with SOP CTO331-08. See Figure 2-1 for all soil boring locations. Soil sample log sheets are included in Appendix C.1 of this document.

#### 2.5.1.1 Surface Soil Sampling

Surface soil samples were collected from the ground surface to a maximum depth of 2 feet bgs or until refusal was reached using DPT. Upon retrieval, all samples were monitored for the presence of volatile organic compounds (VOCs) using a PID. The results of this screening were recorded on boring logs and/or soil sample log sheets (included in Appendix B.1 and Appendix C.1, respectively, of this document). Samples for VOC analyses were collected first from the 0.5- to 1-foot or 1- to 2-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.

All 50 of the proposed surface soil samples were collected at SWMU 15. One surface soil sample was collected from each of the 50 soil borings from the ground surface to depths of 0.5- to 1-foot or 1- to 2-foot bgs using DPT and HA.

#### 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 soil sample intervals for SWMU 15 are listed in Table 2-1.

Fifty-three of the proposed 74 subsurface soil samples were collected at SWMU 15. Soil boring locations 15SB050 through 15SB061 were located in AOC W and because no visible signs of contamination were seen and no PID readings were recorded in any of the soil cores, no samples were collected. The only other reason a proposed subsurface soil sample was not collected was due to refusal while drilling (Table 2-4).

### 2.5.2 Surface Water Sampling

Surface water samples were collected from intermittent streams, drainage ditches, catch basins, and surface runoff locations throughout SWMU 15. All sample locations were marked with a labeled, wooden survey stake or if located on an impermeable surface (concrete or asphalt), with white spray paint. Fluorescent flagging was tied to the stake or a nearby tree (if available) to facilitate relocation of the sample location for surveying purposes. The surface water samples were collected in accordance with the approved QAPP (TtNUS, 2004). All pertinent field data, including water quality parameters, sampling methods, and locations were recorded on a surface water sample log sheet (see Appendix C.3). See Figure 2-2 for surface water sampling locations.

Fifteen of the 19 proposed surface water samples were collected at SWMU 15. New construction had taken place in the area of four proposed sampling locations (15SW/SD003, 15SW/SD007, 15SW/SD008, and 15SW/SD012) and therefore these locations could not be found.

### 2.5.3 Sediment Sampling

Sediment samples were collected from intermittent streams, drainage ditches, catch basins, and surface runoff locations at SWMU 15. The samples were collected in depositional areas that contained predominantly fine (clay and silt) particles. All sediment samples were collected at a depth of 0 to 6 inches bgs and in accordance with 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 methods, depths, descriptions, and locations, were recorded on sediment sample log sheets (see Appendix C.2). See Figure 2-2 for all sediment sampling locations.

Twelve of the 19 proposed sediment samples were collected at SWMU 15. As stated in Section 2.5.2, new construction had taken place in the area of four proposed sampling locations (15SW/SD003, 15SW/SD007, 15SW/SD008, and 15SW/SD012), and these locations could not be found. The three other locations not sampled (15SW/SD004, 15SW/SD010, and 15SW/SD011) were catch basins that contained no sediment.

An additional seven sediment sample locations (15SD020 through 15SD026) were added in June 2005 to support toxicity testing.

### 2.5.4 Groundwater Purging and Sampling

Eight temporary wells were installed in soil borings that encountered groundwater including 15SB002, 15SB006, 15SB009, 15SB031, 15SB035, 15SB046, 15SB048, and 15SB062. See Figure 2-1 for locations.

Purging and stabilization of the temporary wells prior to sampling was accomplished using low-flow techniques in accordance with SOP CTO331-15 and SOP CTO331-16. Sampling was accomplished in accordance with SOP CTO331-05. Sample analytes are provided in Table 2-3.

The temporary wells were purged prior to sampling using a peristaltic pump. Groundwater quality parameters including pH, specific conductance, temperature, dissolved oxygen (DO), and oxidation reduction potential (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. 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. The amount of time a well was purged and the volume of water removed while purging varied with each well depending on how the well reacted. Copies of the monitoring well low-flow purge data sheets and groundwater sample log sheets are provided in Appendix C.4 of this document.

Sample containers were filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. VOC samples were collected and immediately sealed in 40-mL vials so that no headspace existed. Samples for total metals plus tin, dissolved metals plus tin, SVOCs, and

PAHs were collected next and in the order listed (when applicable). Samples with turbidity values greater than 10 nephelometric turbidity units (NTUs) were field filtered for dissolved metals analyses prior to sarnple preservation using a 0.45-micron in-line filter. All pertinent field data, including sampling methods, purge information, pump intake depths, and locations, were recorded on low-flow purge data sheets and groundwater sample log sheets (see Appendix C.4).

## 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, equipment calibration log sheets, field logbooks, and health and safety documentation. Field documentation was completed as per SOP CTO 331-03. The sample log sheets contain information such as sample location and sample identification, 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 are included in Appendix C of this document. Chain-of-custody records (see Appendix C.5) were used to track each sample from collection to receipt and analysis at the laboratory. Equipment calibration log sheets are discussed in Section 2.9.1 and can be found in Appendix C.6 of this document. Upon completion of sample analyses, sample bottle tags were forwarded by laboratory personnel to the NSWC Crane Environmental Protection Department (EPD) for storage.

## 2.7 SAMPLE HANDLING, PACKAGING, AND SHIPPING

Sample handling activities included 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 laboratory 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

Quality assurance (QA)/quality control (QC) samples were generated and collected during sampling activities to monitor both field and laboratory procedures. These procedures are detailed in the approved QAPP and QAPP Addenda. QA/QC samples included field duplicates, equipment rinsate blanks, trip blanks, source water blanks, and temperature blanks. Field duplicate results are tabulated in Appendix G (Analytical Data) 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 and groundwater and surface water samples 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 20 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. When pre-cleaned, dedicated, or disposable sampling equipment was used (no decontamination was required), one equipment rinsate blank was collected as a batch blank. 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 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-base 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.6.

### 2.9.2 Field Investigation Preventive Maintenance Procedures/Schedule

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 soil boring and surface water/sediment sampling locations were surveyed (see Figures 2-1 and 2-2, respectively). For all soil boring and surface water/sediment locations, the ground surface elevation was surveyed to the nearest 0.10 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 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 each round of RFI activities in accordance with SOP CTO331-17. This equipment included drilling rigs, down-hole tools, and soil and water sampling equipment.

### 2.11.1 Sampling Equipment

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

### 2.12.1 Groundwater-Level Measurements

Water-level measurements were obtained from each temporary monitoring well prior to development and purging. The water-level measurements were recorded to the nearest 0.01 foot and can be found on the sample log sheets provided in Appendix C of this document.

### 2.12.2 Estimation of Stream Flow

Stream flow estimates were made based on visual observations and can be found on the surface water sample log sheets located in Appendix C.3. Due to shallow depths, dense grassy cover, and/or natural features interfering with adequate unrestricted stream/drainage ditch runs, stream flow measurement SOP CTO331-21 could not be followed at all sampling locations.

## 2.13 FIELD CORRECTIVE ACTION

Corrective action includes the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or "out of QC" performance that can affect data quality, and the process of 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 resulting 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 this field investigation.

## 2.14 INVESTIGATION-DERIVED WASTE HANDLING

The field investigations generated several types of potentially contaminated wastes including personal protective equipment (PPE), decontamination fluids from sampling equipment decontamination, 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 Drilling and Sampling Equipment Decontamination Fluids – All purge waters and equipment decontamination fluids were collected and discharged to the NSWC Crane permitted waste treatment plant.

Waste Cuttings 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.

## 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 and the HASP. 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 through pre-visit communication and daily meetings during field work.

## 2.16 RECORDKEEPING

Various hardcover, bound record books were maintained for each field activity in accordance with SOP CTO331-03. 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 and arrival and departure times of personnel, management issues, etc. Various field notebooks were also maintained. For example, the site geologist supervising temporary 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 for CTO 0331.

## 2.17 RESTORATION AND REVEGETATION

At the conclusion of the field activities, the FOL met with NSWC personnel to discuss areas impacted by drilling activities at SWMU 15 that required site restoration. Restoration of SWMU 15 consisted of smoothing out ruts made by the DPT rig and reseeding.

TABLE 2-1

SOIL BORING DEPTHS, METHODS OF COLLECTION, AND SAMPLE INTERVALS
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA
PAGES 1 OF 2

| Boring No. | Total Depth (feet bgs) | Drilling Method[1] | Date Drilled | Depth Interval(s) of Soil Samples (feet bgs) |
|---|---|---|---|---|
| **SWMU 15** | | | | |
| 15SB001 | 6 | DPT | 12/9/2004 | 0-2, 2-6 |
| 15SB002[2] | 6 | DPT | 12/8/2004 | 0-2, 2-6 |
| 15SB003 | 6 | DPT | 12/9/2004 | 0-2, 2-6 |
| 15SB004 | 6 | DPT | 12/9/2004 | 0-2, 2-6 |
| 15SB005 | 6 | DPT | 12/8/2004 | 0-2, 2-6 |
| 15SB006[2] | 6 | DPT | 12/8/2004 | 0-2, 2-6 |
| 15SB007 | 6 | DPT | 12/8/2004 | 0-2, 2-6 |
| 15SB008 | 9 | DPT | 12/8/2004 | 0-2, 2-6, 6-10 |
| 15SB009[2] | 9.5 | DPT | 12/8/2004 | 0-2, 2-6, 6-10 |
| 15SB010 | 9.5 | DPT | 12/8/2004 | 0-2, 2-6, 6-10 |
| 15SB011 | 6 | DPT | 12/8/2004 | 0-2, 2-6 |
| 15SB012 | 6 | DPT | 12/8/2004 | 0-2, 2-6 |
| 15SB013 | 6 | DPT | 12/8/2004 | 0-2, 2-6 |
| 15SB014 | 6 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB015 | 6 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB016 | 6 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB017 | 6 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB018 | 6 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB019 | 6 | DPT | 12/10/2004 | 0-2, 2-6 |
| 15SB020 | 6 | DPT | 12/10/2004 | 0-2, 2-6 |
| 15SB021 | 6 | DPT | 12/10/2004 | 0-2, 2-6 |
| 15SB022 | 6 | DPT | 10/12/2004 | 0-2, 2-6 |
| 15SB023 | 6 | DPT | 12/10/2004 | 0-2, 2-6 |
| 15SB024 | 5 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB025 | 5 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB026 | 3.5 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB027 | 3 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB028 | 4 | DPT | 12/11/2004 | 0-2, 2-6 |
| 15SB029 | 5 | DPT | 12/9/2004 | 0-2, 2-6 |
| 15SB030 | 3 | DPT | 12/14/2004 | 0-2, 2-6 |
| 15SB031[2] | 14 | DPT | 12/9/2004 | 0-2, 2-6, 6-10, 10-14 |
| 15SB032 | 3 | DPT | 12/9/2004 | 0-2, 2-6 |
| 15SB033 | 2 | HA | 12/14/2004 | 0-2 |
| 15SB034 | 2 | HA | 12/14/2004 | 0-2 |
| 15SB035[2] | 6 | DPT | 12/9/2004 | 0-2, 2-6 |
| 15SB036 | 2 | HA | 12/14/2004 | 0-2 |
| 15SB037 | 4 | DPT | 12/9/2004 | 0-2, 2-6 |
| 15SB038 | 2 | HA | 12/14/2004 | 0-2 |

TABLE 2-1

SOIL BORING DEPTHS, METHODS OF COLLECTION, AND SAMPLE INTERVALS
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Boring No. | Total Depth (feet bgs) | Drilling Method[1] | Date Drilled | Depth Interval(s) of Soil Samples (feet bgs) |
|---|---|---|---|---|
| 15SB039 | 3 | DPT | 12/10/2004 | 0-2 |
| 15SB040 | 6 | DPT | 12/10/2004 | 0-2, 2-6 |
| 15SB041 | 2 | HA | 12/14/2004 | 0-2 |
| 15SB042 | 6 | DPT | 12/10/2004 | 0-2, 2-6 |
| 15SB043 | 5 | DPT | 12/10/2004 | 0-2, 2-6 |
| 15SB044 | 4.5 | DPT | 12/10/2004 | 0-2, 2-6 |
| 15SB045 | 14 | DPT | 12/10/2004 | 0-2, 2-6, 6-10, 10-12 |
| 15SB046[2] | 20.5 | DPT | 12/10/2004 | 0-2, 2-6, 6-10, 10-20 |
| 15SB047 | 2 | DPT | 12/9/2004 | 0-2 |
| 15SB048[2] | 15 | DPT | 12/9/2004 | 0-2, 2-6, 6-10, 10-15 |
| 15SB049 | 1 | HA | 12/14/2004 | 0-2 |
| 15SB050[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB051[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB052[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB053[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB054[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB055[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB056[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB057[3] | 9.5 | DPT | 12/13/2004 | NS |
| 15SB058[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB059[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB060[3] | 6 | DPT | 12/13/2004 | NS |
| 15SB061[2][3] | 6 | DPT | 12/13/2004 | NS |
| 15SB062[2] | 3.5 | HA | 12/14/2004 | 0-2, 2-6 |

1 - DPT = Direct Push Technology HA = Hand augering.
2 - Temporary wells installed at these locations.
3 - Located in Area of Concern W. No visible signs of contamination in soil core, therefore not sampled.
bgs - Below ground surface.
NS = Not sampled.

TABLE 2-2

TEMPORARY MONITORING WELL CONSTRUCTION INFORMATION AND WATER-LEVEL MEASUREMENTS
SWMU 15 (ROADS AND GROUNDS)
NSWC CRANE
CRANE, INDIANA

| Temporary Well Number | Corresponding Soil Boring Number | Installation Date | Northing (feet) | Easting (feet) | Ground Elevation (feet amsl) | Riser Height (feet above ground surface) | Top of Riser Elevation (feet amsl) | Total Depth (feet bgs)(1) | Screened Interval | | | | Water-Bearing Zone | January 5 - 8, 2005 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Top (feet bgs) | Bottom (feet bgs) | Top (feet amsl) | Bottom (feet amsl) | | Depth to Water (feet btor) | Water Elevation (feet amsl) |
| 15TW001 | 15SB002 | 12/8/04 | 1317491.74 | 3027519.72 | 758.07 | 1.44 | 759.51 | 6.0 | 1.00 | 6.00 | 757.07 | 752.07 | OB | 2.90 | 756.61 |
| 15TW002 | 15SB006 | 12/8/04 | 1317451.19 | 3027512.32 | 755.64 | 1.52 | 757.16 | 6.0 | 1.00 | 6.00 | 754.64 | 749.64 | OB | 3.95 | 753.21 |
| 15TW003 | 15SB009 | 12/8/04 | 1317429.64 | 3027643.80 | 752.08 | 1.00 | 753.08 | 9.5 | 4.50 | 9.50 | 747.58 | 742.58 | OB | 2.22 | 750.86 |
| 15TW004 | 15SB031 | 12/9/04 | 1317470.44 | 3028187.10 | 756.32 | 1.48 | 757.80 | 14.0 | 9.00 | 14.00 | 747.32 | 742.32 | OB | 9.73 | 748.07 |
| 15TW005 | 15SB035 | 12/9/04 | 1317331.38 | 3028308.96 | 708.40 | 4.18 | 712.58 | 6.0 | 1.00 | 6.00 | 707.40 | 702.40 | OB | 4.15 | 708.43 |
| 15TW006 | 15SB046 | 12/10/04 | 1317772.54 | 3028437.38 | 763.18 | 1.35 | 764.53 | 20.5 | 10.00 | 20.00 | 753.18 | 743.18 | OB | 13.88 | 750.65 |
| 15TW007 | 15SB048 | 12/9/04 | 1317628.25 | 3028420.25 | 755.69 | 0.10 | 755.79 | 15.0 | 10.00 | 15.00 | 745.69 | 740.69 | OB | 10.28 | 745.51 |
| 15TW008 | 15SB062 | 12/14/04 | 1317725.72 | 3028627.22 | 737.26 | 2.60 | 739.86 | 3.5 | 1.00 | 3.50 | 736.26 | 733.76 | OB | 3.19 | 736.67 |

**Notes:**
1 = Total depth of boring, total depth of temporary well may be less.
amsl = Above mean sea level (NAVD88).
bgs = Below ground surface.
btor = Below top of riser/reference point.
NAVD = 1988 North American Vertical Datum (NAVD88).
NM = Not measured.
OB = Overburden soils.

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND ANALYSES
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | Pesticides | Herbicides | PCBs | Cyanide | Sieve | Total Organic Carbon | Toxicity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals | 8260B | SVOCs (except PAHs) | PAHs | | | | | | | |
| **Groundwater (temporary wells)** | | | | | | | | | | | | |
| 15GWTW001 | X | | X | X | X | | | X | | | | |
| 15GWTW002 | X | | X | X | X | | | X | | | | |
| 15GWTW002-F | | X | | | | | | | | | | |
| 15GWTW003 | X | | X | X | X | | | X | | | | |
| 15GWTW003-F | | X | | | | | | | | | | |
| 15GWTW004 | X | | X | X | X | X | X | X | | | | |
| 15GWTW004-F | | X | | | | | | | | | | |
| 15GWTW005 | X | | X | X | X | X | X | X | | | | |
| 15GWTW005-F | | X | | | | | | | | | | |
| 15GWTW006 | X | | X | X | X | X | X | X | | | | |
| 15GWTW007 | X | | X | X | X | X | X | X | | | | |
| 15GWTW007-F | | X | | | | | | | | | | |
| 15GWTW008 | X | | X | X | X | X | X | X | | | | |
| 15GWTW008-F | | X | | | | | | | | | | |
| 15GWTW009 | O | | O | O | O | O | O | O | | | | |
| **Analyzed** | **8** | **6** | **8** | **8** | **8** | **5** | **5** | **8** | **0** | **0** | **0** | **0** |
| **Omitted** | **1** | | **1** | **1** | **1** | **1** | **1** | **1** | | | | |
| **Surface Water** | | | | | | | | | | | | |
| 15SW00101 | X | | X | X | X | X | X | X | | | | |
| 15SW00101-F | | X | | | | | | | | | | |
| 15SW00201 | X | | X | X | X | X | X | X | | | | |
| 15SW00201-F | | X | | | | | | | | | | |
| 15SW00301 | O | | O | O | O | O | O | O | | | | |
| 15SW00301-F | | O | | | | | | | | | | |
| 15SW00401 | X | | X | X | X | X | X | X | | | | |
| 15SW00401-F | | X | | | | | | | | | | |
| 15SW00501 | X | | X | X | X | | | X | | | | |
| 15SW00501-F | | X | | | | | | | | | | |
| 15SW00601 | X | | X | X | X | X | X | X | | | | |
| 15SW00601-F | | X | | | | | | | | | | |
| 15SW00701 | O | | O | O | O | | | O | | | | |
| 15SW00701-F | | O | | | | | | | | | | |
| 15SW00801 | O | | O | O | O | O | O | O | | | | |
| 15SW00801-F | | O | | | | | | | | | | |
| 15SW00901 | X | | X | X | X | U | U | X | | | | |
| 15SW00901-F | | X | | | | | | | | | | |
| 15SW01001 | X | | X | X | X | X | X | X | | | | |
| 15SW01001-F | | X | | | | | | | | | | |
| 15SW01101 | X | | X | X | X | X | X | X | | | | |

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND ANALYSES
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | Pesticides | Herbicides | PCBs | Cyanide | Sieve | Total Organic Carbon | Toxicity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals | 8260B | SVOCs (except PAHs) | PAHs | | | | | | | |
| **Groundwater (temporary wells) (Continued)** | | | | | | | | | | | | |
| 15SW01101-F | | X | | | | | | | | | | |
| 15SW01201 | O | | O | O | O | O | O | O | | | | |
| 15SW01201-F | | O | | | | | | | | | | |
| 15SW01301 | X | | X | X | X | X | X | X | | | | |
| 15SW01301-F | | X | | | | | | | | | | |
| 15SW01401 | X | | X | X | X | X | X | X | | | | |
| 15SW01401-F | | X | | | | | | | | | | |
| 15SW01501 | X | | X | X | X | X | X | X | | | | |
| 15SW01501-F | | X | | | | | | | | | | |
| 15SW01601 | X | | X | X | X | X | X | X | | | | |
| 15SW01601-F | | X | | | | | | | | | | |
| 15SW01701 | X | | X | X | X | X | X | X | | | | |
| 15SW01701-F | | X | | | | | | | | | | |
| 15SW01801 | X | | X | X | X | X | X | X | | | | |
| 15SW01801-F | | X | | | | | | | | | | |
| 15SW01901 | X | | X | X | X | X | X | X | | | | |
| 15SW01901-F | | X | | | | | | | | | | |
| **Analyzed** | **15** | **15** | **15** | **15** | **15** | **14** | **14** | **15** | **0** | **0** | **0** | **0** |
| **Omitted** | **4** | **4** | **4** | **4** | **4** | **3** | **3** | **4** | | | | |
| **Sediment** | | | | | | | | | | | | |
| 15SD0010006 | X | | X | X | X | X | X | X | X | | | |
| 15SD0020006 | X | | X | X | X | X | X | X | X | | | |
| 15SD0030006 | O | | O | O | O | O | O | O | O | | | |
| 15SD0040006 | O | | O | O | O | O | O | O | O | | | |
| 15SD0050006 | X | | X | X | X | X | X | X | X | | | |
| 15SD0060006 | X | | X | X | X | X | X | X | | | | |
| 15SD0070006 | O | | O | O | O | | | O | | | | |
| 15SD0080006 | O | | O | O | O | O | O | O | | | | |
| 15SD0090006 | X | | X | X | X | X | X | X | | | | |
| 15SD0100006 | O | | O | O | O | O | O | O | | | | |
| 15SD0110006 | O | | O | O | O | O | O | O | | | | |
| 15SD0120006 | O | | O | O | O | O | O | O | | | | |
| 15SD0130006 | X | | X | X | X | X | X | X | | | | |
| 15SD0140006 | X | | X | X | X | X | X | X | | | | |
| 15SD0150006 | X | | X | X | X | X | X | X | | | | |
| 15SD0160006 | X | | X | X | X | X | X | X | | | | |
| 15SD0170006 | X | | X | X | X | X | X | X | | | | |
| 15SD0180006 | X | | X | X | X | X | X | X | | | | |
| 15SD0190006 | X | | X | X | X | X | X | X | | | | |

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND ANALYSES
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals | 8260B | SVOCs (except PAHs) | PAHs | Pesticides | Herbicides | PCBs | Cyanide | Sieve | Total Organic Carbon | Toxicity |
| **Sediment (Continued)** | | | | | | | | | | | | |
| 15SD0200006 | X | | | X | | | | | | X | X | X |
| 15SD0210006 | | | | X | | | | | | | | X |
| 15SD0220006 | X | | | X | | | | | | X | X | X |
| 15SD0230006 | X | | | X | | | | | | X | X | X |
| 15SD0240006 | X | | | X | | | | | | X | X | X |
| 15SD0250006 | | | | X | | | | | | | | X |
| 15SD0260006 | X | | | X | | | | | | X | X | X |
| **Analyzed** | **17** | | **12** | **19** | **12** | **12** | **12** | **12** | **3** | **5** | **5** | **6** |
| **Omitted** | **7** | | **7** | **7** | **7** | **6** | **6** | **7** | **2** | **0** | **0** | **0** |
| **Surface Soil** | | | | | | | | | | | | |
| 15SS0010002 | X | | X | X | X | | X | | | | | |
| 15SS0020002 | X | | X | X | X | | X | | | | | |
| 15SS0030002 | X | | X | X | X | | X | | | | | |
| 15SS0040002 | X | | X | X | X | | X | | | | | |
| 15SS0050002 | X | | X | X | X | | X | | | | | |
| 15SS0060002 | X | | X | X | X | | X | | | | | |
| 15SS0070002 | X | | X | X | X | | X | | | | | |
| 15SS0080002 | X | | X | X | X | | | | | | | |
| 15SS0090002 | X | | X | X | X | | | | | | | |
| 15SS0100002 | X | | X | X | X | | | | | | | |
| 15SS0110002 | | | X | X | X | | | | | | | |
| 15SS0120002 | | | X | X | X | | | | | | | |
| 15SS0130002 | | | X | X | X | | | | | | | |
| 15SS0140002 | X | | | | | X | X | | | | | |
| 15SS0150002 | X | | | | | X | X | | | | | |
| 15SS0160002 | X | | | | | X | X | | | | | |
| 15SS0170002 | X | | | | | X | X | | | | | |
| 15SS0180002 | X | | | | | X | X | | | | | |
| 15SS0190002 | X | | X | X | X | X | X | X | | | | |
| 15SS0200002 | X | | X | X | X | X | X | X | | | | |
| 15SS0210002 | X | | X | X | X | X | X | X | | | | |
| 15SS0220002 | X | | X | X | X | X | X | X | | | | |
| 15SS0230002 | X | | X | X | X | X | X | X | | | | |
| 15SS0240002 | | | | X | X | | | | | | | |
| 15SS0250002 | | | | X | X | | | | | | | |
| 15SS0260002 | | | | X | X | | | | | | | |
| 15SS0270002 | | | | X | X | | | | | | | |
| 15SS0280002 | | | | X | X | | | | | | | |
| 15SS0290002 | X | | X | X | X | X | X | X | | | | |

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND ANALYSES
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | Pesticides | Herbicides | PCBs | Cyanide | Sieve | Total Organic Carbon | Toxicity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals | 8260B | SVOCs (except PAHs) | PAHs | | | | | | | |
| **Surface Soil (Continued)** | | | | | | | | | | | | |
| 15SS0300002 | X | | X | X | X | X | X | X | | | | |
| 15SS0310002 | X | | X | X | X | X | X | X | | | | |
| 15SS0320002 | X | | X | X | X | X | X | X | | | | |
| 15SS0330002 | X | | X | X | X | X | X | X | | | | |
| 15SS0340002 | X | | X | X | X | X | X | X | | | | |
| 15SS0350002 | X | | X | X | X | X | X | X | | | | |
| 15SS0360002 | X | | X | X | X | X | X | X | | | | |
| 15SS0370002 | X | | X | X | X | X | X | X | | | | |
| 15SS0380002 | X | | X | X | X | X | X | X | | | | |
| 15SS0390002 | X | | X | X | X | X | X | X | | | | |
| 15SS0400002 | X | | X | X | X | X | X | X | | | | |
| 15SS0410002 | X | | X | X | X | X | X | X | | | | |
| 15SS0420002 | X | | X | X | X | | | | | | | |
| 15SS0430002 | X | | X | X | X | | | | | | | |
| 15SS0440002 | X | | X | X | X | | | | | | | |
| 15SS0450002 | X | | X | X | X | X | X | X | | | | |
| 15SS0460002 | X | | X | X | X | X | X | X | | | | |
| 15SS0470002 | X | | X | X | X | X | X | X | | | | |
| 15SS0480002 | X | | X | X | X | X | X | X | | | | |
| 15SS0490002 | X | | X | X | X | X | X | X | | | | |
| 15SS0620002 | X | | X | X | X | X | X | X | | | | |
| **Analyzed** | **42** | | **40** | **45** | **45** | **29** | **36** | **24** | **0** | **0** | **0** | **0** |
| **Omitted** | | | | | | | | | | | | |
| **Subsurface Soil** | | | | | | | | | | | | |
| 15SB0010206 | X | | X | X | X | | X | | | | | |
| 15SB0020206 | X | | X | X | X | | X | | | | | |
| 15SB0030206 | X | | X | X | X | | X | | | | | |
| 15SB0040206 | X | | X | X | X | | X | | | | | |
| 15SB0050206 | X | | X | X | X | | X | | | | | |
| 15SB0060206 | X | | X | X | X | | X | | | | | |
| 15SB0070206 | X | | X | X | X | | X | | | | | |
| 15SB0080206 | X | | X | X | X | | | | | | | |
| 15SB0080610 | X | | X | X | X | | | | | | | |
| 15SB008xxxx | O | | O | O | O | | | | | | | |
| 15SB0090206 | X | | X | X | X | | | | | | | |
| 15SB0090610 | X | | X | X | X | | | | | | | |
| 15SB009xxxx | O | | O | O | O | | | | | | | |
| 15SB0100206 | X | | X | X | X | | | | | | | |
| 15SB0100610 | X | | X | X | X | | | | | | | |

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND ANALYSES
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | Pesticides | Herbicides | PCBs | Cyanide | Sieve | Total Organic Carbon | Toxicity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals | 8260B | SVOCs (except PAHs) | PAHs | | | | | | | |
| **Subsurface Soil (Continued)** | | | | | | | | | | | | |
| 15SB010xxxx | O | | O | O | O | | | | | | | |
| 15SB0110206 | | | X | X | X | | | X | | | | |
| 15SB0120206 | | | X | X | X | | | X | | | | |
| 15SB0130206 | | | X | X | X | | | X | | | | |
| 15SB0140206 | X | | | | | X | X | | | | | |
| 15SB0150206 | X | | | | | X | X | | | | | |
| 15SB0160206 | X | | | | | X | X | | | | | |
| 15SB0170206 | X | | | | | X | X | | | | | |
| 15SB0180206 | X | | | | | X | X | | | | | |
| 15SB0190206 | X | | X | X | X | X | X | X | | | | |
| 15SB0200206 | X | | X | X | X | X | X | X | | | | |
| 15SB0210206 | X | | X | X | X | X | X | X | | | | |
| 15SB0220206 | X | | X | X | X | X | X | X | | | | |
| 15SB0230206 | X | | X | X | X | X | X | X | | | | |
| 15SB0240206 | | | | X | X | | | | | | | |
| 15SB0250206 | | | | X | X | | | | | | | |
| 15SB0260206 | | | | X | X | | | | | | | |
| 15SB0270206 | | | | X | X | | | | | | | |
| 15SB0280206 | | | | X | X | | | | | | | |
| 15SB0290206 | X | | X | X | X | X | X | X | | | | |
| 15SB0300206 | X | | X | X | X | X | X | X | | | | |
| 15SB0310206 | X | | X | X | X | X | X | X | | | | |
| 15SB0310610 | X | | X | X | X | X | X | X | | | | |
| 15SB0311014 | X | | X | X | X | X | X | X | | | | |
| 15SB0320206 | X | | X | X | X | X | X | X | | | | |
| 15SB0330206 | O | | O | O | O | O | O | O | | | | |
| 15SB0340206 | O | | O | O | O | O | O | O | | | | |
| 15SB0350206 | X | | X | X | X | X | X | X | | | | |
| 15SB0360206 | O | | O | O | O | O | O | O | | | | |
| 15SB0370206 | X | | X | X | X | X | X | X | | | | |
| 15SB0380206 | O | | O | O | O | O | O | O | | | | |
| 15SB0390206 | O | | O | O | O | O | O | O | | | | |
| 15SB0400206 | X | | X | X | X | X | X | X | | | | |
| 15SB0410206 | O | | O | O | O | O | O | O | | | | |
| 15SB0420206 | X | | X | X | X | | | | | | | |
| 15SB0430206 | X | | X | X | X | | | | | | | |
| 15SB0440206 | X | | X | X | X | | | | | | | |
| 15SB0450206 | X | | X | X | X | X | X | X | | | | |
| 15SB0450610 | X | | X | X | X | X | X | X | | | | |

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND ANALYSES
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | Pesticides | Herbicides | PCBs | Cyanide | Sieve | Total Organic Carbon | Toxicity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals | 8260B | SVOCs (except PAHs) | PAHs | | | | | | | |
| **Subsurface Soil (Continued)** | | | | | | | | | | | | |
| 15SB0451012 | X | | X | X | X | X | X | X | | | | |
| 15SB0460206 | X | | X | X | X | X | X | X | | | | |
| 15SB0460610 | X | | X | X | X | X | X | X | | | | |
| 15SB0461020 | X | | X | X | X | X | X | X | | | | |
| 15SB0480206 | X | | X | X | X | X | X | X | | | | |
| 15SB0480610 | X | | X | X | X | X | X | X | | | | |
| 15SB0481015 | X | | X | X | X | X | X | X | | | | |
| 15SB050xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB051xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB052xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB053xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB054xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB055xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB056xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB057xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB058xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB059xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB060xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB061xxxx | O | | O | O | O | O | O | O | | | | |
| 15SB0620206 | X | | X | X | X | X | X | X | | | | |
| **Analyzed** | **45** | | **43** | **48** | **48** | **29** | **36** | **27** | **0** | **0** | **0** | **0** |
| **Omitted** | **21** | | **21** | **21** | **21** | **18** | **18** | **18** | | | | |

Metals - U.S. EPA Contract Laboratory Program Target Analyte List (TAL) Metals.
O = Omitted (See Table 2-4 for reason).
PAHs - Polynuclear aromatic hydrocarbons.
PCBs - Polychlorinated biphenyls.
SVOC - Semivolatile organic compounds.
VOC - Volatile organic compounds.
X = Analyzed.

TABLE 2-4

RATIONALE FOR PROPSED SAMPLES NOT COLLECTED AND ADDITIONAL SAMPLES COLLECTED
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | Pesticides | Herbicides | PCBs | Cyanide | Toxicity | REASON |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals plus Tin (dissolved) | 8260B | SVOCs (except PAHs) | PAHs | | | | | | |
| **Surface Water** | | | | | | | | | | | |
| 15SW00301 | O | | O | O | O | O | O | O | | | Impacted by new construction (location not found) |
| 15SW00701 | O | | O | O | O | | | O | | | Proposed location not found |
| 15SW00801 | O | | O | O | O | O | O | O | | | Impacted by new construction (location not found) |
| 15SW01201 | O | | O | O | O | O | O | O | | | Impacted by new construction (sanitary sewer) |
| **Sediment** | | | | | | | | | | | |
| 15SD0030006 | O | | O | O | O | O | O | O | O | | Impacted by new construction (location not found) |
| 15SD0040006 | O | | O | O | O | O | O | O | O | | Catch basin (no sediment) |
| 15SD0070006 | O | | O | O | O | | | O | | | Proposed location not found |
| 15SD0080006 | O | | O | O | O | O | O | O | | | Impacted by new construction (location not found) |
| 15SD0100006 | O | | O | O | O | O | O | O | | | Catch basin (no sediment) |
| 15SD0110006 | O | | O | O | O | O | O | O | | | Catch basin (no sediment) |
| 15SD0120006 | O | | O | O | O | O | O | O | | | Impacted by new construction (sanitary sewer) |
| 15SD0200006 | | | | | | | | | | O | Additional sample to support Ecological Risk Assessment |
| 15SD0210006 | | | | | | | | | | O | Additional sample to support Ecological Risk Assessment |
| 15SD0220006 | | | | | | | | | | O | Additional sample to support Ecological Risk Assessment |
| 15SD0230006 | | | | | | | | | | O | Additional sample to support Ecological Risk Assessment |
| 15SD0240006 | | | | | | | | | | O | Additional sample to support Ecological Risk Assessment |
| 15SD0250006 | | | | | | | | | | O | Additional sample to support Ecological Risk Assessment |
| 15SD0260006 | | | | | | | | | | O | Additional sample to support Ecological Risk Assessment |

TABLE 2-4

RATIONALE FOR PROPSED SAMPLES NOT COLLECTED AND ADDITIONAL SAMPLES COLLECTED
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | Pesticides | Herbicides | PCBs | Cyanide | Toxicity | REASON |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals plus Tin (dissolved) | 8260B | SVOCs (except PAHs) | PAHs | | | | | | |
| **Subsurface Soil** | | | | | | | | | | | |
| 15SB008xxxx | O | | O | O | O | | | | | | Refusal at 9 feet |
| 15SB009xxxx | O | | O | O | O | | | | | | Refusal at 9.5 feet |
| 15SB010xxxx | O | | O | O | O | | | | | | Refusal at 9.5 feet |
| 15SB0330206 | O | | O | O | O | O | O | O | | | Refusal at 2 feet |
| 15SB0340206 | O | | O | O | O | O | O | O | | | Refusal at 2 feet |
| 15SB0360206 | O | | O | O | O | O | O | O | | | Refusal at 2 feet |
| 15SB0380206 | O | | O | O | O | O | O | O | | | Refusal at 2 feet |
| 15SB0390206 | O | | O | O | O | O | O | O | | | Refusal at 3 feet |
| 15SB0410206 | O | | O | O | O | O | O | O | | | Refusal at 2 feet |
| 15SB050xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB051xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB052xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB053xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB054xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB055xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB056xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB057xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB058xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB059xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |

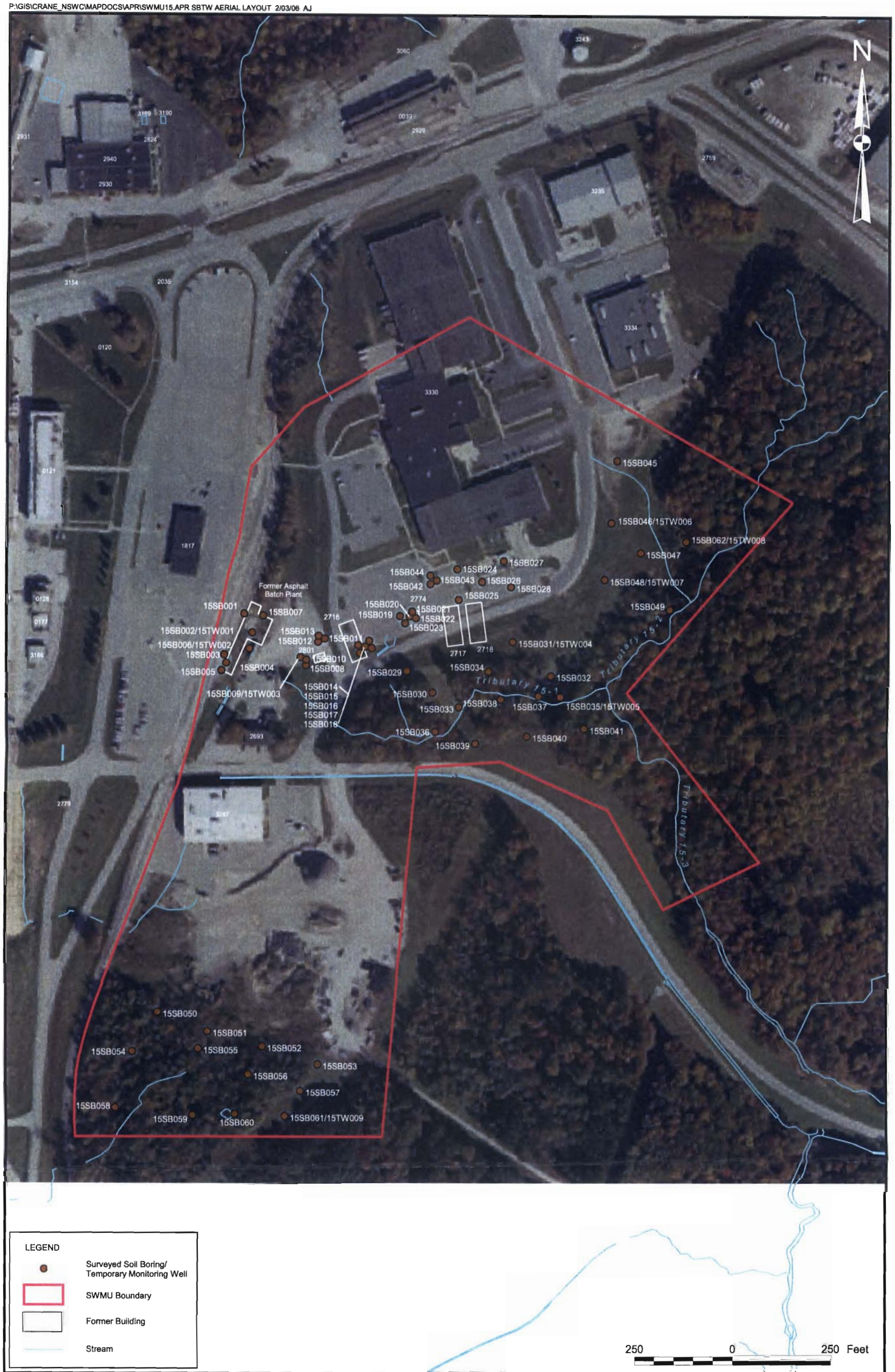
TABLE 2-4

RATIONALE FOR PROPSED SAMPLES NOT COLLECTED AND ADDITIONAL SAMPLES COLLECTED
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Sample Number | Metals | | VOCs | SVOCs | | Pesticides | Herbicides | PCBs | Cyanide | Toxicity | REASON |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TAL Metals plus Tin (total) | TAL Metals plus Tin (dissolved) | 8260B | SVOCs (except PAHs) | PAHs | | | | | | |
| **Subsurface Soil (Continued)** | | | | | | | | | | | |
| 15SB060xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |
| 15SB061xxxx | O | | O | O | O | O | O | O | | | AOC W (no visible signs of contamination in soil core) |

PAHs - Polynuclear aromatic hydrocarbons.
PCBs - Polychlorinated biphenyls
SVOCs - Semivolatile organic compounds.
TAL - Target Analyte List.
VOCs - Volatile organic compounds.
O - Proposed analysis.

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU15.APR SBTW AERIAL LAYOUT 2/03/06 AJ



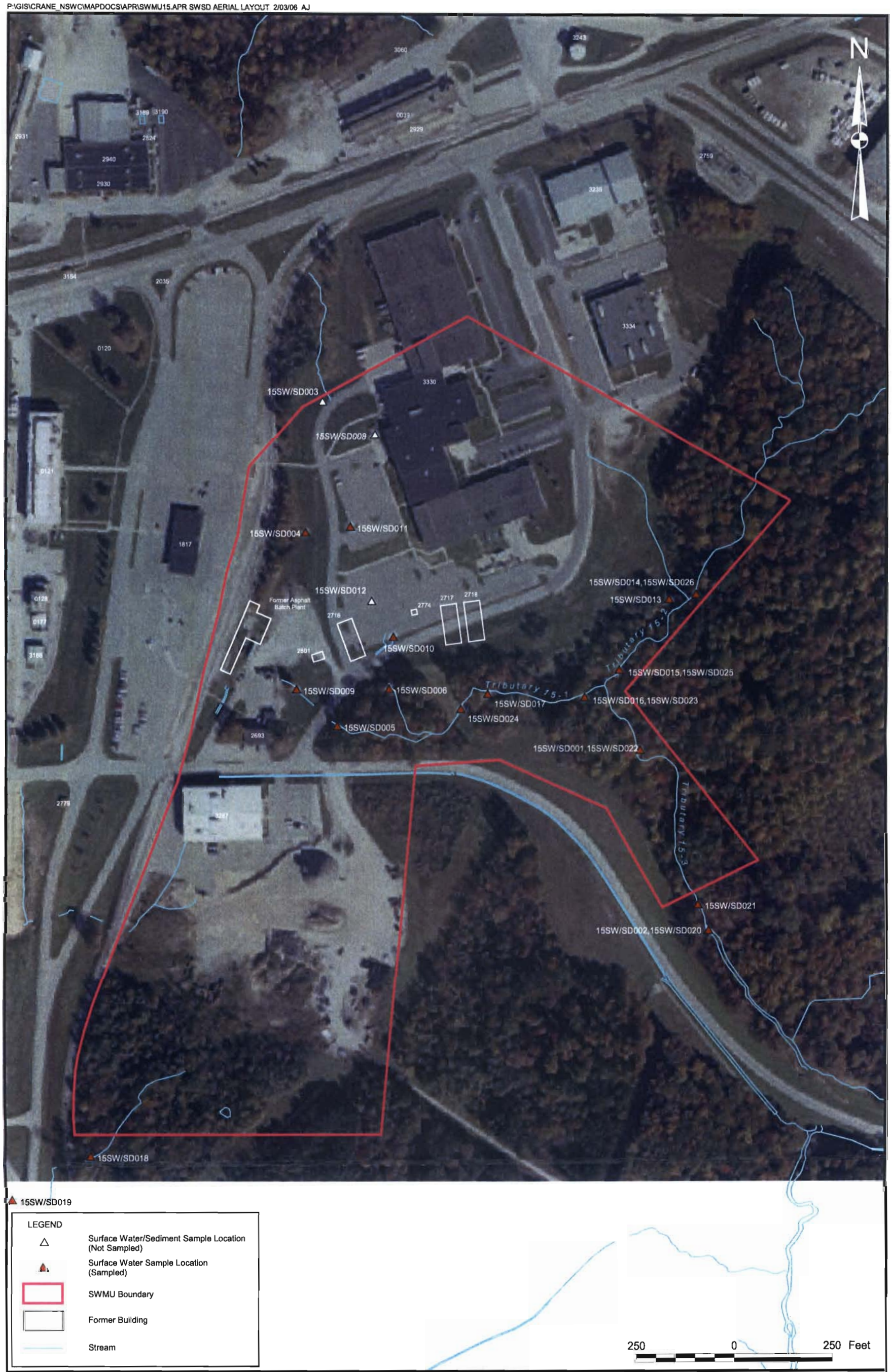

| DRAWN BY | DATE |
|---|---|
| A. JANOCHA | 2/03/06 |
| CHECKED BY | DATE |
| R. BASINSKI | 2/03/06 |
| COST/SCHEDULE-AREA | |
| SCALE AS NOTED | |

NAVFAC

SURVEYED SOIL BORING / TEMPORARY GROUNDWATER WELL LOCATIONS
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA

| CONTRACT NUMBER CTO 0331 | |
|---|---|
| APPROVED BY | DATE |
| APPROVED BY | DATE |
| DRAWING NO. FIGURE 2 - 1 | REV 0 |

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU15.APR SWSD AERIAL LAYOUT 2/03/06 AJ




| DRAWN BY | DATE |
|---|---|
| A. JANOCHA | 2/03/06 |
| CHECKED BY | DATE |
| R. BASINSKI | 2/03/06 |
| COST/SCHEDULE-AREA | |
| SCALE AS NOTED | |

NAVFAC

SURFACE WATER/SEDIMENT SAMPLE LOCATIONS
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA

| CONTRACT NUMBER CTO 0331 | |
|---|---|
| APPROVED BY | DATE |
| APPROVED BY | DATE |
| DRAWING NO. FIGURE 2 - 2 | REV 0 |

# 3.0 DATA PRESENTATION AND QUALITY

This section describes the analytical data and summarizes the quality of SWMU 15 data. Data presentation is provided in Section 3.1; data quality is described in Section 3.2. Analytical data is presented in Appendix G. Additional detail concerning the data validation and post-validation quality review is presented in Appendix H.

## 3.1 DATA PRESENTATION

RFI data were collected by Tetra Tech NUS (TtNUS) in one sampling round spanning 6 months, as described in Section 2.0 of this report. All samples were collected in December 2004 and January 2005 except for seven sediment samples that were collected in June 2005. These last seven samples were collected to support toxicity testing of the sediments. A complete list of samples collected, and scheduled samples that were not collected, is presented in Table 2-3. Table 2-4 provides explanations for why some samples were not collected or why additional samples were collected. 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 immediately below present descriptions of available background data and SWMU 15 site data.

### 3.1.1 Background Data Set Descriptions

#### 3.1.1.1 Surface Soil Background Concentrations

In addition to the RFI data collection described above, soil samples were 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 metals concentrations in SWMU soils are indicative of background concentrations.

Soil samples were classified into Soil Groups that uniquely represent the chemical and physical soil characteristics by which various Crane soils differ. Those characteristics are as follows:

- 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 15, there is one depositional environment (Pennsylvanian), and two depths (surface and subsurface). In the subsurface, there are two distinct grain size classifications. After chemical analyses and extensive statistical testing, one distinct Soil Group emerged as representing SWMU 15 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 surface soil background data. These tables were taken from TtNUS (2001). Table 3-1 shows concentration ranges and related statistics for all NSWC Crane soils, regardless of depositional environment, depth, or grain size. This table helps the data user understand how an individual SWMU-specific background data set compares to the data set for all of NSWC Crane. Table 3-2 presents surface soil background data summaries specific to SWMU 15 (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 locations of maximum observed concentrations, estimates of the statistical distribution shapes, and estimates of the concentrations (95-percent upper tolerance limit) that encompass 95 percent of the data, on average.

#### 3.1.1.2 Subsurface Soil Background Concentrations

Similar to surface soils, the NSWC Crane basewide background soil collection effort yielded two distinct Soil Groups that represent SWMU 15 subsurface soil metals 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.

#### 3.1.1.3 Surface Water, Sediment, and Groundwater Upgradient Concentrations

For mobile environmental media such as surface water, sediment, and groundwater, "background" concentrations are represented by upgradient 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.

During this investigation, no permanent groundwater monitoring wells were installed and no upgradient groundwater locations were sampled. Surface water channels were divided into three groups: Tributaries 15-1 and 15-2, Tributary 15-3, and Storm Sewer and Outfall (or Storm Sewer) System. These labels were assigned so that the various sample groups could be referenced efficiently. These stream segments all flow into Turkey Creek located to the southeast of SWMU 15. Sampling location 15SW/SD014 is the only location representing upgradient conditions for these three sample groups. In the Appendix G tables, the upgradient samples are marked as "UPGRAD."

The maximum observed chemical concentrations are almost certain to be contained in the site (i.e., SWMU 15) surface water and sediment data (rather than the upgradient data) even if the SWMU 15 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 upgradient of SMWU 15, when one considers 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 Data Set Descriptions

#### 3.1.2.1 Surface Soil Site Data

During the RFI, select surface soil samples were collected for metals, SVOC, VOC, herbicide, pesticide, and PCB analyses as described in Section 2.0.

Some surface soil samples were not collected as proposed. 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 data for SMWU 15 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 Round 1. The samples are marked as to which area they belong. Table 3-5 indicates how often each chemical was detected, the locations of the maximum and minimum detections, 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 Subsurface Soil Site Data

During the RFI, select subsurface soil samples were collected for metals, SVOC, VOC, herbicide, pesticide, and PCB analyses as described in Section 2.0.

Some subsurface 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. Several subsurface soil samples were collected but were only to be analyzed if the surface soil data at the same location indicated that contaminant concentrations were high enough to cause significant subsurface soil contamination. Many of the surface soil samples had no significant contamination; therefore, the subsurface soil samples were not analyzed for select parameters. Twelve locations (15SB050 through 15SB061) in the landfill area located southwest of SMWU 15 proper were also designated for sample collection if landfill debris was observed to be present in the soil cores. No debris was observed and these samples were not collected.

The data for SMWU 15 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 Round 1. Table 3-7 indicates how often each chemical was detected, the locations of the maximum and minimum detections, etc. Table 3-8 is similar to Table G-1 but display 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 Tables 3-8.

#### 3.1.2.3 Surface Water Site Data

Data collected for surface water during the RFI are summarized in Tables 3-9 through 3-16. The surface water samples were analyzed for various combinations of total and dissolved metals, SVOCs, VOCs, herbicides, pesticides, PCBs, and water-quality parameters (e.g., temperature and pH). Details of the analytical scheme are presented in Table 2-3.

After data collection, the surface water sample data were divided into three data sets (see Figures 2-1 and 2-2). One data set (Storm Sewer and Outfall) represents the storm water collection and conveyance system located in the SWMU proper. One data set (Tributaries 15-1 and 15-2) represents samples that were collected in what is considered to be the SWMU proper but do not belong in the Sewer and Outfall category. This group includes locations 15SW/SD018 and 15SW/SD019, which are located in the southeastern corner of the SWMU. The third data set (Tributary 15-3) represents the most downgradient surface channel locations. These locations are in the southeastern region of the sampled area.

Frequencies of chemical detections and other descriptive statistics for these data are presented in Tables 3-9 (upgradient) and in Tables 3-11 through 3-13 (downgradient). Individual results are provided in Tables 3-10 (upgradient) and 3-14 through 3-16 (downgradient).

The summary formats for surface water are similar to those described for surface and subsurface soils (See Sections 3.1.2.1 and 3.1.2.2). A complete printout of all surface water data is presented in Appendix Table G-2. The upgradient surface water sample (15SW01401) is labeled as "upgrad" in those tables.

#### 3.1.2.4 Sediment Site Data

Select sediment samples were analyzed for various combinations of total metals, SVOCs, VOCs, herbicides, pesticides, PCBs, cyanide, and toxicity (See Table 2-3). The majority of sediment chemistry data was generated in December 2004 and January 2005; however, a supplemental set of metals, SVOC, total organic carbon (TOC), and sieve data was generated in conjunction with the seven toxicity samples collected in June 2005. Table 2-3 shows which of these samples were analyzed for the various additional parameters. All sediment chemistry data are presented in Tables 3-17 through 3-24 for the same groupings as described for surface water in the previous section: Sewer and Outfall, Tributary 15-1, Tributary 15-2, and Tributary 15-3. The toxicity testing results are presented in Section 8.0 (Ecological Risk Assessment). The summary formats of sediment data tables in this section 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 the RFI. The upgradient sample locations (15SD0140006 and 15SD0260006) and associated samples are labeled as "UPGRAD" in those printouts.

#### 3.1.2.5 Groundwater Site Data

During the RFI, groundwater samples were collected from select soil borings to represent groundwater that is perched above bedrock or in the shallow bedrock. The groundwater samples were analyzed for various combinations of total and dissolved metals, SVOCs, VOCS, herbicides, pesticides, PCBs, and water-quality parameters. See Table 2-3 for a summary of the analytical scheme.

Summary statistics for groundwater data are in Table 3-25. Data for all chemicals detected at least once in groundwater are presented in Table 3-26. Appendix Table G-4 presents all groundwater data generated during the RFI.

#### 3.1.2.6 Sample Nomenclature Change

Sediment sample numbers originally included a round number between the location identifier and the sediment depth. This can be seen, for example, in sediment sample number 15SD001010006. Because only one round of samples was collected, it was not necessary to keep the round number, so all sediment sample numbers were changed to omit the round number. Using the example above, the final sediment sample number became 15SD0010006.

The rest of this report is devoted to an interpretation of the data and data quality to support the RFI objectives. This interpretation begins in Section 3.2 with a summary of the data quality.

## 3.2 DATA QUALITY SUMMARY

A tabulation of data quality characteristics and a detailed QC data review for the data representing SWMU 15 are presented in Appendix H of this report for the December 2004/January 2005 data. Sediment chemistry data quality for the toxicity testing samples was reviewed but not assessed in the same manner as the earlier data because there were not enough QC samples to support such an analysis. However, data validation was conducted as described for all other sediment data, and a review of the June 2005 sediment chemistry QC data indicated that the data quality was consistent with that observed for the earlier data. An additional measure of data quality was available by comparing the chemical (vs. toxicity results) data for the seven toxicity samples with the previously collected sediment samples from similar locations. The results were consistent. If data quality had changed significantly, one would expect the measured analyte concentrations to change significantly. This did not happen, so the June 2005 data are considered to be comparable in quality to the earlier data. Discussions in the following sections focus on the December 2004/January 2005 QC data.

Based on the reviews in Appendix H, the following summaries (Sections 3.2 through 3.4) were prepared to describe SWMU 15 data quality. Sample collection and analysis completeness was generally satisfactory with some exceptions (See Appendix H, Section H.3.1). The data were of sufficient quality to support the risk assessments included in this RFI.

### 3.2.1 Precision and Accuracy

Herbicides – Hexachlorophene and pentachlorophenol are not herbicides, but these compounds were analyzed by an herbicide analytical method to obtain lower detection limits than could be obtained with the normally used SVOC analytical method. Sample collection completeness goals were achieved for all matrices. The hexachlorophene and pentachlorophenol results exhibited a severe to moderate low bias

[approximately 20 to 62 percent recoveries in matrix spike (MS) and matrix spike duplicate (MSD)] in solid and aqueous. Performance was slightly better for the aqueous samples. Precision for pentachlorophenol was erratic in aqueous samples.

Total and Dissolved Metals and Cyanide - Some percent recoveries (bias indicators) were unusually high or low for a few isolated soil and sediment samples but the metals results, with the exception of barium data in solid matrices, exhibited no significant bias. This is exemplified by the consistent reporting of mean percent recoveries for laboratory control samples (LCSs) and MSs within the range of 75 to 125 percent. The barium mean recovery approached 160 percent for solid matrices and indicates a high bias in soil and sediment. Several soil and sediment relative percent difference (RPD) results exceeded the reference point of 50 percent across all metals; however, the laboratory precision was comparable 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) and sporadically high bias indicators that represent an occasional large degree of heterogeneity. For low concentration samples, this may also reflect some influence from laboratory contaminants. Refer to Appendix H for details.

Pesticides and PCBs – No significant problems were detected with these analytes except for a slight low bias in endrin aldehyde results for solid and liquid matrices.

SVOCs – Recoveries in LCSs, MSs, and MSDs were generally biased low. This is typical of environmental SVOC data. Recoveries of some SVOC analytes were less than 10 percent and resulted in rejected data. The following chemicals had a severe to moderate low bias in solid matrices: 2,4-dimethylphenol, 3&4-methylphenol, 3,3'-dichlorobenzidine, 4-chloroaniline, hexachlorocyclopentadiene. The following chemicals had a severe to moderate low bias in aqueous matrices: 2,4-dinitrophenol, 2-nitrophenol, 3,3-dichlorobenzidine, 4,6-dinitro-2-methylphenol, and 4-nitrophenol. Overall, the SVOCs, including polycyclic aromatic hydrocarbons (PAHs), generally showed a slight to moderate low bias in solid matrices, with results for compounds identified above having been rejected in some samples. A complete tabulation of rejections is provided Appendix H, Table H-3. In soils, the analytical precision was generally acceptable, with mean RPD values less than 50 percent in most cases. In aqueous samples, a high degree of uncertainty exists for several compounds, especially phenols.

Sieve and TOC Analysis in Sediment - These parameters were measured in five of the seven samples collected for toxicity testing (See Table 2-3). No data quality problems were identified. All sieve fractions

add up to 100 percent, and TOC results are fairly consistent (9,200 to 17,000 mg/kg) across the five measured drainage channel locations.

VOCs – The compounds acetonitrile, acrolein, dichlorodifluoromethane, isobutanol, and propionitrile constitute all of the results rejected for the volatile analyses for Round 1. The data were rejected because these compounds yielded 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 SWMU 15. Aside from these compounds, analytical performance for VOCs was consistently within expectations. Mean recoveries were within the target range of 75 to 125 percent for most aqueous sample analyses, and mean recoveries for solid sample analyses exhibited a slight to moderate low bias. Precision was generally acceptable with a few minor exceptions, as explained in Appendix H, Section H.3.4.

### 3.2.2 Representativeness

All samples appear to be representative of the intended environmental matrix. However, lack of data where samples could not be collected or where data have been rejected should be considered when evaluating the representativeness of the areas or volumes of environmental media that were characterized. In addition, some significant disparities were noted between dissolved and total metals concentrations for particular samples. Dissolved metals concentrations should not exceed total metals concentrations, but this condition was violated for a relatively few metals in a few surface water and groundwater samples. Details are provided in Appendix H, Section H.3.6.

Some dissolved metals concentrations exceeded total metals concentrations in the same sample. This is common when concentrations are near detection limits or when random measurement uncertainties cause the dissolved metals concentration to be slightly (e.g., 30 percent) greater than the total metals concentrations. Nickel results exhibited the most frequent and greatest percentage deviation in this regard, but the deviations all occurred for results that were within approximately five times the maximum non-detect concentrations. No discrepancies significant enough to indicate a data quality problem were identified.

### 3.2.3 Comparability and Completeness

Sample collection deviated slightly from the proposed sampling strategy in both rounds, but the deviations were a reflection of site conditions rather than investigative deficiencies. Uncollected samples were generally not collected because the intended sampling location no longer existed, surface water or sediment was not available at all planned locations, or refusal was encountered during soil boring

advancement. Sample collection statistics are provided in Table H-1; completeness statistics based on number of valid results compared to the total number of results are provided in Table H-2. Inability to sample the northwestern part of the SWMU for surface water and sediment (near locations 15SW/SD003, 15SW/SD007, 15SW/SD008, and 15SW/SD012) does not represent a negative impact to the project. The area now drains to where samples were collected.

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

### 3.2.4 Sensitivity

Various analyses yielded non-detect values that exceeded the risk-based target levels (RBTLs) presented in the SWMU 15 QAPP (TtNUS, 2004) and subsequent QAPP revisions. This occurred for all analytical fractions and all matrices. The elevated non-detect values were a result of sample dilutions, laboratory blank contamination, or other causes that reflect the current technology regarding laboratory analyses for the selected parameters in the matrices of interest. In those cases, the exceedances of RBTLs are not considered to be significance, although the inability to achieve the target concentrations must be considered when evaluating the data because the significance may change with data use. It would have been impracticable and unnecessary to seek or develop analytical methods with lower detection limits. Therefore, these situations should be reviewed prior to data use (See Section H.3.2 and Tables H-3 through H-6).

TABLE 3-1

SUMMARY OF DESCRIPTIVE STATISTICS
COMPLETE BACKGROUND SOIL SAMPLE DATA SET
SWMU 15 - ROADS AND GROUNDS AREA[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 | 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.
mg/kg - milligram per kilogram.

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 15 - ROADS AND GROUNDS AREA[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 15 - ROADS AND GROUNDS AREA[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 15 - ROADS AND GROUNDS AREA[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
DESCRIPTIVE STATISTICS FOR SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detects | Sample with Maximum Detected Concentration |
|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | | | | |
| 2-BUTANONE | 4400 | 89600 | 10/40 | 2 J | 22 | 0.8 - 1.48 | 2.32 | 7.70 | 15SS0120002 |
| ACETONE | 3800 | 2500 | 7/40 | 25 J | 79 J | 0.8 - 39 | 12.6 | 42.7 | 15SS0440002 |
| CARBON DISULFIDE | 1500 | 94.1 | 1/40 | 1 J | 1 J | 0.8 - 1.48 | 0.536 | 1.00 | 15SS0440002 |
| CIS-1,2-DICHLOROETHENE | 20 | 784 | 2/40 | 1 J | 5 | 0.8 - 1.48 | 0.649 | 3.00 | 15SS0220002 |
| METHYLENE CHLORIDE | 1.2 | 4050 | 29/40 | 1 J | 97 J | 0.992 - 10 | 14.7 | 19.3 | 15SS0300002 |
| TOTAL XYLENES | 7100 | 10000 | 1/40 | 1.06 J | 1.06 J | 0.8 - 1.48 | 0.537 | 1.06 | 15SS0120002 |
| TRICHLOROFLUOROMETHANE | 8000 | 16400 | 13/40 | 1 J | 5 | 0.8 - 1.48 | 1.10 | 2.31 | 15SS0620002 |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 3240 | 17/45 | 5 J | 590 J | 3.63 - 111 | 27.7 | 65.7 | 15SS0070002 |
| ACENAPHTHENE | 31000 | 682000 | 10/45 | 5 J | 410 | 3.63 - 111 | 20.1 | 74.1 | 15SS0030002 |
| ACENAPHTHYLENE | 18000 | 682000 | 11/45 | 4 J | 1200 | 3.63 - 27.5 | 41.7 | 163 | 15SS0030002 |
| ACETOPHENONE | 890 | 300000 | 1/45 | 150 J | 150 J | 71.7 - 310 | 51.6 | 150 | 15SS0460002 |
| ANTHRACENE | 51000 | 1480000 | 21/45 | 5 J | 1200 | 3.63 - 15.6 | 60.7 | 128 | 15SS0030002 |
| BENZO(A)ANTHRACENE | 160 | 5210 | 28/45 | 5 J | 4600 J | 3.63 - 15.6 | 199 | 318 | 15SS0030002 |
| BENZO(A)PYRENE | 62 | 1520 | 24/45 | 7 J | 10000 | 3.63 - 27.5 | 334 | 624 | 15SS0030002 |
| BENZO(B)FLUORANTHENE | 490 | 59800 | 22/45 | 5 J | 12000 | 3.63 - 27.5 | 407 | 829 | 15SS0030002 |
| BENZO(G,H,I)PERYLENE | 16000 | 119000 | 23/45 | 14 | 13000 | 3.63 - 27.5 | 558 | 1088 | 15SS0030002 |
| BENZO(K)FLUORANTHENE | 490 | 148000 | 21/45 | 6 J | 6900 | 3.63 - 27.5 | 257 | 547 | 15SS0030002 |
| BIS(2-ETHYLHEXYL) PHTHALATE | 35000 | 925 | 11/45 | 79 J | 760 | 71.7 - 301 | 84.2 | 199 | 15SS0300002 |
| CHRYSENE | 160 | 4730 | 29/45 | 6 J | 9500 J | 3.63 - 14.1 | 325 | 503 | 15SS0030002 |
| DI-N-BUTYL PHTHALATE | 250000 | 150 | 6/45 | 91 J | 290 J | 71.7 - 301 | 61.7 | 162 | 15SS0440002 |
| DI-N-OCTYL PHTHALATE | 240000 | 709000 | 1/45 | 920 J | 920 J | 71.7 - 301 | 65.1 | 920 | 15SS0300002 |
| DIBENZO(A,H)ANTHRACENE | 62 | 18400 | 6/45 | 18 | 3200 | 3.63 - 111 | 99.3 | 717 | 15SS0030002 |
| DIBENZOFURAN | 2400 | NA | 3/45 | 95 J | 460 J | 71.7 - 301 | 56.0 | 232 | 15SS0030002 |
| FLUORANTHENE | 230000 | 122000 | 36/45 | 4 J | 6000 | 3.7 - 4.28 | 282 | 352 | 15SS0030002 |
| FLUORENE | 41000 | 122000 | 9/45 | 6 J | 330 | 3.63 - 111 | 16.9 | 66.4 | 15SS0010002 |
| INDENO(1,2,3-CD)PYRENE | 620 | 109000 | 19/45 | 11 J | 11000 | 3.63 - 27.5 | 370 | 871 | 15SS0030002 |
| N-NITROSODIPHENYLAMINE | 220 | 545 | 1/45 | 1500 | 1500 | 71.7 - 301 | 78.0 | 1500 | 15SS0380002 |
| NAPHTHALENE | 700 | 99.4 | 15/45 | 4 J | 280 J | 3.63 - 111 | 20.8 | 53.0 | 15SS0070002 |
| PHENANTHRENE | 13000 | 45700 | 34/45 | 5 J | 2800 | 3.7 - 4.28 | 147 | 193 | 15SS0010002 |
| PYRENE | 230000 | 78500 | 34/45 | 6 J | 14000 J | 3.7 - 4.28 | 526 | 695 | 15SS0030002 |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDD | 710 | 758 | 4/29 | 2.7 J | 110 | 1.51 - 1.75 | 6.02 | 38.5 | 15SS0220002 |
| 4,4'-DDE | 1700 | 596 | 2/29 | 2 J | 12 | 1.51 - 1.75 | 1.24 | 7.00 | 15SS0490002 |
| 4,4'-DDT | 1300 | 170 | 1/29 | 14 | 14 | 1.51 - 1.75 | 1.27 | 14.0 | 15SS0490002 |
| ALPHA-CHLORDANE | 480 | 224 | 4/29 | 1.6 J | 69 | 0.729 - 0.843 | 3.28 | 21.3 | 15SS0200002 |
| AROCLOR-1260 | 220 | 0.332 | 4/27 | 20 | 1200 | 10.1 - 11.7 | 58.1 | 361 | 15SS0230002 |
| GAMMA-CHLORDANE | 480 | 224 | 3/29 | 3.6 | 75 | 0.729 - 0.843 | 3.48 | 30.2 | 15SS0200002 |
| HEPTACHLOR | 110 | 5.98 | 1/29 | 8.5 | 8.5 | 0.729 - 0.843 | 0.673 | 8.50 | 15SS0200002 |
| HEPTACHLOR EPOXIDE | 33 | 152 | 1/29 | 4.8 | 4.8 | 0.729 - 0.843 | 0.545 | 4.80 | 15SS0200002 |
| **Herbicides (ug/kg)** | | | | | | | | | |
| PENTACHLOROPHENOL | 1.4 | 1.8 | 1/36 | 28 J | 28 J | 0.482 - 3.8 | 1.08 | 28.0 | 15SS0490002 |

TABLE 3-5
DESCRIPTIVE STATISTICS FOR SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detects | Sample with Maximum Detected Concentration |
|---|---|---|---|---|---|---|---|---|---|
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | 8.3 | NA | 42/42 | 1700 J | 29900 J | --- | 17008 | 17008 | 15SS0200002, 15SS0310002 |
| ANTIMONY | 0.27 | 0.27 | 3/42 | 1.4 J | 2.7 J | 0.022 - 1.2 | 0.281 | 1.87 | 15SS0060002 |
| ARSENIC | 0.29 | 18 | 42/42 | 0.79 J | 20.7 J | --- | 8.26 | 8.26 | 15SS0360002 |
| BARIUM | 82 | 330 | 42/42 | 16 J | 254 J | --- | 84.3 | 84.3 | 15SS0140002 |
| BERYLLIUM | 3.2 | 21 | 38/42 | 0.31 J | 2.9 | 0.1 - 0.22 | 0.774 | 0.848 | 15SS0190002 |
| CADMIUM | 0.38 | 0.36 | 36/42 | 0.18 J | 6.9 J | 0.16 - 0.34 | 0.545 | 0.616 | 15SS0020002 |
| CALCIUM | NA | NA | 42/42 | 170 J | 381000 J | --- | 55750 | 55750 | 15SS0050002 |
| CHROMIUM | 2.1 | 26 | 42/42 | 6 J | 49.7 J | --- | 24.3 | 24.3 | 15SS0360002 |
| COBALT | 0.17 | 13 | 42/42 | 0.59 J | 59.6 J | --- | 7.83 | 7.83 | 15SS0350002 |
| COPPER | 310 | 5.4 | 42/42 | 1.4 J | 20.1 J | --- | 11.3 | 11.3 | 15SS0060002 |
| IRON | 2300 | NA | 42/42 | 1870 J | 57600 J | --- | 24621 | 24621 | 15SS0360002 |
| LEAD | 81 | 11 | 42/42 | 1.7 J | 155 J | --- | 19.3 | 19.3 | 15SS0080002 |
| MAGNESIUM | NA | NA | 42/42 | 754 J | 42700 J | --- | 4643 | 4643 | 15SS0030002 |
| MANGANESE | 110 | NA | 42/42 | 28.6 J | 4400 J | --- | 432 | 432 | 15SS0350002 |
| MERCURY | 0.1 | 0.1 | 35/42 | 0.01 J | 0.13 | 0.006 - 0.007 | 0.0294 | 0.0346 | 15SS0100002 |
| NICKEL | 14 | 13.6 | 42/42 | 4.2 J | 31.6 J | --- | 14.3 | 14.3 | 15SS0350002 |
| POTASSIUM | NA | NA | 42/42 | 419 J | 2720 J | --- | 1433 | 1433 | 15SS0440002 |
| SELENIUM | 0.26 | 0.0276 | 33/42 | 0.11 J | 1.1 | 0.06 - 0.5 | 0.401 | 0.473 | 15SS0380002 |
| SILVER | 1.6 | 4.04 | 1/42 | 0.04 J | 0.04 J | 0.041 - 0.35 | 0.0311 | 0.0400 | 15SS0450002 |
| SODIUM | NA | NA | 27/42 | 76.4 J | 1250 J | 35.3 - 121 | 137 | 194 | 15SS0190002 |
| THALLIUM | 0.056 | 0.0569 | 14/42 | 0.21 J | 0.47 J | 0.06 - 0.49 | 0.200 | 0.340 | 15SS0380002 |
| TIN | 4700 | 7.62 | 6/42 | 0.34 J | 2.2 J | 0.21 - 1.2 | 0.324 | 0.727 | 15SS0060002 |
| VANADIUM | 7.8 | 7.8 | 42/42 | 5.3 J | 57.4 | --- | 31.9 | 31.9 | 15SS0360002 |
| ZINC | 680 | 6.62 | 42/42 | 19.4 J | 626 | --- | 60.2 | 60.2 | 15SS0020002 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
HHRA - Human Health Risk Assessment.
ERA - Ecological Risk Assessment.
ug/kg - micrograms per kilogram.
mg/kg - milligrams per kilogram.
NA - No applicable criterion.

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | HHRA CRITERION | ERA CRITERION | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB001 | 15SB002 | 15SB003 | 15SB004 | 15SB005 | 15SB006 | 15SB007 | 15SB008 | 15SB009 | 15SB010 | 15SB011 |
| SAMPLE NUMBER | | | 15SS0010002 | 15SS0020002 | 15SS0030002 | 15SS0040002 | 15SS0050002 | 15SS0060002 | 15SS0070002 | 15SS0080002 | 15SS0090002 | 15SS0100002 | 15SS0110002 |
| SOIL GROUP | | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | 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 |
| SAMPLE DATE | | | 12/9/2004 | 12/8/2004 | 12/9/2004 | 12/9/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | | | |
| 2-BUTANONE | 4400 | 89600 | 2 J | 1.15 U | 1.14 U | 1.05 U | 1.48 U | 1.04 U | 1.04 U | 0.8 U | 1.31 U | 1.29 U | 0.97 U |
| ACETONE | 3800 | 2500 | 14 U | 14 U | 6 U | 5 U | 13 U | 27 U | 11 U | 0.8 UJ | 6 U | 5 U | 6 U |
| CARBON DISULFIDE | 1500 | 94.1 | 0.846 U | 1.15 U | 1.14 U | 1.05 U | 1.48 U | 1.04 U | 1.04 U | 0.8 U | 1.31 U | 1.29 U | 0.97 U |
| CIS-1,2-DICHLOROETHENE | 20 | 784 | 0.846 U | 1.15 U | 1.14 U | 1.05 U | 1.48 U | 1.04 U | 1.04 U | 0.8 U | 1.31 U | 1.29 U | 0.97 U |
| METHYLENE CHLORIDE | 1.2 | 4050 | 5 J | 6 J | 10 J | 7 J | 4 J | 4 J | 4 J | 3 J | 8 J | 3 J | 1 J |
| TOTAL XYLENES | 7100 | 10000 | 0.846 U | 1.15 U | 1.14 U | 1.05 U | 1.48 U | 1.04 U | 1.04 U | 0.8 U | 1.31 U | 1.29 U | 0.97 U |
| TRICHLOROFLUOROMETHANE | 8000 | 16400 | 0.846 U | 1.15 U | 1.14 U | 1.05 U | 1.48 U | 1.04 U | 1.04 U | 0.8 U | 1.31 U | 1.29 U | 0.97 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 3240 | 21 J | 94 J | 100 | 14.1 U | 111 U | 170 | 590 J | 31 J | 14.2 UJ | 15.6 UJ | 7 J |
| ACENAPHTHENE | 31000 | 682000 | 230 | 9 J | 410 | 14.1 U | 111 U | 27.5 U | 4.13 UJ | 7.43 UJ | 14.2 UJ | 15.6 UJ | 3.81 UJ |
| ACENAPHTHYLENE | 18000 | 682000 | 220 | 40 J | 1200 | 14.1 U | 150 J | 27.5 U | 4.13 UJ | 8 J | 23 J | 15.6 UJ | 4 J |
| ACETOPHENONE | 890 | 300000 | 75.5 U | 89.6 U | 295 U | 71.7 U | 301 U | 74.4 U | 160 U | 75.5 U | 72.1 U | 158 U | 77.4 U |
| ANTHRACENE | 51000 | 1480000 | 750 | 75 J | 1200 | 16 J | 150 J | 78 | 24 | 10 J | 17 J | 15.6 U | 3.81 U |
| BENZO(A)ANTHRACENE | 160 | 5210 | 1200 J | 770 J | 4600 J | 14.1 UJ | 460 | 92 J | 27 | 47 | 20 J | 15.6 U | 18 |
| BENZO(A)PYRENE | 62 | 1520 | 1300 | 1100 J | 10000 | 130 | 730 | 27.5 U | 21 | 44 | 14.2 U | 15.6 U | 23 |
| BENZO(B)FLUORANTHENE | 490 | 59800 | 1500 | 2100 J | 12000 | 14.1 U | 620 | 27.5 U | 4.13 U | 60 | 14.2 U | 15.6 U | 24 |
| BENZO(G,H,I)PERYLENE | 16000 | 119000 | 2700 | 850 J | 13000 | 1900 | 4700 | 27.5 U | 4.13 U | 85 | 14.2 U | 15.6 U | 30 |
| BENZO(K)FLUORANTHENE | 490 | 148000 | 750 | 2200 J | 6900 | 14.1 U | 270 | 27.5 U | 4.13 U | 40 | 14.2 U | 15.6 U | 16 |
| BIS(2-ETHYLHEXYL) PHTHALATE | 35000 | 925 | 75.5 U | 89.6 U | 295 U | 71.7 U | 301 U | 74.4 U | 120 J | 79 J | 72.1 UJ | 158 UJ | 77.4 U |
| CHRYSENE | 160 | 4730 | 1300 J | 890 J | 9500 J | 14.1 UJ | 450 | 92 J | 36 | 58 | 23 J | 42 | 21 |
| DI-N-BUTYL PHTHALATE | 250000 | 150 | 75.5 U | 89.6 U | 295 U | 71.7 U | 301 UJ | 74.4 U | 83.9 U | 75.5 U | 72.1 U | 158 U | 77.4 U |
| DI-N-OCTYL PHTHALATE | 240000 | 709000 | 75.5 U | 89.6 U | 295 U | 71.7 U | 301 U | 74.4 U | 83.9 U | 75.5 U | 72.1 U | 158 U | 77.4 U |
| DIBENZO(A,H)ANTHRACENE | 62 | 18400 | 540 | 250 J | 3200 | 14.1 U | 111 U | 27.5 U | 4.13 U | 7.43 U | 14.2 U | 15.6 U | 3.81 U |
| DIBENZOFURAN | 2400 | NA | 140 J | 89.6 U | 460 J | 71.7 U | 301 U | 74.4 U | 95 J | 75.5 U | 72.1 U | 158 U | 77.4 U |
| FLUORANTHENE | 230000 | 122000 | 3100 | 640 J | 6000 | 23 J | 330 | 110 | 41 | 54 | 26 J | 20 J | 21 |
| FLUORENE | 41000 | 122000 | 330 | 10 J | 170 | 14.1 U | 111 U | 27.5 U | 4.13 UJ | 7.43 UJ | 14.2 UJ | 15.6 UJ | 3.81 UJ |
| INDENO(1,2,3-CD)PYRENE | 620 | 109000 | 1900 | 770 J | 11000 | 250 | 1200 | 27.5 U | 4.13 U | 50 | 14.2 U | 15.6 U | 23 |
| N-NITROSODIPHENYLAMINE | 220 | 545 | 75.5 U | 89.6 U | 295 U | 71.7 U | 301 UJ | 74.4 U | 83.9 U | 75.5 U | 72.1 U | 158 U | 77.4 U |
| NAPHTHALENE | 700 | 99.4 | 40 | 65 J | 230 | 14.1 U | 111 U | 89 | 280 J | 13 J | 14.2 UJ | 15.6 UJ | 7 J |
| PHENANTHRENE | 13000 | 45700 | 2800 | 170 J | 1300 | 33 | 120 J | 520 | 220 | 58 | 30 | 19 J | 13 |
| PYRENE | 230000 | 78500 | 3900 J | 790 J | 14000 J | 97 J | 1000 | 190 J | 52 | 50 | 29 | 27 J | 24 |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | | | | |
| 4,4'-DDD | 710 | 758 | | | | | | | | | | | |
| 4,4'-DDE | 1700 | 596 | | | | | | | | | | | |
| 4,4'-DDT | 1300 | 170 | | | | | | | | | | | |
| ALPHA-CHLORDANE | 480 | 224 | | | | | | | | | | | |
| AROCLOR-1260 | 220 | 0.332 | | | | | | | | | | | 10.4 U |
| GAMMA-CHLORDANE | 480 | 224 | | | | | | | | | | | |
| HEPTACHLOR | 110 | 5.98 | | | | | | | | | | | |
| HEPTACHLOR EPOXIDE | 33 | 152 | | | | | | | | | | | |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB001 | 15SB002 | 15SB003 | 15SB004 | 15SB005 | 15SB006 | 15SB007 | 15SB008 | 15SB009 | 15SB010 | 15SB011 |
| SAMPLE NUMBER | HHRA | ERA | 15SS0010002 | 15SS0020002 | 15SS0030002 | 15SS0040002 | 15SS0050002 | 15SS0060002 | 15SS0070002 | 15SS0080002 | 15SS0090002 | 15SS0100002 | 15SS0110002 |
| SOIL GROUP | CRITERION | CRITERION | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | 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 |
| SAMPLE DATE | | | 12/9/2004 | 12/8/2004 | 12/9/2004 | 12/9/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 |
| **Herbicides (ug/kg)** | | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 1.4 | 1.8 | 0.507 U | 0.602 U | 0.495 U | 0.482 U | 3.8 U | 0.5 U | 0.563 U | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | | | | |
| ALUMINUM | 8.30 | NA | 15600 J | 19900 J | 6140 J | 1890 J | 1700 J | 8230 J | 15100 J | 13400 J | 2850 J | 3230 J | |
| ANTIMONY | 0.270 | 0.270 | 0.36 U | 1.2 U | 0.54 U | 0.11 U | 0.12 U | 2.7 J | 1.5 J | 0.51 U | 0.59 U | 1.4 J | |
| ARSENIC | 0.290 | 18.0 | 3.7 J | 8.4 J | 20.6 J | 0.79 J | 0.98 J | 7.8 J | 5.8 J | 9.1 J | 7.7 J | 5.9 J | |
| BARIUM | 82.0 | 330 | 42.8 J | 122 J | 50.5 J | 16 J | 16.4 J | 72.1 J | 74.5 J | 72.5 J | 38.6 J | 35.8 J | |
| BERYLLIUM | 3.20 | 21.0 | 0.38 J | 2 J | 0.44 J | 0.1 U | 0.1 U | 0.87 J | 1.1 J | 0.7 J | 0.17 U | 0.22 U | |
| CADMIUM | 0.380 | 0.360 | 0.26 U | 6.9 J | 0.59 J | 0.43 J | 0.52 J | 1.1 J | 2.3 J | 0.51 J | 0.6 J | 0.89 J | |
| CALCIUM | NA | NA | 46900 J | 37300 J | 230000 J | 327000 J | 381000 J | 92100 J | 3460 J | 50100 J | 345000 J | 341000 J | |
| CHROMIUM | 2.10 | 26.0 | 24.2 J | 25 J | 13.1 J | 7.2 J | 6 J | 15.8 J | 20.8 J | 23.7 J | 9 J | 10.1 J | |
| COBALT | 0.170 | 13.0 | 1.6 J | 6.8 J | 2.5 J | 0.59 J | 0.67 J | 4.9 J | 7.4 J | 7.7 J | 1.6 J | 2.2 J | |
| COPPER | 310 | 5.40 | 6.2 J | 15.4 J | 10 J | 1.4 J | 1.9 J | 20.1 J | 14.4 J | 12.4 J | 5.4 J | 6.1 J | |
| IRON | 2300 | NA | 14500 J | 43300 J | 12500 J | 1870 J | 2200 J | 23200 J | 24300 J | 27200 J | 5010 J | 4900 J | |
| LEAD | 81.0 | 11.0 | 6.6 J | 15 J | 27.6 J | 1.7 J | 4 J | 29.8 J | 15.5 J | 155 J | 20.3 J | 31.1 J | |
| MAGNESIUM | NA | NA | 2160 J | 2440 J | 42700 J | 6770 J | 12000 J | 3390 J | 993 J | 2840 J | 19600 J | 18900 J | |
| MANGANESE | 110 | NA | 28.6 J | 414 J | 156 J | 69.7 J | 69.2 J | 215 J | 130 J | 321 J | 200 J | 192 J | |
| MERCURY | 0.100 | 0.100 | 0.014 J | 0.045 J | 0.017 J | 0.006 U | 0.006 U | 0.031 J | 0.03 J | 0.051 J | 0.013 J | 0.13 | |
| NICKEL | 14.0 | 13.6 | 7.2 J | 17.6 J | 11.6 J | 4.2 J | 5 J | 14.7 J | 15.8 J | 19 J | 9.3 J | 10.6 J | |
| POTASSIUM | NA | NA | 1260 J | 1470 J | 912 J | 583 J | 419 J | 806 J | 975 J | 1690 J | 783 J | 699 J | |
| SELENIUM | 0.260 | 0.0276 | 0.18 U | 0.54 J | 0.99 J | 0.06 U | 0.06 U | 0.41 J | 0.55 J | 0.41 J | 0.57 J | 0.28 U | |
| SILVER | 1.60 | 4.04 | 0.042 U | 0.07 U | 0.35 U | 0.041 U | 0.16 U | 0.09 U | 0.06 U | 0.06 U | 0.05 U | 0.09 U | |
| SODIUM | NA | NA | 59.8 U | 150 J | 269 J | 95.2 J | 111 J | 116 J | 170 J | 132 J | 182 J | 183 J | |
| THALLIUM | 0.0560 | 0.0569 | 0.19 U | 0.49 U | 0.24 U | 0.39 U | 0.06 U | 0.23 U | 0.39 U | 0.17 U | 0.09 U | 0.08 U | |
| TIN | 4700 | 7.62 | 0.8 U | 0.45 U | 0.62 U | 0.28 U | 0.26 U | 2.2 J | 0.7 U | 0.89 U | 0.57 U | 1.2 U | |
| VANADIUM | 7.80 | 7.80 | 21.7 J | 40 J | 20.2 J | 5.3 J | 5.7 J | 19.7 J | 32.6 J | 26.2 J | 14.6 J | 23.3 J | |
| ZINC | 680 | 6.62 | 20.6 J | 626 | 51.8 J | 22.6 J | 33.5 J | 111 | 214 | 60.6 | 35.4 J | 42.9 J | |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB012 | 15SB013 | 15SB014 | 15SB015 | 15SB016 | 15SB017 | 15SB018 | 15SB019 | 15SB020 | 15SB021 | 15SB022 |
| SAMPLE NUMBER | HHRA | ERA | 15SS0120002 | 15SS0130002 | 15SS0140002 | 15SS0150002 | 15SS0160002 | 15SS0170002 | 15SS0180002 | 15SS0190002 | 15SS0200002 | 15SS0210002 | 15SS0220002 |
| SOIL GROUP | CRITERIA | CRITERIA | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | 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 |
| SAMPLE DATE | | | 12/8/2004 | 12/8/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | | | |
| 2-BUTANONE | 4400 | 89600 | 22 | 8 J | | | | | | 0.982 U | 4 J | 0.939 U | 6 J |
| ACETONE | 3800 | 2500 | 73 J | 22 U | | | | | | 26 J | 38 J | 7 U | 30 J |
| CARBON DISULFIDE | 1500 | 94.1 | 1.06 U | 0.992 U | | | | | | 0.982 U | 1.06 U | 0.939 U | 0.975 U |
| CIS-1,2-DICHLOROETHENE | 20 | 784 | 1.06 U | 0.992 U | | | | | | 0.982 U | 1.06 U | 0.939 U | 5 |
| METHYLENE CHLORIDE | 1.2 | 4050 | 1.06 UJ | 0.992 UJ | | | | | | 60 J | 10 U | 8 U | 5 U |
| TOTAL XYLENES | 7100 | 10000 | 1.06 J | 0.992 U | | | | | | 0.982 U | 1.06 U | 0.939 U | 0.975 U |
| TRICHLOROFLUOROMETHANE | 8000 | 16400 | 1.06 U | 0.992 U | | | | | | 2 J | 1.06 U | 0.939 U | 0.975 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 3240 | 4.03 UJ | 3.9 UJ | | | | | | 34 | 4 U | 3.78 U | 5 J |
| ACENAPHTHENE | 31000 | 682000 | 4.03 UJ | 3.9 UJ | | | | | | 9 | 5 J | 5 J | 20 |
| ACENAPHTHYLENE | 18000 | 682000 | 4.03 UJ | 3.9 UJ | | | | | | 4.05 U | 4 U | 3.78 U | 3.92 U |
| ACETOPHENONE | 890 | 300000 | 100 U | 79.1 U | | | | | | 82.2 U | 81.3 U | 76.7 U | 79.7 U |
| ANTHRACENE | 51000 | 1480000 | 4.03 U | 3.9 U | | | | | | 24 | 12 | 5 J | 40 |
| BENZO(A)ANTHRACENE | 160 | 5210 | 8 J | 3.9 U | | | | | | 29 | 22 | 7 J | 58 |
| BENZO(A)PYRENE | 62 | 1520 | 4.03 U | 3.9 U | | | | | | 24 | 23 | 8 | 55 |
| BENZO(B)FLUORANTHENE | 490 | 59800 | 17 | 3.9 U | | | | | | 15 | 22 | 3.78 U | 56 |
| BENZO(G,H,I)PERYLENE | 16000 | 119000 | 4.03 U | 3.9 U | | | | | | 22 | 34 | 19 | 71 |
| BENZO(K)FLUORANTHENE | 490 | 148000 | 11 | 3.9 U | | | | | | 17 | 14 | 3.78 U | 27 |
| BIS(2-ETHYLHEXYL)PHTHALATE | 35000 | 925 | 250 J | 79.1 U | | | | | | 82.2 U | 81.3 U | 76.7 U | 79.7 U |
| CHRYSENE | 160 | 4730 | 23 | 3.9 U | | | | | | 33 | 25 | 7 J | 68 |
| DI-N-BUTYL PHTHALATE | 250000 | 150 | 91 J | 79.1 U | | | | | | 82.2 U | 81.3 U | 76.7 U | 79.7 U |
| DI-N-OCTYL PHTHALATE | 240000 | 709000 | 81.8 U | 79.1 U | | | | | | 82.2 U | 81.3 U | 76.7 U | 79.7 U |
| DIBENZO(A,H)ANTHRACENE | 62 | 18400 | 4.03 U | 3.9 U | | | | | | 4.05 U | 4 U | 3.78 U | 3.92 U |
| DIBENZOFURAN | 2400 | NA | 81.8 U | 79.1 U | | | | | | 82.2 U | 81.3 U | 76.7 U | 79.7 U |
| FLUORANTHENE | 230000 | 122000 | 13 | 3.9 U | | | | | | 41 | 48 | 12 | 130 |
| FLUORENE | 41000 | 122000 | 4.03 UJ | 3.9 UJ | | | | | | 8 J | 6 J | 3.78 U | 19 |
| INDENO(1,2,3-CD)PYRENE | 620 | 109000 | 4.03 U | 3.9 U | | | | | | 14 | 22 | 3.78 U | 51 |
| N-NITROSODIPHENYLAMINE | 220 | 545 | 81.8 U | 79.1 U | | | | | | 82.2 U | 81.3 U | 76.7 U | 79.7 U |
| NAPHTHALENE | 700 | 99.4 | 4.03 UJ | 3.9 UJ | | | | | | 15 | 4 U | 4 J | 9 |
| PHENANTHRENE | 13000 | 45700 | 4.03 U | 3.9 U | | | | | | 170 | 69 | 21 | 190 |
| PYRENE | 230000 | 78500 | 15 | 3.9 U | | | | | | 68 | 73 | 18 | 190 |
| **Pesticides PCBs (ug/kg)** | | | | | | | | | | | | | |
| 4,4'-DDD | 710 | 758 | | | 1.62 U | 1.6 U | 1.6 U | 1.61 U | 1.63 U | 1.66 U | 1.64 U | 1.55 U | 110 |
| 4,4'-DDE | 1700 | 596 | | | 1.62 U | 1.6 U | 1.6 U | 1.61 U | 1.63 U | 2 J | 1.64 U | 1.55 U | 1.61 U |
| 4,4'-DDT | 1300 | 3.5 | | | 1.62 U | 1.6 U | 1.6 U | 1.61 U | 1.63 U | 1.66 U | 1.64 U | 1.55 U | 1.61 U |
| ALPHA-CHLORDANE | 480 | 224 | | | 0.778 U | 0.77 U | 0.772 U | 0.773 U | 0.787 U | 0.798 U | 69 | 0.745 U | 11 |
| AROCLOR-1260 | 220 | 0.332 | 11 U | 10.6 U | | | | | | 11 U | 10.9 U | 10.3 U | 190 |
| GAMMA-CHLORDANE | 480 | 224 | | | 0.778 U | 0.77 U | 0.772 U | 0.773 U | 0.787 U | 0.798 U | 75 | 0.745 U | 12 |
| HEPTACHLOR | 110 | 5.98 | | | 0.778 U | 0.77 U | 0.772 U | 0.773 U | 0.787 U | 0.798 U | 8.5 | 0.745 U | 0.773 U |
| HEPTACHLOR EPOXIDE | 33 | 152 | | | 0.778 U | 0.77 U | 0.772 U | 0.773 U | 0.787 U | 0.798 U | 4.8 | 0.745 U | 0.773 U |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB012 | 15SB013 | 15SB014 | 15SB015 | 15SB016 | 15SB017 | 15SB018 | 15SB019 | 15SB020 | 15SB021 | 15SB022 |
| SAMPLE NUMBER | HHRA CRITERIA | ERA CRITERIA | 15SS0120002 | 15SS0130002 | 15SS0140002 | 15SS0150002 | 15SS0160002 | 15SS0170002 | 15SS0180002 | 15SS0190002 | 15SS0200002 | 15SS0210002 | 15SS0220002 |
| SOIL GROUP | | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | 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 |
| SAMPLE DATE | | | 12/8/2004 | 12/8/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 |
| **Herbicides (ug/kg)** | | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 1.4 | 1.8 | | | 0.539 U | 0.533 U | 0.534 U | 0.535 U | 0.545 U | 0.552 U | 0.546 U | 0.515 U | 0.535 U |
| **Inorganics (mg/kg)** | | | | | | | | | | | | | |
| ALUMINUM | 8.3 | NA | | | 27800 J | 26300 J | 22100 J | 22900 J | 24500 J | 13200 J | 29900 J | 16100 J | 19700 J |
| ANTIMONY | 0.27 | 0.27 | | | 0.32 U | 0.36 U | 0.28 U | 0.3 U | 0.3 U | 0.44 U | 0.25 U | 0.15 U | 0.32 U |
| ARSENIC | 0.29 | 18 | | | 8.3 J | 9.2 J | 7.8 J | 8.3 J | 8.6 J | 5.5 J | 7.3 J | 5.1 J | 8.3 J |
| BARIUM | 82 | 330 | | | 254 J | 157 J | 84.7 J | 75.3 J | 94.3 J | 72.5 J | 75.3 J | 61.4 J | 90.4 J |
| BERYLLIUM | 3.2 | 21 | | | 1.1 J | 0.76 J | 0.79 J | 0.86 J | 0.93 J | 2.9 | 0.58 | 0.51 | 0.65 |
| CADMIUM | 0.38 | 0.36 | | | 0.16 U | 0.25 U | 0.21 U | 0.26 U | 0.34 U | 0.41 J | 0.33 J | 0.18 J | 0.38 J |
| CALCIUM | NA | NA | | | 2980 J | 3760 J | 1900 J | 8310 J | 119000 J | 52100 J | 1660 J | 1430 J | 26800 J |
| CHROMIUM | 2.1 | 26 | | | 36.8 J | 30.2 J | 23.7 J | 28.6 J | 34 J | 15.3 J | 27.8 J | 19.8 J | 23.8 J |
| COBALT | 0.17 | 13 | | | 3.4 J | 4.6 J | 10.5 J | 6.1 J | 4.8 J | 6.2 J | 4.4 J | 3.5 J | 6.9 J |
| COPPER | 310 | 5.4 | | | 13.3 J | 12.9 J | 9.9 J | 13 J | 12.8 J | 18.8 J | 18.2 J | 7.6 J | 12.4 J |
| IRON | 2300 | NA | | | 28000 J | 27600 J | 23300 J | 32400 J | 37000 J | 24700 J | 27100 J | 18200 J | 19100 J |
| LEAD | 81 | 11 | | | 13.5 J | 14.7 J | 14 J | 15.3 J | 16.6 J | 9.2 J | 9.8 J | 6.6 J | 18.1 J |
| MAGNESIUM | NA | NA | | | 2530 J | 2930 J | 1880 J | 3770 J | 2600 J | 2800 J | 4450 J | 1550 J | 4660 J |
| MANGANESE | 110 | NA | | | 50.1 J | 168 J | 378 J | 233 J | 161 J | 222 | 118 | 86.1 | 246 |
| MERCURY | 0.1 | 0.1 | | | 0.007 U | 0.025 J | 0.013 J | 0.02 J | 0.007 U | 0.017 J | 0.02 J | 0.007 U | 0.023 J |
| NICKEL | 14 | 13.6 | | | 13.4 J | 13.5 J | 15.4 J | 16.6 J | 15.1 J | 16.1 J | 15.7 J | 9.5 J | 14.7 J |
| POTASSIUM | NA | NA | | | 2190 J | 2330 J | 2100 J | 1920 J | 2380 J | 1400 J | 2280 J | 1030 J | 1710 J |
| SELENIUM | 0.26 | 0.0276 | | | 0.32 U | 0.39 U | 0.25 U | 0.42 U | 0.5 U | 0.5 J | 0.27 J | 0.14 J | 0.29 J |
| SILVER | 1.6 | 4.04 | | | 0.043 U | 0.049 U | 0.045 U | 0.05 U | 0.045 U | 0.053 U | 0.043 U | 0.046 U | 0.046 U |
| SODIUM | NA | NA | | | 167 J | 308 J | 129 J | 185 J | 287 J | 1250 J | 150 J | 82.7 J | 216 J |
| THALLIUM | 0.056 | 0.0569 | | | 0.32 U | 0.36 U | 0.3 U | 0.32 U | 0.32 U | 0.23 U | 0.38 U | 0.19 U | 0.29 U |
| TIN | 4700 | 7.62 | | | 0.52 J | 0.39 J | 0.34 J | 0.39 J | 0.52 J | 0.81 U | 0.67 U | 0.44 U | 0.61 U |
| VANADIUM | 7.8 | 7.8 | | | 40.6 J | 43.8 J | 34.8 J | 36.7 J | 38.6 J | 31.4 J | 43.7 J | 30 J | 35.7 J |
| ZINC | 680 | 6.62 | | | 24.8 J | 38.8 J | 34.5 J | 45.1 J | 34.6 J | 46.9 J | 57.7 J | 20.1 J | 48.7 J |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB023 | 15SB024 | 15SB025 | 15SB026 | 15SB027 | 15SB028 | 15SB029 | 15SB030 | 15SB031 | 15SB032 | 15SB033 |
| SAMPLE NUMBER | HHRA | ERA | 15SS0230002 | 15SS0240002 | 15SS0250002 | 15SS0260002 | 15SS0270002 | 15SS0280002 | 15SS0290002 | 15SS0300002 | 15SS0310002 | 15SS0320002 | 15SS0330002 |
| SOIL GROUP | CRITERIA | CRITERIA | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | 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 |
| SAMPLE DATE | | | 12/10/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/9/2004 | 12/14/2004 | 12/9/2004 | 12/9/2004 | 12/14/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | | | |
| 2-BUTANONE | 4400 | 89600 | 4 J | | | | | | 0.806 U | 1.19 U | 1.01 UJ | 1.04 U | 1.08 U |
| ACETONE | 3800 | 2500 | 25 J | | | | | | 5 U | 39 U | 25 U | 10 U | 9 U |
| CARBON DISULFIDE | 1500 | 94.1 | 0.905 U | | | | | | 0.806 U | 1.19 UJ | 1.01 UJ | 1.04 U | 1.08 UJ |
| CIS-1,2-DICHLOROETHENE | 20 | 784 | 0.905 U | | | | | | 0.806 U | 1.19 U | 1.01 UJ | 1.04 U | 1.08 U |
| METHYLENE CHLORIDE | 1.2 | 4050 | 7 U | | | | | | 15 J | 97 J | 16 J | 19 J | 28 J |
| TOTAL XYLENES | 7100 | 10000 | 0.905 U | | | | | | 0.806 U | 1.19 U | 1.01 UJ | 1.04 U | 1.08 U |
| TRICHLOROFLUOROMETHANE | 8000 | 16400 | 0.905 U | | | | | | 1 J | 3 J | 3 J | 2 J | 3 J |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 3240 | 17 J | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 3.8 U | 4.08 U | 3.75 U | 3.96 U | 4.01 U |
| ACENAPHTHENE | 31000 | 682000 | 14.9 U | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 3.8 U | 4.08 U | 3.75 U | 3.96 U | 4.01 U |
| ACENAPHTHYLENE | 18000 | 682000 | 23 J | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 3.8 U | 4.08 U | 3.75 U | 3.96 U | 4.01 U |
| ACETOPHENONE | 890 | 300000 | 75.8 U | 80.8 U | 80 U | 75.4 U | 75.5 U | 73.8 U | 77.1 U | 82.8 U | 76 U | 80.4 U | 81.4 U |
| ANTHRACENE | 51000 | 1480000 | 30 J | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 3.8 U | 4.08 U | 3.75 U | 3.96 U | 4.01 U |
| BENZO(A)ANTHRACENE | 160 | 5210 | 130 J | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 15 | 4.08 U | 3.75 U | 3.96 U | 12 |
| BENZO(A)PYRENE | 62 | 1520 | 160 | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 13 J | 4.08 U | 3.75 UJ | 3.96 UJ | 7 J |
| BENZO(B)FLUORANTHENE | 490 | 59800 | 140 | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 13 J | 4.08 U | 3.75 UJ | 3.96 UJ | 9 |
| BENZO(G,H,I)PERYLENE | 16000 | 119000 | 210 | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 16 J | 4.08 U | 3.75 UJ | 3.96 UJ | 17 |
| BENZO(K)FLUORANTHENE | 490 | 148000 | 100 | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 10 J | 4.08 U | 3.75 UJ | 3.96 UJ | 6 J |
| BIS(2-ETHYLHEXYL)PHTHALATE | 35000 | 925 | 75.8 U | 80.8 U | 80 U | 75.4 U | 75.5 U | 73.8 U | 93 J | 760 | 76 U | 80.4 U | 81.4 U |
| CHRYSENE | 160 | 4730 | 170 J | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 11 | 4.08 U | 3.75 U | 3.96 U | 18 |
| DI-N-BUTYL PHTHALATE | 250000 | 150 | 75.8 U | 80.8 U | 80 U | 75.4 U | 75.5 U | 120 J | 77.1 U | 82.8 U | 76 U | 80.4 U | 81.4 U |
| DI-N-OCTYL PHTHALATE | 240000 | 709000 | 75.8 U | 80.8 U | 80 U | 75.4 U | 75.5 U | 73.8 U | 77.1 U | 920 J | 76 U | 80.4 U | 81.4 U |
| DIBENZO(A,H)ANTHRACENE | 62 | 18400 | 14.9 U | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 3.8 UJ | 4.08 U | 3.75 UJ | 3.96 UJ | 4.01 U |
| DIBENZOFURAN | 2400 | NA | 75.8 U | 80.8 U | 80 U | 75.4 U | 75.5 U | 73.8 U | 77.1 U | 82.8 U | 76 U | 80.4 U | 81.4 U |
| FLUORANTHENE | 230000 | 122000 | 110 | 4 J | 5 J | 3.71 U | 3.72 U | 10 | 21 | 4.08 U | 3.75 U | 5 J | 38 |
| FLUORENE | 41000 | 122000 | 21 J | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 3.8 U | 4.08 U | 3.75 U | 3.96 U | 4.01 U |
| INDENO(1,2,3-CD)PYRENE | 620 | 109000 | 160 | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 11 J | 4.08 U | 3.75 UJ | 3.96 UJ | 4.01 U |
| N-NITROSODIPHENYLAMINE | 220 | 545 | 75.8 U | 80.8 U | 80 U | 75.4 U | 75.5 U | 73.8 U | 77.1 U | 82.8 U | 76 U | 80.4 U | 81.4 U |
| NAPHTHALENE | 700 | 99.4 | 14.9 U | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 3.63 U | 3.8 U | 4.08 U | 3.75 U | 3.96 U | 4.01 U |
| PHENANTHRENE | 13000 | 45700 | 92 | 6 J | 5 J | 3.71 U | 3.72 U | 9 | 12 | 4.08 U | 3.75 U | 5 J | 22 |
| PYRENE | 230000 | 78500 | 210 J | 3.98 U | 3.94 U | 3.71 U | 3.72 U | 7 J | 32 | 4.08 U | 3.75 U | 7 J | 30 |
| **Pesticides PCBs (ug/kg)** | | | | | | | | | | | | | |
| 4,4'-DDD | 710 | 758 | 38 | | | | | | 1.55 U | 1.67 U | 1.53 U | 1.62 U | 1.64 U |
| 4,4'-DDE | 1700 | 596 | 1.53 U | | | | | | 1.55 U | 1.67 U | 1.53 U | 1.62 U | 1.64 U |
| 4,4'-DDT | 1300 | 3.5 | 1.53 U | | | | | | 1.55 U | 1.67 U | 1.53 U | 1.62 U | 1.64 U |
| ALPHA-CHLORDANE | 480 | 224 | 1.6 J | | | | | | 3.7 | 0.803 U | 0.738 U | 0.78 U | 0.79 U |
| AROCLOR-1260 | 220 | 0.332 | 1200 | | | | | | 10.4 U | 11.1 U | 10.2 U | 10.8 U | 10.9 U |
| GAMMA-CHLORDANE | 480 | 224 | 0.735 U | | | | | | 3.6 | 0.803 U | 0.738 U | 0.78 U | 0.79 U |
| HEPTACHLOR | 110 | 5.98 | 0.735 U | | | | | | 0.748 U | 0.803 U | 0.738 U | 0.78 U | 0.79 U |
| HEPTACHLOR EPOXIDE | 33 | 152 | 0.735 U | | | | | | 0.748 U | 0.803 U | 0.738 U | 0.78 U | 0.79 U |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB023 | 15SB024 | 15SB025 | 15SB026 | 15SB027 | 15SB028 | 15SB029 | 15SB030 | 15SB031 | 15SB032 | 15SB033 |
| SAMPLE NUMBER | HHRA | ERA | 15SS0230002 | 15SS0240002 | 15SS0250002 | 15SS0260002 | 15SS0270002 | 15SS0280002 | 15SS0290002 | 15SS0300002 | 15SS0310002 | 15SS0320002 | 15SS0330002 |
| SOIL GROUP | CRITERIA | CRITERIA | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | 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 |
| SAMPLE DATE | | | 12/10/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/11/2004 | 12/9/2004 | 12/14/2004 | 12/9/2004 | 12/9/2004 | 12/14/2004 |
| **Herbicides (ug/kg)** | | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 1.4 | 1.8 | 0.509 U | | | | | | 0.518 U | 0.556 U | 0.511 U | 0.54 U | 0.547 U |
| **Inorganics (mg/kg)** | | | | | | | | | | | | | |
| ALUMINUM | 8.3 | NA | 20600 J | | | | | | 17500 J | 21200 J | 29900 J | 13900 J | 14300 J |
| ANTIMONY | 0.27 | 0.27 | 0.46 U | | | | | | 0.05 U | 0.21 U | 0.022 U | 0.19 U | 0.46 U |
| ARSENIC | 0.29 | 18 | 13.4 J | | | | | | 6.6 J | 13.7 J | 3.4 J | 6.2 J | 12.7 J |
| BARIUM | 82 | 330 | 80.6 J | | | | | | 61.5 J | 93 J | 76.6 J | 69.2 J | 74.8 J |
| BERYLLIUM | 3.2 | 21 | 0.59 | | | | | | 0.52 | 0.73 | 0.64 | 0.81 | 0.62 |
| CADMIUM | 0.38 | 0.36 | 0.38 J | | | | | | 0.27 J | 0.3 J | 0.21 J | 0.21 J | 0.32 J |
| CALCIUM | NA | NA | 54300 J | | | | | | 21200 J | 1190 J | 2530 J | 1340 J | 1530 J |
| CHROMIUM | 2.1 | 26 | 28.4 J | | | | | | 20.6 J | 39.9 J | 31 J | 22.1 J | 29.5 J |
| COBALT | 0.17 | 13 | 5.4 J | | | | | | 4.8 J | 14 J | 3.4 J | 10.9 J | 8.1 J |
| COPPER | 310 | 5.4 | 13.2 J | | | | | | 9.8 J | 8.7 J | 10.5 J | 8.4 J | 16.8 J |
| IRON | 2300 | NA | 23100 J | | | | | | 18500 J | 31800 J | 19000 J | 23700 J | 51200 J |
| LEAD | 81 | 11 | 15.8 J | | | | | | 13.5 J | 20.5 J | 12.8 J | 15.6 J | 26.3 J |
| MAGNESIUM | NA | NA | 4610 J | | | | | | 2720 J | 1770 J | 1660 J | 1110 J | 1090 J |
| MANGANESE | 110 | NA | 189 | | | | | | 196 J | 406 J | 58.3 J | 568 J | 423 J |
| MERCURY | 0.1 | 0.1 | 0.027 J | | | | | | 0.013 J | 0.043 J | 0.007 U | 0.025 J | 0.041 J |
| NICKEL | 14 | 13.6 | 14.5 J | | | | | | 12.3 J | 15.2 J | 15.2 J | 11.7 J | 13.8 J |
| POTASSIUM | NA | NA | 1840 J | | | | | | 1380 J | 1430 J | 1660 J | 968 J | 1270 J |
| SELENIUM | 0.26 | 0.0276 | 0.35 J | | | | | | 0.28 J | 0.81 | 0.11 J | 0.4 J | 0.76 |
| SILVER | 1.6 | 4.04 | 0.048 U | | | | | | 0.049 U | 0.049 U | 0.043 U | 0.048 U | 0.05 U |
| SODIUM | NA | NA | 128 J | | | | | | 62.7 U | 69.8 U | 76.6 U | 81.8 U | 48.7 U |
| THALLIUM | 0.056 | 0.0569 | 0.28 U | | | | | | 0.23 J | 0.36 J | 0.35 J | 0.29 J | 0.33 J |
| TIN | 4700 | 7.62 | 0.8 U | | | | | | 0.28 U | 0.36 U | 0.38 U | 0.27 U | 0.32 U |
| VANADIUM | 7.8 | 7.8 | 38.8 J | | | | | | 28 | 46.6 | 30.2 | 27.1 | 31.6 |
| ZINC | 680 | 6.62 | 46.8 J | | | | | | 32 J | 38.3 J | 24.6 J | 34.2 J | 50.4 J |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB034 | 15SB035 | 15SB036 | 15SB037 | 15SB038 | 15SB039 | 15SB040 | 15SB041 | 15SB042 | 15SB043 | 15SB044 |
| SAMPLE NUMBER | HHRA | ERA | 15SS0340002 | 15SS0350002 | 15SS0360002 | 15SS0370002 | 15SS0380002 | 15SS0390002 | 15SS0400002 | 15SS0410002 | 15SS0420002 | 15SS0430002 | 15SS0440002 |
| SOIL GROUP | CRITERIA | CRITERIA | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | 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 |
| SAMPLE DATE | | | 12/14/2004 | 12/9/2004 | 12/14/2004 | 12/9/2004 | 12/14/2004 | 12/10/2004 | 12/10/2004 | 12/14/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | | | |
| 2-BUTANONE | 4400 | 89600 | 0.914 U | 1.22 U | 3 J | 3 J | 1.09 U | 0.919 U | 1.15 U | 1.12 U | 6 J | 1.04 U | 19 |
| ACETONE | 3800 | 2500 | 9 U | 10 U | 19 U | 32 U | 23 U | 3 U | 18 U | 32 U | 28 J | 11 U | 79 J |
| CARBON DISULFIDE | 1500 | 94.1 | 0.914 UJ | 1.22 U | 1.22 UJ | 1.15 U | 1.09 UJ | 0.919 U | 1.15 U | 1.12 UJ | 0.98 U | 1.04 U | 1 J |
| CIS-1,2-DICHLOROETHENE | 20 | 784 | 0.914 U | 1.22 U | 1.22 U | 1.15 U | 1.09 U | 0.919 U | 1.15 U | 1.12 U | 1 J | 1.04 U | 0.972 U |
| METHYLENE CHLORIDE | 1.2 | 4050 | 8 J | 27 J | 7 J | 5 J | 39 J | 14 J | 51 J | 9 J | 5 U | 4 U | 7 U |
| TOTAL XYLENES | 7100 | 10000 | 0.914 U | 1.22 U | 1.22 U | 1.15 U | 1.09 U | 0.919 U | 1.15 U | 1.12 U | 0.98 U | 1.04 U | 0.972 U |
| TRICHLOROFLUOROMETHANE | 8000 | 16400 | 0.914 U | 2 J | 1.22 U | 1.15 U | 2 J | 0.919 U | 2 J | 2 J | 0.98 U | 1.04 U | 0.972 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 3240 | 3.87 U | 4.21 U | 4.19 U | 4.2 U | 5 J | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 8 J | 6 J |
| ACENAPHTHENE | 31000 | 682000 | 3.87 U | 4.21 U | 4.19 U | 4.2 U | 21 | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 26 | 3.91 U |
| ACENAPHTHYLENE | 18000 | 682000 | 3.87 U | 4.21 U | 4.19 U | 4.2 U | 3.99 U | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 4.01 U | 3.91 U |
| ACETOPHENONE | 890 | 300000 | 78.5 U | 85.5 U | 85.1 U | 85.4 U | 80.9 U | 75.1 U | 86.9 U | 83.6 U | 82.1 U | 81.4 U | 79.4 U |
| ANTHRACENE | 51000 | 1480000 | 3.87 U | 4.21 U | 4.19 U | 4.2 U | 9 | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 56 | 6 J |
| BENZO(A)ANTHRACENE | 160 | 5210 | 3.87 U | 17 J | 5 J | 4.2 UJ | 42 | 3.7 U | 7 J | 4.12 U | 8 J | 110 | 35 |
| BENZO(A)PYRENE | 62 | 1520 | 3.87 U | 19 J | 4.19 U | 4.2 UJ | 26 | 3.7 U | 4.28 U | 4.12 U | 9 | 100 | 36 |
| BENZO(B)FLUORANTHENE | 490 | 59800 | 3.87 U | 23 J | 4.19 U | 4.2 UJ | 27 | 3.7 U | 5 J | 4.12 U | 4.04 U | 100 | 48 |
| BENZO(G,H,I)PERYLENE | 16000 | 119000 | 3.87 U | 24 J | 4.19 U | 4.2 UJ | 33 | 3.7 U | 4.28 U | 4.12 U | 14 | 140 | 48 |
| BENZO(K)FLUORANTHENE | 490 | 148000 | 3.87 U | 10 J | 4.19 U | 4.2 UJ | 21 | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 52 | 33 |
| BIS(2-ETHYLHEXYL)PHTHALATE | 35000 | 925 | 85 J | 85.5 U | 170 J | 100 J | 250 J | 75.1 U | 86.9 U | 130 J | 82.1 U | 81.4 U | 79.4 U |
| CHRYSENE | 160 | 4730 | 3.87 U | 20 J | 6 J | 4.2 UJ | 69 | 3.7 U | 6 J | 4.12 U | 10 | 130 | 63 |
| DI-N-BUTYL PHTHALATE | 250000 | 150 | 78.5 U | 85.5 U | 85.1 U | 85.4 U | 80.9 U | 75.1 U | 100 J | 83.6 U | 82.1 U | 81.4 U | 290 J |
| DI-N-OCTYL PHTHALATE | 240000 | 709000 | 78.5 U | 85.5 U | 85.1 U | 85.4 U | 80.9 U | 75.1 U | 86.9 U | 83.6 U | 82.1 U | 81.4 U | 79.4 U |
| DIBENZO(A,H)ANTHRACENE | 62 | 18400 | 3.87 U | 4.21 UJ | 4.19 U | 4.2 UJ | 3.99 U | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 4.01 U | 3.91 U |
| DIBENZOFURAN | 2400 | NA | 78.5 U | 85.5 U | 85.1 U | 85.4 U | 80.9 U | 75.1 U | 86.9 U | 83.6 U | 82.1 U | 81.4 U | 79.4 U |
| FLUORANTHENE | 230000 | 122000 | 6 J | 29 | 11 | 4.2 U | 160 | 3.7 U | 10 | 4.12 U | 17 | 240 | 88 |
| FLUORENE | 41000 | 122000 | 3.87 U | 4.21 U | 4.19 U | 4.2 U | 3.99 U | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 28 | 3.91 U |
| INDENO(1,2,3-CD)PYRENE | 620 | 109000 | 3.87 U | 19 J | 4.19 U | 4.2 UJ | 3.99 U | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 89 | 38 |
| N-NITROSODIPHENYLAMINE | 220 | 545 | 78.5 U | 85.5 U | 85.1 U | 85.4 U | 1500 | 75.1 U | 86.9 U | 83.6 U | 82.1 U | 81.4 U | 79.4 U |
| NAPHTHALENE | 700 | 99.4 | 3.87 U | 4.21 U | 4.19 U | 4.2 U | 7 J | 3.7 U | 4.28 U | 4.12 U | 4.04 U | 16 | 5 J |
| PHENANTHRENE | 13000 | 45700 | 3.87 U | 20 | 7 J | 4.2 U | 52 | 3.7 U | 12 | 4.12 U | 16 | 270 | 47 |
| PYRENE | 230000 | 78500 | 6 J | 47 J | 10 | 4.2 UJ | 110 | 3.7 U | 12 | 4.12 U | 23 | 320 | 140 |
| **Pesticides PCBs (ug/kg)** | | | | | | | | | | | | | |
| 4,4'-DDD | 710 | 758 | 1.58 U | 1.72 U | 1.72 U | 1.72 U | 1.63 UJ | 1.51 U | 1.75 U | 1.69 U | | | |
| 4,4'-DDE | 1700 | 596 | 1.58 U | 1.72 U | 1.72 U | 1.72 U | 1.63 UJ | 1.51 U | 1.75 U | 1.69 U | | | |
| 4,4'-DDT | 1300 | 3.5 | 1.58 U | 1.72 U | 1.72 U | 1.72 U | 1.63 U | 1.51 U | 1.75 U | 1.69 U | | | |
| ALPHA-CHLORDANE | 480 | 224 | 0.762 U | 0.829 U | 0.826 U | 0.828 U | 0.785 U | 0.729 U | 0.843 U | 0.811 U | | | |
| AROCLOR-1260 | 220 | 0.332 | 20 | 11.5 U | 32 | 11.5 U | 10.9 U | 10.1 U | 11.7 U | 11.2 U | | | |
| GAMMA-CHLORDANE | 480 | 224 | 0.762 U | 0.829 U | 0.826 U | 0.828 U | 0.785 U | 0.729 U | 0.843 U | 0.811 U | | | |
| HEPTACHLOR | 110 | 5.98 | 0.762 U | 0.829 U | 0.826 U | 0.828 U | 0.785 U | 0.729 U | 0.843 U | 0.811 U | | | |
| HEPTACHLOR EPOXIDE | 33 | 152 | 0.762 U | 0.829 U | 0.826 U | 0.828 U | 0.785 U | 0.729 U | 0.843 U | 0.811 U | | | |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB034 | 15SB035 | 15SB036 | 15SB037 | 15SB038 | 15SB039 | 15SB040 | 15SB041 | 15SB042 | 15SB043 | 15SB044 |
| SAMPLE NUMBER | HHRA | ERA | 15SS0340002 | 15SS0350002 | 15SS0360002 | 15SS0370002 | 15SS0380002 | 15SS0390002 | 15SS0400002 | 15SS0410002 | 15SS0420002 | 15SS0430002 | 15SS0440002 |
| SOIL GROUP | CRITERIA | CRITERIA | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | 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 |
| SAMPLE DATE | | | 12/14/2004 | 12/9/2004 | 12/14/2004 | 12/9/2004 | 12/14/2004 | 12/10/2004 | 12/10/2004 | 12/14/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 |
| **Herbicides (ug/kg)** | | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 1.4 | 1.8 | 0.528 U | 0.574 U | 0.572 U | 0.573 U | 0.543 U | 0.504 U | 0.584 U | 0.562 U | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | | | | |
| ALUMINUM | 8.3 | NA | 15800 J | 19500 J | 12500 J | 16700 J | 11300 J | 13600 J | 19200 J | 18500 J | 19300 J | 16400 J | 24700 J |
| ANTIMONY | 0.27 | 0.27 | 0.44 U | 0.25 U | 0.27 U | 0.09 U | 0.54 U | 0.19 U | 0.22 U | 0.03 U | 0.24 U | 0.35 U | 0.32 U |
| ARSENIC | 0.29 | 18 | 5.8 J | 14.9 J | 20.7 J | 7.2 J | 12.9 J | 4.9 J | 5 J | 6.1 J | 7.8 J | 8.5 J | 6.1 J |
| BARIUM | 82 | 330 | 68.6 J | 102 J | 98 J | 117 J | 135 J | 50.9 J | 86.5 J | 112 J | 82.9 J | 60.1 J | 113 J |
| BERYLLIUM | 3.2 | 21 | 0.52 | 1.6 | 1.5 | 1.1 | 0.65 | 0.31 J | 0.59 | 0.76 | 0.49 J | 0.97 | 0.85 |
| CADMIUM | 0.38 | 0.36 | 0.36 J | 0.34 J | 0.37 J | 0.25 J | 0.25 J | 0.19 J | 0.39 J | 0.23 J | 0.25 J | 0.21 J | 0.18 J |
| CALCIUM | NA | NA | 7850 J | 1690 J | 1580 J | 1470 J | 170 J | 883 J | 110000 J | 753 J | 4720 J | 1270 J | 4000 J |
| CHROMIUM | 2.1 | 26 | 20.4 J | 34.4 J | 49.7 J | 26.3 J | 32.3 J | 18.1 J | 23 J | 16.9 J | 23.4 J | 40.2 J | 36.8 J |
| COBALT | 0.17 | 13 | 6.2 J | 59.6 J | 9.2 J | 20.8 J | 11.3 J | 4.3 J | 7 J | 14.3 J | 5.2 J | 5.3 J | 5.1 J |
| COPPER | 310 | 5.4 | 9.3 J | 11 J | 15.3 J | 11.1 J | 10.6 J | 7.5 J | 9.4 J | 7.6 J | 12.8 J | 13.3 J | 16.8 J |
| IRON | 2300 | NA | 16700 J | 48200 J | 57600 J | 36900 J | 37300 J | 15200 J | 14900 J | 15400 J | 21900 J | 46500 J | 34300 J |
| LEAD | 81 | 11 | 21.5 J | 24.6 J | 21.6 J | 19.2 J | 25.7 J | 13.2 J | 10 J | 15.4 J | 10.2 J | 13.4 J | 11 J |
| MAGNESIUM | NA | NA | 1810 J | 1520 J | 790 J | 1210 J | 754 J | 1540 J | 9980 J | 1560 J | 3240 J | 1290 J | 2540 J |
| MANGANESE | 110 | NA | 294 J | 4400 J | 857 J | 1570 J | 815 J | 421 | 310 | 992 J | 176 | 170 | 116 |
| MERCURY | 0.1 | 0.1 | 0.023 J | 0.049 J | 0.063 J | 0.044 J | 0.052 J | 0.01 J | 0.019 J | 0.041 J | 0.017 J | 0.007 U | 0.05 J |
| NICKEL | 14 | 13.6 | 12.3 J | 31.6 J | 16.8 J | 19.5 J | 13.6 J | 8.6 J | 15.3 J | 20.4 J | 13 J | 15.7 J | 16.7 J |
| POTASSIUM | NA | NA | 1340 J | 1400 J | 974 J | 1150 J | 908 J | 900 J | 1930 J | 1330 J | 1550 J | 1130 J | 2720 J |
| SELENIUM | 0.26 | 0.0276 | 0.36 J | 0.78 | 0.71 | 0.52 | 1.1 | 0.19 J | 0.69 | 0.57 | 0.28 J | 0.31 J | 0.33 J |
| SILVER | 1.6 | 4.04 | 0.043 U | 0.051 U | 0.06 U | 0.05 U | 0.046 U | 0.046 U | 0.055 U | 0.047 U | 0.054 U | 0.045 U | 0.046 U |
| SODIUM | NA | NA | 56.3 U | 76.5 U | 35.3 U | 53.3 U | 61 U | 135 J | 136 J | 49.7 U | 116 J | 76.4 J | 142 J |
| THALLIUM | 0.056 | 0.0569 | 0.3 J | 0.43 J | 0.21 J | 0.34 J | 0.47 J | 0.18 U | 0.28 U | 0.36 J | 0.23 U | 0.19 U | 0.28 U |
| TIN | 4700 | 7.62 | 0.35 U | 0.28 U | 0.32 U | 0.21 U | 0.21 U | 0.49 U | 0.58 U | 0.26 U | 0.61 U | 0.63 U | 0.67 U |
| VANADIUM | 7.8 | 7.8 | 26.9 | 41.7 | 57.4 | 29.5 | 31.3 | 30.2 J | 34.7 J | 27.3 | 36.6 J | 37.2 J | 34.5 J |
| ZINC | 680 | 6.62 | 47.3 J | 63.2 J | 53.5 J | 59.7 J | 34.8 J | 19.4 J | 36 J | 48.5 J | 36.3 J | 38.1 J | 30.6 J |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | HHRA CRITERIA | ERA CRITERIA | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB045 | 15SB046 | 15SB047 | 15SB048 | 15SB049 | 15SB062 |
| SAMPLE NUMBER | | | 15SS0450002 | 15SS0460002 | 15SS0470002 | 15SS0480002 | 15SS0490002 | 15SS0620002 |
| SOIL GROUP | | | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | ORIG |
| DEPTH RANGE | | | 0 - 2 | 0 - 2 | 0 - 2 | 0 - 2 | 0 - 2 | 0 - 2 |
| SAMPLE DATE | | | 12/10/2004 | 12/10/2004 | 12/9/2004 | 12/9/2004 | 12/14/2004 | 12/14/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | |
| 2-BUTANONE | 4400 | 89600 | 0.908 U | 0.927 U | 0.88 U | 0.932 U | 1.12 U | 1.19 U |
| ACETONE | 3800 | 2500 | 3 U | 3 U | 2 U | 4 U | 12 U | 2 U |
| CARBON DISULFIDE | 1500 | 94.1 | 0.908 U | 0.927 U | 0.88 U | 0.932 U | 1.12 UJ | 1.19 UJ |
| CIS-1,2-DICHLOROETHENE | 20 | 784 | 0.908 U | 0.927 U | 0.88 U | 0.932 U | 1.12 U | 1.19 U |
| METHYLENE CHLORIDE | 1.2 | 4050 | 4 U | 4 U | 6 J | 10 J | 28 J | 66 J |
| TOTAL XYLENES | 7100 | 10000 | 0.908 U | 0.927 U | 0.88 U | 0.932 U | 1.12 U | 1.19 U |
| TRICHLOROFLUOROMETHANE | 8000 | 16400 | 0.908 U | 0.927 U | 0.88 U | 1 J | 2 J | 5 |
| **Semivolatile Organics (ug/kg)** | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 3240 | 10 | 8 | 5 J | 6 J | 16.9 U | 4.28 U |
| ACENAPHTHENE | 31000 | 682000 | 3.79 U | 6 J | 3.72 U | 3.85 U | 16.9 U | 4.28 U |
| ACENAPHTHYLENE | 18000 | 682000 | 3.79 U | 26 | 7 J | 3.85 U | 87 | 4.28 U |
| ACETOPHENONE | 890 | 300000 | 77 U | 150 J | 75.6 U | 310 U | 86 U | 86.9 U |
| ANTHRACENE | 51000 | 1480000 | 3.79 U | 38 | 14 | 5 J | 120 | 4.28 U |
| BENZO(A)ANTHRACENE | 160 | 5210 | 24 | 210 | 85 | 3.85 UJ | 850 | 4.28 U |
| BENZO(A)PYRENE | 62 | 1520 | 52 | 210 | 61 J | 3.85 U | 820 | 4.28 U |
| BENZO(B)FLUORANTHENE | 490 | 59800 | 80 | 340 | 73 J | 3.85 U | 970 | 4.28 U |
| BENZO(G,H,I)PERYLENE | 16000 | 119000 | 86 | 260 | 58 J | 3.85 U | 710 | 4.28 U |
| BENZO(K)FLUORANTHENE | 490 | 148000 | 47 | 170 | 43 J | 3.85 U | 750 | 4.28 U |
| BIS(2-ETHYLHEXYL)PHTHALATE | 35000 | 925 | 77 U | 79.7 U | 75.6 U | 78.1 U | 150 J | 86.9 U |
| CHRYSENE | 160 | 4730 | 63 | 270 | 83 | 3.85 UJ | 1100 | 4.28 U |
| DI-N-BUTYL PHTHALATE | 250000 | 150 | 77 U | 79.7 U | 75.6 U | 240 J | 130 J | 86.9 U |
| DI-N-OCTYL PHTHALATE | 240000 | 709000 | 77 U | 79.7 U | 75.6 U | 78.1 U | 86 U | 86.9 U |
| DIBENZO(A,H)ANTHRACENE | 62 | 18400 | 18 | 75 | 3.72 UJ | 3.85 U | 220 | 4.28 U |
| DIBENZOFURAN | 2400 | NA | 77 U | 79.7 U | 75.6 U | 78.1 U | 86 U | 86.9 U |
| FLUORANTHENE | 230000 | 122000 | 40 | 210 | 110 | 5 J | 940 | 4.28 U |
| FLUORENE | 41000 | 122000 | 3.79 U | 6 J | 3.72 U | 3.85 U | 16.9 U | 4.28 U |
| INDENO(1,2,3-CD)PYRENE | 620 | 109000 | 57 | 210 | 43 J | 3.85 U | 650 | 4.28 U |
| N-NITROSODIPHENYLAMINE | 220 | 545 | 77 U | 79.7 U | 75.6 U | 78.1 U | 86 U | 86.9 U |
| NAPHTHALENE | 700 | 99.4 | 7 J | 8 | 3.72 U | 3.85 U | 16.9 U | 4.28 U |
| PHENANTHRENE | 13000 | 45700 | 25 | 46 | 63 | 5 J | 130 | 4.28 U |
| PYRENE | 230000 | 78500 | 85 | 330 | 140 | 7 J | 1600 | 4.28 U |
| **Pesticides PCBs (ug/kg)** | | | | | | | | |
| 4,4'-DDD | 710 | 758 | 1.55 U | 1.61 U | 1.73 U | 3.3 J | 2.7 J | 1.75 UJ |
| 4,4'-DDE | 1700 | 596 | 1.55 U | 1.61 U | 1.73 U | 1.66 U | 12 | 1.75 UJ |
| 4,4'-DDT | 1300 | 3.5 | 1.55 U | 1.61 U | 1.73 U | 1.66 U | 14 | 1.75 U |
| ALPHA-CHLORDANE | 480 | 224 | 0.747 U | 0.773 U | 0.831 U | 0.8 U | 0.834 U | 0.843 U |
| AROCLOR-1260 | 220 | 0.332 | 10.3 U | 10.7 U | 11.5 U | 11.1 U | 11.6 U | 11.7 U |
| GAMMA-CHLORDANE | 480 | 224 | 0.747 U | 0.773 U | 0.831 U | 0.8 U | 0.834 U | 0.843 U |
| HEPTACHLOR | 110 | 5.98 | 0.747 U | 0.773 U | 0.831 U | 0.8 U | 0.834 U | 0.843 U |
| HEPTACHLOR EPOXIDE | 33 | 152 | 0.747 U | 0.773 U | 0.831 U | 0.8 U | 0.834 U | 0.843 U |

TABLE 3-6

RESULTS FOR CHEMICALS DETECTED IN SURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | HHRA CRITERIA | ERA CRITERIA | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|
| LOCATION | | | 15SB045 | 15SB046 | 15SB047 | 15SB048 | 15SB049 | 15SB062 |
| SAMPLE NUMBER | | | 15SS0450002 | 15SS0460002 | 15SS0470002 | 15SS0480002 | 15SS0490002 | 15SS0620002 |
| SOIL GROUP | | | 3 | 3 | 3 | 3 | 3 | 3 |
| SAMPLE CODE | | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | ORIG |
| DEPTH RANGE | | | 0 - 2 | 0 - 2 | 0 - 2 | 0 - 2 | 0 - 2 | 0 - 2 |
| SAMPLE DATE | | | 12/10/2004 | 12/10/2004 | 12/9/2004 | 12/9/2004 | 12/14/2004 | 12/14/2004 |
| **Herbicides (ug/kg)** | | | | | | | | |
| PENTACHLOROPHENOL | 1.4 | 1.8 | 0.517 U | 0.535 U | 0.508 U | 0.524 U | 28 J | 0.584 U |
| **Inorganics (mg/kg)** | | | | | | | | |
| ALUMINUM | 8.3 | NA | 19300 J | 22600 J | 21100 J | 20100 J | 17800 J | 18000 J |
| ANTIMONY | 0.27 | 0.27 | 0.32 U | 0.32 U | 0.2 U | 0.37 U | 0.5 U | 0.21 U |
| ARSENIC | 0.29 | 18 | 11.8 J | 8.3 J | 9.9 J | 8.4 J | 8 J | 5.5 J |
| BARIUM | 82 | 330 | 87.1 J | 69.2 J | 84.5 J | 87.1 J | 110 J | 114 J |
| BERYLLIUM | 3.2 | 21 | 0.6 | 0.64 | 0.59 | 0.77 J | 1 | 0.81 |
| CADMIUM | 0.38 | 0.36 | 0.25 J | 0.26 J | 0.25 J | 0.86 J | 0.4 J | 0.29 J |
| CALCIUM | NA | NA | 9140 J | 3300 J | 2280 J | 32700 J | 3610 J | 2190 J |
| CHROMIUM | 2.1 | 26 | 21 J | 25.1 J | 23 J | 23.3 J | 20.8 J | 17.8 J |
| COBALT | 0.17 | 13 | 6.4 J | 5.1 J | 4.3 J | 7 J | 13.1 J | 11.9 J |
| COPPER | 310 | 5.4 | 9.2 J | 13 J | 15.8 J | 10.7 J | 11.7 J | 9.6 J |
| IRON | 2300 | NA | 16300 J | 24300 J | 25300 J | 23500 J | 20300 J | 15800 J |
| LEAD | 81 | 11 | 10.6 J | 11 J | 16.1 J | 14.8 J | 25.6 J | 18.9 J |
| MAGNESIUM | NA | NA | 3020 J | 3560 J | 2890 J | 3550 J | 1870 J | 1940 J |
| MANGANESE | 110 | NA | 156 | 246 | 180 J | 346 J | 687 J | 1110 J |
| MERCURY | 0.1 | 0.1 | 0.031 J | 0.026 J | 0.083 J | 0.038 J | 0.035 J | 0.031 J |
| NICKEL | 14 | 13.6 | 12.7 J | 13.2 J | 13.6 J | 14.3 J | 21.2 J | 16.4 J |
| POTASSIUM | NA | NA | 1510 J | 1550 J | 1660 J | 1740 J | 1370 J | 1530 J |
| SELENIUM | 0.26 | 0.0276 | 0.29 J | 0.33 J | 0.46 J | 0.39 J | 0.55 | 0.36 J |
| SILVER | 1.6 | 4.04 | 0.04 J | 0.05 U | 0.044 U | 0.05 U | 0.07 U | 0.052 U |
| SODIUM | NA | NA | 99.9 J | 126 J | 121 U | 87.7 J | 81.6 U | 81.8 U |
| THALLIUM | 0.056 | 0.0569 | 0.26 U | 0.28 U | 0.37 J | 0.26 U | 0.35 J | 0.37 J |
| TIN | 4700 | 7.62 | 0.66 U | 0.71 U | 0.36 U | 0.56 U | 0.53 U | 0.32 U |
| VANADIUM | 7.8 | 7.8 | 30.4 J | 40.5 J | 39.4 | 37.3 J | 30.1 | 29.2 |
| ZINC | 680 | 6.62 | 40.6 J | 36.7 J | 42.7 J | 43.7 | 56.4 J | 43.2 J |

Blank cell indicates no analysis was conducted for the parameter.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
HHRA - Human Health Risk Assessment.
ERA - Ecological Risk Assessment.
ug/kg - micrograms per kilogram.
mg/kg - milligrams per kilogram.
NA - No applicable criterion.
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Chemicals detected at concentrations greater than either HHRA or ERA criteria are identified by bold formatting.

TABLE 3-7

DESCRIPTIVE STATISTICS FOR SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detects | Sample with Maximum Detected Concentration |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | | | |
| 2-BUTANONE | 4400 | 18/43 | 1 J | 18 | 0.867 - 1.23 | 2.69 | 5.73 | 15SB0461020 |
| 2-HEXANONE | NA | 1/43 | 2 J | 2 J | 0.796 - 1.48 | 0.543 | 2.00 | 15SB0460206 |
| ACETONE | 3800 | 18/43 | 3 J | 72 | 3 - 42 | 16.2 | 29.1 | 15SB0210206, 15SB0400206 |
| CARBON DISULFIDE | 1500 | 3/43 | 1 J | 3 J | 0.796 - 1.48 | 0.609 | 2.00 | 15SB0461020 |
| CIS-1,2-DICHLOROETHENE | 20 | 2/43 | 2 J | 2 J | 0.796 - 1.48 | 0.578 | 2.00 | 15SB0220206, 15SB0430206 |
| METHYLENE CHLORIDE | 1.2 | 36/43 | 1 J | 54 J | 0.891 - 10 | 10.9 | 12.6 | 15SB0450610 |
| TOTAL XYLENES | 7100 | 1/43 | 1.13 J | 1.13 J | 0.796 - 1.48 | 0.520 | 1.13 | 15SB0311014 |
| TRICHLOROFLUOROMETHANE | 8000 | 12/43 | 1 J | 3 | 0.815 - 1.48 | 0.909 | 1.95 | 15SB0311014, 15SB0450610 |
| **Semivolatile Organics (ug/kg)** | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 7/19 | 4 J | 47 | 3.85 - 4.3 | 7.59 | 17.1 | 15SB0020206 |
| ACENAPHTHENE | 31000 | 5/19 | 6 J | 110 | 3.78 - 4.3 | 11.4 | 37.8 | 15SB0020206 |
| ACETOPHENONE | 890 | 1/12 | 140 J | 140 J | 72.7 - 130 | 51.7 | 140 | 15SB0460206 |
| ANTHRACENE | 51000 | 8/19 | 4 J | 120 | 3.78 - 4.3 | 14.3 | 31.3 | 15SB0020206 |
| BENZO(A)ANTHRACENE | 160 | 9/19 | 8 | 110 | 3.85 - 4.3 | 21.1 | 42.3 | 15SB0280206 |
| BENZO(A)PYRENE | 62 | 9/19 | 8 | 150 | 3.85 - 4.3 | 22.0 | 44.2 | 15SB0230206 |
| BENZO(B)FLUORANTHENE | 490 | 9/19 | 10 | 230 | 3.85 - 4.3 | 27.9 | 56.7 | 15SB0230206 |
| BENZO(G,H,I)PERYLENE | 16000 | 8/19 | 6 J | 120 | 3.79 - 4.3 | 17.4 | 38.5 | 15SB0280206 |
| BENZO(K)FLUORANTHENE | 490 | 8/19 | 5 J | 86 | 3.78 - 4.3 | 14.7 | 32.3 | 15SB0280206 |
| BIS(2-ETHYLHEXYL) PHTHALATE | 35000 | 1/12 | 110 J | 110 J | 72.7 - 86.9 | 45.9 | 110 | 15SB0090206 |
| CHRYSENE | 160 | 9/19 | 9 | 120 | 3.85 - 4.3 | 23.6 | 47.6 | 15SB0230206, 15SB0280206 |
| DI-N-BUTYL PHTHALATE | 250000 | 2/12 | 100 J | 180 J | 72.7 - 87.4 | 57.0 | 140 | 15SB0460206 |
| DIBENZO(A,H)ANTHRACENE | 62 | 3/19 | 7 J | 31 | 3.78 - 4.3 | 5.04 | 21.3 | 15SB0280206 |
| FLUORANTHENE | 230000 | 10/19 | 12 | 370 | 3.85 - 4.3 | 54.5 | 102 | 15SB0020206 |
| FLUORENE | 41000 | 7/19 | 4 J | 120 | 3.79 - 4.3 | 12.3 | 29.9 | 15SB0020206 |
| INDENO(1,2,3-CD)PYRENE | 620 | 8/19 | 6 J | 85 | 3.79 - 4.3 | 13.2 | 28.6 | 15SB0280206 |
| ISOSAFROLE | NA | 2/12 | 1300 | 6000 | 72.7 - 86.9 | 642 | 3650 | 15SB0460206 |
| NAPHTHALENE | 700 | 7/19 | 6 J | 42 | 3.79 - 4.3 | 7.37 | 16.6 | 15SB0020206 |
| PHENANTHRENE | 13000 | 11/19 | 6 J | 510 | 3.85 - 4.3 | 59.1 | 101 | 15SB0020206 |
| PYRENE | 230000 | 11/19 | 12 | 490 | 3.85 - 4.3 | 81.7 | 140 | 15SB0280206 |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | |
| 4,4'-DDD | 710 | 1/5 | 2.3 J | 2.3 J | 1.53 - 1.64 | 1.09 | 2.30 | 15SB0480206 |
| 4,4'-DDT | 1300 | 1/5 | 1.59 J | 1.59 J | 1.53 - 1.64 | 0.951 | 1.59 | 15SB0480206 |
| ALPHA-CHLORDANE | 480 | 1/5 | 1 J | 1 J | 0.744 - 0.788 | 0.508 | 1.00 | 15SB0140206 |
| GAMMA-CHLORDANE | 480 | 1/5 | 1.1 J | 1.1 J | 0.744 - 0.788 | 0.528 | 1.10 | 15SB0140206 |
| **Inorganics (mg/kg)** | | | | | | | | |
| ALUMINUM | 8.3 | 12/12 | 14400 J | 31100 J | --- | 20658 | 20658 | 15SB0230206 |
| ARSENIC | 0.29 | 12/12 | 3.9 J | 14.9 J | --- | 8.23 | 8.23 | 15SB0230206 |
| BARIUM | 82 | 12/12 | 53.7 J | 157 J | --- | 101 | 101 | 15SB0080206, 15SB0100610 |
| BERYLLIUM | 3.2 | 12/12 | 0.55 | 1.1 J | --- | 0.814 | 0.814 | 15SB0060206, 15SB0100206 |
| CADMIUM | 0.38 | 12/12 | 0.22 J | 0.95 | --- | 0.405 | 0.405 | 15SB0480206 |
| CALCIUM | NA | 9/12 | 726 J | 22900 J | 301 - 5680 | 4347 | 5442 | 15SB0450206 |
| CHROMIUM | 2.1 | 12/12 | 16.5 J | 32.6 J | --- | 24.0 | 24.0 | 15SB0060206 |
| COBALT | 0.17 | 12/12 | 5.4 J | 54.2 J | --- | 13.9 | 13.9 | 15SB0100206 |

TABLE 3-7

DESCRIPTIVE STATISTICS FOR SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detects | Sample with Maximum Detected Concentration |
|---|---|---|---|---|---|---|---|---|
| COPPER | 310 | 12/12 | 6.1 J | 18.7 J | --- | 11.7 | 11.7 | 15SB0230206 |
| IRON | 2300 | 12/12 | 16500 J | 35600 J | --- | 25508 | 25508 | 15SB0230206 |
| LEAD | 81 | 12/12 | 9.2 J | 21.7 J | --- | 13.4 | 13.4 | 15SB0480206 |
| MAGNESIUM | NA | 12/12 | 1030 J | 3890 J | --- | 2125 | 2125 | 15SB0230206 |
| MANGANESE | 110 | 12/12 | 101 | 3570 J | --- | 732 | 732 | 15SB0090206 |
| MERCURY | 0.1 | 8/9 | 0.008 J | 0.055 J | 0.007 | 0.0262 | 0.0290 | 15SB0100206 |
| NICKEL | 14 | 12/12 | 12 J | 33.2 J | --- | 18.2 | 18.2 | 15SB0060206 |
| POTASSIUM | NA | 12/12 | 1050 J | 2820 J | --- | 1688 | 1688 | 15SB0060206 |
| SELENIUM | 0.26 | 11/12 | 0.16 J | 0.79 J | 0.28 | 0.368 | 0.389 | 15SB0100206 |
| SILVER | 1.6 | 1/12 | 0.05 J | 0.05 J | 0.044 - 0.08 | 0.0309 | 0.0500 | 15SB0460206 |
| SODIUM | NA | 11/12 | 79 J | 135 J | 83 | 102 | 107 | 15SB0090206 |
| THALLIUM | 0.056 | 4/12 | 0.27 J | 0.39 J | 0.17 - 0.33 | 0.199 | 0.333 | 15SB0230206 |
| VANADIUM | 7.8 | 12/12 | 23.5 J | 55.9 J | --- | 33.9 | 33.9 | 15SB0230206 |
| ZINC | 680 | 11/12 | 26 J | 61 J | 64.7 | 43.3 | 44.3 | 15SB0230206 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
HHRA - Human Health Risk Assessment.
ug/kg - micrograms per kilogram.
mg/kg - milligrams per kilogram.
NA - No applicable criterion.

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION [1] | | 15SB001 | 15SB002 | 15SB003 | 15SB004 | 15SB005 | 15SB006 | 15SB007 | 15SB008 | 15SB008 | 15SB009 |
| SAMPLE NUMBER | HHRA | 15SB0010206 | 15SB0020206 | 15SB0030206 | 15SB0040206 | 15SB0050206 | 15SB0060206 | 15SB0070206 | 15SB0080206 | 15SB0080610 | 15SB0090206 |
| SOIL GROUP | CRITERION | 9 | 8 | 9 | 8 | 8 | 9 | 9 | 8 | 8 | 8 |
| SAMPLE CODE | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | ORIG | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 6 - 10 | 2 - 6 |
| SAMPLE DATE | | 12/9/2004 | 12/8/2004 | 12/9/2004 | 12/9/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-BUTANONE | 4400 | 0.91 U | 3 J | 0.982 U | 2 J | 0.995 U | 0.906 U | 0.891 U | 8 J | 1 U | 10 J |
| 2-HEXANONE | NA | 0.91 U | 0.938 U | 0.982 U | 1.01 U | 0.995 U | 0.906 U | 0.891 U | 1.06 U | 1 U | 1.13 U |
| ACETONE | 3800 | 4 BU | 23 BU | 7 BU | 22 BU | 16 BU | 8 BU | 6 BU | 35 U | 11 U | 42 U |
| CARBON DISULFIDE | 1500 | 0.91 U | 0.938 U | 0.982 U | 1.01 U | 0.995 U | 0.906 U | 1 J | 1.06 U | 1 U | 1.13 U |
| CIS-1,2-DICHLOROETHENE | 20 | 0.91 U | 0.938 U | 0.982 U | 1.01 U | 0.995 U | 0.906 U | 0.891 U | 1.06 U | 1 U | 1.13 U |
| METHYLENE CHLORIDE | 1.2 | 7 J | 2 J | 18 J | 11 J | 1 J | 3 J | 0.891 U | 6 J | 5 J | 5 J |
| TOTAL XYLENES | 7100 | 0.91 U | 0.938 U | 0.982 U | 1.01 U | 0.995 U | 0.906 U | 0.891 U | 1.06 U | 1 U | 1.13 U |
| TRICHLOROFLUOROMETHANE | 8000 | 0.91 U | 0.938 U | 2 J | 1.01 U | 0.995 U | 0.906 U | 0.891 U | 1.06 U | 1 U | 1.13 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 3.85 U | 47 | 4.05 U | 3.98 U | 3.96 U | 7 J | 27 | 4.05 UJ | 3.98 UJ | 4.3 UJ |
| ACENAPHTHENE | 31000 | 3.85 U | 110 | 4.05 U | 3.98 U | 3.96 U | 6 J | 3.87 U | 4.05 UJ | 3.98 UJ | 4.3 UJ |
| ACETOPHENONE | 890 | | | | | | 80.9 U | | 82.3 U | 130 U | 87.4 U |
| ANTHRACENE | 51000 | 3.85 U | 120 | 4.05 J | 5 J | 3.96 U | 5 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| BENZO(A)ANTHRACENE | 160 | 3.85 UJ | 100 J | 15 J | 3.98 UJ | 3.96 UJ | 15 J | 3.87 UJ | 4.05 U | 3.98 U | 4.3 U |
| BENZO(A)PYRENE | 62 | 3.85 U | 57 | 12 | 3.98 U | 3.96 U | 16 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| BENZO(B)FLUORANTHENE | 490 | 3.85 U | 80 | 11 | 3.98 U | 3.96 U | 28 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| BENZO(G,H,I)PERYLENE | 16000 | 3.85 U | 19 | 6 J | 3.98 U | 3.96 U | 14 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| BENZO(K)FLUORANTHENE | 490 | 3.85 U | 55 | 16 | 3.98 U | 3.96 U | 21 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| BIS(2-ETHYLHEXYL) PHTHALATE | 35000 | | | | | | 80.9 U | | 82.3 U | 80.8 U | 110 J |
| CHRYSENE | 160 | 3.85 U | 90 | 15 | 3.98 U | 3.96 U | 24 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| DI-N-BUTYL PHTHALATE | 250000 | | | | | | 80.9 U | | 82.3 U | 100 J | 87.4 U |
| DIBENZO(A,H)ANTHRACENE | 62 | 3.85 U | 7 J | 4.05 U | 3.98 U | 3.96 U | 3.99 UJ | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| FLUORANTHENE | 230000 | 3.85 U | 370 | 48 | 3.98 U | 14 | 28 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| FLUORENE | 41000 | 3.85 U | 120 | 4.05 U | 3.98 U | 4 J | 6 J | 3.87 U | 4.05 UJ | 3.98 UJ | 4.3 UJ |
| INDENO(1,2,3-CD)PYRENE | 620 | 3.85 U | 20 | 6 J | 3.98 U | 3.96 U | 11 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| ISOSAFROLE | NA | | | | | | 80.9 U | | 82.3 U | 80.8 U | 1300 |
| NAPHTHALENE | 700 | 3.85 U | 42 | 4.05 U | 3.98 U | 3.96 U | 6 J | 16 | 4.05 UJ | 3.98 UJ | 4.3 UJ |
| PHENANTHRENE | 13000 | 3.85 U | 510 | 18 | 3.98 U | 10 | 27 J | 11 | 4.05 U | 3.98 U | 4.3 U |
| PYRENE | 230000 | 3.85 U | 390 | 61 | 12 | 12 | 33 J | 3.87 U | 4.05 U | 3.98 U | 4.3 U |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | | |
| 4,4'-DDD | 710 | | | | | | | | | | |
| 4,4'-DDT | 1300 | | | | | | | | | | |
| ALPHA-CHLORDANE | 480 | | | | | | | | | | |
| GAMMA-CHLORDANE | 480 | | | | | | | | | | |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION [1] | | 15SB001 | 15SB002 | 15SB003 | 15SB004 | 15SB005 | 15SB006 | 15SB007 | 15SB008 | 15SB008 | 15SB009 |
| SAMPLE NUMBER | HHRA | 15SB0010206 | 15SB0020206 | 15SB0030206 | 15SB0040206 | 15SB0050206 | 15SB0060206 | 15SB0070206 | 15SB0080206 | 15SB0080610 | 15SB0090206 |
| SOIL GROUP | CRITERION | 9 | 8 | 9 | 8 | 8 | 9 | 9 | 8 | 8 | 8 |
| SAMPLE CODE | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | ORIG | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 6 - 10 | 2 - 6 |
| SAMPLE DATE | | 12/9/2004 | 12/8/2004 | 12/9/2004 | 12/9/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| ALUMINUM | 8.3 | | | | | | 16500 J | | 19200 J | 25500 J | 20700 J |
| ARSENIC | 0.29 | | | | | | 3.9 J | | 4.5 J | 8.1 J | 6.4 J |
| BARIUM | 82 | | | | | | 93.4 J | | 157 J | 59.4 J | 141 J |
| BERYLLIUM | 3.2 | | | | | | 1.1 J | | 0.84 J | 0.69 J | 1 J |
| CADMIUM | 0.38 | | | | | | 0.37 J | | 0.3 J | 0.34 J | 0.54 J |
| CALCIUM | NA | | | | | | 5680 U | | 1370 J | 301 U | 1430 J |
| CHROMIUM | 2.1 | | | | | | 32.6 J | | 16.5 J | 27.6 J | 17 J |
| COBALT | 0.17 | | | | | | 14.5 J | | 13.7 J | 11.4 J | 16.2 J |
| COPPER | 310 | | | | | | 14.3 J | | 6.1 J | 11 J | 7.7 J |
| IRON | 2300 | | | | | | 30200 J | | 16500 J | 28300 J | 22500 J |
| LEAD | 81 | | | | | | 12.4 J | | 13.5 J | 11.1 J | 15.4 J |
| MAGNESIUM | NA | | | | | | 2380 J | | 1030 J | 1320 J | 1190 J |
| MANGANESE | 110 | | | | | | 1020 J | | 1400 J | 397 J | 3570 J |
| MERCURY | 0.1 | | | | | | | | 0.042 J | 0.025 J | 0.049 J |
| NICKEL | 14 | | | | | | 33.2 J | | 17.7 J | 13.3 J | 20.9 J |
| POTASSIUM | NA | | | | | | 2820 J | | 1200 J | 1360 J | 1260 J |
| SELENIUM | 0.26 | | | | | | 0.21 J | | 0.4 J | 0.39 J | 0.51 J |
| SILVER | 1.6 | | | | | | 0.047 U | | 0.06 U | 0.05 U | 0.07 U |
| SODIUM | NA | | | | | | 79 J | | 112 J | 110 J | 135 J |
| THALLIUM | 0.056 | | | | | | 0.36 J | | 0.3 U | 0.3 U | 0.32 U |
| VANADIUM | 7.8 | | | | | | 23.5 J | | 30.1 J | 34.3 J | 31.1 J |
| ZINC | 680 | | | | | | 64.7 U | | 48.9 | 40.7 J | 46.4 |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION (1) | | 15SB009 | 15SB010 | 15SB010 | 15SB011 | 15SB012 | 15SB013 | 15SB014 | 15SB019 | 15SB020 | 15SB021 |
| SAMPLE NUMBER | HHRA | 15SB0090610 | 15SB0100206 | 15SB0100610 | 15SB0110206 | 15SB0120206 | 15SB0130206 | 15SB0140206 | 15SB0190206 | 15SB0200206 | 15SB0210206 |
| SOIL GROUP | CRITERIA | 8 | 8 | 8 | 8 | 9 | 8 | 8 | 8 | 9 | 9 |
| SAMPLE CODE | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | ORIG | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 6 - 10 | 2 - 6 | 6 - 10 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 |
| SAMPLE DATE | | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/11/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-BUTANONE | 4400 | 0.936 U | 13 J | 0.998 U | 1.02 U | 1.02 U | 1.2 J | | 0.939 U | 1.02 U | 1.05 U |
| 2-HEXANONE | NA | 0.936 U | 1.48 U | 0.998 U | 1.02 U | 1.02 U | 1.02 U | | 0.939 U | 1.02 U | 1.05 U |
| ACETONE | 3800 | 7 U | 67 J | 14 U | 12 BU | 11 BU | 11 BU | | 7 J | 7 J | 3 J |
| CARBON DISULFIDE | 1500 | 0.936 U | 1.48 U | 0.998 U | 1.02 U | 1.02 U | 1.02 U | | 0.939 U | 1.02 U | 1.05 U |
| CIS-1,2-DICHLOROETHENE | 20 | 0.936 U | 1.48 U | 0.998 U | 1.02 U | 1.02 U | 1.02 U | | 0.939 U | 1.02 U | 1.05 U |
| METHYLENE CHLORIDE | 1.2 | 4 J | 7 J | 10 J | 1.35 J | 1.02 U | 2 J | | 24 J | 18 J | 1.05 UJ |
| TOTAL XYLENES | 7100 | 0.936 U | 1.48 U | 0.998 U | 1.02 U | 1.02 U | 1.02 U | | 0.939 U | 1.02 U | 1.05 U |
| TRICHLOROFLUOROMETHANE | 8000 | 0.936 U | 1.48 U | 0.998 U | 1.02 U | 1.02 U | 1.02 U | | 2 J | 1.02 U | 1.05 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 3.96 UJ | 4.28 UJ | 4.01 UJ | | | | | | | |
| ACENAPHTHENE | 31000 | 3.96 UJ | 4.28 UJ | 4.01 UJ | | | | | | | |
| ACETOPHENONE | 890 | 80.4 U | 86.9 U | 81.5 U | | | | | | | |
| ANTHRACENE | 51000 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| BENZO(A)ANTHRACENE | 160 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| BENZO(A)PYRENE | 62 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| BENZO(B)FLUORANTHENE | 490 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| BENZO(G,H,I)PERYLENE | 16000 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| BENZO(K)FLUORANTHENE | 490 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 35000 | 80.4 U | 86.9 U | 81.5 U | | | | | | | |
| CHRYSENE | 160 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| DI-N-BUTYL PHTHALATE | 250000 | 80.4 U | 86.9 U | 81.5 U | | | | | | | |
| DIBENZO(A,H)ANTHRACENE | 62 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| FLUORANTHENE | 230000 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| FLUORENE | 41000 | 3.96 UJ | 4.28 UJ | 4.01 UJ | | | | | | | |
| INDENO(1,2,3-CD)PYRENE | 620 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| ISOSAFROLE | NA | 80.4 U | 86.9 U | 81.5 U | | | | | | | |
| NAPHTHALENE | 700 | 3.96 UJ | 4.28 UJ | 4.01 UJ | | | | | | | |
| PHENANTHRENE | 13000 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| PYRENE | 230000 | 3.96 U | 4.28 U | 4.01 U | | | | | | | |
| **Pesticides PCBs (ug/kg)** | | | | | | | | | | | |
| 4,4'-DDD | 710 | | | | | | | 1.53 U | | | |
| 4,4'-DDT | 1300 | | | | | | | 1.53 U | | | |
| ALPHA-CHLORDANE | 480 | | | | | | | 1 J | | | |
| GAMMA-CHLORDANE | 480 | | | | | | | 1.1 J | | | |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION [1] | | 15SB009 | 15SB010 | 15SB010 | 15SB011 | 15SB012 | 15SB013 | 15SB014 | 15SB019 | 15SB020 | 15SB021 |
| SAMPLE NUMBER | HHRA | 15SB0090610 | 15SB0100206 | 15SB0100610 | 15SB0110206 | 15SB0120206 | 15SB0130206 | 15SB0140206 | 15SB0190206 | 15SB0200206 | 15SB0210206 |
| SOIL GROUP | CRITERIA | 8 | 8 | 8 | 8 | 9 | 8 | 8 | 8 | 9 | 9 |
| SAMPLE CODE | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | ORIG | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 6 - 10 | 2 - 6 | 6 - 10 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 |
| SAMPLE DATE | | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/8/2004 | 12/11/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| ALUMINUM | 8.3 | 20200 J | 23600 J | 18700 J | | | | 21100 J | | | |
| ARSENIC | 0.29 | 7.7 J | 14.6 J | 8.4 J | | | | 11.6 J | | | |
| BARIUM | 82 | 53.7 J | 85.8 J | 157 J | | | | 106 J | | | |
| BERYLLIUM | 3.2 | 0.64 J | 1.1 J | 0.9 J | | | | 0.8 J | | | |
| CADMIUM | 0.38 | 0.31 J | 0.43 J | 0.44 J | | | | 0.33 J | | | |
| CALCIUM | NA | 391 U | 1320 J | 726 J | | | | 4490 J | | | |
| CHROMIUM | 2.1 | 26.3 J | 19.4 J | 23.1 J | | | | 23.9 J | | | |
| COBALT | 0.17 | 5.4 J | 54.2 J | 8 J | | | | 13.8 J | | | |
| COPPER | 310 | 9.9 J | 7.4 J | 11.1 J | | | | 13.6 J | | | |
| IRON | 2300 | 29400 J | 21600 J | 30800 J | | | | 32800 J | | | |
| LEAD | 81 | 10.3 J | 11.7 J | 14.5 J | | | | 15.5 J | | | |
| MAGNESIUM | NA | 1650 J | 1400 J | 1550 J | | | | 2920 J | | | |
| MANGANESE | 110 | 201 J | 160 J | 399 J | | | | 1010 J | | | |
| MERCURY | 0.1 | 0.008 J | 0.055 J | 0.008 J | | | | | | | |
| NICKEL | 14 | 12.7 J | 25.2 J | 12.2 J | | | | 19.8 J | | | |
| POTASSIUM | NA | 1260 J | 1500 J | 1240 J | | | | 2020 J | | | |
| SELENIUM | 0.26 | 0.28 U | 0.79 J | 0.34 J | | | | 0.38 J | | | |
| SILVER | 1.6 | 0.06 U | 0.08 U | 0.07 U | | | | 0.044 U | | | |
| SODIUM | NA | 88.6 J | 118 J | 105 J | | | | 115 J | | | |
| THALLIUM | 0.056 | 0.24 U | 0.33 U | 0.23 U | | | | 0.27 J | | | |
| VANADIUM | 7.8 | 34.5 J | 34.8 J | 37.9 J | | | | 39.5 J | | | |
| ZINC | 680 | 26.8 J | 47.6 J | 34.4 J | | | | 60.8 J | | | |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION [1] | | 15SB022 | 15SB023 | 15SB028 | 15SB029 | 15SB030 | 15SB031 | 15SB031 | 15SB031 | 15SB032 | 15SB035 |
| SAMPLE NUMBER | HHRA | 15SB0220206 | 15SB0230206 | 15SB0280206 | 15SB0290206 | 15SB0300206 | 15SB0310206 | 15SB0310610 | 15SB0311014 | 15SB0320206 | 15SB0350206 |
| SOIL GROUP | CRITERIA | 8 | 8 | 9 | 9 | 8 | 8 | 8 | 8 | 9 | 9 |
| SAMPLE CODE | | NORMAL | ORIG | ORIG | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 6 - 10 | 10 - 14 | 2 - 6 | 2 - 6 |
| SAMPLE DATE | | 12/10/2004 | 12/10/2004 | 12/11/2004 | 12/9/2004 | 12/14/2004 | 12/9/2004 | 12/9/2004 | 12/9/2004 | 12/9/2004 | 12/9/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-BUTANONE | 4400 | 0.876 U | 3 J | | 1.04 U | 1.19 U | 1.07 U | 7 J | 12 J | 1.01 U | 1 J |
| 2-HEXANONE | NA | 0.876 U | 0.994 U | | 1.04 U | 1.19 U | 1.07 U | 1.06 U | 1.12 U | 1.01 U | 0.796 U |
| ACETONE | 3800 | 15 J | 29 J | | 3 BU | 34 J | 13 BU | 28 BU | 72 BJ | 5 BU | 19 BU |
| CARBON DISULFIDE | 1500 | 0.876 U | 0.994 U | | 1.04 U | 1.19 UJ | 1.07 U | 1.06 U | 1.12 U | 1.01 U | 0.796 U |
| CIS-1,2-DICHLOROETHENE | 20 | 2 J | 0.994 U | | 1.04 U | 1.19 U | 1.07 U | 1.06 U | 1.12 U | 1.01 U | 0.796 U |
| METHYLENE CHLORIDE | 1.2 | 3 J | 21 J | | 15 J | 6 J | 15 J | 4 J | 33 J | 10 J | 20 J |
| TOTAL XYLENES | 7100 | 0.876 U | 0.994 U | | 1.04 U | 1.19 U | 1.07 U | 1.06 U | 1.13 J | 1.01 U | 0.796 U |
| TRICHLOROFLUOROMETHANE | 8000 | 0.876 U | 2 J | | 1.44 J | 1.19 U | 1.07 U | 1.06 U | 3 J | 1.01 U | 2 J |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 5 J | 4 U | 12 | | | | | | | |
| ACENAPHTHENE | 31000 | 8 | 27 | 38 | | | | | | | |
| ACETOPHENONE | 890 | | 81.2 U | 72.7 U | | | | | | | |
| ANTHRACENE | 51000 | 8 | 33 | 71 | | | | | | | |
| BENZO(A)ANTHRACENE | 160 | 12 | 99 | 110 | | | | | | | |
| BENZO(A)PYRENE | 62 | 13 | 150 | 120 | | | | | | | |
| BENZO(B)FLUORANTHENE | 490 | 11 | 230 | 100 | | | | | | | |
| BENZO(G,H,I)PERYLENE | 16000 | 14 | 100 | 120 | | | | | | | |
| BENZO(K)FLUORANTHENE | 490 | 8 | 58 | 86 | | | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 35000 | | 81.2 UJ | 72.7 U | | | | | | | |
| CHRYSENE | 160 | 13 | 120 | 120 | | | | | | | |
| DI-N-BUTYL PHTHALATE | 250000 | | 81.2 U | 72.7 U | | | | | | | |
| DIBENZO(A,H)ANTHRACENE | 62 | 3.8 U | 26 | 31 | | | | | | | |
| FLUORANTHENE | 230000 | 26 | 230 | 260 | | | | | | | |
| FLUORENE | 41000 | 7 J | 22 | 46 | | | | | | | |
| INDENO(1,2,3-CD)PYRENE | 620 | 8 | 78 | 85 | | | | | | | |
| ISOSAFROLE | NA | | 81.2 U | 72.7 U | | | | | | | |
| NAPHTHALENE | 700 | 15 | 4 U | 24 | | | | | | | |
| PHENANTHRENE | 13000 | 36 | 30 J | 390 | | | | | | | |
| PYRENE | 230000 | 40 | 430 | 490 | | | | | | | |
| **Pesticides PCBs (ug/kg)** | | | | | | | | | | | |
| 4,4'-DDD | 710 | | 1.64 U | | | | | | | | |
| 4,4'-DDT | 1300 | | 1.64 U | | | | | | | | |
| ALPHA-CHLORDANE | 480 | | 0.788 U | | | | | | | | |
| GAMMA-CHLORDANE | 480 | | 0.788 U | | | | | | | | |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION [1] | | 15SB022 | 15SB023 | 15SB028 | 15SB029 | 15SB030 | 15SB031 | 15SB031 | 15SB031 | 15SB032 | 15SB035 |
| SAMPLE NUMBER | HHRA | 15SB0220206 | 15SB0230206 | 15SB0280206 | 15SB0290206 | 15SB0300206 | 15SB0310206 | 15SB0310610 | 15SB0311014 | 15SB0320206 | 15SB0350206 |
| SOIL GROUP | CRITERIA | 8 | 8 | 9 | 9 | 8 | 8 | 8 | 8 | 9 | 9 |
| SAMPLE CODE | | NORMAL | ORIG | ORIG | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 6 - 10 | 10 - 14 | 2 - 6 | 2 - 6 |
| SAMPLE DATE | | 12/10/2004 | 12/10/2004 | 12/11/2004 | 12/9/2004 | 12/14/2004 | 12/9/2004 | 12/9/2004 | 12/9/2004 | 12/9/2004 | 12/9/2004 |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| ALUMINUM | 8.3 | | 31100 J | | | | | | | | |
| ARSENIC | 0.29 | | 14.9 J | | | | | | | | |
| BARIUM | 82 | | 130 J | | | | | | | | |
| BERYLLIUM | 3.2 | | 0.72 J | | | | | | | | |
| CADMIUM | 0.38 | | 0.36 J | | | | | | | | |
| CALCIUM | NA | | 3040 J | | | | | | | | |
| CHROMIUM | 2.1 | | 29.3 J | | | | | | | | |
| COBALT | 0.17 | | 6.8 J | | | | | | | | |
| COPPER | 310 | | 18.7 J | | | | | | | | |
| IRON | 2300 | | 35600 J | | | | | | | | |
| LEAD | 81 | | 15.5 J | | | | | | | | |
| MAGNESIUM | NA | | 3890 J | | | | | | | | |
| MANGANESE | 110 | | 161 J | | | | | | | | |
| MERCURY | 0.1 | | | | | | | | | | |
| NICKEL | 14 | | 15.6 J | | | | | | | | |
| POTASSIUM | NA | | 2710 J | | | | | | | | |
| SELENIUM | 0.26 | | 0.42 J | | | | | | | | |
| SILVER | 1.6 | | 0.07 U | | | | | | | | |
| SODIUM | NA | | 112 J | | | | | | | | |
| THALLIUM | 0.056 | | 0.39 J | | | | | | | | |
| VANADIUM | 7.8 | | 55.9 J | | | | | | | | |
| ZINC | 680 | | 61 J | | | | | | | | |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION [1] | | 15SB037 | 15SB040 | 15SB042 | 15SB043 | 15SB044 | 15SB045 | 15SB045 | 15SB045 | 15SB046 | 15SB046 |
| SAMPLE NUMBER | HHRA | 15SB0370206 | 15SB0400206 | 15SB0420206 | 15SB0430206 | 15SB0440206 | 15SB0450206 | 15SB0450610 | 15SB0451012 | 15SB0460206 | 15SB0460610 |
| SOIL GROUP | CRITERIA | 8 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| SAMPLE CODE | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 6 - 10 | 10 - 12 | 2 - 6 | 6 - 10 |
| SAMPLE DATE | | 12/9/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-BUTANONE | 4400 | 1.23 U | 0.99 U | 0.873 U | 3 J | 2 J | 0.95 U | 0.95 U | 0.928 U | 4 J | 7 J |
| 2-HEXANONE | NA | 1.23 U | 0.99 U | 0.873 U | 0.933 U | 0.815 U | 0.95 U | 0.95 U | 0.928 U | 2 J | 1.04 U |
| ACETONE | 3800 | 3 BU | 3 J | 6 J | 29 J | 15 J | 11 U | 18 J | 6 J | 40 J | 69 J |
| CARBON DISULFIDE | 1500 | 1.23 U | 0.99 U | 0.873 U | 0.933 U | 0.815 U | 0.95 U | 0.95 U | 0.928 U | 0.878 U | 2 J |
| CIS-1,2-DICHLOROETHENE | 20 | 1.23 U | 0.99 U | 0.873 U | 2 J | 0.815 U | 0.95 U | 0.95 U | 0.928 U | 0.878 U | 1.04 U |
| METHYLENE CHLORIDE | 1.2 | 20 J | 0.99 UJ | 14 J | 15 J | 12 J | 10 U | 54 J | 13 J | 10 U | 33 J |
| TOTAL XYLENES | 7100 | 1.23 U | 0.99 U | 0.873 U | 0.933 U | 0.815 U | 0.95 U | 0.95 U | 0.928 U | 0.878 U | 1.04 U |
| TRICHLOROFLUOROMETHANE | 8000 | 2 J | 0.99 U | 0.873 U | 1 J | 0.815 U | 0.95 U | 3 | 1 J | 0.878 U | 2 J |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | | | | | | 18 | | | 3.97 U | |
| ACENAPHTHENE | 31000 | | | | | | 3.78 U | | | 3.97 U | |
| ACETOPHENONE | 890 | | | | | | 76.7 U | | | 140 J | |
| ANTHRACENE | 51000 | | | | | | 3.78 U | | | 3.97 U | |
| BENZO(A)ANTHRACENE | 160 | | | | | | 8 | | | 14 | |
| BENZO(A)PYRENE | 62 | | | | | | 10 | | | 12 | |
| BENZO(B)FLUORANTHENE | 490 | | | | | | 18 | | | 22 | |
| BENZO(G,H,I)PERYLENE | 16000 | | | | | | 19 | | | 16 | |
| BENZO(K)FLUORANTHENE | 490 | | | | | | 3.78 U | | | 9 | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 35000 | | | | | | 76.7 U | | | 80.6 U | |
| CHRYSENE | 160 | | | | | | 19 | | | 18 | |
| DI-N-BUTYL PHTHALATE | 250000 | | | | | | 76.7 U | | | 180 J | |
| DIBENZO(A,H)ANTHRACENE | 62 | | | | | | 3.78 U | | | 3.97 U | |
| FLUORANTHENE | 230000 | | | | | | 12 | | | 16 | |
| FLUORENE | 41000 | | | | | | 4 J | | | 3.97 U | |
| INDENO(1,2,3-CD)PYRENE | 620 | | | | | | 9 | | | 12 | |
| ISOSAFROLE | NA | | | | | | 76.7 U | | | 6000 | |
| NAPHTHALENE | 700 | | | | | | 7 J | | | 6 J | |
| PHENANTHRENE | 13000 | | | | | | 42 | | | 6 J | |
| PYRENE | 230000 | | | | | | 24 | | | 26 | |
| **Pesticides PCBs (ug/kg)** | | | | | | | | | | | |
| 4,4'-DDD | 710 | | | | | | 1.54 U | | | 1.62 U | |
| 4,4'-DDT | 1300 | | | | | | 1.54 U | | | 1.62 U | |
| ALPHA-CHLORDANE | 480 | | | | | | 0.744 U | | | 0.782 U | |
| GAMMA-CHLORDANE | 480 | | | | | | 0.744 U | | | 0.782 U | |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION (1) | | 15SB037 | 15SB040 | 15SB042 | 15SB043 | 15SB044 | 15SB045 | 15SB045 | 15SB045 | 15SB046 | 15SB046 |
| SAMPLE NUMBER | HHRA | 15SB0370206 | 15SB0400206 | 15SB0420206 | 15SB0430206 | 15SB0440206 | 15SB0450206 | 15SB0450610 | 15SB0451012 | 15SB0460206 | 15SB0460610 |
| SOIL GROUP | CRITERIA | 8 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| SAMPLE CODE | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 2 - 6 | 6 - 10 | 10 - 12 | 2 - 6 | 6 - 10 |
| SAMPLE DATE | | 12/9/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 | 12/10/2004 |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| ALUMINUM | 8.3 | | | | | | 14400 J | | | 19100 J | |
| ARSENIC | 0.29 | | | | | | 7.2 J | | | 5.2 J | |
| BARIUM | 82 | | | | | | 65.8 J | | | 69.3 J | |
| BERYLLIUM | 3.2 | | | | | | 0.79 | | | 0.55 | |
| CADMIUM | 0.38 | | | | | | 0.27 J | | | 0.22 J | |
| CALCIUM | NA | | | | | | 22900 J | | | 1400 J | |
| CHROMIUM | 2.1 | | | | | | 26.5 J | | | 21.4 J | |
| COBALT | 0.17 | | | | | | 7.4 J | | | 10.2 J | |
| COPPER | 310 | | | | | | 11.9 J | | | 10.2 J | |
| IRON | 2300 | | | | | | 20000 J | | | 19000 J | |
| LEAD | 81 | | | | | | 9.5 J | | | 9.2 J | |
| MAGNESIUM | NA | | | | | | 3550 J | | | 2090 J | |
| MANGANESE | 110 | | | | | | 241 | | | 101 | |
| MERCURY | 0.1 | | | | | | 0.012 J | | | 0.007 U | |
| NICKEL | 14 | | | | | | 21.6 J | | | 12 J | |
| POTASSIUM | NA | | | | | | 2350 J | | | 1050 J | |
| SELENIUM | 0.26 | | | | | | 0.36 J | | | 0.16 J | |
| SILVER | 1.6 | | | | | | 0.044 U | | | 0.05 J | |
| SODIUM | NA | | | | | | 120 J | | | 82.3 J | |
| THALLIUM | 0.056 | | | | | | 0.17 U | | | 0.23 U | |
| VANADIUM | 7.8 | | | | | | 23.8 J | | | 31 J | |
| ZINC | 680 | | | | | | 42.3 J | | | 26 J | |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|
| LOCATION [1] | | 15SB046 | 15SB048 | 15SB048 | 15SB048 | 15SB062 |
| SAMPLE NUMBER | HHRA | 15SB0461020 | 15SB0480206 | 15SB0480610 | 15SB0481015 | 15SB0620206 |
| SOIL GROUP | CRITERIA | 8 | 8 | 8 | 8 | 8 |
| SAMPLE CODE | | NORMAL | ORIG | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 10 - 20 | 2 - 6 | 6 - 10 | 10 - 15 | 2 - 6 |
| SAMPLE DATE | | 12/10/2004 | 12/9/2004 | 12/9/2004 | 12/9/2004 | 12/14/2004 |
| **Volatile Organics (ug/kg)** | | | | | | |
| 2-BUTANONE | 4400 | 18 | 3 J | 2 J | 0.867 U | 4 J |
| 2-HEXANONE | NA | 1.28 U | 1.02 U | 1.1 U | 0.867 U | 1.24 U |
| ACETONE | 3800 | 71 J | 15 U | 20 BU | 5 BU | 32 J |
| CARBON DISULFIDE | 1500 | 3 J | 1.02 U | 1.1 U | 0.867 U | 1.24 UJ |
| CIS-1,2-DICHLOROETHENE | 20 | 1.28 U | 1.02 U | 1.1 U | 0.867 U | 1.24 U |
| METHYLENE CHLORIDE | 1.2 | 21 J | 8 J | 3 J | 11 J | 1.24 UJ |
| TOTAL XYLENES | 7100 | 1.28 U | 1.02 U | 1.1 U | 0.867 U | 1.24 U |
| TRICHLOROFLUOROMETHANE | 8000 | 2 J | 1.02 U | 1.1 U | 0.867 U | 1.24 U |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | | 4 J | | | |
| ACENAPHTHENE | 31000 | | 3.79 U | | | |
| ACETOPHENONE | 890 | | 100 U | | | |
| ANTHRACENE | 51000 | | 4 J | | | |
| BENZO(A)ANTHRACENE | 160 | | 8 | | | |
| BENZO(A)PYRENE | 62 | | 8 | | | |
| BENZO(B)FLUORANTHENE | 490 | | 10 | | | |
| BENZO(G,H,I)PERYLENE | 16000 | | 3.79 U | | | |
| BENZO(K)FLUORANTHENE | 490 | | 5 J | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 35000 | | 77 U | | | |
| CHRYSENE | 160 | | 9 | | | |
| DI-N-BUTYL PHTHALATE | 250000 | | 77 U | | | |
| DIBENZO(A,H)ANTHRACENE | 62 | | 3.79 U | | | |
| FLUORANTHENE | 230000 | | 13 | | | |
| FLUORENE | 41000 | | 3.79 U | | | |
| INDENO(1,2,3-CD)PYRENE | 620 | | 3.79 U | | | |
| ISOSAFROLE | NA | | 77 U | | | |
| NAPHTHALENE | 700 | | 3.79 U | | | |
| PHENANTHRENE | 13000 | | 27 J | | | |
| PYRENE | 230000 | | 18 | | | |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | 710 | | 2.3 J | | | |
| 4,4'-DDT | 1300 | | 1.59 J | | | |
| ALPHA-CHLORDANE | 480 | | 0.767 U | | | |
| GAMMA-CHLORDANE | 480 | | 0.767 U | | | |

TABLE 3-8

RESULTS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|
| LOCATION [1] | | 15SB046 | 15SB048 | 15SB048 | 15SB048 | 15SB062 |
| SAMPLE NUMBER | HHRA | 15SB0461020 | 15SB0480206 | 15SB0480610 | 15SB0481015 | 15SB0620206 |
| SOIL GROUP | CRITERIA | 8 | 8 | 8 | 8 | 8 |
| SAMPLE CODE | | NORMAL | ORIG | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | 10 - 20 | 2 - 6 | 6 - 10 | 10 - 15 | 2 - 6 |
| SAMPLE DATE | | 12/10/2004 | 12/9/2004 | 12/9/2004 | 12/9/2004 | 12/14/2004 |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | 8.3 | | 17800 J | | | |
| ARSENIC | 0.29 | | 6.3 J | | | |
| BARIUM | 82 | | 92.6 J | | | |
| BERYLLIUM | 3.2 | | 0.64 J | | | |
| CADMIUM | 0.38 | | 0.95 | | | |
| CALCIUM | NA | | 12300 J | | | |
| CHROMIUM | 2.1 | | 24.3 J | | | |
| COBALT | 0.17 | | 5.7 J | | | |
| COPPER | 310 | | 18 J | | | |
| IRON | 2300 | | 19400 J | | | |
| LEAD | 81 | | 21.7 J | | | |
| MAGNESIUM | NA | | 2530 J | | | |
| MANGANESE | 110 | | 124 J | | | |
| MERCURY | 0.1 | | 0.033 J | | | |
| NICKEL | 14 | | 14.4 J | | | |
| POTASSIUM | NA | | 1480 J | | | |
| SELENIUM | 0.26 | | 0.32 J | | | |
| SILVER | 1.6 | | 0.047 U | | | |
| SODIUM | NA | | 83 U | | | |
| THALLIUM | 0.056 | | 0.31 J | | | |
| VANADIUM | 7.8 | | 29.9 | | | |
| ZINC | 680 | | 52.4 J | | | |

Blank cell indicates no analysis was conducted for the parameter.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
HHRA - Human Health Risk Assessment.
ug/kg - micrograms per kilogram.
mg/kg - milligrams per kilogram.
NA - No applicable criterion.
1 - Locations 8 through 10, 33,34, 36,38,39,41,50-61 were not sampled due to refusal or no visible signs of conatmination in soil core.
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Chemicals detected above HHRA criteria values are identified by bold formatting.

TABLE 3-9
DESCRIPTIVE STATISTICS FOR UPGRADIENT SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA

| Parameter | HHRA CRITERIA | ERA CRITERIA | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detects | Sample of Maximum Detect |
|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics (ug/L)** | | | | | | | | | |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | 1/1 | 0.12 | 0.12 | --- | 0.120 | 0.120 | 15SW01401 |
| BENZO(A)PYRENE | 0.0092 | 0.014 | 1/1 | 0.1 | 0.1 | --- | 0.100 | 0.100 | 15SW01401 |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | 1/1 | 0.2 | 0.2 | --- | 0.200 | 0.200 | 15SW01401 |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | 1/1 | 0.11 | 0.11 | --- | 0.110 | 0.110 | 15SW01401 |
| BENZO(K)FLUORANTHENE | 0.8 | NA | 1/1 | 0.1 | 0.1 | --- | 0.100 | 0.100 | 15SW01401 |
| CHRYSENE | 1.6 | NA | 1/1 | 0.18 | 0.18 | --- | 0.180 | 0.180 | 15SW01401 |
| FLUORANTHENE | 150 | 3.6 | 1/1 | 0.49 | 0.49 | --- | 0.490 | 0.490 | 15SW01401 |
| INDENO(1,2,3-CD)PYRENE | 0.092 | 4.31 | 1/1 | 0.09 J | 0.09 J | --- | 0.0900 | 0.0900 | 15SW01401 |
| PHENANTHRENE | 18 | 0.93 | 1/1 | 0.32 | 0.32 | --- | 0.320 | 0.320 | 15SW01401 |
| PYRENE | 18 | 0.3 | 1/1 | 0.42 | 0.42 | --- | 0.420 | 0.420 | 15SW01401 |
| **Herbicides (ug/L)** | | | | | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | 1/1 | 0.037 J | 0.037 J | --- | 0.0370 | 0.0370 | 15SW01401 |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 3600 | 87 | 1/1 | 421 J | 421 J | --- | 421 | 421 | 15SW01401 |
| BARIUM | 260 | 473 | 1/1 | 40.7 J | 40.7 J | --- | 40.7 | 40.7 | 15SW01401 |
| CALCIUM | NA | NA | 1/1 | 40600 J | 40600 J | --- | 40600 | 40600 | 15SW01401 |
| COPPER | 150 | 9.9 | 1/1 | 1.5 J | 1.5 J | --- | 1.50 | 1.50 | 15SW01401 |
| IRON | 1100 | 1000 | 1/1 | 411 J | 411 J | --- | 411 | 411 | 15SW01401 |
| MAGNESIUM | NA | NA | 1/1 | 9810 J | 9810 J | --- | 9810 | 9810 | 15SW01401 |
| MANGANESE | 88 | 564 | 1/1 | 69 | 69 | --- | 69.0 | 69.0 | 15SW01401 |
| NICKEL | 73 | 55.4 | 1/1 | 3.8 J | 3.8 J | --- | 3.80 | 3.80 | 15SW01401 |
| POTASSIUM | NA | NA | 1/1 | 1610 J | 1610 J | --- | 1610 | 1610 | 15SW01401 |
| SODIUM | NA | NA | 1/1 | 23000 J | 23000 J | --- | 23000 | 23000 | 15SW01401 |
| ZINC | 1100 | 127 | 1/1 | 7.5 J | 7.5 J | --- | 7.50 | 7.50 | 15SW01401 |
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | 1/1 | 48.8 J | 48.8 J | --- | 48.8 | 48.8 | 15SW01401-F |
| BARIUM, FILTERED | 260 | 473 | 1/1 | 33 J | 33 J | --- | 33.0 | 33.0 | 15SW01401-F |
| CALCIUM, FILTERED | NA | NA | 1/1 | 40400 J | 40400 J | --- | 40400 | 40400 | 15SW01401-F |
| COBALT, FILTERED | 73 | 19 | 1/1 | 0.86 J | 0.86 J | --- | 0.860 | 0.860 | 15SW01401-F |
| COPPER, FILTERED | 150 | 9.5 | 1/1 | 1.2 J | 1.2 J | --- | 1.20 | 1.20 | 15SW01401-F |
| MAGNESIUM, FILTERED | NA | NA | 1/1 | 11000 | 11000 | --- | 11000 | 11000 | 15SW01401-F |
| MANGANESE, FILTERED | 88 | 564 | 1/1 | 41.2 | 41.2 | --- | 41.2 | 41.2 | 15SW01401-F |
| NICKEL, FILTERED | 73 | 55.3 | 1/1 | 4.3 J | 4.3 J | --- | 4.30 | 4.30 | 15SW01401-F |
| POTASSIUM, FILTERED | NA | NA | 1/1 | 1670 J | 1670 J | --- | 1670 | 1670 | 15SW01401-F |
| SODIUM, FILTERED | NA | NA | 1/1 | 23900 J | 23900 J | --- | 23900 | 23900 | 15SW01401-F |
| ZINC, FILTERED | 1100 | 126 | 1/1 | 3.7 J | 3.7 J | --- | 3.70 | 3.70 | 15SW01401-F |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | 1/1 | 11 | 11 | --- | 11.0 | 11.0 | 15SW01401 |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | 1/1 | 55.3 | 55.3 | --- | 55.3 | 55.3 | 15SW01401 |
| PH | NA | NA | 1/1 | 7.77 | 7.77 | --- | 7.77 | 7.77 | 15SW01401 |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | 1/1 | 0.478 | 0.478 | --- | 0.478 | 0.478 | 15SW01401 |
| TEMPERATURE ( C) | NA | NA | 1/1 | 9.88 | 9.88 | --- | 9.88 | 9.88 | 15SW01401 |
| TURBIDITY (NTU) | NA | NA | 1/1 | 39 | 39 | --- | 39.0 | 39.0 | 15SW01401 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
HHRA - Human Health Risk Assessment.
ERA - Ecological Risk Assessment.
ug/L - micrograms per liter.
mg/L - milligrams per liter.
MV - millivolts.
mS/cm - milliSiemens per centimeter.
C - Celsius.
NTU - Nephelometric turbidity units.
NA - No applicable criteria.

TABLE 3-10

RESULTS FOR CHEMICALS DETECTED IN UPGRADIENT SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA

| SAMPLING ROUND<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | 01<br>15SW/SD003<br>15SW00301<br>NOT FOUND<br>1/11/2005 | 01<br>15SW/SD014<br>15SW01401<br>NORMAL<br>1/11/2005 | 01<br>15SW/SD014<br>15SW01401-F<br>NORMAL<br>1/11/2005 |
|---|---|---|---|---|---|
| **Semivolatile Organics (ug/L)** | | | | | |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | | 0.12 | |
| BENZO(A)PYRENE | 0.0092 | 0.014 | | 0.1 | |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | | 0.2 | |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | | 0.11 | |
| BENZO(K)FLUORANTHENE | 0.8 | NA | | 0.1 | |
| CHRYSENE | 1.6 | NA | | 0.18 | |
| FLUORANTHENE | 150 | 3.6 | | 0.49 | |
| INDENO(1,2,3-CD)PYRENE | 0.092 | 4.31 | | 0.09 J | |
| PHENANTHRENE | 18 | 0.93 | | 0.32 | |
| PYRENE | 18 | 0.3 | | 0.42 | |
| **Herbicides (ug/L)** | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | | 0.037 J | |
| **Total Metals (ug/L)** | | | | | |
| ALUMINUM | 3600 | 87 | | 421 J | |
| BARIUM | 260 | 473 | | 40.7 J | |
| CALCIUM | NA | NA | | 40600 J | |
| COPPER | 150 | 9.9 | | 1.5 J | |
| IRON | 1100 | 1000 | | 411 J | |
| MAGNESIUM | NA | NA | | 9810 J | |
| MANGANESE | 88 | 564 | | 69 | |
| NICKEL | 73 | 55.4 | | 3.8 J | |
| POTASSIUM | NA | NA | | 1610 J | |
| SODIUM | NA | NA | | 23000 J | |
| ZINC | 1100 | 127 | | 7.5 J | |
| **Dissolved Metals (ug/L)** | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | | | 48.8 J |
| BARIUM, FILTERED | 260 | 473 | | | 33 J |
| CALCIUM, FILTERED | NA | NA | | | 40400 J |
| COBALT, FILTERED | 73 | 19 | | | 0.86 J |
| COPPER, FILTERED | 150 | 9.5 | | | 1.2 J |
| MAGNESIUM, FILTERED | NA | NA | | | 11000 |
| MANGANESE, FILTERED | 88 | 564 | | | 41.2 |
| NICKEL, FILTERED | 73 | 55.3 | | | 4.3 J |
| POTASSIUM, FILTERED | NA | NA | | | 1670 J |
| SODIUM, FILTERED | NA | NA | | | 23900 J |
| ZINC, FILTERED | 1100 | 126 | | | 3.7 J |
| **Field Parameters** | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | | 11 | |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | | 55.3 | |
| PH | NA | NA | | 7.77 | |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | | 0.478 | |
| TEMPERATURE (°C) | NA | NA | | 9.88 | |
| TURBIDITY (NTU) | NA | NA | | 39 | |

Blank cell indicates no analysis was conducted for the parameter.
Chemicals detected at concentrations greater than either HHRA or ERA criteria are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.

TABLE 3-11

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT STORM SEWER AND OUTFALL SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics (ug/L)** | | | | | | | | | |
| ACENAPHTHENE | 37 | 27 | 1/5 | 0.33 | 0.33 | 0.048 - 0.053 | 0.0860 | 0.330 | 15SW01001 |
| ACENAPHTHYLENE | 37 | 4840 | 1/5 | 0.43 | 0.43 | 0.048 - 0.053 | 0.106 | 0.430 | 15SW01001 |
| ANTHRACENE | 180 | 0.68 | 3/5 | 0.07 J | 0.36 | 0.048 - 0.05 | 0.136 | 0.210 | 15SW01001 |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | 3/5 | 0.25 | 1.84 | 0.048 - 0.05 | 0.636 | 1.04 | 15SW01001 |
| BENZO(A)PYRENE | 0.0092 | 0.014 | 3/5 | 0.25 | 2.38 | 0.048 - 0.05 | 0.860 | 1.42 | 15SW01001 |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | 3/5 | 0.56 | 5.83 | 0.048 - 0.05 | 2.01 | 3.33 | 15SW01001 |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | 3/5 | 0.24 | 2.46 | 0.048 - 0.05 | 0.904 | 1.49 | 15SW01001 |
| BENZO(K)FLUORANTHENE | 0.8 | NA | 3/5 | 0.19 J | 1.72 | 0.048 - 0.05 | 0.584 | 0.957 | 15SW01001 |
| BIS(2-ETHYLHEXYL) PHTHALATE | 4.8 | 0.3 | 1/5 | 1.01 J | 1.01 J | 0.952 - 1.03 | 0.595 | 1.01 | 15SW01001 |
| CHRYSENE | 1.6 | NA | 3/5 | 0.48 | 4.46 | 0.048 - 0.05 | 1.55 | 2.56 | 15SW01001 |
| DIBENZO(A,H)ANTHRACENE | 0.0092 | NA | 2/5 | 0.3 | 0.46 | 0.048 - 0.05 | 0.167 | 0.380 | 15SW01001 |
| FLUORANTHENE | 150 | 3.6 | 3/5 | 1.32 | 11.9 | 0.048 - 0.05 | 3.62 | 6.02 | 15SW01001 |
| FLUORENE | 24 | 2.4 | 2/5 | 0.08 J | 0.34 | 0.048 - 0.05 | 0.0987 | 0.210 | 15SW01001 |
| INDENO(1,2,3-CD)PYRENE | 0.092 | 4.31 | 3/5 | 0.22 | 2.09 | 0.048 - 0.05 | 0.772 | 1.27 | 15SW01001 |
| NAPHTHALENE | 0.62 | 26 | 1/5 | 0.12 | 0.12 | 0.048 - 0.053 | 0.0440 | 0.120 | 15SW01001 |
| PHENANTHRENE | 18 | 0.93 | 3/5 | 0.47 | 4.73 | 0.048 - 0.05 | 1.55 | 2.56 | 15SW01001 |
| PYRENE | 18 | 0.3 | 4/5 | 0.06 J | 8.61 | 0.05 | 3.06 | 3.81 | 15SW01001 |
| **Herbicides (ug/L)** | | | | | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | 5/5 | 0.022 J | 0.075 J | --- | 0.0454 | 0.0454 | 15SW00601 |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 3600 | 87 | 5/5 | 54.6 J | 606 J | --- | 292 | 292 | 15SW01001 |
| BARIUM | 260 | 473 | 5/5 | 25.4 J | 79.4 J | --- | 63.9 | 63.9 | 15SW01101 |
| CALCIUM | NA | NA | 5/5 | 30400 J | 96300 J | --- | 69140 | 69140 | 15SW01101 |
| CHROMIUM | 11 | 91.4 | 2/5 | 1.3 J | 3.6 J | 0.79 - 0.97 | 1.25 | 2.45 | 15SW01101 |
| COBALT | 73 | 19 | 2/5 | 1.7 J | 5.8 J | 0.16 - 0.53 | 1.62 | 3.75 | 15SW00601 |
| COPPER | 150 | 9.9 | 5/5 | 1.3 J | 8.1 J | --- | 3.00 | 3.00 | 15SW01101 |
| IRON | 1100 | 1000 | 4/5 | 699 J | 976 J | 49.9 | 675 | 838 | 15SW01101 |
| LEAD | 15 | 7 | 2/5 | 1.6 J | 1.8 J | 0.369 - 0.48 | 0.804 | 1.70 | 15SW01101 |
| MAGNESIUM | NA | NA | 5/5 | 8600 J | 18900 J | --- | 14180 | 14180 | 15SW01101 |
| MANGANESE | 88 | 564 | 5/5 | 6.4 J | 1230 | --- | 344 | 344 | 15SW00601 |
| NICKEL | 73 | 55.4 | 4/5 | 1.4 J | 3.7 J | 0.88 | 1.95 | 2.33 | 15SW00601 |
| POTASSIUM | NA | NA | 5/5 | 757 J | 6500 J | --- | 2641 | 2641 | 15SW01101 |
| SELENIUM | 18 | s | 1/5 | 1.3 J | 1.3 J | 0.45 - 0.66 | 0.492 | 1.30 | 15SW00401 |
| SODIUM | NA | NA | 5/5 | 15600 J | 135000 J | --- | 82080 | 82080 | 15SW01101 |
| VANADIUM | 3.6 | 12 | 2/5 | 1.4 J | 1.6 J | 1.14 | 0.942 | 1.50 | 15SW01101 |
| ZINC | 1100 | 127 | 5/5 | 18.5 J | 102 J | --- | 41.6 | 41.6 | 15SW00401 |

TABLE 3-11

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT STORM SEWER AND OUTFALL SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | 2/5 | 10.1 J | 29.8 J | 8.35 | 10.5 | 20.0 | 15SW01001-F |
| BARIUM, FILTERED | 260 | 473 | 5/5 | 18.7 J | 88.8 J | --- | 64.4 | 64.4 | 15SW01101-F |
| CALCIUM, FILTERED | NA | NA | 5/5 | 30400 J | 99600 J | --- | 72000 | 72000 | 15SW01101-F |
| CHROMIUM, FILTERED | 11 | 78.6 | 1/5 | 3.4 J | 3.4 J | 0.52 - 1.3 | 1.05 | 3.40 | 15SW01101-F |
| COBALT, FILTERED | 73 | 19 | 5/5 | 0.26 J | 6.1 | --- | 1.78 | 1.78 | 15SW00601-F |
| COPPER, FILTERED | 150 | 9.5 | 5/5 | 1 J | 5 J | --- | 2.52 | 2.52 | 15SW01101-F |
| IRON, FILTERED | 1100 | 1000 | 3/5 | 311 J | 425 J | 120 - 210 | 265 | 386 | 15SW00901-F |
| MAGNESIUM, FILTERED | NA | NA | 5/5 | 10000 | 21700 | --- | 16220 | 16220 | 15SW01101-F |
| MANGANESE, FILTERED | 88 | 564 | 5/5 | 4.7 J | 1230 | --- | 333 | 333 | 15SW00601-F |
| NICKEL, FILTERED | 73 | 55.3 | 5/5 | 2 J | 5.1 J | --- | 3.68 | 3.68 | 15SW00601-F |
| POTASSIUM, FILTERED | NA | NA | 5/5 | 788 J | 7590 J | --- | 2946 | 2946 | 15SW01101-F |
| SELENIUM, FILTERED | 18 | 5 | 1/5 | 1.1 J | 1.1 J | 0.34 - 0.55 | 0.400 | 1.10 | 15SW00401-F |
| SODIUM, FILTERED | NA | NA | 5/5 | 16100 J | 141000 J | --- | 84780 | 84780 | 15SW01101-F |
| ZINC, FILTERED | 1100 | 126 | 5/5 | 2.1 J | 88 J | --- | 26.2 | 26.2 | 15SW00401-F |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | 5/5 | 9.66 | 10.76 | --- | 10.3 | 10.3 | 15SW00401 |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | 5/5 | -6.8 | 115.5 | --- | 45.0 | 45.0 | 15SW01101 |
| PH | NA | NA | 5/5 | 7.03 | 7.84 | --- | 7.60 | 7.60 | 15SW01001 |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | 5/5 | 0.237 | 1.028 | --- | 0.691 | 0.691 | 15SW00601 |
| TEMPERATURE (°C) | NA | NA | 5/5 | 10.48 | 13.33 | --- | 12.0 | 12.0 | 15SW01101 |
| TURBIDITY (NTU) | NA | NA | 5/5 | 5.3 | 35 | --- | 14.7 | 14.7 | 15SW01001 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.

TABLE 3-12

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics (ug/L)** | | | | | | | | | |
| ACENAPHTHENE | 37 | 27 | 1/7 | 0.06 J | 0.06 J | 0.048 - 0.052 | 0.0297 | 0.0600 | 15SW01301 |
| ANTHRACENE | 180 | 0.68 | 1/7 | 0.05 J | 0.05 J | 0.048 - 0.052 | 0.0284 | 0.0500 | 15SW01701 |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | 2/7 | 0.13 | 0.13 | 0.048 - 0.052 | 0.0549 | 0.130 | 15SW01601, 15SW01701 |
| BENZO(A)PYRENE | 0.0092 | 0.014 | 2/7 | 0.12 | 0.14 | 0.048 - 0.052 | 0.0549 | 0.130 | 15SW01601 |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | 2/7 | 0.21 | 0.28 | 0.048 - 0.052 | 0.0878 | 0.245 | 15SW01601 |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | 2/7 | 0.11 | 0.13 | 0.048 - 0.052 | 0.0521 | 0.120 | 15SW01601 |
| BENZO(K)FLUORANTHENE | 0.8 | NA | 2/7 | 0.11 | 0.14 | 0.048 - 0.052 | 0.0535 | 0.125 | 15SW01701 |
| CHRYSENE | 1.6 | NA | 2/7 | 0.21 | 0.25 | 0.048 - 0.052 | 0.0835 | 0.230 | 15SW01601 |
| FLUORANTHENE | 150 | 3.6 | 4/7 | 0.1 | 0.81 | 0.048 - 0.052 | 0.264 | 0.443 | 15SW01601 |
| INDENO(1,2,3-CD)PYRENE | 0.092 | 4.31 | 2/7 | 0.09 J | 0.09 J | 0.048 - 0.052 | 0.0435 | 0.0900 | 15SW01601, 15SW01701 |
| NAPHTHALENE | 0.62 | 26 | 1/7 | 0.05 J | 0.05 J | 0.048 - 0.052 | 0.0283 | 0.0500 | 15SW01301 |
| PHENANTHRENE | 18 | 0.93 | 4/7 | 0.06 J | 0.34 | 0.048 - 0.052 | 0.121 | 0.193 | 15SW01601 |
| PYRENE | 18 | 0.3 | 5/7 | 0.05 J | 0.57 | 0.049 - 0.052 | 0.202 | 0.272 | 15SW01601 |
| **Herbicides (ug/L)** | | | | | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | 4/6 | 0.028 J | 0.065 J | 0.013 | 0.0342 | 0.0480 | 15SW01601 |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 3600 | 87 | 7/7 | 130 J | 3020 J | --- | 1246 | 1246 | 15SW01801 |
| ANTIMONY | 1.5 | 80 | 1/7 | 2.5 J | 2.5 J | 0.19 - 0.48 | 0.477 | 2.50 | 15SW01301 |
| ARSENIC | 0.045 | 148 | 1/7 | 1.4 J | 1.4 J | 0.29 - 1.2 | 0.515 | 1.40 | 15SW01801 |
| BARIUM | 260 | 473 | 7/7 | 51 J | 162 J | --- | 78.5 | 78.5 | 15SW01301 |
| CALCIUM | NA | NA | 7/7 | 32100 J | 96900 J | --- | 62629 | 62629 | 15SW01301 |
| CHROMIUM | 11 | 91.4 | 4/7 | 1.9 J | 3.6 J | 0.43 - 1 | 1.75 | 2.80 | 15SW01801 |
| COBALT | 73 | 19 | 5/7 | 1.4 | 4.2 J | 0.58 - 0.91 | 1.86 | 2.46 | 15SW01701 |
| COPPER | 150 | 9.9 | 6/7 | 1.7 J | 5.1 J | 1.1 | 2.96 | 3.37 | 15SW01801 |
| IRON | 1100 | 1000 | 7/7 | 306 J | 3330 J | --- | 1860 | 1860 | 15SW01801 |
| LEAD | 15 | 7 | 5/7 | 1.1 J | 2.9 J | 0.327 - 0.633 | 1.50 | 2.00 | 15SW01801 |
| MAGNESIUM | NA | NA | 7/7 | 6630 J | 16100 J | --- | 12109 | 12109 | 15SW00501 |
| MANGANESE | 88 | 564 | 7/7 | 71.5 | 463 | --- | 299 | 299 | 15SW01301 |
| NICKEL | 73 | 55.4 | 7/7 | 1.5 J | 8 J | --- | 3.86 | 3.86 | 15SW01701 |
| POTASSIUM | NA | NA | 7/7 | 1340 J | 2640 J | --- | 2040 | 2040 | 15SW01301 |
| SODIUM | NA | NA | 7/7 | 15700 J | 64700 J | --- | 36486 | 36486 | 15SW00501 |
| VANADIUM | 3.6 | 12 | 5/7 | 1.2 J | 6.1 | 1.14 | 2.51 | 3.28 | 15SW01801 |
| ZINC | | | 6/7 | 5.2 J | 61.3 J | 10.6 | 23.2 | 26.1 | 15SW01301 |
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | 3/7 | 21.9 J | 187 | 8.35 - 10.6 | 36.6 | 79.2 | 15SW01701-F |
| BARIUM, FILTERED | 260 | 473 | 7/7 | 47.2 J | 149 J | --- | 72.4 | 72.4 | 15SW01301-F |
| CADMIUM, FILTERED | 1.8 | 2.36 | 2/7 | 0.09 J | 0.36 J | 0.04 - 0.33 | 0.108 | 0.225 | 15SW01801-F |
| CALCIUM, FILTERED | NA | NA | 7/7 | 25200 | 99600 J | --- | 60086 | 60086 | 15SW01301-F |
| COBALT, FILTERED | 73 | 19 | 7/7 | 0.38 J | 4.1 | --- | 1.52 | 1.52 | 15SW01701-F |
| COPPER, FILTERED | 150 | 9.5 | 7/7 | 1.2 J | 2.7 J | --- | 1.74 | 1.74 | 15SW01601-F |
| IRON, FILTERED | 1100 | 1000 | 5/7 | 299 J | 952 J | 154 - 166 | 414 | 547 | 15SW01301-F |

**Dissolved Metals (ug/L) (Continued)**

TABLE 3-12

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| LEAD, FILTERED | 15 | 5.5 | 2/7 | 0.192 J | 0.199 J | 0.123 - 0.486 | 0.143 | 0.196 | 15SW01901-F |
| MAGNESIUM, FILTERED | NA | NA | 7/7 | 6410 J | 18000 | --- | 12317 | 12317 | 15SW00501-F |
| MANGANESE, FILTERED | 88 | 564 | 7/7 | 65.8 | 437 | --- | 263 | 263 | 15SW01301-F |
| NICKEL, FILTERED | 73 | 55.3 | 7/7 | 2.7 J | 9 J | --- | 4.46 | 4.46 | 15SW01701-F |
| POTASSIUM, FILTERED | NA | NA | 7/7 | 861 J | 2720 J | --- | 1829 | 1829 | 15SW01301-F |
| SELENIUM, FILTERED | 18 | 5 | 1/7 | 0.67 J | 0.67 J | 0.12 - 0.54 | 0.237 | 0.670 | 15SW01301-F |
| SODIUM, FILTERED | NA | NA | 7/7 | 14500 J | 64500 J | --- | 35214 | 35214 | 15SW00501-F |
| THALLIUM, FILTERED | 0.24 | 6 | 2/7 | 0.09 J | 0.1 J | 0.06 - 0.1 | 0.0557 | 0.0950 | 15SW01801-F |
| ZINC, FILTERED | 1100 | 126 | 6/7 | 3.1 J | 41.1 J | 3.4 | 10.2 | 11.6 | 15SW01301-F |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | 5/5 | 9.53 | 11.33 | --- | 10.6 | 10.6 | 15SW01501 |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | 7/7 | -15.7 | 79.3 | --- | 17.5 | 17.5 | 15SW01601 |
| PH (S.U.) | NA | NA | 7/7 | 7.57 | 7.93 | --- | 7.75 | 7.75 | 15SW01501 |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | 7/7 | 0.375 | 1.08 | --- | 0.712 | 0.712 | 15SW00501 |
| TEMPERATURE (°C) | NA | NA | 7/7 | 6.73 | 11.41 | --- | 9.45 | 9.45 | 15SW00501 |
| TURBIDITY (NTU) | NA | NA | 7/7 | 9.1 | 370 | --- | 99.0 | 99.0 | 15SW01301 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.
S.U. - Standard units.

TABLE 3-13

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT TRIBUTARY 15-3
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/L)** | | | | | | | | | |
| ACETONE | 550 | 1700 | 2/2 | 3.1 J | 4 J | --- | 3.55 | 3.55 | 15SW00201 |
| **Semivolatile Organics (ug/L)** | | | | | | | | | |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | 2/2 | 0.09 J | 0.14 | --- | 0.115 | 0.115 | 15SW00201 |
| BENZO(A)PYRENE | 0.0092 | 0.014 | 2/2 | 0.1 | 0.16 | --- | 0.130 | 0.130 | 15SW00201 |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | 2/2 | 0.22 | 0.31 | --- | 0.265 | 0.265 | 15SW00201 |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | 2/2 | 0.1 | 0.14 | --- | 0.120 | 0.120 | 15SW00201 |
| BENZO(K)FLUORANTHENE | 0.8 | NA | 2/2 | 0.08 J | 0.13 | --- | 0.105 | 0.105 | 15SW00201 |
| CHRYSENE | 1.6 | NA | 2/2 | 0.2 | 0.32 | --- | 0.260 | 0.260 | 15SW00201 |
| FLUORANTHENE | 150 | 3.6 | 2/2 | 0.56 | 0.95 | --- | 0.755 | 0.755 | 15SW00201 |
| INDENO(1,2,3-CD)PYRENE | 0.092 | 4.31 | 2/2 | 0.08 J | 0.11 | --- | 0.0950 | 0.0950 | 15SW00201 |
| PHENANTHRENE | 18 | 0.93 | 2/2 | 0.23 | 0.42 | --- | 0.325 | 0.325 | 15SW00201 |
| PYRENE | 18 | 0.3 | 2/2 | 0.41 | 0.64 | --- | 0.525 | 0.525 | 15SW00201 |
| **Herbicides (ug/L)** | | | | | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | 2/2 | 0.05 J | 0.053 J | --- | 0.0515 | 0.0515 | 15SW00201 |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 3600 | 87 | 1/2 | 1080 J | 1080 J | 41.6 | 550 | 1080 | 15SW00101 |
| BARIUM | 260 | 473 | 2/2 | 34.4 J | 45.6 J | --- | 40.0 | 40.0 | 15SW00101 |
| CALCIUM | NA | NA | 2/2 | 43200 J | 50800 J | --- | 47000 | 47000 | 15SW00101 |
| CHROMIUM | 11 | 91.4 | 1/2 | 1.9 J | 1.9 J | 0.42 | 1.06 | 1.90 | 15SW00101 |
| COBALT | 73 | 19 | 1/2 | 1.4 J | 1.4 J | 0.5 | 0.825 | 1.40 | 15SW00101 |
| COPPER | 150 | 9.9 | 2/2 | 1.3 J | 2.5 J | --- | 1.90 | 1.90 | 15SW00101 |
| IRON | 1100 | 1000 | 1/2 | 1390 J | 1390 J | 41 | 705 | 1390 | 15SW00101 |
| LEAD | 15 | 7 | 1/2 | 1.5 J | 1.5 J | 0.279 | 0.820 | 1.50 | 15SW00101 |
| MAGNESIUM | NA | NA | 2/2 | 8840 J | 10300 J | --- | 9570 | 9570 | 15SW00101 |
| MANGANESE | 88 | 564 | 2/2 | 42 | 107 | --- | 74.5 | 74.5 | 15SW00101 |
| NICKEL | 73 | 55.4 | 2/2 | 2.2 J | 4.3 J | --- | 3.25 | 3.25 | 15SW00101 |
| POTASSIUM | NA | NA | 2/2 | 1670 J | 1940 J | --- | 1805 | 1805 | 15SW00101 |
| SODIUM | NA | NA | 2/2 | 24000 J | 28300 J | --- | 26150 | 26150 | 15SW00101 |
| VANADIUM | 3.6 | 12 | 1/2 | 2.1 | 2.1 | 1.14 | 1.34 | 2.10 | 15SW00101 |
| ZINC | 1100 | 127 | 1/2 | 12.7 J | 12.7 J | 3.5 | 7.23 | 12.7 | 15SW00101 |
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | 2/2 | 25.9 J | 2090 | --- | 1058 | 1058 | 15SW00201-F |
| ARSENIC, FILTERED | 0.045 | 148 | 2/2 | 1 J | 17 J | --- | 9.00 | 9.00 | 15SW00101-F |
| BARIUM, FILTERED | 260 | 473 | 2/2 | 41.2 J | 46.6 J | --- | 43.9 | 43.9 | 15SW00201-F |
| CALCIUM, FILTERED | NA | NA | 2/2 | 42800 J | 47600 J | --- | 45200 | 45200 | 15SW00101-F |
| CHROMIUM, FILTERED | 11 | 78.6 | 1/2 | 4.1 J | 4.1 J | 0.47 | 2.17 | 4.10 | 15SW00201-F |
| COBALT, FILTERED | 73 | 19 | 2/2 | 0.92 J | 2.1 | --- | 1.51 | 1.51 | 15SW00201-F |
| COPPER, FILTERED | 150 | 9.5 | 2/2 | 1.5 J | 5.2 J | --- | 3.35 | 3.35 | 15SW00201-F |
| IRON, FILTERED | 1100 | 1000 | 1/2 | 2860 J | 2860 J | 134 | 1464 | 2860 | 15SW00201-F |
| LEAD, FILTERED | 15 | 5.5 | 1/2 | 3.1 J | 3.1 J | 0.162 | 1.59 | 3.10 | 15SW00201-F |
| MAGNESIUM, FILTERED | NA | NA | 2/2 | 7630 | 9720 | --- | 8675 | 8675 | 15SW00101-F |

TABLE 3-13

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT TRIBUTARY 15-3
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L) (Continued)** | | | | | | | | | |
| MANGANESE, FILTERED | 88 | 564 | 2/2 | 92.3 | 114 | --- | 103 | 103 | 15SW00201-F |
| NICKEL, FILTERED | 73 | 55.3 | 2/2 | 3.6 J | 6.9 J | --- | 5.25 | 5.25 | 15SW00201-F |
| POTASSIUM, FILTERED | NA | NA | 2/2 | 1630 J | 1670 J | --- | 1650 | 1650 | 15SW00101-F |
| SODIUM, FILTERED | NA | NA | 2/2 | 19600 J | 29400 J | --- | 24500 | 24500 | 15SW00101-F |
| VANADIUM, FILTERED | 3.6 | 12 | 1/2 | 4.2 | 4.2 | 1.14 | 2.39 | 4.20 | 15SW00201-F |
| ZINC, FILTERED | 1100 | 126 | 2/2 | 2.5 J | 42.7 | --- | 22.6 | 22.6 | 15SW00201-F |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | 2/2 | 7.33 | 11.5 | --- | 9.42 | 9.42 | 15SW00101 |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | 2/2 | 78.7 | 81 | --- | 79.9 | 79.9 | 15SW00201 |
| PH | NA | NA | 2/2 | 7.25 | 7.86 | --- | 7.56 | 7.56 | 15SW00101 |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | 2/2 | 0.48 | 0.579 | --- | 0.530 | 0.530 | 15SW00101 |
| TEMPERATURE (C ) | NA | NA | 2/2 | 9.36 | 9.7 | --- | 9.53 | 9.53 | 15SW00101 |
| TURBIDITY (NTU) | NA | NA | 2/2 | 45 | 90 | --- | 67.5 | 67.5 | 15SW00201 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.

TABLE 3-14

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT STORM SEWER AND OUTFALL
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND<br>LOCATION (1)<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | 01<br>15SW/SD004<br>15SW00401<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD004<br>15SW00401-F<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD010<br>15SW01001<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD010<br>15SW01001-F<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD011<br>15SW01101<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD011<br>15SW01101-F<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD006<br>15SW00601<br>ORIG<br>1/11/2005 | 01<br>15SW/SD006<br>15SW00601-F<br>ORIG<br>1/11/2005 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics (ug/L)** | | | | | | | | | | |
| ACENAPHTHENE | 37 | 27 | 0.05 U | | 0.33 | | 0.053 U | | 0.049 U | |
| ACENAPHTHYLENE | 37 | 4840 | 0.05 U | | 0.43 | | 0.053 U | | 0.049 U | |
| ANTHRACENE | 180 | 0.68 | 0.05 U | | 0.36 | | 0.2 | | 0.07 J | |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | 0.05 U | | 1.84 | | 1.04 | | 0.25 | |
| BENZO(A)PYRENE | 0.0092 | 0.014 | 0.05 U | | 2.38 | | 1.62 | | 0.25 | |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | 0.05 U | | 5.83 | | 3.6 | | 0.56 | |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | 0.05 U | | 2.46 | | 1.77 | | 0.24 | |
| BENZO(K)FLUORANTHENE | 0.8 | NA | 0.05 U | | 1.72 | | 0.96 | | 0.19 J | |
| BIS(2-ETHYLHEXYL) PHTHALATE | 4.8 | 0.3 | 1 U | | 1.01 J | | 1.03 U | | 0.952 U | |
| CHRYSENE | 1.6 | NA | 0.05 U | | 4.46 | | 2.75 | | 0.48 | |
| DIBENZO(A,H)ANTHRACENE | 0.0092 | NA | 0.05 U | | 0.46 | | 0.3 | | 0.049 U | |
| FLUORANTHENE | 150 | 3.6 | 0.05 U | | 11.9 | | 4.84 | | 1.32 | |
| FLUORENE | 24 | 2.4 | 0.05 U | | 0.34 | | 0.08 J | | 0.049 U | |
| INDENO(1,2,3-CD)PYRENE | 0.022 | 4.31 | 0.05 U | | 2.09 | | 1.5 | | 0.22 | |
| NAPHTHALENE | 0.62 | 26 | 0.05 U | | 0.12 | | 0.053 U | | 0.049 U | |
| PHENANTHRENE | 18 | 0.93 | 0.05 U | | 4.73 | | 2.48 | | 0.47 | |
| PYRENE | 18 | 0.3 | 0.05 U | | 8.61 | | 5.55 | | 1.03 | |
| **Herbicides (ug/L)** | | | | | | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | 0.06 J | | 0.037 J | | 0.033 J | | 0.075 J | |
| **Total Metals (ug/L)** | | | | | | | | | | |
| ALUMINUM | 3600 | 87 | 54.6 J | | 606 J | | 500 J | | 240 J | |
| BARIUM | 260 | 473 | 78.8 J | | 25.4 J | | 79.4 J | | 74.4 J | |
| CALCIUM | NA | NA | 68600 J | | 30400 J | | 96300 J | | 81200 J | |
| CHROMIUM | 11 | 91.4 | 0.94 U | | 1.3 J | | 3.6 J | | 0.79 U | |
| COBALT | 73 | 19 | 0.16 U | | 0.53 U | | 0.53 U | | 5.8 J | |
| COPPER | 150 | 9.9 | 1.6 J | | 2.6 J | | 8.1 J | | 1.4 J | |
| IRON | 1100 | 1000 | 49.9 U | | 764 J | | 976 J | | 699 J | |
| LEAD | 15 | 7 | 0.369 U | | 1.6 J | | 1.8 J | | 0.48 U | |
| MAGNESIUM | NA | NA | 12000 J | | 8600 J | | 18900 J | | 18700 J | |
| MANGANESE | 88 | 564 | 6.4 J | | 48.1 | | 36.5 J | | 1230 | |
| NICKEL | 73 | 55.4 | 1.4 J | | 1.9 J | | 2.3 J | | 3.7 J | |
| POTASSIUM | NA | NA | 757 J | | 2250 J | | 6500 J | | 2350 J | |
| SELENIUM | 18 | 5 | 1.3 J | | 0.65 U | | 0.45 U | | 0.56 U | |
| SODIUM | NA | NA | 126000 J | | 15600 J | | 135000 J | | 59400 J | |
| VANADIUM | 3.6 | 12 | 1.14 U | | 1.4 J | | 1.6 J | | 1.14 U | |
| ZINC | 1100 | 127 | 102 J | | 28.7 J | | 33.4 J | | 25.2 J | |

TABLE 3-14

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT STORM SEWER AND OUTFALL
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND<br>LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | 01<br>15SW/SD004<br>15SW00401<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD004<br>15SW00401-F<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD010<br>15SW01001<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD010<br>15SW01001-F<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD011<br>15SW01101<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD011<br>15SW01101-F<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD006<br>15SW00601<br>ORIG<br>1/11/2005 | 01<br>15SW/SD006<br>15SW00601-F<br>ORIG<br>1/11/2005 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L)** | | | | | | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | | 8.35 U | | 29.8 J | | 10.1 J | | 8.35 U |
| BARIUM, FILTERED | 260 | 473 | | 78.9 J | | 18.7 J | | 88.8 J | | 74.4 J |
| CALCIUM, FILTERED | NA | NA | | 72500 J | | 30400 J | | 99600 J | | 87200 J |
| CHROMIUM, FILTERED | 11 | 78.6 | | 1.3 U | | 0.98 U | | 3.4 J | | 0.52 U |
| COBALT, FILTERED | 73 | 19 | | 0.26 J | | 0.27 J | | 0.27 J | | 6.1 |
| COPPER, FILTERED | 150 | 9.5 | | 3.2 J | | 1 J | | 5 J | | 1.6 J |
| IRON, FILTERED | 1100 | 1000 | | 311 J | | 120 U | | 422 J | | 210 U |
| MAGNESIUM, FILTERED | NA | NA | | 14100 | | 10000 | | 21700 | | 19900 |
| MANGANESE, FILTERED | 88 | 564 | | 6.1 J | | 31 | | 4.7 J | | 1230 |
| NICKEL, FILTERED | 73 | 55.3 | | 3.8 J | | 2 J | | 4.3 J | | 5.1 J |
| POTASSIUM, FILTERED | NA | NA | | 788 J | | 2260 J | | 7590 J | | 2530 J |
| SELENIUM, FILTERED | 18 | 5 | | 1.1 J | | 0.45 U | | 0.34 U | | 0.55 U |
| SODIUM, FILTERED | NA | NA | | 132000 J | | 16100 J | | 141000 J | | 59800 J |
| ZINC, FILTERED | 1100 | 126 | | 88 J | | 2.1 J | | 5 J | | 15.7 J |
| **Field Parameters** | | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | 10.76 | | 10.38 | | 9.66 | | 10.47 | |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | 53.1 | | 32.7 | | 115.5 | | 30.4 | |
| PH (S.U.) | NA | NA | 7.76 | | 7.84 | | 7.61 | | 7.75 | |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | 0.72 | | 0.237 | | 0.946 | | 1.028 | |
| TEMPERATURE (°C) | NA | NA | 12.21 | | 12.94 | | 13.33 | | 10.97 | |
| TURBIDITY (NTU) | NA | NA | 5.3 | | 35 | | 12 | | 13 | |

TABLE 3-14

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT STORM SEWER AND OUTFALL
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND<br>LOCATION (1)<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERIA | ERA CRITERIA | 01<br>15SW/SD009<br>15SW00901<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD009<br>15SW00901-F<br>NORMAL<br>1/12/2005 |
|---|---|---|---|---|
| **Semivolatile Organics (ug/L)** | | | | |
| ACENAPHTHENE | 37 | 27 | 0.048 U | |
| ACENAPHTHYLENE | 37 | 4840 | 0.048 U | |
| ANTHRACENE | 180 | 0.68 | 0.048 U | |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | 0.048 U | |
| BENZO(A)PYRENE | 0.0092 | 0.014 | 0.048 U | |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | 0.048 U | |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | 0.048 U | |
| BENZO(K)FLUORANTHENE | 0.8 | NA | 0.048 U | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 4.8 | 0.3 | 0.952 U | |
| CHRYSENE | 1.6 | NA | 0.048 U | |
| DIBENZO(A,H)ANTHRACENE | 0.0092 | NA | 0.048 U | |
| FLUORANTHENE | 150 | 3.6 | 0.048 U | |
| FLUORENE | 24 | 2.4 | 0.048 U | |
| INDENO(1,2,3-CD)PYRENE | 0.022 | 4.31 | 0.048 U | |
| NAPHTHALENE | 0.62 | 26 | 0.048 U | |
| PHENANTHRENE | 18 | 0.93 | 0.048 U | |
| PYRENE | 18 | 0.3 | 0.06 J | |
| **Herbicides (ug/L)** | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | 0.022 J | |
| **Total Metals (ug/L)** | | | | |
| ALUMINUM | 3600 | 87 | 61.2 J | |
| BARIUM | 260 | 473 | 61.7 J | |
| CALCIUM | NA | NA | 69200 J | |
| CHROMIUM | 11 | 91.4 | 0.97 U | |
| COBALT | 73 | 19 | 1.7 J | |
| COPPER | 150 | 9.9 | 1.3 J | |
| IRON | 1100 | 1000 | 911 J | |
| LEAD | 15 | 7 | 0.387 U | |
| MAGNESIUM | NA | NA | 12700 J | |
| MANGANESE | 88 | 564 | 401 | |
| NICKEL | 73 | 55.4 | 0.88 U | |
| POTASSIUM | NA | NA | 1350 J | |
| SELENIUM | 18 | 5 | 0.66 U | |
| SODIUM | NA | NA | 74400 J | |
| VANADIUM | 3.6 | 12 | 1.14 U | |
| ZINC | 1100 | 127 | 18.5 J | |

TABLE 3-14

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT STORM SEWER AND OUTFALL
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND<br>LOCATION (1)<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERIA | ERA CRITERIA | 01<br>15SW/SD009<br>15SW00901<br>NORMAL<br>1/12/2005 | 01<br>15SW/SD009<br>15SW00901-F<br>NORMAL<br>1/12/2005 |
|---|---|---|---|---|
| **Dissolved Metals (ug/L)** | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | | 8.35 U |
| BARIUM, FILTERED | 260 | 473 | | 61.1 J |
| CALCIUM, FILTERED | NA | NA | | 70300 J |
| CHROMIUM, FILTERED | 11 | 78.6 | | 0.87 U |
| COBALT, FILTERED | 73 | 19 | | 2 |
| COPPER, FILTERED | 150 | 9.5 | | 1.8 J |
| IRON, FILTERED | 1100 | 1000 | | 425 J |
| MAGNESIUM, FILTERED | NA | NA | | 15400 |
| MANGANESE, FILTERED | 88 | 564 | | 394 |
| NICKEL, FILTERED | 73 | 55.3 | | 3.2 J |
| POTASSIUM, FILTERED | NA | NA | | 1560 J |
| SELENIUM, FILTERED | 18 | 5 | | 0.46 U |
| SODIUM, FILTERED | NA | NA | | 75000 J |
| ZINC, FILTERED | 1100 | 126 | | 20.2 J |
| **Field Parameters** | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | 10.14 | |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | -6.8 | |
| PH | NA | NA | 7.03 | |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | 0.522 | |
| TEMPERATURE ( C) | NA | NA | 10.48 | |
| TURBIDITY (NTU) | NA | NA | 8.3 | |

blank cell indicates no analysis was conducted for the parameter.
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Chemicals detected above either HHRA or ERA criteria values are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.

TABLE 3-15

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| STREAM ORDER<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | TRIB 15-1/15-2<br>15SW/SD005<br>15SW00501<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD005<br>15SW00501-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD013<br>15SW01301<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD013<br>15SW01301-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD015<br>15SW01501<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD015<br>15SW01501-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD016<br>15SW01601<br>NORMAL<br>1/11/2005 |
|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics (ug/L)** | | | | | | | | | |
| ACENAPHTHENE | 37 | 27 | 0.048 U | | 0.06 J | | 0.05 U | | 0.049 U |
| ANTHRACENE | 180 | 0.68 | 0.048 U | | 0.05 U | | 0.05 U | | 0.049 U |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | 0.048 U | | 0.05 U | | 0.05 U | | 0.13 |
| BENZO(A)PYRENE | 0.0092 | 0.014 | 0.048 U | | 0.05 U | | 0.05 U | | 0.14 |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | 0.048 U | | 0.05 U | | 0.05 U | | 0.28 |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | 0.048 U | | 0.05 U | | 0.05 U | | 0.13 |
| BENZO(K)FLUORANTHENE | 0.8 | NA | 0.048 U | | 0.05 U | | 0.05 U | | 0.11 |
| CHRYSENE | 1.6 | NA | 0.048 U | | 0.05 U | | 0.05 U | | 0.25 |
| FLUORANTHENE | 150 | 3.6 | 0.048 U | | 0.1 | | 0.15 | | 0.81 |
| INDENO(1,2,3-CD)PYRENE | 0.092 | 4.31 | 0.048 U | | 0.05 U | | 0.05 U | | 0.09 J |
| NAPHTHALENE | 0.62 | 26 | 0.048 U | | 0.05 J | | 0.05 U | | 0.049 U |
| PHENANTHRENE | 18 | 0.93 | 0.048 U | | 0.06 J | | 0.09 J | | 0.34 |
| PYRENE | 18 | 0.3 | 0.05 J | | 0.09 J | | 0.12 | | 0.57 |
| **Herbicides (ug/L)** | | | | | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | | | 0.028 J | | 0.037 J | | 0.065 J |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 3600 | 87 | 130 J | | 586 J | | 194 J | | 1850 J |
| ANTIMONY | 1.5 | 80 | 0.25 U | | 2.5 J | | 0.48 U | | 0.23 U |
| ARSENIC | 0.045 | 148 | 0.5 U | | 1 U | | 0.29 U | | 1.2 U |
| BARIUM | 260 | 473 | 84.1 J | | 162 J | | 51 J | | 55.6 J |
| CALCIUM | NA | NA | 86900 J | | 96900 J | | 47800 J | | 64100 J |
| CHROMIUM | 11 | 91.4 | 0.6 U | | 1 U | | 0.43 U | | 3.5 J |
| COBALT | 73 | 19 | 0.91 U | | 1.4 J | | 0.58 U | | 3.7 J |
| COPPER | 150 | 9.9 | 1.1 U | | 4.9 J | | 1.7 J | | 3.4 J |
| IRON | 1100 | 1000 | 431 J | | 2660 J | | 306 J | | 2700 J |
| LEAD | 15 | 7 | 0.327 U | | 2.3 J | | 0.633 U | | 2.5 J |
| MAGNESIUM | NA | NA | 16100 J | | 15400 J | | 10800 J | | 12600 J |
| MANGANESE | 88 | 564 | 242 | | 463 | | 71.5 | | 308 |
| NICKEL | 73 | 55.4 | 1.5 J | | 1.9 J | | 2.3 J | | 7.8 J |
| POTASSIUM | NA | NA | 2230 J | | 2640 J | | 1800 J | | 2300 J |
| SODIUM | NA | NA | 64700 J | | 15700 J | | 21400 J | | 46500 J |
| VANADIUM | 3.6 | 12 | 1.14 U | | 1.2 J | | 1.14 U | | 3.8 |
| ZINC | 0 | 0 | 9.2 J | | 61.3 J | | 5.2 J | | 26 J |
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | | 8.35 U | | 8.35 U | | 28.6 J | |
| BARIUM, FILTERED | 260 | 473 | | 80 J | | 149 J | | 50.5 J | |
| CADMIUM, FILTERED | 1.8 | 2.36 | | 0.04 U | | 0.33 U | | 0.05 U | |
| CALCIUM, FILTERED | NA | NA | | 83400 J | | 99600 J | | 46800 J | |
| COBALT, FILTERED | 73 | 19 | | 0.96 J | | 1.1 | | 0.55 J | |

TABLE 3-15

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| STREAM ORDER<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | TRIB 15-1/15-2<br>15SW/SD005<br>15SW00501<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD005<br>15SW00501-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD013<br>15SW01301<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD013<br>15SW01301-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD015<br>15SW01501<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD015<br>15SW01501-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD016<br>15SW01601<br>NORMAL<br>1/11/2005 |
|---|---|---|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| COPPER, FILTERED | 150 | 9.5 | | 1.7 J | | 2 J | | 1.2 J | |
| IRON, FILTERED | 1100 | 1000 | | 359 J | | 952 J | | 154 U | |
| LEAD, FILTERED | 15 | 5.5 | | 0.206 U | | 0.199 U | | 0.204 U | |
| MAGNESIUM, FILTERED | NA | NA | | 18000 | | 16000 | | 10700 | |
| MANGANESE, FILTERED | 88 | 564 | | 227 | | 437 | | 65.8 | |
| NICKEL, FILTERED | 73 | 55.3 | | 3.3 J | | 3.4 J | | 3.2 J | |
| POTASSIUM, FILTERED | NA | NA | | 2420 J | | 2720 J | | 1660 J | |
| SELENIUM, FILTERED | 18 | 5 | | 0.54 U | | 0.67 J | | 0.12 U | |
| SODIUM, FILTERED | NA | NA | | 64500 J | | 15300 J | | 21500 J | |
| THALLIUM, FILTERED | 0.24 | 6 | | 0.06 U | | 0.08 U | | 0.1 U | |
| ZINC, FILTERED | 1100 | 126 | | 7.1 J | | 41.1 J | | 3.1 J | |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | 9.53 | | 10.39 | | 11.33 | | 11.08 |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | 24.3 | | -0.1 | | 3.4 | | 79.3 |
| PH | NA | NA | 7.64 | | 7.7 | | 7.93 | | 7.86 |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | 1.08 | | 0.783 | | 0.518 | | 0.771 |
| TEMPERATURE (C ) | NA | NA | 11.41 | | 9.64 | | 9.84 | | 10.27 |
| TURBIDITY (NTU) | NA | NA | 9.1 | | 370 | | 19 | | 140 |

TABLE 3-15

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| STREAM ORDER<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | TRIB 15-1/15-2<br>15SW/SD016<br>15SW01601-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD017<br>15SW01701<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD017<br>15SW01701-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD018<br>15SW01801<br>NORMAL<br>1/9/2005 | TRIB 15-1/15-2<br>15SW/SD018<br>15SW01801-F<br>NORMAL<br>1/9/2005 | TRIB 15-1/15-2<br>15SW/SD019<br>15SW01901<br>NORMAL<br>1/9/2005 | TRIB 15-1/15-2<br>15SW/SD019<br>15SW01901-F<br>NORMAL<br>1/9/2005 |
|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics (ug/L)** | | | | | | | | | |
| ACENAPHTHENE | 37 | 27 | | 0.048 U | | 0.052 U | | 0.049 U | |
| ANTHRACENE | 180 | 0.68 | | 0.05 J | | 0.052 U | | 0.049 U | |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | | 0.13 | | 0.052 U | | 0.049 U | |
| BENZO(A)PYRENE | 0.0092 | 0.014 | | 0.12 | | 0.052 U | | 0.049 U | |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | | 0.21 | | 0.052 U | | 0.049 U | |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | | 0.11 | | 0.052 U | | 0.049 U | |
| BENZO(K)FLUORANTHENE | 0.8 | NA | | 0.14 | | 0.052 U | | 0.049 U | |
| CHRYSENE | 1.6 | NA | | 0.21 | | 0.052 U | | 0.049 U | |
| FLUORANTHENE | 150 | 3.6 | | 0.71 | | 0.052 U | | 0.049 U | |
| INDENO(1,2,3-CD)PYRENE | 0.092 | 4.31 | | 0.09 J | | 0.052 U | | 0.049 U | |
| NAPHTHALENE | 0.62 | 26 | | 0.048 U | | 0.052 U | | 0.049 U | |
| PHENANTHRENE | 18 | 0.93 | | 0.28 | | 0.052 U | | 0.049 U | |
| PYRENE | 18 | 0.3 | | 0.53 | | 0.052 U | | 0.049 U | |
| **Herbicides (ug/L)** | | | | | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | | 0.062 J | | 0.013 U | | 0.013 U | |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 3600 | 87 | | 1040 J | | 3020 J | | 1900 J | |
| ANTIMONY | 1.5 | 80 | | 0.19 U | | 0.34 U | | 0.19 U | |
| ARSENIC | 0.045 | 148 | | 0.69 U | | 1.4 J | | 0.73 U | |
| BARIUM | 260 | 473 | | 61 J | | 72.4 J | | 63.4 J | |
| CALCIUM | NA | NA | | 71600 J | | 39000 J | | 32100 J | |
| CHROMIUM | 11 | 91.4 | | 1.9 J | | 3.6 J | | 2.2 J | |
| COBALT | 73 | 19 | | 4.2 J | | 1.6 | | 1.4 | |
| COPPER | 150 | 9.9 | | 1.9 J | | 5.1 J | | 3.2 J | |
| IRON | 1100 | 1000 | | 1430 J | | 3330 J | | 2160 J | |
| LEAD | 15 | 7 | | 1.1 J | | 2.9 J | | 1.2 J | |
| MAGNESIUM | NA | NA | | 15200 J | | 8030 J | | 6630 J | |
| MANGANESE | 88 | 564 | | 404 | | 191 J | | 412 J | |
| NICKEL | 73 | 55.4 | | 8 J | | 3.2 | | 2.3 | |
| POTASSIUM | NA | NA | | 2420 J | | 1550 J | | 1340 J | |
| SODIUM | NA | NA | | 58900 J | | 29800 J | | 18400 J | |
| VANADIUM | 3.6 | 12 | | 1.9 J | | 6.1 | | 3.4 | |
| ZINC | 0 | 0 | | 32.3 J | | 22.8 J | | 10.6 U | |
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | 21.9 J | | 187 | | 10.2 U | | 10.6 U |
| BARIUM, FILTERED | 260 | 473 | 47.2 J | | 56.4 J | | 71.7 J | | 51.9 J |
| CADMIUM, FILTERED | 1.8 | 2.36 | 0.15 U | | 0.04 U | | 0.36 J | | 0.09 J |
| CALCIUM, FILTERED | NA | NA | 61800 J | | 69600 J | | 34200 | | 25200 |
| COBALT, FILTERED | 73 | 19 | 2.6 | | 4.1 | | 0.38 J | | 0.94 J |

TABLE 3-15

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| STREAM ORDER<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | TRIB 15-1/15-2<br>15SW/SD016<br>15SW01601-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD017<br>15SW01701<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD017<br>15SW01701-F<br>NORMAL<br>1/11/2005 | TRIB 15-1/15-2<br>15SW/SD018<br>15SW01801<br>NORMAL<br>1/9/2005 | TRIB 15-1/15-2<br>15SW/SD018<br>15SW01801-F<br>NORMAL<br>1/9/2005 | TRIB 15-1/15-2<br>15SW/SD019<br>15SW01901<br>NORMAL<br>1/9/2005 | TRIB 15-1/15-2<br>15SW/SD019<br>15SW01901-F<br>NORMAL<br>1/9/2005 |
|---|---|---|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L) (Continued)** | | | | | | | | | |
| COPPER, FILTERED | 150 | 9.5 | 2.7 J | | 1.9 J | | 1.4 J | | 1.3 J |
| IRON, FILTERED | 1100 | 1000 | 166 U | | 643 J | | 299 J | | 484 J |
| LEAD, FILTERED | 15 | 5.5 | 0.123 U | | 0.486 U | | 0.192 J | | 0.199 J |
| MAGNESIUM, FILTERED | NA | NA | 12100 | | 14800 | | 8210 J | | 6410 J |
| MANGANESE, FILTERED | 88 | 564 | **260** | | **398** | | 87.7 J | | **367 J** |
| NICKEL, FILTERED | 73 | 55.3 | 6.6 J | | 9 J | | 3 J | | 2.7 J |
| POTASSIUM, FILTERED | NA | NA | 1900 J | | 2140 J | | 1100 J | | 861 J |
| SELENIUM, FILTERED | 18 | 5 | 0.31 U | | 0.45 U | | 0.29 U | | 0.27 U |
| SODIUM, FILTERED | NA | NA | 49300 J | | 59600 J | | 21800 J | | 14500 J |
| THALLIUM, FILTERED | 0.24 | 6 | 0.08 U | | 0.08 U | | 0.1 J | | 0.09 J |
| ZINC, FILTERED | 1100 | 126 | 4.3 J | | 10.4 J | | 3.4 U | | 3.7 J |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | | 10.57 | | | | | |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | | 4.4 | | 27 | | -15.7 | |
| PH | NA | NA | | 7.74 | | 7.57 | | 7.82 | |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | | 0.947 | | 0.512 | | 0.375 | |
| TEMPERATURE (°C) | NA | NA | | 10.87 | | 6.73 | | 7.37 | |
| TURBIDITY (NTU) | NA | NA | | 60 | | 70 | | 25 | |

Blank cell indicates no analysis was conducted for the parameter.
Chemicals detected above either HHRA or ERA criteria values are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.

TABLE 3-16

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARY 15-3
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| STREAM ORDER<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | TRIB 15-3<br>15SW/SD001<br>15SW00101<br>NORMAL<br>1/11/2005 | TRIB 15-3<br>15SW/SD001<br>15SW00101-F<br>NORMAL<br>1/11/2005 | TRIB 15-3<br>15SW/SD002<br>15SW00201<br>NORMAL<br>1/11/2005 | TRIB 15-3<br>15SW/SD002<br>15SW00201-F<br>NORMAL<br>1/11/2005 |
|---|---|---|---|---|---|---|
| **Volatile Organics (ug/L)** | | | | | | |
| ACETONE | 550 | 1700 | 3.1 J | | 4 J | |
| **Semivolatile Organics (ug/L)** | | | | | | |
| BENZO(A)ANTHRACENE | 0.092 | 0.025 | 0.09 J | | 0.14 | |
| BENZO(A)PYRENE | 0.0092 | 0.014 | 0.1 | | 0.16 | |
| BENZO(B)FLUORANTHENE | 0.092 | 9.07 | 0.22 | | 0.31 | |
| BENZO(G,H,I)PERYLENE | 0.26 | 7.64 | 0.1 | | 0.14 | |
| BENZO(K)FLUORANTHENE | 0.8 | NA | 0.08 J | | 0.13 | |
| CHRYSENE | 1.6 | NA | 0.2 | | 0.32 | |
| FLUORANTHENE | 150 | 3.6 | 0.56 | | 0.95 | |
| INDENO(1,2,3-CD)PYRENE | 0.092 | 4.31 | 0.08 J | | 0.11 | |
| PHENANTHRENE | 18 | 0.93 | 0.23 | | 0.42 | |
| PYRENE | 18 | 0.3 | 0.41 | | 0.64 | |
| **Herbicides (ug/L)** | | | | | | |
| PENTACHLOROPHENOL | 0.56 | 6.9 | 0.05 J | | 0.053 J | |
| **Total Metals (ug/L)** | | | | | | |
| ALUMINUM | 3600 | 87 | 1080 J | | 41.6 U | |
| BARIUM | 260 | 473 | 45.6 J | | 34.4 J | |
| CALCIUM | NA | NA | 50800 J | | 43200 J | |
| CHROMIUM | 11 | 91.4 | 1.9 J | | 0.42 U | |
| COBALT | 73 | 19 | 1.4 J | | 0.5 U | |
| COPPER | 150 | 9.9 | 2.5 J | | 1.3 J | |
| IRON | 1100 | 1000 | 1390 J | | 41 U | |
| LEAD | 15 | 7 | 1.5 J | | 0.279 U | |
| MAGNESIUM | NA | NA | 10300 J | | 8840 J | |
| MANGANESE | 88 | 564 | 107 | | 42 | |
| NICKEL | 73 | 55.4 | 4.3 J | | 2.2 J | |
| POTASSIUM | NA | NA | 1940 J | | 1670 J | |
| SODIUM | NA | NA | 28300 J | | 24000 J | |
| VANADIUM | 3.6 | 12 | 2.1 | | 1.14 U | |
| ZINC | 1100 | 127 | 12.7 J | | 3.5 U | |
| **Dissolved Metals (ug/L)** | | | | | | |
| ALUMINUM, FILTERED | 3600 | 87 | | 25.9 J | | 2090 |
| ARSENIC, FILTERED | 0.045 | 148 | | 17 J | | 1 J |
| BARIUM, FILTERED | 260 | 473 | | 41.2 J | | 46.6 J |
| CALCIUM, FILTERED | NA | NA | | 47600 J | | 42800 J |
| CHROMIUM, FILTERED | 11 | 78.6 | | 0.47 U | | 4.1 J |
| COBALT, FILTERED | 73 | 19 | | 0.92 J | | 2.1 |
| COPPER, FILTERED | 150 | 9.5 | | 1.5 J | | 5.2 J |
| IRON, FILTERED | 1100 | 1000 | | 134 U | | 2860 J |

TABLE 3-16

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARY 15-3
SURFACE WATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| STREAM ORDER<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | TRIB 15-3<br>15SW/SD001<br>15SW00101<br>NORMAL<br>1/11/2005 | TRIB 15-3<br>15SW/SD001<br>15SW00101-F<br>NORMAL<br>1/11/2005 | TRIB 15-3<br>15SW/SD002<br>15SW00201<br>NORMAL<br>1/11/2005 | TRIB 15-3<br>15SW/SD002<br>15SW00201-F<br>NORMAL<br>1/11/2005 |
|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L) (Continued)** | | | | | | |
| LEAD, FILTERED | 15 | 5.5 | | 0.162 U | | 3.1 J |
| MAGNESIUM, FILTERED | NA | NA | | 9720 | | 7630 |
| MANGANESE, FILTERED | 88 | 564 | | 92.3 | | 114 |
| NICKEL, FILTERED | 73 | 55.3 | | 3.6 J | | 6.9 J |
| POTASSIUM, FILTERED | NA | NA | | 1670 J | | 1630 J |
| SODIUM, FILTERED | NA | NA | | 29400 J | | 19600 J |
| VANADIUM, FILTERED | 3.6 | 12 | | 1.14 U | | 4.2 |
| ZINC, FILTERED | 1100 | 126 | | 2.5 J | | 42.7 |
| **Field Parameters** | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | NA | 11.5 | | 7.33 | |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | NA | 78.7 | | 81 | |
| PH | NA | NA | 7.86 | | 7.25 | |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | NA | 0.579 | | 0.48 | |
| TEMPERATURE (°C) | NA | NA | 9.7 | | 9.36 | |
| TURBIDITY (NTU) | NA | NA | 45 | | 90 | |

Blank cell indicates no analysis was conducted for the parameter.
Chemicals detected above either HHRA or ERA criteria values are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.

TABLE 3-17

DESCRIPTIVE STATISTICS FOR UPGRADIENT SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 20.2 | 1/2 | 5 J | 5 J | 4.1 | 3.53 | 5.00 | 15SD0140006 |
| ACENAPHTHENE | 370000 | 6.71 | 2/2 | 27 | 36 | --- | 31.5 | 31.5 | 15SD0260006 |
| ANTHRACENE | 2200000 | 57.2 | 2/2 | 71 | 89 | --- | 80.0 | 80.0 | 15SD0260006 |
| BENZO(A)ANTHRACENE | 620 | 108 | 2/2 | 270 | 330 | --- | 300 | 300 | 15SD0260006 |
| BENZO(A)PYRENE | 62 | 150 | 2/2 | 330 | 390 | --- | 360 | 360 | 15SD0260006 |
| BENZO(B)FLUORANTHENE | 620 | 10400 | 2/2 | 340 | 440 | --- | 390 | 390 | 15SD0260006 |
| BENZO(G,H,I)PERYLENE | 50000 | 170 | 2/2 | 200 | 400 | --- | 300 | 300 | 15SD0140006 |
| BENZO(K)FLUORANTHENE | 6200 | 240 | 2/2 | 190 | 310 | --- | 250 | 250 | 15SD0260006 |
| CHRYSENE | 62000 | 166 | 2/2 | 350 | 390 | --- | 370 | 370 | 15SD0260006 |
| DIBENZO(A,H)ANTHRACENE | 62 | 33 | 2/2 | 38 | 65 | --- | 51.5 | 51.5 | 15SD0140006 |
| FLUORANTHENE | 230000 | 423 | 2/2 | 720 | 1000 | --- | 860 | 860 | 15SD0260006 |
| FLUORENE | 270000 | 77.4 | 2/2 | 34 | 47 | --- | 40.5 | 40.5 | 15SD0260006 |
| INDENO(1,2,3-CD)PYRENE | 620 | 200 | 2/2 | 180 | 310 | --- | 245 | 245 | 15SD0140006 |
| NAPHTHALENE | 5600 | 176 | 2/2 | 8 J | 10 | --- | 9.00 | 9.00 | 15SD0140006 |
| PHENANTHRENE | 230000 | 204 | 2/2 | 560 | 630 | --- | 595 | 595 | 15SD0260006 |
| PYRENE | 230000 | 195 | 2/2 | 690 | 960 | --- | 825 | 825 | 15SD0260006 |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDT | 1700 | 4.16 | 1/1 | 4.2 | 4.2 | --- | 4.20 | 4.20 | 15SD0140006 |
| **Herbicides (ug/kg)** | | | | | | | | | |
| PENTACHLOROPHENOL | 3000 | 23000 | 1/1 | 1.5 J | 1.5 J | --- | 1.50 | 1.50 | 15SD0140006 |
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | 7600 | NA | 2/2 | 10100 J | 14400 J | --- | 12250 | 12250 | 15SD0140006 |
| ANTIMONY | 3.1 | NA | 1/2 | 0.59 J | 0.59 J | 1.1 | 0.570 | 0.590 | 15SD0260006 |
| ARSENIC | 0.39 | 9.79 | 2/2 | 7.9 J | 20.9 J | --- | 14.4 | 14.4 | 15SD0140006 |
| BARIUM | 540 | NA | 2/2 | 109 J | 128 J | --- | 119 | 119 | 15SD0140006 |
| BERYLLIUM | 15 | NA | 2/2 | 0.86 J | 1.8 J | --- | 1.33 | 1.33 | 15SD0140006 |
| CADMIUM | 3.7 | 0.99 | 2/2 | 0.2 J | 0.65 J | --- | 0.425 | 0.425 | 15SD0140006 |
| CALCIUM | NA | NA | 2/2 | 3800 J | 4910 J | --- | 4355 | 4355 | 15SD0140006 |
| CHROMIUM | 22 | 43.4 | 2/2 | 29.1 J | 46.1 J | --- | 37.6 | 37.6 | 15SD0140006 |
| COBALT | 140 | 50 | 2/2 | 37.1 J | 85.9 J | --- | 61.5 | 61.5 | 15SD0140006 |
| COPPER | 310 | 31.6 | 2/2 | 10.7 J | 17.3 J | --- | 14.0 | 14.0 | 15SD0140006 |
| IRON | 2300 | NA | 2/2 | 28200 J | 61000 J | --- | 44600 | 44600 | 15SD0140006 |
| LEAD | 400 | 35.8 | 2/2 | 24.7 J | 35 J | --- | 29.9 | 29.9 | 15SD0140006 |
| MAGNESIUM | NA | NA | 2/2 | 1210 J | 1780 J | --- | 1495 | 1495 | 15SD0140006 |
| MANGANESE | 180 | NA | 2/2 | 2160 J | 5160 J | --- | 3660 | 3660 | 15SD0140006 |
| MERCURY | 2.3 | 0.174 | 1/2 | 0.035 J | 0.035 J | 0.007 | 0.0193 | 0.0350 | 15SD0140006 |
| NICKEL | 160 | 22.7 | 2/2 | 30.3 J | 64.5 J | --- | 47.4 | 47.4 | 15SD0140006 |
| POTASSIUM | NA | NA | 2/2 | 993 | 1440 J | --- | 1217 | 1217 | 15SD0140006 |
| SELENIUM | 39 | NA | 2/2 | 0.37 J | 0.96 J | --- | 0.665 | 0.665 | 15SD0140006 |
| THALLIUM | 0.52 | NA | 1/2 | 0.22 J | 0.22 J | 0.23 | 0.168 | 0.220 | 15SD0260006 |
| VANADIUM | 7.8 | NA | 2/2 | 24.6 J | 42.4 J | --- | 33.5 | 33.5 | 15SD0140006 |
| ZINC | 2300 | 121 | 2/2 | 57.8 J | 161 | --- | 109 | 109 | 15SD0140006 |

TABLE 3-17

DESCRIPTIVE STATISTICS FOR UPGRADIENT SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Miscellaneous Parameters (Percent)** | | | | | | | | | |
| SILT/CLAY | NA | NA | 1/1 | 20 | 20 | --- | 20.0 | 20.0 | 15SD0260006 |
| SIEVE 1" | NA | NA | 1/1 | 0 | 0 | --- | --- | --- | 15SD0260006 |
| SIEVE 1-1/2" | NA | NA | 1/1 | 0 | 0 | --- | --- | --- | 15SD0260006 |
| SIEVE 2" | NA | NA | 1/1 | 0 | 0 | --- | --- | --- | 15SD0260006 |
| SIEVE 3" | NA | NA | 1/1 | 0 | 0 | --- | --- | --- | 15SD0260006 |
| SIEVE 3/4" | NA | NA | 1/1 | 2 | 2 | --- | 2.00 | 2.00 | 15SD0260006 |
| SIEVE 3/8" | NA | NA | 1/1 | 1 | 1 | --- | 1.00 | 1.00 | 15SD0260006 |
| SIEVE NO. 004 | NA | NA | 1/1 | 1 | 1 | --- | 1.00 | 1.00 | 15SD0260006 |
| SIEVE NO. 010 | NA | NA | 1/1 | 4 | 4 | --- | 4.00 | 4.00 | 15SD0260006 |
| SIEVE NO. 020 | NA | NA | 1/1 | 9 | 9 | --- | 9.00 | 9.00 | 15SD0260006 |
| SIEVE NO. 040 | NA | NA | 1/1 | 9 | 9 | --- | 9.00 | 9.00 | 15SD0260006 |
| SIEVE NO. 060 | NA | NA | 1/1 | 12 | 12 | --- | 12.0 | 12.0 | 15SD0260006 |
| SIEVE NO. 140 | NA | NA | 1/1 | 30 | 30 | --- | 30.0 | 30.0 | 15SD0260006 |
| SIEVE NO. 200 | NA | NA | 1/1 | 12 | 12 | --- | 12.0 | 12.0 | 15SD0260006 |
| TOTAL ORGANIC CARBON (mg/kg) | NA | NA | 1/1 | 9200 J | 9200 J | --- | 9200 | 9200 | 15SD0260006 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/kg - milligrams per kilogram.
ug/kg - micrograms per kilogram.
NA - No applicable criterion.

TABLE 3-18

RESULTS FOR CHEMICALS DETECTED IN UPGRADIENT SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA

| LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>DEPTH RANGE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | 15SW/SD003<br>15SD0030006<br>NOT FOUND<br>0 - 0.5<br>1/11/2005 | 15SW/SD014<br>15SD0140006<br>NORMAL<br>0 - 0.5<br>1/11/2005 | 15SW/SD026<br>15SD0260006<br>NORMAL<br>0 - 0.5<br>6/7/2005 |
|---|---|---|---|---|---|
| **Semivolatile Organics (ug/kg)** | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 20.2 | | 5 J | 4.1 U |
| ACENAPHTHENE | 370000 | 6.71 | | 27 | 36 |
| ANTHRACENE | 2200000 | 57.2 | | 71 | 89 |
| BENZO(A)ANTHRACENE | 620 | 108 | | 270 | 330 |
| BENZO(A)PYRENE | 62 | 150 | | 330 | 390 |
| BENZO(B)FLUORANTHENE | 620 | 10400 | | 340 | 440 |
| BENZO(G,H,I)PERYLENE | 50000 | 170 | | 400 | 200 |
| BENZO(K)FLUORANTHENE | 6200 | 240 | | 190 | 310 |
| CHRYSENE | 62000 | 166 | | 350 | 390 |
| DIBENZO(A,H)ANTHRACENE | 62 | 33 | | 65 | 38 |
| FLUORANTHENE | 230000 | 423 | | 720 | 1000 |
| FLUORENE | 270000 | 77.4 | | 34 | 47 |
| INDENO(1,2,3-CD)PYRENE | 620 | 200 | | 310 | 180 |
| NAPHTHALENE | 5600 | 176 | | 10 | 8 J |
| PHENANTHRENE | 230000 | 204 | | 560 | 630 |
| PYRENE | 230000 | 195 | | 690 | 960 |
| **Pesticides/PCBs (ug/kg)** | | | | | |
| 4,4'-DDT | 1700 | 4.16 | | 4.2 | |
| **Herbicides (ug/kg)** | | | | | |
| PENTACHLOROPHENOL | 3000 | 23000 | | 1.5 J | |
| **Inorganics (mg/kg)** | | | | | |
| ALUMINUM | 7600 | NA | | 14400 J | 10100 J |
| ANTIMONY | 3.1 | NA | | 1.1 U | 0.59 J |
| ARSENIC | 0.39 | 9.79 | | 20.9 J | 7.9 J |
| BARIUM | 540 | NA | | 128 J | 109 J |
| BERYLLIUM | 15 | NA | | 1.8 J | 0.86 J |
| CADMIUM | 3.7 | 0.99 | | 0.65 J | 0.2 J |
| CALCIUM | NA | NA | | 4910 J | 3800 J |
| CHROMIUM | 22 | 43.4 | | 46.1 J | 29.1 J |
| COBALT | 140 | 50 | | 85.9 J | 37.1 J |
| COPPER | 310 | 31.6 | | 17.3 J | 10.7 J |
| IRON | 2300 | NA | | 61000 J | 28200 J |
| LEAD | 400 | 35.8 | | 35 J | 24.7 J |
| MAGNESIUM | NA | NA | | 1780 J | 1210 J |
| MANGANESE | 180 | NA | | 5160 J | 2160 J |
| MERCURY | 2.3 | 0.174 | | 0.035 J | 0.007 UJ |
| NICKEL | 160 | 22.7 | | 64.5 J | 30.3 J |
| POTASSIUM | NA | NA | | 1440 J | 993 |
| SELENIUM | 39 | NA | | 0.96 J | 0.37 J |
| THALLIUM | 0.52 | NA | | 0.23 U | 0.22 J |
| VANADIUM | 7.8 | NA | | 42.4 J | 24.6 J |
| ZINC | 2300 | 121 | | 161 | 57.8 J |
| **Miscellaneous Parameters (%)** | | | | | |
| PERCENT SILT/CLAY | NA | NA | | | 20 |
| SIEVE 1" | NA | NA | | | 0 |
| SIEVE 1-1/2" | NA | NA | | | 0 |
| SIEVE 2" | NA | NA | | | 0 |
| SIEVE 3" | NA | NA | | | 0 |
| SIEVE 3/4" | NA | NA | | | 2 |
| SIEVE 3/8" | NA | NA | | | 1 |
| SIEVE NO. 004 | NA | NA | | | 1 |
| SIEVE NO. 010 | NA | NA | | | 4 |
| SIEVE NO. 020 | NA | NA | | | 9 |
| SIEVE NO. 040 | NA | NA | | | 9 |
| SIEVE NO. 060 | NA | NA | | | 12 |
| SIEVE NO. 140 | NA | NA | | | 30 |
| SIEVE NO. 200 | NA | NA | | | 12 |
| TOTAL ORGANIC CARBON (mg/kg) | NA | NA | | | 9200 J |

Blank cell indicates no analysis was conducted for the parameter.
Chemicals detected above either HHRA or ERA criteria values are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
mg/kg - milligrams per kilogram.
ug/kg - micrograms per kilogram.

TABLE 3-19

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT STORM SEWER AND OUTFALL SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA

| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | | | | |
| ACETONE | 1400000 | 9.9 | 2/2 | 2 J | 8 J | --- | 5.00 | 5.00 | 15SD0090006 |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 20.2 | 1/2 | 47 | 47 | 16.3 | 27.6 | 47.0 | 15SD0060006 |
| ACENAPHTHENE | 370000 | 6.71 | 2/2 | 18 J | 560 | --- | 289 | 289 | 15SD0060006 |
| ANTHRACENE | 2200000 | 57.2 | 2/2 | 25 J | 1300 | --- | 663 | 663 | 15SD0060006 |
| BENZO(A)ANTHRACENE | 620 | 108 | 2/2 | 100 J | 3300 | --- | 1700 | 1700 | 15SD0060006 |
| BENZO(A)PYRENE | 62 | 150 | 2/2 | 120 J | 3700 J | --- | 1910 | 1910 | 15SD0060006 |
| BENZO(B)FLUORANTHENE | 620 | 10400 | 2/2 | 150 J | 4300 J | --- | 2225 | 2225 | 15SD0060006 |
| BENZO(G,H,I)PERYLENE | 50000 | 170 | 2/2 | 160 J | 3800 J | --- | 1980 | 1980 | 15SD0060006 |
| BENZO(K)FLUORANTHENE | 6200 | 240 | 2/2 | 89 J | 1900 J | --- | 995 | 995 | 15SD0060006 |
| BIS(2-ETHYLHEXYL) PHTHALATE | 35000 | 182 | 2/2 | 270 J | 280 J | --- | 275 | 275 | 15SD0090006 |
| CHRYSENE | 62000 | 166 | 2/2 | 160 J | 4100 | --- | 2130 | 2130 | 15SD0060006 |
| DIBENZO(A,H)ANTHRACENE | 62 | 33 | 1/2 | 700 J | 700 J | 16.3 | 354 | 700 | 15SD0060006 |
| DIBENZOFURAN | 15000 | 449 | 1/2 | 420 | 420 | 82.6 | 231 | 420 | 15SD0060006 |
| FLUORANTHENE | 230000 | 423 | 2/2 | 340 | 12000 | --- | 6170 | 6170 | 15SD0060006 |
| FLUORENE | 270000 | 77.4 | 2/2 | 20 J | 820 | --- | 420 | 420 | 15SD0060006 |
| INDENO(1,2,3-CD)PYRENE | 620 | 200 | 2/2 | 120 J | 3100 J | --- | 1610 | 1610 | 15SD0060006 |
| NAPHTHALENE | 5600 | 176 | 1/2 | 140 | 140 | 16.3 | 74.1 | 140 | 15SD0060006 |
| PHENANTHRENE | 230000 | 204 | 2/2 | 250 | 9100 | --- | 4675 | 4675 | 15SD0060006 |
| PYRENE | 230000 | 195 | 2/2 | 340 J | 16000 J | --- | 8170 | 8170 | 15SD0060006 |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDD | 2400 | 4.88 | 1/2 | 1.7 J | 1.7 J | 1.62 | 1.26 | 1.70 | 15SD0090006 |
| 4,4'-DDT | 1700 | 4.16 | 2/2 | 4.9 | 6.2 | --- | 5.55 | 5.55 | 15SD0090006 |
| **Herbicides (ug/kg)** | | | | | | | | | |
| PENTACHLOROPHENOL | 3000 | 23000 | 1/2 | 4.9 J | 4.9 J | 0.54 | 2.59 | 4.90 | 15SD0090006 |
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | 7600 | NA | 2/2 | 4010 J | 6850 J | --- | 5430 | 5430 | 15SD0060006 |
| ARSENIC | 0.39 | 9.79 | 2/2 | 3.6 J | 4.9 J | --- | 4.25 | 4.25 | 15SD0060006 |
| BARIUM | 540 | NA | 2/2 | 23.5 J | 60.4 J | --- | 42.0 | 42.0 | 15SD0060006 |
| CADMIUM | 3.7 | 0.99 | 2/2 | 0.42 J | 0.63 J | --- | 0.525 | 0.525 | 15SD0090006 |
| CALCIUM | NA | NA | 2/2 | 88000 J | 129000 J | --- | 108500 | 108500 | 15SD0090006 |
| CHROMIUM | 22 | 43.4 | 2/2 | 14.1 J | 39.6 J | --- | 26.9 | 26.9 | 15SD0090006 |
| COBALT | 140 | 50 | 2/2 | 3.8 J | 8 J | --- | 5.90 | 5.90 | 15SD0060006 |
| COPPER | 310 | 31.6 | 2/2 | 8.4 J | 12.2 J | --- | 10.3 | 10.3 | 15SD0060006 |
| IRON | 2300 | NA | 2/2 | 9670 J | 11800 J | --- | 10735 | 10735 | 15SD0060006 |
| LEAD | 400 | 35.8 | 2/2 | 39.7 J | 133 J | --- | 86.4 | 86.4 | 15SD0090006 |
| MAGNESIUM | NA | NA | 2/2 | 9260 J | 14500 J | --- | 11880 | 11880 | 15SD0090006 |
| MANGANESE | 180 | NA | 2/2 | 323 J | 1050 J | --- | 687 | 687 | 15SD0060006 |
| MERCURY | 2.3 | 0.174 | 2/2 | 0.015 J | 0.085 J | --- | 0.0500 | 0.0500 | 15SD0060006 |
| NICKEL | 160 | 22.7 | 2/2 | 9.2 J | 10.2 J | --- | 9.70 | 9.70 | 15SD0060006 |
| POTASSIUM | NA | NA | 2/2 | 589 J | 850 J | --- | 720 | 720 | 15SD0060006 |
| SODIUM | NA | NA | 1/2 | 117 J | 117 J | 108 | 85.5 | 117 | 15SD0090006 |
| VANADIUM | 7.8 | NA | 2/2 | 13.5 J | 17 J | --- | 15.3 | 15.3 | 15SD0060006 |
| ZINC | 2300 | 121 | 2/2 | 56.5 | 163 | --- | 110 | 110 | 15SD0090006 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/kg - milligrams per kilogram.
ug/kg - micrograms per kilogram.
NA - No applicable criterion.

TABLE 3-20

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERIA | ERA CRITERIA | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detects | Sample of Maximum Detect |
|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 20.2 | 7/10 | 4 J | 100 | 4.37 - 15.5 | 19.8 | 25.7 | 15SD0150006 |
| ACENAPHTHENE | 370000 | 6.71 | 9/10 | 6 J | 850 | 4.37 | 202 | 224 | 15SD0150006 |
| ACENAPHTHYLENE | 370000 | 5.87 | 4/10 | 6 J | 48 | 3.81 - 15.5 | 11.6 | 22.5 | 15SD0180006 |
| ANTHRACENE | 2200000 | 57.2 | 9/10 | 18 | 1800 | 4.37 | 439 | 488 | 15SD0150006 |
| BENZO(A)ANTHRACENE | 620 | 108 | 10/10 | 13 | 3700 J | --- | 1209 | 1209 | 15SD0240006 |
| BENZO(A)PYRENE | 62 | 150 | 10/10 | 15 | 4500 J | --- | 1285 | 1285 | 15SD0240006 |
| BENZO(B)FLUORANTHENE | 620 | 10400 | 10/10 | 18 | 6000 J | --- | 1509 | 1509 | 15SD0240006 |
| BENZO(G,H,I)PERYLENE | 50000 | 170 | 10/10 | 16 | 3200 J | --- | 1168 | 1168 | 15SD0240006 |
| BENZO(K)FLUORANTHENE | 6200 | 240 | 10/10 | 11 | 2000 J | --- | 681 | 681 | 15SD0240006 |
| BIS(2-ETHYLHEXYL) PHTHALATE | 35000 | 182 | 4/7 | 130 J | 270 J | 88.6 - 112 | 119 | 173 | 15SD0050006 |
| CHRYSENE | 62000 | 166 | 10/10 | 14 | 4500 J | --- | 1442 | 1442 | 15SD0240006 |
| DI-N-BUTYL PHTHALATE | 610000 | 1114 | 1/7 | 220 J | 220 J | 77.4 - 112 | 68.6 | 220 | 15SD0190006 |
| DIBENZO(A,H)ANTHRACENE | 62 | 33 | 8/10 | 110 J | 620 J | 3.81 - 4.37 | 238 | 298 | 15SD0240006 |
| DIBENZOFURAN | 15000 | 449 | 3/7 | 89 J | 130 J | 77.4 - 88.7 | 71.3 | 110 | 15SD0180006 |
| FLUORANTHENE | 230000 | 423 | 10/10 | 25 | 9800 J | --- | 2958 | 2958 | 15SD0240006 |
| FLUORENE | 270000 | 77.4 | 9/10 | 8 | 800 | 4.37 | 204 | 227 | 15SD0150006 |
| INDENO(1,2,3-CD)PYRENE | 620 | 200 | 10/10 | 15 | 2700 J | --- | 993 | 993 | 15SD0240006 |
| NAPHTHALENE | 5600 | 176 | 9/10 | 5 J | 370 | 4.37 | 70.4 | 78.0 | 15SD0150006 |
| PHENANTHRENE | 230000 | 204 | 10/10 | 18 | 8100 | --- | 2756 | 2756 | 15SD0150006 |
| PYRENE | 230000 | 195 | 10/10 | 35 J | 18000 J | --- | 4471 | 4471 | 15SD0240006 |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDD | 2400 | 4.88 | 5/7 | 1.56 J | 35 | 1.58 - 1.59 | 10.9 | 15.0 | 15SD0180006 |
| 4,4'-DDE | 1700 | 3.16 | 5/7 | 2.5 J | 76 | 1.58 - 1.59 | 17.5 | 24.2 | 15SD0130006 |
| 4,4'-DDT | 1700 | 4.16 | 7/7 | 2.1 J | 100 | --- | 23.0 | 23.0 | 15SD0180006 |
| ALPHA-CHLORDANE | 1600 | 3.24 | 2/7 | 7.4 | 31 | 0.751 - 1.09 | 5.79 | 19.2 | 15SD0150006 |
| AROCLOR-1260 | 110 | 59.8 | 1/7 | 330 | 330 | 10.4 - 15.1 | 52.2 | 330 | 15SD0150006 |
| GAMMA-CHLORDANE | 1600 | 3.24 | 2/7 | 6 J | 28 | 0.751 - 1.09 | 5.16 | 17.0 | 15SD0150006 |
| **Herbicides (ug/kg)** | | | | | | | | | |
| 2,4,5-T | 61000 | 58700 | 1/7 | 6.8 J | 6.8 J | 1.56 - 2.27 | 1.72 | 6.80 | 15SD0150006 |
| PENTACHLOROPHENOL | 3000 | 23000 | 5/7 | 1.5 J | 3.2 J | 0.595 - 0.755 | 1.60 | 2.10 | 15SD0130006 |
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | 7600 | NA | 9/9 | 3760 J | 17700 J | --- | 10171 | 10171 | 15SD0180006 |
| ARSENIC | 0.39 | 9.79 | 9/9 | 3.9 J | 33.8 J | --- | 10.1 | 10.1 | 15SD0190006 |
| BARIUM | 540 | NA | 9/9 | 24.8 J | 131 J | --- | 74.1 | 74.1 | 15SD0150006 |
| BERYLLIUM | 15 | NA | 8/9 | 0.34 J | 1.2 J | 0.19 | 0.612 | 0.676 | 15SD0150006 |
| CADMIUM | 3.7 | 0.99 | 7/9 | 0.18 J | 0.56 J | 0.27 - 0.28 | 0.315 | 0.366 | 15SD0130006 |
| CALCIUM | NA | NA | 9/9 | 1610 J | 119000 J | --- | 61734 | 61734 | 15SD0230006 |
| CHROMIUM | 22 | 43.4 | 9/9 | 10.4 J | 70.1 J | --- | 24.3 | 24.3 | 15SD0190006 |
| COBALT | 140 | 50 | 9/9 | 4.6 J | 21.6 J | --- | 12.9 | 12.9 | 15SD0150006 |
| COPPER | 310 | 31.6 | 9/9 | 4.9 J | 17.8 J | --- | 10.7 | 10.7 | 15SD0130006 |
| IRON | 2300 | NA | 9/9 | 11700 J | 74200 J | --- | 25656 | 25656 | 15SD0190006 |
| LEAD | 400 | 35.8 | 9/9 | 8.9 J | 32 J | --- | 18.4 | 18.4 | 15SD0150006 |
| MAGNESIUM | NA | NA | 9/9 | 1280 J | 17400 J | --- | 8440 | 8440 | 15SD0050006 |

TABLE 3-20

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERIA | ERA CRITERIA | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detects | Sample of Maximum Detect |
|---|---|---|---|---|---|---|---|---|---|
| **Inorganics (mg/kg) (Continued)** | | | | | | | | | |
| MANGANESE | 180 | NA | 9/9 | 543 J | 1990 J | --- | 1080 | 1080 | 15SD0180006 |
| MERCURY | 2.3 | 0.174 | 7/9 | 0.01 J | 0.083 J | 0.007 - 0.008 | 0.0271 | 0.0337 | 15SD0150006 |
| NICKEL | 160 | 22.7 | 9/9 | 8.6 J | 32.9 J | --- | 17.7 | 17.7 | 15SD0150006 |
| POTASSIUM | NA | NA | 9/9 | 564 J | 1700 J | --- | 1083 | 1083 | 15SD0150006 |
| SELENIUM | 39 | NA | 8/9 | 0.19 J | 0.8 J | 0.13 | 0.362 | 0.399 | 15SD0190006 |
| SODIUM | NA | NA | 4/9 | 110 J | 243 J | 83.4 - 146 | 92.7 | 147 | 15SD0230006 |
| THALLIUM | 0.52 | NA | 4/9 | 0.1 J | 0.3 J | 0.04 - 0.19 | 0.114 | 0.190 | 15SD0180006 |
| TIN | 4700 | NA | 1/9 | 10.2 J | 10.2 J | 0.095 - 0.62 | 1.30 | 10.2 | 15SD0150006 |
| VANADIUM | 7.8 | NA | 9/9 | 12.3 J | 83.6 J | --- | 28.7 | 28.7 | 15SD0190006 |
| ZINC | 2300 | 121 | 9/9 | 39.5 | 88.8 | --- | 53.2 | 53.2 | 15SD0150006 |
| **Miscellaneous Parameters (Percent)** | | | | | | | | | |
| SILT/CLAY | NA | NA | 2/2 | 3 | 18 | --- | 10.5 | 10.5 | 15SD0240006 |
| SIEVE 1" | NA | NA | 2/2 | 0 | 0 | --- | --- | --- | 15SD0230006, 15SD0240006 |
| SIEVE 1-1/2" | NA | NA | 2/2 | 0 | 0 | --- | --- | --- | 15SD0230006, 15SD0240006 |
| SIEVE 2" | NA | NA | 2/2 | 0 | 0 | --- | --- | --- | 15SD0230006, 15SD0240006 |
| SIEVE 3" | NA | NA | 2/2 | 0 | 0 | --- | --- | --- | 15SD0230006, 15SD0240006 |
| SIEVE 3/4" | NA | NA | 2/2 | 0 | 5 | --- | 2.50 | 2.50 | 15SD0230006 |
| SIEVE 3/8" | NA | NA | 2/2 | 4 | 23 | --- | 13.5 | 13.5 | 15SD0230006 |
| SIEVE NO. 004 | NA | NA | 2/2 | 2 | 15 | --- | 8.50 | 8.50 | 15SD0230006 |
| SIEVE NO. 010 | NA | NA | 2/2 | 5 | 20 | --- | 12.5 | 12.5 | 15SD0230006 |
| SIEVE NO. 020 | NA | NA | 2/2 | 16 | 17 | --- | 16.5 | 16.5 | 15SD0240006 |
| SIEVE NO. 040 | NA | NA | 2/2 | 10 | 30 | --- | 20.0 | 20.0 | 15SD0240006 |
| SIEVE NO. 060 | NA | NA | 2/2 | 4 | 11 | --- | 7.50 | 7.50 | 15SD0240006 |
| SIEVE NO. 140 | NA | NA | 2/2 | 3 | 10 | --- | 6.50 | 6.50 | 15SD0240006 |
| SIEVE NO. 200 | NA | NA | 2/2 | 1 | 4 | --- | 2.50 | 2.50 | 15SD0240006 |
| TOTAL ORGANIC CARBON (mg/kg) | NA | NA | 2/2 | 10000 J | 16000 J | --- | 13000 | 13000 | 15SD0230006 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/kg - milligrams per kilogram.
ug/kg - micrograms per kilogram.
NA - No applicable criterion.

TABLE 3-21

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT TRIBUTARY 15-3
SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | | | | |
| ACETONE | 1400000 | 9.9 | 1/2 | 2 J | 2 J | 1.11 | 1.28 | 2.00 | 15SD0020006 |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 20.2 | 5/5 | 8 J | 18 | --- | 12.2 | 12.2 | 15SD0010006 |
| ACENAPHTHENE | 370000 | 6.71 | 5/5 | 14 | 120 | --- | 74.0 | 74.0 | 15SD0010006 |
| ACENAPHTHYLENE | 370000 | 5.87 | 4/5 | 6 J | 16 J | 3.93 | 7.79 | 9.25 | 15SD0010006 |
| ACETOPHENONE | NA | NA | 1/2 | 110 J | 110 J | 83.2 | 75.8 | 110 | 15SD0020006 |
| ANTHRACENE | 2200000 | 57.2 | 5/5 | 41 | 280 | --- | 182 | 182 | 15SD0010006 |
| BENZO(A)ANTHRACENE | 620 | 108 | 5/5 | 150 | 960 J | --- | 566 | 566 | 15SD0220006 |
| BENZO(A)PYRENE | 62 | 150 | 5/5 | 200 | 1200 J | --- | 678 | 678 | 15SD0220006 |
| BENZO(B)FLUORANTHENE | 620 | 10400 | 5/5 | 280 | 1200 J | --- | 762 | 762 | 15SD0220006 |
| BENZO(G,H,I)PERYLENE | 50000 | 170 | 5/5 | 300 | 1100 J | --- | 692 | 692 | 15SD0220006 |
| BENZO(K)FLUORANTHENE | 6200 | 240 | 5/5 | 130 | 760 J | --- | 396 | 396 | 15SD0220006 |
| CHRYSENE | 62000 | 166 | 5/5 | 300 | 1200 J | --- | 720 | 720 | 15SD0220006 |
| DIBENZO(A,H)ANTHRACENE | 62 | 33 | 5/5 | 48 | 200 J | --- | 123 | 123 | 15SD0220006 |
| FLUORANTHENE | 230000 | 423 | 5/5 | 510 | 2000 J | --- | 1292 | 1292 | 15SD0220006 |
| FLUORENE | 270000 | 77.4 | 5/5 | 17 | 150 J | --- | 91.8 | 91.8 | 15SD0220006 |
| INDENO(1,2,3-CD)PYRENE | 620 | 200 | 5/5 | 220 | 870 J | --- | 546 | 546 | 15SD0220006 |
| NAPHTHALENE | 5600 | 176 | 5/5 | 15 J | 33 | --- | 22.6 | 22.6 | 15SD0010006 |
| PHENANTHRENE | 230000 | 204 | 5/5 | 570 | 2100 J | --- | 1308 | 1308 | 15SD0220006 |
| PYRENE | 230000 | 195 | 5/5 | 530 | 4800 J | --- | 2326 | 2326 | 15SD0220006 |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDD | 2400 | 4.88 | 2/2 | 1.9 J | 7.6 J | --- | 4.75 | 4.75 | 15SD0010006 |
| 4,4'-DDE | 1700 | 3.16 | 1/2 | 21 | 21 | 1.7 | 10.9 | 21.0 | 15SD0010006 |
| 4,4'-DDT | 1700 | 4.16 | 2/2 | 2.5 J | 16 J | --- | 9.25 | 9.25 | 15SD0010006 |
| ALPHA-CHLORDANE | 1600 | 3.24 | 1/2 | 5.3 | 5.3 | 0.819 | 2.85 | 5.30 | 15SD0010006 |
| AROCLOR-1254 | 110 | 59.8 | 2/2 | 54 J | 230 J | --- | 142 | 142 | 15SD0010006 |
| GAMMA-CHLORDANE | 1600 | 3.24 | 1/2 | 4 J | 4 J | 0.819 | 2.20 | 4.00 | 15SD0010006 |
| **Herbicides (ug/kg)** | | | | | | | | | |
| 2,4,5-T | 61000 | 58700 | 1/2 | 5.7 J | 5.7 J | 1.68 | 3.27 | 5.70 | 15SD0020006 |
| PENTACHLOROPHENOL | 3000 | 23000 | 2/2 | 1.6 J | 2.4 J | --- | 2.00 | 2.00 | 15SD0010006 |
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | 7600 | NA | 4/4 | 8610 J | 11300 J | --- | 9598 | 9598 | 15SD0010006 |
| ANTIMONY | 3.1 | NA | 2/4 | 0.74 J | 1.4 J | 0.35 - 0.64 | 0.659 | 1.07 | 15SD0220006 |
| ARSENIC | 0.39 | 9.79 | 4/4 | 6.9 J | 10 J | --- | 8.28 | 8.28 | 15SD0010006 |
| BARIUM | 540 | NA | 4/4 | 58.5 J | 87.7 J | --- | 75.7 | 75.7 | 15SD0010006 |
| BERYLLIUM | 15 | NA | 4/4 | 0.61 J | 0.94 J | --- | 0.785 | 0.785 | 15SD0200006 |
| CADMIUM | 3.7 | 0.99 | 3/4 | 0.16 J | 0.44 J | 0.3 | 0.238 | 0.267 | 15SD0010006 |
| CALCIUM | NA | NA | 4/4 | 19100 J | 34900 J | --- | 27550 | 27550 | 15SD0010006 |
| CHROMIUM | 22 | 43.4 | 4/4 | 17.8 J | 27.2 J | --- | 22.6 | 22.6 | 15SD0200006 |
| COBALT | 140 | 50 | 4/4 | 13.6 J | 36.1 J | --- | 22.8 | 22.8 | 15SD0010006 |
| COPPER | 310 | 31.6 | 4/4 | 10.3 J | 12.7 J | --- | 11.3 | 11.3 | 15SD0010006 |
| IRON | 2300 | NA | 4/4 | 21700 J | 31000 J | --- | 26250 | 26250 | 15SD0200006 |
| LEAD | 400 | 35.8 | 4/4 | 14.6 J | 29.3 J | --- | 20.0 | 20.0 | 15SD0010006 |

**Inorganics (mg/kg) (Continued)**

TABLE 3-21

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT TRIBUTARY 15-3
SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | ERA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|---|
| MAGNESIUM | NA | NA | 4/4 | 2980 J | 4950 J | --- | 3928 | 3928 | 15SD0200006 |
| MANGANESE | 180 | NA | 4/4 | 703 J | 1940 J | --- | 1313 | 1313 | 15SD0010006 |
| MERCURY | 2.3 | 0.174 | 3/4 | 0.014 J | 0.028 J | 0.007 | 0.0169 | 0.0213 | 15SD0220006 |
| NICKEL | 160 | 22.7 | 4/4 | 18.6 J | 35.4 J | --- | 24.9 | 24.9 | 15SD0010006 |
| POTASSIUM | NA | NA | 4/4 | 981 | 1470 J | --- | 1205 | 1205 | 15SD0010006 |
| SELENIUM | 39 | NA | 4/4 | 0.33 J | 0.58 J | --- | 0.425 | 0.425 | 15SD0010006 |
| SODIUM | NA | NA | 2/4 | 20.7 J | 202 J | 91.2 - 95 | 79.0 | 111 | 15SD0200006 |
| THALLIUM | 0.52 | NA | 2/4 | 0.14 J | 0.15 J | 0.13 - 0.15 | 0.108 | 0.145 | 15SD0220006 |
| VANADIUM | 7.8 | NA | 4/4 | 17.4 J | 28.9 J | --- | 23.6 | 23.6 | 15SD0200006 |
| ZINC | 2300 | 121 | 4/4 | 48.6 J | 76.1 | --- | 58.7 | 58.7 | 15SD0010006 |
| **Miscellaneous Parameters (%)** | | | | | | | | | |
| PERCENT SILT/CLAY | NA | NA | 2/2 | 8 | 28 | --- | 18.0 | 18.0 | 15SD0220006 |
| SIEVE 1" | NA | NA | 2/2 | 0 | 0 | --- | --- | --- | 15SD0200006, 15SD0220006 |
| SIEVE 1-1/2" | NA | NA | 2/2 | 0 | 0 | --- | --- | --- | 15SD0200006, 15SD0220006 |
| SIEVE 2" | NA | NA | 2/2 | 0 | 0 | --- | --- | --- | 15SD0200006, 15SD0220006 |
| SIEVE 3" | NA | NA | 2/2 | 0 | 0 | --- | --- | --- | 15SD0200006, 15SD0220006 |
| SIEVE 3/4" | NA | NA | 2/2 | 0 | 2 | --- | 1.00 | 1.00 | 15SD0200006 |
| SIEVE 3/8" | NA | NA | 2/2 | 1 | 6 | --- | 3.50 | 3.50 | 15SD0200006 |
| SIEVE NO. 004 | NA | NA | 2/2 | 1 | 8 | --- | 4.50 | 4.50 | 15SD0200006 |
| SIEVE NO. 010 | NA | NA | 2/2 | 4 | 16 | --- | 10.0 | 10.0 | 15SD0200006 |
| SIEVE NO. 020 | NA | NA | 2/2 | 6 | 19 | --- | 12.5 | 12.5 | 15SD0200006 |
| SIEVE NO. 040 | NA | NA | 2/2 | 12 | 18 | --- | 15.0 | 15.0 | 15SD0200006 |
| SIEVE NO. 060 | NA | NA | 2/2 | 10 | 10 | --- | 10.0 | 10.0 | 15SD0200006, 15SD0220006 |
| SIEVE NO. 140 | NA | NA | 2/2 | 10 | 26 | --- | 18.0 | 18.0 | 15SD0220006 |
| SIEVE NO. 200 | NA | NA | 2/2 | 4 | 12 | --- | 8.00 | 8.00 | 15SD0220006 |
| TOTAL ORGANIC CARBON (mg/kg) | NA | NA | 2/2 | 10000 J | 17000 J | --- | 13500 | 13500 | 15SD0220006 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/kg - milligrams per kilogram.
ug/kg - micrograms per kilogram.
NA - No applicable criterion.

TABLE 3-22

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT STORM SEWER AND OUTFALL SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA

| SAMPLING ROUND<br>LOCATION (1)<br>SAMPLE NUMBER<br>SAMPLE CODE<br>DEPTH RANGE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | 01<br>15SW/SD006<br>15SD0060006<br>NORMAL<br>0 - 0.5<br>1/11/2005 | 01<br>15SW/SD009<br>15SD0090006<br>NORMAL<br>0 - 0.5<br>1/12/2005 |
|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | |
| ACETONE | 1400000 | 9.9 | 2 J | 8 J |
| **Semivolatile Organics (ug/kg)** | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 20.2 | 47 | 16.3 U |
| ACENAPHTHENE | 370000 | 6.71 | 560 | 18 J |
| ANTHRACENE | 2200000 | 57.2 | 1300 | 25 J |
| BENZO(A)ANTHRACENE | 620 | 108 | 3300 | 100 J |
| BENZO(A)PYRENE | 62 | 150 | 3700 J | 120 J |
| BENZO(B)FLUORANTHENE | 620 | 10400 | 4300 J | 150 J |
| BENZO(G,H,I)PERYLENE | 50000 | 170 | 3800 J | 160 J |
| BENZO(K)FLUORANTHENE | 6200 | 240 | 1900 J | 89 J |
| BIS(2-ETHYLHEXYL) PHTHALATE | 35000 | 182 | 270 J | 280 J |
| CHRYSENE | 62000 | 166 | 4100 | 160 J |
| DIBENZO(A,H)ANTHRACENE | 62 | 33 | 700 J | 16.3 UJ |
| DIBENZOFURAN | 15000 | 449 | 420 | 82.6 U |
| FLUORANTHENE | 230000 | 423 | 12000 | 340 |
| FLUORENE | 270000 | 77.4 | 820 | 20 J |
| INDENO(1,2,3-CD)PYRENE | 620 | 200 | 3100 J | 120 J |
| NAPHTHALENE | 5600 | 176 | 140 | 16.3 U |
| PHENANTHRENE | 230000 | 204 | 9100 | 250 |
| PYRENE | 230000 | 195 | 16000 J | 340 J |
| **Pesticides PCBs (ug/kg)** | | | | |
| 4,4'-DDD | 2400 | 4.88 | 1.62 U | 1.7 J |
| 4,4'-DDT | 1700 | 4.16 | 4.9 | 6.2 |
| **Herbicides (ug/kg)** | | | | |
| PENTACHLOROPHENOL | 3000 | 23000 | 0.54 U | 4.9 J |
| **Inorganics (mg/kg)** | | | | |
| ALUMINUM | 7600 | NA | 6850 J | 4010 J |
| ARSENIC | 0.39 | 9.79 | 4.9 J | 3.6 J |
| BARIUM | 540 | NA | 60.4 J | 23.5 J |
| CADMIUM | 3.7 | 0.99 | 0.42 J | 0.63 J |
| CALCIUM | NA | NA | 88000 J | 129000 J |
| CHROMIUM | 22 | 43.4 | 14.1 J | 39.6 J |
| COBALT | 140 | 50 | 8 J | 3.8 J |
| COPPER | 310 | 31.6 | 12.2 J | 8.4 J |
| IRON | 2300 | NA | 11800 J | 9670 J |
| LEAD | 400 | 35.8 | 39.7 J | 133 J |
| MAGNESIUM | NA | NA | 9260 J | 14500 J |
| MANGANESE | 180 | NA | 1050 J | 323 J |
| MERCURY | 2.3 | 0.174 | 0.085 J | 0.015 J |
| NICKEL | 160 | 22.7 | 10.2 J | 9.2 J |
| POTASSIUM | NA | NA | 850 J | 589 J |
| SODIUM | NA | NA | 108 U | 117 J |
| VANADIUM | 7.8 | NA | 17 J | 13.5 J |
| ZINC | 2300 | 121 | 56.5 | 163 |

Chemicals detected above either HHRA or ERA criteria values are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
1 - Locations 4,7,8,10, 11, and 12 were not sampled either because no sediment was found or the location was not found.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/kg - milligrams per kilogram.
ug/kg - micrograms per kilogram.
NA - No applicable criterion.

TABLE 3-23

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION | HHRA CRITERION | ERA CRITERION | 15SW/SD005 | 15SW/SD013 | 15SW/SD015 | 15SW/SD016 | 15SW/SD017 | 15SW/SD018 | 15SW/SD019 | 15SW/SD023 | 15SW/SD024 | 15SW/SD025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | | | 15SD0050006 | 15SD0130006 | 15SD0150006 | 15SD0160006 | 15SD0170006 | 15SD0180006 | 15SD0190006 | 15SD0230006 | 15SD0240006 | 15SD0250006 |
| SAMPLE CODE | | | ORIG | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | | | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 | 6/7/2005 | 6/7/2005 | 6/7/2005 |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 20.2 | 4 J | 10 J | 100 | 15.5 U | 15.5 U | 9 J | 4.37 U | 10 J | 19 J | 28 J |
| ACENAPHTHENE | 370000 | 6.71 | 6 J | 110 | 850 | 120 | 170 | 160 | 4.37 U | 120 J | 280 J | 200 J |
| ACENAPHTHYLENE | 370000 | 5.87 | 3.81 U | 30 | 8.74 U | 15.5 U | 15.5 U | 48 | 4.37 U | 4.08 U | 6 J | 6 J |
| ANTHRACENE | 2200000 | 57.2 | 18 | 220 | 1800 | 310 | 420 | 290 | 4.37 U | 320 J | 810 J | 200 J |
| BENZO(A)ANTHRACENE | 620 | 108 | 61 | 610 | 3200 | 960 | 1300 | 810 | 13 | 860 J | 3700 J | 580 J |
| BENZO(A)PYRENE | 62 | 150 | 77 | 640 | 2800 | 1100 | 1300 | 830 | 15 | 1000 J | 4500 J | 590 J |
| BENZO(B)FLUORANTHENE | 620 | 10400 | 94 | 650 | 2900 | 1000 | 1400 | 1000 | 18 | 1300 J | 6000 J | 730 J |
| BENZO(G,H,I)PERYLENE | 50000 | 170 | 120 | 910 | 2400 | 1200 | 1600 | 800 | 16 | 970 J | 3200 J | 460 J |
| BENZO(K)FLUORANTHENE | 6200 | 240 | 56 | 500 | 1600 | 680 | 760 | 430 | 11 | 440 J | 2000 J | 330 J |
| BIS(2-ETHYLHEXYL) PHTHALATE | 35000 | 182 | 270 J | 130 J | 88.7 U | 160 J | 130 J | 112 U | 88.6 U | | | |
| CHRYSENE | 62000 | 166 | 110 | 760 | 3600 | 1200 | 1500 | 990 | 14 | 1100 J | 4500 J | 650 J |
| DI-N-BUTYL PHTHALATE | 610000 | 1114 | 77.4 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 220 J | | | |
| DIBENZO(A,H)ANTHRACENE | 62 | 33 | 3.81 U | 180 | 610 | 230 | 280 | 170 | 4.37 U | 180 J | 620 J | 110 J |
| DIBENZOFURAN | 15000 | 449 | 77.4 U | 85.4 U | 88.7 U | 110 J | 89 J | 130 J | 88.6 U | | | |
| FLUORANTHENE | 230000 | 423 | 190 | 1200 | 7700 | 2800 | 3400 | 1800 | 25 | 1700 J | 9800 J | 960 J |
| FLUORENE | 270000 | 77.4 | 8 | 91 | 800 | 160 | 210 | 110 | 4.37 U | 160 J | 380 J | 120 J |
| INDENO(1,2,3-CD)PYRENE | 620 | 200 | 90 | 730 | 2200 | 1000 | 1300 | 690 | 15 | 770 J | 2700 J | 430 J |
| NAPHTHALENE | 5600 | 176 | 5 J | 20 | 370 | 30 J | 52 | 19 | 4.37 U | 25 J | 61 J | 120 J |
| PHENANTHRENE | 230000 | 204 | 140 | 1100 | 8100 | 2500 | 3200 | 1600 | 18 | 2000 J | 7800 J | 1100 J |
| PYRENE | 230000 | 195 | 170 | 1200 | 9900 J | 2800 | 3400 | 2700 J | 35 J | 4600 J | 18000 J | 1900 J |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | | | |
| 4,4'-DDD | 2400 | 4.88 | 1.56 J | 26 | 7.5 | 1.59 U | 1.58 U | 35 | 4.9 | | | |
| 4,4'-DDE | 1700 | 3.16 | 2.5 J | 76 | 16 | 1.59 U | 1.58 U | 24 J | 2.5 J | | | |
| 4,4'-DDT | 1700 | 4.16 | 2.3 J | 40 | 12 | 2.4 J | 2.2 J | 100 | 2.1 J | | | |
| ALPHA-CHLORDANE | 1600 | 3.24 | 0.751 U | 7.4 | 31 | 0.765 U | 0.762 U | 1.09 U | 0.86 U | | | |
| AROCLOR-1260 | 110 | 59.8 | 10.4 U | 11.5 U | 330 | 10.6 U | 10.6 U | 15.1 U | 11.9 U | | | |
| GAMMA-CHLORDANE | 1600 | 3.24 | 0.751 U | 6 J | 28 | 0.765 U | 0.762 U | 1.09 U | 0.86 U | | | |
| **Herbicides (ug/kg)** | | | | | | | | | | | | |
| 2,4,5-T | 61000 | 58700 | 1.56 U | 1.72 U | 6.8 J | 1.59 U | 1.58 U | 2.27 U | 1.79 U | | | |
| PENTACHLOROPHENOL | 3000 | 23000 | 2.3 | 3.2 J | 1.9 J | 1.5 J | 1.6 J | 0.755 U | 0.595 U | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | | | |
| ALUMINUM | 7600 | NA | 3760 J | 12000 J | 13000 J | 6190 J | 7020 J | 17700 J | 17200 J | 6480 J | 8190 J | |
| ARSENIC | 0.39 | 9.79 | 3.9 J | 7.7 J | 10.9 J | 8 J | 5.7 J | 10.5 J | 33.8 J | 5.2 J | 5 J | |
| BARIUM | 540 | NA | 24.8 J | 77.7 J | 131 J | 52.8 J | 49 J | 125 J | 85.9 J | 50.5 J | 69.8 J | |
| BERYLLIUM | 15 | NA | 0.19 U | 0.56 J | 1.2 J | 0.48 J | 0.38 J | 0.74 J | 1 J | 0.71 J | 0.34 J | |
| CADMIUM | 3.7 | 0.99 | 0.39 J | 0.56 J | 0.48 J | 0.27 U | 0.28 U | 0.44 J | 0.33 J | 0.18 J | 0.18 J | |
| CALCIUM | NA | NA | 110000 J | 49300 J | 13600 J | 98900 J | 62600 J | 2800 J | 1610 J | 119000 J | 97800 J | |
| CHROMIUM | 22 | 43.4 | 10.4 J | 20.8 J | 30.4 J | 17.2 J | 17 J | 23.6 J | 70.1 J | 14.1 J | 14.7 J | |
| COBALT | 140 | 50 | 4.6 J | 8.2 J | 21.6 J | 13.5 J | 12.9 J | 16.9 J | 14.6 J | 14.5 J | 9.7 J | |
| COPPER | 310 | 31.6 | 4.9 J | 17.8 J | 16.7 J | 7.2 J | 8.2 J | 13.5 J | 12 J | 6 J | 10.1 J | |
| IRON | 2300 | NA | 11700 J | 18100 J | 31800 J | 21000 J | 19500 J | 23100 J | 74200 J | 16100 J | 15400 J | |
| LEAD | 400 | 35.8 | 8.9 J | 30.7 J | 32 J | 14.2 J | 11.5 J | 19 J | 20.8 J | 12.6 J | 15.9 J | |
| MAGNESIUM | NA | NA | 17400 J | 4270 J | 2240 J | 17200 J | 8510 J | 1800 J | 1280 J | 13500 J | 9760 J | |
| MANGANESE | 180 | NA | 543 J | 548 J | 1150 J | 1090 J | 938 J | 1990 J | 1360 J | 1220 J | 883 J | |

TABLE 3-23

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARIES 15-1 AND 15-2
SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION | HHRA | ERA | 15SW/SD005 | 15SW/SD013 | 15SW/SD015 | 15SW/SD016 | 15SW/SD017 | 15SW/SD018 | 15SW/SD019 | 15SW/SD023 | 15SW/SD024 | 15SW/SD025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | | | 15SD0050006 | 15SD0130006 | 15SD0150006 | 15SD0160006 | 15SD0170006 | 15SD0180006 | 15SD0190006 | 15SD0230006 | 15SD0240006 | 15SD0250006 |
| SAMPLE CODE | CRITERION | CRITERION | ORIG | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | | | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | | | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 | 6/7/2005 | 6/7/2005 | 6/7/2005 |
| **Inorganics (mg/kg) (Continued)** | | | | | | | | | | | | |
| MERCURY | 2.3 | 0.174 | 0.012 J | 0.026 J | 0.083 J | 0.01 J | 0.02 J | 0.052 J | 0.033 J | 0.007 UJ | 0.008 UJ | |
| NICKEL | 160 | 22.7 | 8.6 J | 15 J | 32.9 J | 19.1 J | 16.6 J | 14.4 J | 17.4 J | 21.8 J | 13.7 J | |
| POTASSIUM | NA | NA | 564 J | 1260 J | 1700 J | 886 J | 777 J | 1530 J | 1070 J | 966 | 990 | |
| SELENIUM | 39 | NA | 0.13 U | 0.3 J | 0.47 J | 0.32 J | 0.32 J | 0.58 J | 0.8 J | 0.21 J | 0.19 J | |
| SODIUM | NA | NA | 123 J | 83.4 U | 86.6 U | 111 J | 93 U | 146 U | 85.5 U | 243 J | 110 J | |
| THALLIUM | 0.52 | NA | 0.04 U | 0.13 U | 0.19 U | 0.11 U | 0.07 U | 0.3 J | 0.24 J | 0.1 J | 0.12 J | |
| TIN | 4700 | NA | 0.2 U | 0.59 U | 10.2 J | 0.095 U | 0.15 U | 0.62 U | 0.5 U | 0.47 U | 0.42 U | |
| VANADIUM | 7.8 | NA | 12.3 J | 23.8 J | 26.8 J | 20.3 J | 18.4 J | 39.1 J | 83.6 J | 15.2 J | 18.7 J | |
| ZINC | 2300 | 121 | 42.5 | 81.3 | 88.8 | 39.5 | 43.9 | 48.4 J | 46.1 J | 42.6 J | 45.4 J | |
| **Miscellaneous Parameters (Percent)** | | | | | | | | | | | | |
| SILT/CLAY | NA | NA | | | | | | | | 3 | 18 | |
| SIEVE 1" | NA | NA | | | | | | | | 0 | 0 | |
| SIEVE 1-1/2" | NA | NA | | | | | | | | 0 | 0 | |
| SIEVE 2" | NA | NA | | | | | | | | 0 | 0 | |
| SIEVE 3" | NA | NA | | | | | | | | 0 | 0 | |
| SIEVE 3/4" | NA | NA | | | | | | | | 5 | 0 | |
| SIEVE 3/8" | NA | NA | | | | | | | | 23 | 4 | |
| SIEVE NO. 004 | NA | NA | | | | | | | | 15 | 2 | |
| SIEVE NO. 010 | NA | NA | | | | | | | | 20 | 5 | |
| SIEVE NO. 020 | NA | NA | | | | | | | | 16 | 17 | |
| SIEVE NO. 040 | NA | NA | | | | | | | | 10 | 30 | |
| SIEVE NO. 060 | NA | NA | | | | | | | | 4 | 11 | |
| SIEVE NO. 140 | NA | NA | | | | | | | | 3 | 10 | |
| SIEVE NO. 200 | NA | NA | | | | | | | | 1 | 4 | |
| TOTAL ORGANIC CARBON (mg/kg) | NA | NA | | | | | | | | 16000 J | 10000 J | |

Blank cell indicates no analysis was conducted for the parameter.
Chemicals detected above either HHRA or ERA criteria values are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/kg - milligrams per kilogram.
ug/kg - micrograms per kilogram.
NA - No applicable criterion.

TABLE 3-24

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARY 15-3
SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>DEPTH RANGE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | 15SW/SD001<br>15SD0010006<br>NORMAL<br>0 - 0.5<br>1/11/2005 | 15SW/SD002<br>15SD0020006<br>NORMAL<br>0 - 0.5<br>1/11/2005 | 15SW/SD020<br>15SD0200006<br>NORMAL<br>0 - 0.5<br>6/7/2005 | 15SW/SD021<br>15SD0210006<br>NORMAL<br>0 - 0.5<br>6/7/2005 | 15SW/SD022<br>15SD0220006<br>NORMAL<br>0 - 0.5<br>6/7/2005 |
|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | | |
| ACETONE | 1400000 | 9.9 | 1.11 UJ | 2 J | | | |
| **Semivolatile Organics (ug/kg)** | | | | | | | |
| 2-METHYLNAPHTHALENE | 5600 | 20.2 | 18 | 14 | 10 J | 11 J | 8 J |
| ACENAPHTHENE | 370000 | 6.71 | 120 | 14 | 63 J | 63 J | 110 J |
| ACENAPHTHYLENE | 370000 | 5.87 | 16 J | 9 | 6 J | 3.93 U | 6 J |
| ACETOPHENONE | NA | NA | 83.2 U | 110 J | | | |
| ANTHRACENE | 2200000 | 57.2 | 280 | 41 | 170 J | 150 J | 270 J |
| BENZO(A)ANTHRACENE | 620 | 108 | 740 J | 150 | 530 J | 450 J | 960 J |
| BENZO(A)PYRENE | 62 | 150 | 810 J | 200 | 640 J | 540 J | 1200 J |
| BENZO(B)FLUORANTHENE | 620 | 10400 | 900 J | 280 | 710 J | 720 J | 1200 J |
| BENZO(G,H,I)PERYLENE | 50000 | 170 | 1000 J | 300 | 540 J | 520 J | 1100 J |
| BENZO(K)FLUORANTHENE | 6200 | 240 | 420 J | 130 | 450 J | 220 J | 760 J |
| CHRYSENE | 62000 | 166 | 880 J | 300 | 650 J | 570 J | 1200 J |
| DIBENZO(A,H)ANTHRACENE | 62 | 33 | 190 J | 48 | 83 J | 96 J | 200 J |
| FLUORANTHENE | 230000 | 423 | 1700 | 510 | 1300 J | 950 J | 2000 J |
| FLUORENE | 270000 | 77.4 | 130 | 17 | 84 J | 78 J | 150 J |
| INDENO(1,2,3-CD)PYRENE | 620 | 200 | 800 J | 220 | 440 J | 400 J | 870 J |
| NAPHTHALENE | 5600 | 176 | 33 | 16 | 15 J | 25 J | 24 J |
| PHENANTHRENE | 230000 | 204 | 1800 | 570 | 1100 J | 970 J | 2100 J |
| PYRENE | 230000 | 195 | 2100 J | 530 | 2200 J | 2000 J | 4800 J |
| **Pesticides/PCBs (ug/kg)** | | | | | | | |
| 4,4'-DDD | 2400 | 4.88 | 7.6 J | 1.9 J | | | |
| 4,4'-DDE | 1700 | 3.16 | 21 | 1.7 U | | | |
| 4,4'-DDT | 1700 | 4.16 | 16 J | 2.5 J | | | |
| ALPHA-CHLORDANE | 1600 | 3.24 | 5.9 | 0.819 U | | | |
| AROCLOR-1254 | 110 | 59.8 | 230 J | 54 J | | | |
| GAMMA-CHLORDANE | 1600 | 3.24 | 4 J | 0.819 U | | | |
| **Herbicides (ug/kg)** | | | | | | | |
| 2,4,5-T | 61000 | 58700 | 1.68 U | 5.7 J | | | |
| PENTACHLOROPHENOL | 3000 | 23000 | 2.4 J | 1.6 J | | | |
| **Inorganics (mg/kg)** | | | | | | | |
| ALUMINUM | 7600 | NA | 11300 J | 8610 J | 9010 J | | 9470 J |
| ANTIMONY | 3.1 | NA | 0.64 U | 0.35 U | 0.74 J | | 1.4 J |
| ARSENIC | 0.39 | 9.79 | 10 J | 6.9 J | 9.2 J | | 7 J |
| BARIUM | 540 | NA | 87.7 J | 58.5 J | 87.2 J | | 69.2 J |
| BERYLLIUM | 15 | NA | 0.91 J | 0.68 J | 0.94 J | | 0.61 J |
| CADMIUM | 3.7 | 0.99 | 0.44 J | 0.3 U | 0.2 J | | 0.16 J |
| CALCIUM | NA | NA | 34900 J | 19100 J | 30900 J | | 25300 J |
| CHROMIUM | 22 | 43.4 | 26.9 J | 17.8 J | 27.2 J | | 18.3 J |
| COBALT | 140 | 50 | 36.1 J | 13.6 J | 23 J | | 18.4 J |

TABLE 3-24

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT TRIBUTARY 15-3
SEDIMENT SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>DEPTH RANGE<br>SAMPLE DATE | HHRA CRITERION | ERA CRITERION | 15SW/SD001<br>15SD0010006<br>NORMAL<br>0 - 0.5<br>1/11/2005 | 15SW/SD002<br>15SD0020006<br>NORMAL<br>0 - 0.5<br>1/11/2005 | 15SW/SD020<br>15SD0200006<br>NORMAL<br>0 - 0.5<br>6/7/2005 | 15SW/SD021<br>15SD0210006<br>NORMAL<br>0 - 0.5<br>6/7/2005 | 15SW/SD022<br>15SD0220006<br>NORMAL<br>0 - 0.5<br>6/7/2005 |
|---|---|---|---|---|---|---|---|
| **Inorganics (mg/kg) (Continued)** | | | | | | | |
| COPPER | 310 | 31.6 | 12.7 J | 10.4 J | 11.6 J | | 10.3 J |
| IRON | 2300 | NA | 29000 J | 21700 J | 31000 J | | 23300 J |
| LEAD | 400 | 35.8 | 29.3 J | 14.6 J | 18 J | | 18.2 J |
| MAGNESIUM | NA | NA | 4660 J | 2980 J | 4950 J | | 3120 J |
| MANGANESE | 180 | NA | 1940 J | 703 J | 1450 J | | 1160 J |
| MERCURY | 2.3 | 0.174 | 0.022 J | 0.014 J | 0.007 UJ | | 0.028 J |
| NICKEL | 160 | 22.7 | 35.4 J | 21.4 J | 24.1 J | | 18.6 J |
| POTASSIUM | NA | NA | 1470 J | 1200 J | 981 | | 1170 |
| SELENIUM | 39 | NA | 0.58 J | 0.38 J | 0.41 J | | 0.33 J |
| SODIUM | NA | NA | 95 U | 91.2 U | 202 J | | 20.7 J |
| THALLIUM | 0.52 | NA | 0.15 U | 0.13 U | 0.14 J | | 0.15 J |
| VANADIUM | 7.8 | NA | 26.5 J | 17.4 J | 28.9 J | | 21.5 J |
| ZINC | 2300 | 121 | 76.1 | 58.7 | 51.2 J | | 48.6 J |
| **Miscellaneous Parameters (Percent)** | | | | | | | |
| SILT/CLAY | NA | NA | | | 8 | | 28 |
| SIEVE 1" | NA | NA | | | 0 | | 0 |
| SIEVE 1-1/2" | NA | NA | | | 0 | | 0 |
| SIEVE 2" | NA | NA | | | 0 | | 0 |
| SIEVE 3" | NA | NA | | | 0 | | 0 |
| SIEVE 3/4" | NA | NA | | | 2 | | 0 |
| SIEVE 3/8" | NA | NA | | | 6 | | 1 |
| SIEVE NO. 004 | NA | NA | | | 8 | | 1 |
| SIEVE NO. 010 | NA | NA | | | 16 | | 4 |
| SIEVE NO. 020 | NA | NA | | | 19 | | 6 |
| SIEVE NO. 040 | NA | NA | | | 18 | | 12 |
| SIEVE NO. 060 | NA | NA | | | 10 | | 10 |
| SIEVE NO. 140 | NA | NA | | | 10 | | 26 |
| SIEVE NO. 200 | NA | NA | | | 4 | | 12 |
| TOTAL ORGANIC CARBON (mg/kg) | NA | NA | | | 10000 J | | 17000 J |

Blank cell indicates no analysis was conducted for the parameter.
Chemicals detected above either HHRA or ERA criteria values are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
ERA - Ecological Risk Assessment.
HHRA - Human Health Risk Assessment.
mg/kg - milligrams per kilogram.
ug/kg - micrograms per kilogram.
NA - No applicable criterion.

TABLE 3-25

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT GROUNDWATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/L)** | | | | | | | | |
| ACETONE | 550 | 1/8 | 2.5 J | 2.5 J | 0.5 - 1.6 | 0.644 | 2.50 | 15GWTW004 |
| TOTAL XYLENES | 21 | 1/8 | 1.5 | 1.5 | 0.3 | 0.319 | 1.50 | 15GWTW001 |
| **Semivolatile Organics (ug/L)** | | | | | | | | |
| 2-METHYLNAPHTHALENE | 0.62 | 1/8 | 5.17 | 5.17 | 0.048 - 0.054 | 0.668 | 5.17 | 15GWTW001 |
| 3&4-METHYLPHENOL | 18 | 2/7 | 1 J | 10 | 0.96 - 1.11 | 1.93 | 5.50 | 15GWTW001 |
| ACENAPHTHENE | 37 | 1/8 | 9.91 | 9.91 | 0.048 - 0.054 | 1.26 | 9.91 | 15GWTW001 |
| ACENAPHTHYLENE | 37 | 1/8 | 0.31 | 0.31 | 0.048 - 0.054 | 0.0604 | 0.310 | 15GWTW001 |
| ANTHRACENE | 180 | 2/8 | 0.11 | 0.75 | 0.048 - 0.054 | 0.126 | 0.430 | 15GWTW001 |
| BENZO(A)ANTHRACENE | 0.092 | 1/8 | 0.07 J | 0.07 J | 0.048 - 0.054 | 0.0304 | 0.0700 | 15GWTW001 |
| DIBENZOFURAN | 1.2 | 1/8 | 5 J | 5 J | 0.96 - 10.5 | 1.66 | 5.00 | 15GWTW001 |
| FLUORANTHENE | 150 | 2/8 | 0.06 J | 0.75 | 0.048 - 0.054 | 0.120 | 0.405 | 15GWTW001 |
| FLUORENE | 24 | 1/8 | 4.73 | 4.73 | 0.048 - 0.054 | 0.613 | 4.73 | 15GWTW001 |
| NAPHTHALENE | 0.62 | 1/8 | 20.6 | 20.6 | 0.048 - 0.054 | 2.60 | 20.6 | 15GWTW001 |
| PHENANTHRENE | 18 | 1/8 | 3.21 | 3.21 | 0.048 - 0.054 | 0.423 | 3.21 | 15GWTW001 |
| PYRENE | 18 | 3/8 | 0.06 J | 0.67 | 0.048 - 0.054 | 0.176 | 0.427 | 15GWTW001 |
| SAFROLE | NA | 1/8 | 1 J | 1 J | 0.96 - 10.5 | 1.16 | 1.00 | 15GWTW004 |
| **Herbicides (ug/L)** | | | | | | | | |
| 2,4,5-TP (SILVEX) | 29 | 1/5 | 0.06 J | 0.06 J | 0.04 | 0.0280 | 0.0600 | 15GWTW006 |
| PENTACHLOROPHENOL | 0.56 | 1/5 | 0.027 J | 0.027 J | 0.013 | 0.0106 | 0.0270 | 15GWTW005 |
| **Total Metals (ug/L)** | | | | | | | | |
| ALUMINUM | 3600 | 6/8 | 446 J | 21100 J | 28.8 - 81.9 | 5193 | 6914 | 15GWTW004 |
| ANTIMONY | 1.5 | 1/8 | 6.3 J | 6.3 J | 0.085 - 0.95 | 0.934 | 6.30 | 15GWTW005 |
| ARSENIC | 0.045 | 6/8 | 1.5 J | 10.4 J | 0.45 - 0.74 | 4.51 | 5.92 | 15GWTW004 |
| BARIUM | 260 | 8/8 | 46.3 J | 431 J | --- | 152 | 152 | 15GWTW006 |
| BERYLLIUM | 4 | 2/8 | 0.47 J | 0.81 J | 0.02 - 0.18 | 0.185 | 0.640 | 15GWTW004 |
| CADMIUM | 1.8 | 1/8 | 1.1 J | 1.1 J | 0.08 - 0.82 | 0.271 | 1.10 | 15GWTW005 |
| CALCIUM | NA | 8/8 | 34100 J | 169000 J | --- | 75325 | 75325 | 15GWTW005 |
| CHROMIUM | 11 | 6/8 | 1.4 J | 27.4 J | 0.19 - 0.89 | 6.71 | 8.85 | 15GWTW004 |
| COBALT | 73 | 8/8 | 0.44 J | 108 | --- | 22.6 | 22.6 | 15GWTW003 |
| COPPER | 150 | 7/8 | 0.94 J | 20 J | 0.39 | 7.28 | 8.29 | 15GWTW004 |
| IRON | 1100 | 8/8 | 918 J | 148000 J | --- | 39885 | 39885 | 15GWTW003 |
| LEAD | 15 | 6/8 | 1.2 J | 34.9 J | 0.11 - 0.227 | 9.78 | 13.0 | 15GWTW005 |
| MAGNESIUM | NA | 8/8 | 7060 J | 96000 J | --- | 26523 | 26523 | 15GWTW003 |
| MANGANESE | 88 | 8/8 | 285 J | 16900 J | --- | 4414 | 4414 | 15GWTW003 |
| MERCURY | 1.1 | 4/8 | 0.039 J | 0.081 J | 0.03 | 0.0349 | 0.0548 | 15GWTW004 |
| NICKEL | 73 | 8/8 | 0.65 J | 38 | --- | 13.4 | 13.4 | 15GWTW003 |
| POTASSIUM | NA | 8/8 | 588 J | 4930 J | --- | 2807 | 2807 | 15GWTW004 |
| SELENIUM | 18 | 5/8 | 0.52 J | 2.3 | 0.094 - 0.46 | 0.723 | 1.07 | 15GWTW006 |
| SODIUM | NA | 8/8 | 1720 J | 77700 J | --- | 19720 | 19720 | 15GWTW003 |
| THALLIUM | 0.24 | 3/8 | 0.1 J | 0.16 J | 0.043 - 0.2 | 0.0724 | 0.130 | 15GWTW005 |
| TIN | 2200 | 2/8 | 0.68 J | 0.88 J | 0.048 - 0.53 | 0.292 | 0.780 | 15GWTW005 |
| VANADIUM | 3.6 | 6/8 | 1.2 J | 36.4 | 1.14 | 10.9 | 14.3 | 15GWTW004 |
| ZINC | 1100 | 4/8 | 25.5 J | 91 J | 3.5 - 8.8 | 27.4 | 51.4 | 15GWTW005 |

TABLE 3-25

DESCRIPTIVE STATISTICS FOR DOWNGRADIENT GROUNDWATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | HHRA CRITERION | Frequency of Detection | Minimum Concentration | Maximum Concentration | Range of Nondetects | Mean Concentration | Average of Positive Detections | Sample of Maximum Detection |
|---|---|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L)** | | | | | | | | |
| ANTIMONY, FILTERED | 1.5 | 1/6 | 10.4 J | 10.4 J | 0.085 - 0.96 | 1.86 | 10.4 | 15GWTW005-F |
| ARSENIC, FILTERED | 0.045 | 4/6 | 0.36 J | 10.4 J | 0.18 - 0.32 | 2.77 | 4.09 | 15GWTW003-F |
| BARIUM, FILTERED | 260 | 6/6 | 50.8 J | 133 J | --- | 76.1 | 76.1 | 15GWTW005-F |
| CADMIUM, FILTERED | 1.8 | 3/6 | 0.04 J | 0.06 J | 0.12 - 0.35 | 0.0892 | 0.0467 | 15GWTW002-F |
| CALCIUM, FILTERED | NA | 6/6 | 24600 | 176000 | --- | 79217 | 79217 | 15GWTW005-F |
| COBALT, FILTERED | 73 | 6/6 | 0.43 J | 92 J | --- | 16.7 | 16.7 | 15GWTW003-F |
| COPPER, FILTERED | 150 | 6/6 | 0.44 J | 3 J | --- | 1.38 | 1.38 | 15GWTW005-F |
| IRON, FILTERED | 1100 | 6/6 | 611 J | 122000 J | --- | 23030 | 23030 | 15GWTW003-F |
| LEAD, FILTERED | 15 | 3/6 | 0.15 J | 0.192 J | 0.069 - 0.14 | 0.111 | 0.176 | 15GWTW002-F |
| MAGNESIUM, FILTERED | NA | 6/6 | 7020 J | 92400 J | --- | 29730 | 29730 | 15GWTW003-F |
| MANGANESE, FILTERED | 88 | 6/6 | 5.2 J | 14400 J | --- | 2844 | 2844 | 15GWTW003-F |
| NICKEL, FILTERED | 73 | 6/6 | 2.2 J | 39 J | --- | 10.9 | 10.9 | 15GWTW003-F |
| POTASSIUM, FILTERED | NA | 6/6 | 914 J | 5240 J | --- | 2439 | 2439 | 15GWTW005-F |
| SELENIUM, FILTERED | 18 | 5/6 | 0.39 J | 1.1 J | 0.7 | 0.633 | 0.690 | 15GWTW003-F |
| SODIUM, FILTERED | NA | 6/6 | 1830 J | 70500 J | --- | 21092 | 21092 | 15GWTW003-F |
| THALLIUM, FILTERED | 0.24 | 2/6 | 0.05 J | 0.07 J | 0.043 | 0.0343 | 0.0600 | 15GWTW002-F |
| TIN, FILTERED | 2200 | 1/6 | 0.87 J | 0.87 J | 0.13 - 0.16 | 0.203 | 0.870 | 15GWTW003-F |
| ZINC, FILTERED | 1100 | 2/6 | 3.8 J | 3.9 J | 1.4 - 2.9 | 2.08 | 3.85 | 15GWTW003-F |
| **Field Parameters** | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | 8/8 | 0.31 | 11.51 | --- | 5.00 | 5.00 | 15GWTW001 |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | 8/8 | -120.3 | 118.7 | --- | -12.4 | -12.4 | 15GWTW004 |
| PH | NA | 8/8 | 6.13 | 8.21 | --- | 7.02 | 7.02 | 15GWTW005 |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | 8/8 | 0.167 | 1.258 | --- | 0.702 | 0.702 | 15GWTW003 |
| TEMPERATURE (°C) | NA | 8/8 | 5.75 | 13.21 | --- | 9.01 | 9.01 | 15GWTW006 |
| TURBIDITY (NTU) | NA | 8/8 | 2 | 1000 > | --- | 318 | 318 | 15GWTW005 |

Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.
ug/L - micrograms per liter.

TABLE 3-26

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT GROUNDWATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND | HHRA CRITERION | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 |
|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | 15TW001 | 15TW002 | 15TW002 | 15TW003 | 15TW003 | 15TW004 | 15TW004 | 15TW005 | 15TW005 |
| SAMPLE NUMBER | | 15GWTW001 | 15GWTW002 | 15GWTW002-F | 15GWTW003 | 15GWTW003-F | 15GWTW004 | 15GWTW004-F | 15GWTW005 | 15GWTW005-F |
| SAMPLE CODE | | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DATE | | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/5/2005 | 1/5/2005 |
| **Volatile Organics (ug/L)** | | | | | | | | | | |
| ACETONE | 550 | 0.5 UJ | 0.5 UJ | | 0.5 UJ | | 2.5 J | | 1.6 U | |
| TOTAL XYLENES | 21 | 1.5 | 0.3 U | | 0.3 U | | 0.3 U | | 0.3 U | |
| **Semivolatile Organics (ug/L)** | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 0.62 | 5.17 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| 3&4-METHYLPHENOL | 18 | 10 | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| ACENAPHTHENE | 37 | 9.91 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| ACENAPHTHYLENE | 37 | 0.31 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| ANTHRACENE | 180 | 0.75 | 0.049 U | | 0.054 U | | 0.052 U | | 0.11 | |
| BENZO(A)ANTHRACENE | 0.092 | 0.07 J | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| DIBENZOFURAN | 1.2 | 5 J | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| FLUORANTHENE | 150 | 0.75 | 0.049 U | | 0.054 U | | 0.052 U | | 0.06 J | |
| FLUORENE | 24 | 4.73 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| NAPHTHALENE | 0.62 | 20.6 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| PHENANTHRENE | 18 | 3.21 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| PYRENE | 18 | 0.67 | 0.049 U | | 0.054 U | | 0.052 U | | 0.06 J | |
| SAFROLE | NA | 1.04 U | 1.05 U | | 10.5 U | | 1 J | | 1.11 U | |
| **Herbicides (ug/L)** | | | | | | | | | | |
| 2,4,5-TP (SILVEX) | 29 | | | | | | 0.04 U | | 0.04 U | |
| PENTACHLOROPHENOL | 0.56 | | | | | | 0.013 U | | 0.027 J | |
| **Total Metals (ug/L)** | | | | | | | | | | |
| ALUMINUM | 3600 | 81.9 U | 446 J | | 1410 J | | 21100 J | | 7210 J | |
| ANTIMONY | 1.5 | 0.37 U | 0.95 U | | 0.085 U | | 0.16 U | | 6.3 J | |
| ARSENIC | 0.045 | 0.74 U | 0.45 U | | 9.6 J | | 10.4 J | | 6.3 J | |
| BARIUM | 260 | 46.3 J | 74 J | | 96.2 J | | 174 J | | 224 J | |
| BERYLLIUM | 4 | 0.02 U | 0.03 U | | 0.05 U | | 0.81 J | | 0.47 J | |
| CADMIUM | 1.8 | 0.08 U | 0.11 U | | 0.09 U | | 0.26 U | | 1.1 J | |
| CALCIUM | NA | 57300 J | 63600 J | | 74500 J | | 34100 J | | 169000 J | |
| CHROMIUM | 11 | 0.19 U | 1.4 J | | 1.5 J | | 27.4 J | | 10 J | |
| COBALT | 73 | 0.44 J | 1.2 | | 108 | | 9.4 | | 10.7 J | |
| COPPER | 150 | 0.39 U | 2 J | | 1.2 J | | 20 J | | 19.7 J | |
| IRON | 1100 | 918 J | 1080 J | | 148000 J | | 30000 J | | 10900 J | |
| LEAD | 15 | 0.227 U | 5.7 J | | 1.2 J | | 26.4 J | | 34.9 J | |
| MAGNESIUM | NA | 7060 J | 8510 J | | 96000 J | | 8310 J | | 28900 J | |
| MANGANESE | 88 | 285 J | 694 J | | 16900 J | | 335 J | | 631 J | |
| MERCURY | 1.1 | 0.03 U | 0.039 J | | 0.03 U | | 0.081 J | | 0.06 J | |
| NICKEL | 73 | 0.65 J | 2 | | 38 | | 17.3 | | 21.8 J | |
| POTASSIUM | NA | 588 J | 1630 J | | 1940 J | | 4930 J | | 4840 J | |
| SELENIUM | 18 | 0.97 J | 0.46 U | | 0.094 U | | 0.36 U | | 0.93 J | |
| SODIUM | NA | 1730 J | 6960 J | | 77700 J | | 1720 J | | 2650 J | |
| THALLIUM | 0.24 | 0.043 U | 0.05 U | | 0.043 U | | 0.2 U | | 0.16 J | |
| TIN | 2200 | 0.048 U | 0.15 U | | 0.048 U | | 0.53 U | | 0.88 J | |
| VANADIUM | 3.6 | 1.14 U | 1.2 J | | 2.6 | | 36.4 | | 19.6 J | |
| ZINC | 1100 | 5.7 U | 8.8 U | | 8.5 U | | 58.9 J | | 91 J | |

TABLE 3-26

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT GROUNDWATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERION | 01<br>15TW001<br>15GWTW001<br>NORMAL<br>1/8/2005 | 01<br>15TW002<br>15GWTW002<br>NORMAL<br>1/8/2005 | 01<br>15TW002<br>15GWTW002-F<br>NORMAL<br>1/8/2005 | 01<br>15TW003<br>15GWTW003<br>NORMAL<br>1/8/2005 | 01<br>15TW003<br>15GWTW003-F<br>NORMAL<br>1/8/2005 | 01<br>15TW004<br>15GWTW004<br>NORMAL<br>1/8/2005 | 01<br>15TW004<br>15GWTW004-F<br>NORMAL<br>1/8/2005 | 01<br>15TW005<br>15GWTW005<br>NORMAL<br>1/5/2005 | 01<br>15TW005<br>15GWTW005-F<br>NORMAL<br>1/5/2005 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L)** | | | | | | | | | | |
| ANTIMONY, FILTERED | 1.5 | | | 0.96 U | | 0.09 U | | 0.26 U | | 10.4 J |
| ARSENIC, FILTERED | 0.045 | | | 0.32 U | | 10.4 J | | 2 J | | 0.36 J |
| BARIUM, FILTERED | 260 | | | 68.5 J | | 87.6 J | | 50.8 J | | 133 J |
| CADMIUM, FILTERED | 1.8 | | | 0.06 J | | 0.04 J | | 0.04 J | | 0.32 U |
| CALCIUM, FILTERED | NA | | | 62600 | | 68600 | | 24600 | | 176000 |
| COBALT, FILTERED | 73 | | | 1 J | | 92 J | | 1.6 J | | 0.43 J |
| COPPER, FILTERED | 150 | | | 1.5 J | | 1.4 J | | 0.44 J | | 3 J |
| IRON, FILTERED | 1100 | | | 611 J | | 122000 J | | 2100 J | | 861 J |
| LEAD, FILTERED | 15 | | | 0.192 J | | 0.186 J | | 0.069 U | | 0.14 U |
| MAGNESIUM, FILTERED | NA | | | 8460 J | | 92400 J | | 7020 J | | 28100 J |
| MANGANESE, FILTERED | 88 | | | 760 J | | 14400 J | | 81.9 J | | 5.2 J |
| NICKEL, FILTERED | 73 | | | 4.7 J | | 39 J | | 2.2 J | | 9.8 J |
| POTASSIUM, FILTERED | NA | | | 1470 J | | 1490 J | | 3370 J | | 5240 J |
| SELENIUM, FILTERED | 18 | | | 0.75 J | | 1.1 J | | 0.7 U | | 0.73 J |
| SODIUM, FILTERED | NA | | | 7330 J | | 70500 J | | 1830 J | | 3690 J |
| THALLIUM, FILTERED | 0.24 | | | 0.07 J | | 0.05 J | | 0.043 U | | 0.043 U |
| TIN, FILTERED | 2200 | | | 0.16 U | | 0.87 J | | 0.13 U | | 0.13 U |
| ZINC, FILTERED | 1100 | | | 3.8 J | | 3.9 J | | 1.4 U | | 2.6 U |
| **Field Parameters** | | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | 11.51 | 8.52 | | 0.31 | | 6.62 | | 10.59 | |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | -79.4 | 46 | | -65.3 | | 118.7 | | 32.2 | |
| PH | NA | 7.45 | 7.56 | | 6.13 | | 6.92 | | 8.21 | |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | 0.413 | 0.438 | | 1.258 | | 0.167 | | 1.181 | |
| TEMPERATURE (°C) | NA | 6.53 | 7.35 | | 9.51 | | 10.76 | | 7.86 | |
| TURBIDITY (NTU) | NA | 9.8 | 13 | | 33 | | 650 | | 1000 > | |

TABLE 3-26

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT GROUNDWATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERIA | 01<br>15TW006<br>15GWTW006<br>ORIG<br>1/7/2005 | 01<br>15TW007<br>15GWTW007<br>NORMAL<br>1/7/2005 | 01<br>15TW007<br>15GWTW007-F<br>NORMAL<br>1/7/2005 | 01<br>15TW008<br>15GWTW008<br>NORMAL<br>1/7/2005 | 01<br>15TW008<br>15GWTW008-F<br>NORMAL<br>1/7/2005 |
|---|---|---|---|---|---|---|
| **Volatile Organics (ug/L)** | | | | | | |
| ACETONE | 550 | 0.5 UJ | 1.2 U | | 0.5 UJ | |
| TOTAL XYLENES | 21 | 0.3 U | 0.3 U | | 0.3 U | |
| **Semivolatile Organics (ug/L)** | | | | | | |
| 2-METHYLNAPHTHALENE | 0.62 | 0.048 U | 0.048 U | | 0.048 U | |
| 3&4-METHYLPHENOL | 18 | 0.96 UJ | 1 J | | 0.96 U | |
| ACENAPHTHENE | 37 | 0.048 U | 0.048 U | | 0.048 U | |
| ACENAPHTHYLENE | 37 | 0.048 U | 0.048 U | | 0.048 U | |
| ANTHRACENE | 43 | 0.048 U | 0.048 U | | 0.048 U | |
| BENZO(A)ANTHRACENE | 0.092 | 0.048 U | 0.048 U | | 0.048 U | |
| DIBENZOFURAN | 1.2 | 0.96 U | 0.96 U | | 0.96 U | |
| FLUORANTHENE | 150 | 0.048 U | 0.048 U | | 0.048 U | |
| FLUORENE | 24 | 0.048 U | 0.048 U | | 0.048 U | |
| NAPHTHALENE | 0.62 | 0.048 U | 0.048 U | | 0.048 U | |
| PHENANTHRENE | 18 | 0.048 U | 0.048 U | | 0.048 U | |
| PYRENE | 18 | 0.048 U | 0.55 | | 0.048 U | |
| SAFROLE | NA | 0.96 U | 0.96 U | | 0.96 U | |
| **Herbicides (ug/L)** | | | | | | |
| 2,4,5-TP (SILVEX) | 29 | 0.06 J | 0.04 U | | 0.04 U | |
| PENTACHLOROPHENOL | 0.56 | 0.013 U | 0.013 U | | 0.013 U | |
| **Total Metals (ug/L)** | | | | | | |
| ALUMINUM | 3600 | 28.8 U | 8020 J | | 3300 J | |
| ANTIMONY | 1.5 | 0.25 U | 0.4 U | | 0.13 U | |
| ARSENIC | 0.045 | 2.5 J | 5.2 J | | 1.5 J | |
| BARIUM | 260 | 431 J | 89.9 J | | 77.3 J | |
| BERYLLIUM | 4 | 0.02 UJ | 0.18 U | | 0.1 U | |
| CADMIUM | 1.8 | 0.17 U | 0.61 U | | 0.82 U | |
| CALCIUM | NA | 74400 J | 61100 J | | 68600 J | |
| CHROMIUM | 11 | 0.89 U | 8.9 J | | 3.9 J | |
| COBALT | 73 | 41.4 J | 4.6 J | | 4.9 J | |
| COPPER | 150 | 0.94 J | 10.2 J | | 4 J | |
| IRON | 1100 | 103000 J | 19600 J | | 5580 J | |
| LEAD | 15 | 0.11 U | 7.5 J | | 2.4 J | |
| MAGNESIUM | NA | 28000 J | 18700 J | | 16700 J | |
| MANGANESE | 88 | 14700 J | 898 J | | 869 J | |
| MERCURY | 1.1 | 0.03 UJ | 0.039 J | | 0.03 UJ | |
| NICKEL | 73 | 6.3 J | 13.1 J | | 7.7 J | |
| POTASSIUM | NA | 4410 J | 2960 J | | 1160 J | |
| SELENIUM | 18 | 2.3 | 0.61 J | | 0.52 J | |
| SODIUM | NA | 32600 J | 20200 J | | 14200 J | |
| THALLIUM | 0.24 | 0.043 U | 0.13 J | | 0.1 J | |
| TIN | 2200 | 0.26 U | 0.68 J | | 0.52 U | |
| VANADIUM | 3.6 | 1.14 U | 17.8 J | | 8.2 J | |
| ZINC | 1100 | 3.5 U | 30.2 J | | 25.5 J | |

TABLE 3-26

RESULTS FOR CHEMICALS DETECTED IN DOWNGRADIENT GROUNDWATER SAMPLES
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| SAMPLING ROUND<br>LOCATION<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | HHRA CRITERIA | 01<br>15TW006<br>15GWTW006<br>ORIG<br>1/7/2005 | 01<br>15TW007<br>15GWTW007<br>NORMAL<br>1/7/2005 | 01<br>15TW007<br>15GWTW007-F<br>NORMAL<br>1/7/2005 | 01<br>15TW008<br>15GWTW008<br>NORMAL<br>1/7/2005 | 01<br>15TW008<br>15GWTW008-F<br>NORMAL<br>1/7/2005 |
|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L)** | | | | | | |
| ANTIMONY, FILTERED | 1.5 | | | 0.085 U | | 0.1 U |
| ARSENIC, FILTERED | 0.045 | | | 3.6 J | | 0.18 U |
| BARIUM, FILTERED | 260 | | | 54.8 J | | 61.8 J |
| CADMIUM, FILTERED | 1.8 | | | 0.35 U | | 0.12 U |
| CALCIUM, FILTERED | NA | | | 66800 | | 76700 |
| COBALT, FILTERED | 73 | | | 1.4 J | | 3.6 J |
| COPPER, FILTERED | 150 | | | 0.75 J | | 1.2 J |
| IRON, FILTERED | 1100 | | | 11600 J | | 1010 J |
| LEAD, FILTERED | 15 | | | 0.15 J | | 0.07 U |
| MAGNESIUM, FILTERED | NA | | | 19900 J | | 22500 J |
| MANGANESE, FILTERED | 88 | | | 959 J | | 860 J |
| NICKEL, FILTERED | 73 | | | 4.2 J | | 5.2 J |
| POTASSIUM, FILTERED | NA | | | 2150 J | | 914 J |
| SELENIUM, FILTERED | 18 | | | 0.39 J | | 0.48 J |
| SODIUM, FILTERED | NA | | | 23800 J | | 19400 J |
| THALLIUM, FILTERED | 0.24 | | | 0.043 U | | 0.043 U |
| TIN, FILTERED | 2200 | | | 0.15 U | | 0.13 U |
| ZINC, FILTERED | 1100 | | | 2.6 U | | 2.9 U |
| **Field Parameters** | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | NA | 0.38 | 0.61 | | 1.42 | |
| OXIDATION REDUCTION POTENTIAL (MV) | NA | -120.3 | -103.2 | | 72.1 | |
| PH | NA | 6.55 | 6.81 | | 6.5 | |
| SPECIFIC CONDUCTANCE (MS/CM) | NA | 0.844 | 0.695 | | 0.618 | |
| TEMPERATURE ( C) | NA | 13.21 | 11.09 | | 5.75 | |
| TURBIDITY (NTU) | NA | 2 | 550 | | 290 | |

Blank cell indicates no analysis was conducted for the parameter.
Chemicals detected above either HHRA or ERA criteria values are identified by bold formatting.
Data qualifiers (e.g., U, J) are defined in Appendix H of the text.
°C - Degrees Celsius.
HHRA - Human Health Risk Assessment.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
mS/cm - milliSiemens per centimeter.
MV - millivolts.
NA - No applicable criterion.
NTU - Nephelometric turbidity units.

# 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).

SWMU 15, the former Roads and Grounds Area, is located on a ridge in the north-central portion of the facility (Figure 1-2). Lake Greenwood and the Furst Creek drainage basin lie to the north of the SWMU (Figure 1-2). Boggs Creek and its tributaries lie to the west. Turkey Creek and its tributaries lie to the east and south of the SWMU. SWMU 15 lies on the eastern side of the ridge, and most of the land area slopes to the east and southeast.

The northern and northwestern portions of this SWMU range in elevation from 780 to about 800 feet amsl. Tributary creek 15-1 runs from west to east through the central portion of SWMU 15 (Figure 2-2). Tributary creek 15-2 runs from northeast to southwest along the northeastern side of the SWMU. These two tributaries are deeply incised in the landscape and coalesce near surface water/sediment sampling location 15SW/SD15 (Figure 2-2). The resulting creek (tributary 15-3) flows south-southeast toward Turkey Creek. The elevation at the point where tributary 15-3 leaves SWMU 15 is about 680 feet amsl. Thus, the total relief in this local area is about 120 feet. Most of the area on the northwestern and southwestern sides of the SWMU are relatively flat. The steepest slopes (approximately 15 to 30 percent) occur where the land surface drops rapidly near the tributary creeks.

All of the buildings and roads occur on the flatter upper portions of the hills. Building 3330 is a large elongate building that lies on the northern side of the SWMU. Buildings 2693 and 3287 are on the west-central side of the SWMU. Buildings 2716, 2717, 2718, and 2801 and the Asphalt Batch Plant have been demolished and are no longer present at the site (Figures 1-3 and 2-2).

## 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 evenly distributed throughout the calendar year; the maximum precipitation occurs during the spring and early summer. The average annual precipitation at the facility is about 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 15 consists of a ridge with a northeast-southwest orientation that lies along the northern and western sides of the SWMU. The ridge crest generally coincides with or is very close to Highway 45 (Figure 1-3). Hence, surface water runoff from most of the buildings, former buildings, grassy areas, railroad tracks, roads, and parking lots flows to the eastern and southeastern sides of SWMU 15.

Surface drainage from the eastern and southeastern sides of Building 3330 flows down the side of the ridge and into an unnamed tributary (tributary 15-2). Drainage ditches and storm sewers on the northwestern and west-central sides of the SWMU flow eastward into tributary 15-1, which drains eastward and joins tributary 15-2 near sampling station 15SW/SD016. The combined flow (i.e., tributary 3) then travels southward (Figure 2-2). This unnamed creek enters Turkey Creek approximately 2 miles south of SWMU 15 after it travels past the eastern sides of Mine Fill A (SWMU 12) and the Defense Reutilization and Marketing Office (DRMO) storage area.

A small portion of land on the southwestern side of SWMU 15 (near surface water sampling location 15SW/SD18; Figure 2-2) drains to the southwest under Highway 45. This drainage eventually flows into Boggs Creek, after it passes the western sides of SWMUs 9 and 13.

One round of surface water sampling and flow measurements were conducted in January 2005 for the RFI. Based on measurements and visual observations, estimates of surface water flow were made at each surface water sampling location during the single sampling event. The flow estimates are tabulated in Table 4-1 and range from no flow to 674 gallons per day. Zero flow was recorded in several storm sewer locations (e.g., 15SW/SD004, 15SW/SD010, and 15SW/SD011) that drain the northwestern quadrant of SWMU 15 (west and southwest of Building 3330. However, this storm sewer discharges to the ground surface at location 15SW/SD006. Here, the flow was estimated to be about 20 to 30 gallons per minute (gpm). A second storm sewer system drains the area surrounding the former Asphalt Batch Plant shown on Figure 1-3 and Building 2693, which are located on the west-central side of SWMU 15. This sewer discharges to the ground surface near sampling location 15SW/SD009. In January 2005, the flow rate at 15SW/SD009 was estimated to be about 8 to 12 gpm. A short distance downstream at station 15SW/SD005 (see Figure 2-2), the flow was estimated to be about the same (12 gpm). The discharges from these two storm sewers join together to form tributary 15-1. Farther downstream, at locations 15SW/SD17 and 15SW/SD16, the flow continued to increase to 90 and 135 gpm, respectively. Hence, the flow rate in tributary 15-1 appears to be increasing along its entire reach.

The flow in tributary 15-2 was estimated at two different locations. At 15SW/SD14 and 15SW/SD015, flow rates of 90 and 30 gpm, respectively, were estimated. Because of the uncertainty in the flow estimation procedures, there was probably little difference in the flow rates measured at these two locations. It is likely though that the overall flow in tributary 15-2 was less than the flow in tributary 15-1.

In tributary 15-3 (i.e., combined flow of tributaries 15-1 and 15-2), the flow rate was estimated to be 494 gpm at 15SW/SD001 and 674 gpm at 15SW/SD002. It appears that a significant source of water is entering tributary 15-3 that cannot be attributed to tributaries 15-1 or 15-2. Groundwater discharge into tributary 15-3 is the most plausible explanation for the increased flow rate observed in this section of the drainage system.

## 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, siltstones,

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. Because the pre-Pennsylvanian bedrock is dipping to the west-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. At SWMU 9 (Pesticide Control Area), which lies about 1 mile southwest of SWMU 15, the United States Army Corps of Engineers (USACE) drilled a well (09C01) through the top of the ridge to a total depth of 150 feet. This well penetrated 13 feet of overburden soil and 132.5 feet of Pennsylvanian (Mansfield) shales, sandstones, siltstones, and coal seams. The boring also encountered 5.5 feet of Mississippian limestone at the bottom, which the USACE and Indiana Geological Survey identified as the Glen Dean Limestone (Barnhill and Hansley, 1993).

The mapping performed by Barnhill (1993) and Kvale and Barnhill (1994) shows that the pre-Pennsylvanian paleoerosion surface at SWMU 15 in Section 14 (R4W, T5N) is at approximately 580 to 590 feet amsl. Using a basal elevation of about 590 feet amsl, the thickness of Pennsylvanian rock at SWMU 15 ranges from about 90 feet along tributary 15-3 up to approximately 200 feet thick in the northern and northwestern sides of the SWMU. The bulk of the ridge is composed of Pennsylvanian bedrock, which consists of discontinuous layers of siltstones, sandstones, shales, and coal seams. These rock units extend from the ridgetop down to the Pennsylvanian-Mississippian unconformity (at approximately 590 feet amsl).

Below the Pennsylvanian rocks lie Mississippian-age limestone and sandstone formations of the Stephensport Group, including the Glen Dean, Golconda, and Beech Creek Limestones, the Big Clifty Sandstone, and the Hardinsburg Formation (siltstone and shale) (Figure 4-2). Because these formations lie at least 90 feet or more below the creek beds, they will not be discussed further in this report.

## 4.5 SOILS

A veneer of natural soil blankets the top and the sideslopes of the SWMU 15 ridge. The soils are the result of Pennsylvanian-age rocks (mostly sandstone, shales, and siltstones) weathering in place. This type of residual soil is the most prevalent soil type at NSWC Crane. The residual soils on the ridgetop and sideslopes consist predominantly of fine materials, including varying amounts of clay, silt, sand, and rock fragments.

The SWMU 15 soils are as thin as only 2 feet at soil borings 15SB033, 15SB034, and 15SB036 (located south of former buildings 2717 and 2718 in the Hillside Debris Area; see Figures 2-2 and soil boring logs in Appendix B). Thicker soil cover (up to 8 feet thick) was encountered in most of the rest of the SWMU 15 area. Soils from 14 to 21 feet thick occur near soil borings 15SB031, 15SB045, 15SB046, and 15SB048 (Table 2-1 and Figure 2-1). These soil borings all occur in areas that were built up with fill material to create a flatter surface; hence, the soil and fill materials are thicker than the natural residual soils.

## 4.6 HYDROGEOLOGY

During the RFI at SWMU 15, a total of nine temporary monitoring wells were installed. The date of installation, the total depth, the ground surface elevation, the screen elevations, and other physical characteristics of each of these nine monitoring wells are listed in Table 2-2. The boring logs and well construction logs for the wells are included in Appendix B. The locations of the nine monitoring wells are shown on Figure 2-2.

While drilling through the overburden on top and sides of the ridge, saturated conditions were observed on occasion near the base of the soil layer. The groundwater at these locations is believed to be perched in the residual soils directly on top of the bedrock surface. Water levels measured in eight of the temporary wells in January 2005 (Table 2-2) indicate that between 2.9 and 8.3 feet of saturated soils lie perched on the bedrock surface.

Figure 4-4 presents the potentiometric surface for the perched groundwater measured in January 2005. The highest elevations (750 to 757 feet amsl) were measured in four temporary wells installed higher up on the hillside at SWMU 15 (15TW001, 15TW002, 15TW003, 15TW006, see Figure 4-4). Lower groundwater elevations (736 to 748 feet amsl) were measured in three temporary wells (15TW004, 15TW007, and 15TW008) located on the side of the hill. The lowest groundwater elevation (708.43 feet amsl) was measured in 15TW005, which is located at the bottom of the hill by the bank of tributary 15-1. In general, groundwater elevations mimic ground surface elevations. The potentiometric surface shown in Figure 4-4 indicates that the perched groundwater is flowing to the east and south toward the tributary creeks. It is assumed that groundwater in the Pennsylvanian rocks beneath the perched groundwater has a similar potentiometric surface and that this groundwater is also flowing toward and discharging into the unnamed creeks. As suggested by the surface water flow estimates, flow in each of the unnamed tributaries increases in a downstream direction (Section 4.3). The gaining stream conditions are most likely caused by groundwater discharging to the creeks.

## 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 (NEESA, 1983). Cleared areas at the facility have various stages of grassland, old field, 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. Scrubs or shrubs are present in these areas, and leaf litter and fallen limbs and 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 site 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, old field, 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 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.

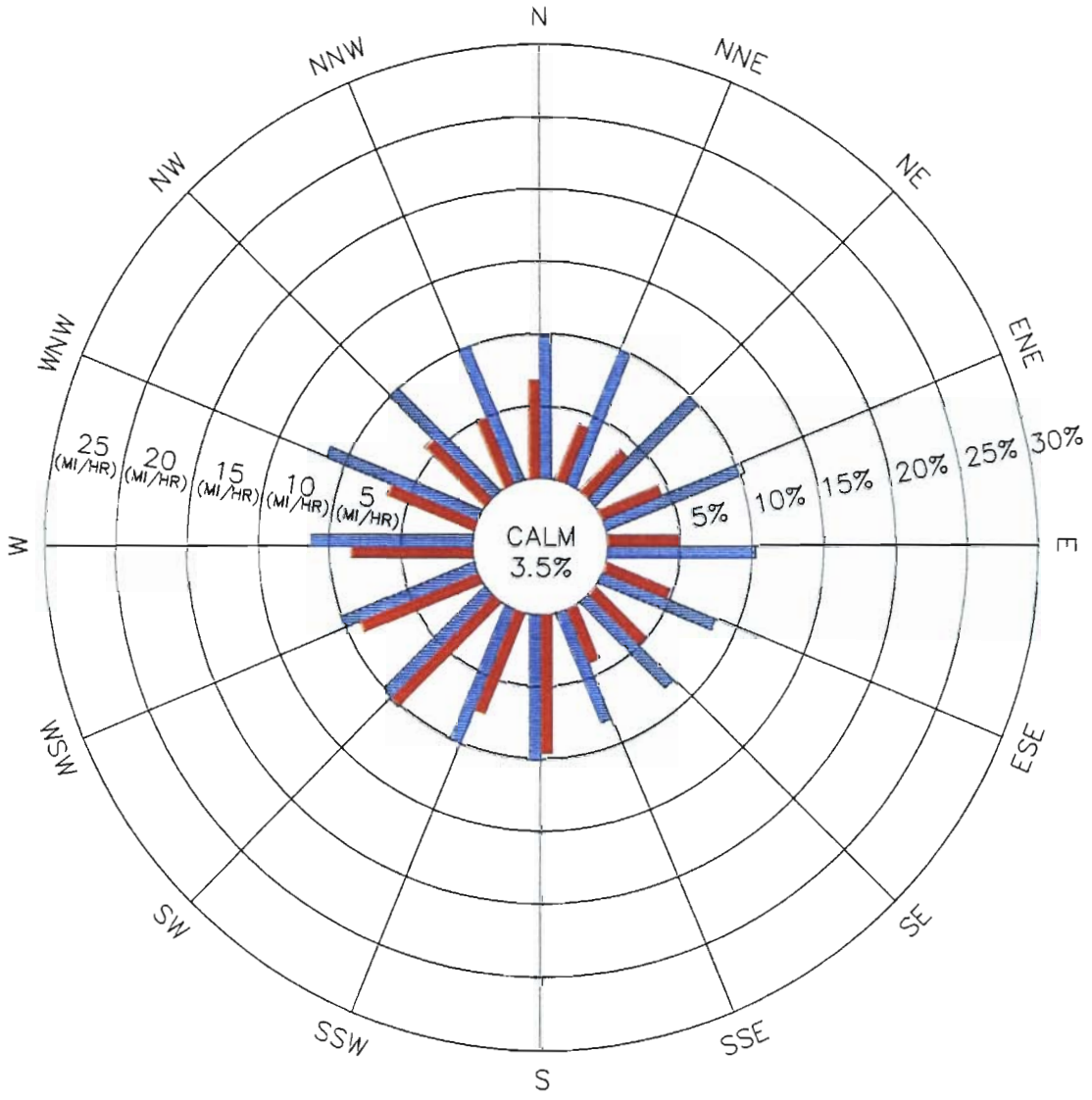
**TABLE 4-1**

**ESTIMATED FLOW RATES AT SURFACE WATER SAMPLING LOCATIONS**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE**
**CRANE, INDIANA**

| Surface Water Sampling Location[1] | Estimated Flow Rate January 9 - 12, 2005 | |
|---|---|---|
| | (gpm) | Note |
| 15SW/SD001 | 494 | -- |
| 15SW/SD002 | 674 | -- |
| 15SW/SD003 | NS | -- |
| 15SW/SD004 | 0 | stagnant water |
| 15SW/SD005 | 12 | -- |
| 15SW/SD006 | 20 - 30 | -- |
| 15SW/SD007 | NS | -- |
| 15SW/SD008 | NS | -- |
| 15SW/SD009 | 8 - 12 | -- |
| 15SW/SD010 | 0 | stagnant water |
| 15SW/SD011 | 0 | stagnant water |
| 15SW/SD012 | NS | -- |
| 15SW/SD013 | 0.3 | -- |
| 15SW/SD014 | 90 | -- |
| 15SW/SD015 | 30 | -- |
| 15SW/SD016 | 135 | -- |
| 15SW/SD017 | 90 | -- |
| 15SW/SD018 | 9 | -- |
| 15SW/SD019 | 117 | -- |

1 - See surface water sample log sheets (Appendix C) for flow calculations or estimates; locations shown on Figure 2-2.
gpm = gallons per minute.
NS = Not sampled; see Table 2-4.

ACAD: 1245km02.dwg 09/21/05 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 DM | DATE 6/1/05 | FIVE-YEAR WIND ROSE SUMMARY FOR INDIANAPOLIS, INDIANA SWMU 15-ROADS AND GROUNDS AREA NSWC CRANE CRANE, INDIANA | CONTRACT NO. 1245 |
| 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

| PERIOD | EPOCH | THICKNESS (FEET) | LITHOLOGY | FORMATION | GROUP |
|---|---|---|---|---|---|
| PENN-SYL-VANIAN | POTTS-VILLE | 150–300 | | MANSFIELD FM. | "RACCOON CREEK" |
| MISSISSIPPIAN | CHESTER | 20–30 | | GLEN DEAN LS | STEPHENS-PORT |
| | | 30–40 | | HARDINSBURG SS. | |
| | | 40–50 | | GOLCONDA LS. | |
| | | 25–40 | | BIG CLIFTY FM. | |
| | | 15–25 | | BEECH CREEK LS. | |
| | | 20–40 | | ELWREN FM. | WEST BADEN |
| | | 0–5 | | REELSVILLE LS. | |
| | | 20–40 | | SAMPLE FM. | |
| | | 10–20 | | BEAVER BEND LS. | |
| | | 12–30 | | BETHEL FM. | |
| | MERAMEC | 15–20 | | PAOLI LS. | BLUE RIVER |
| | | 100–120 | | STE. GENEVIEVE LS. | |
| | | 100–120 | | ST. LOUIS LS. | |
| | | 90–100 | | SALEM LS. | SANDERS |
| | | 50–80 | | HARRODSBURG LS. | |
| | OSAGE | 600–800 | | MULDRAUGH FM. | BORDEN |

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 | DATE | | | CONTRACT NUMBER | OWNER NO. |
|---|---|---|---|---|---|
| K. PEILA | 9/23/05 | NAVFAC | GENERALIZED STRATIGRAPHIC COLUMN<br>SWMU 15 - ROADS AND GROUNDS AREA<br>NAVAL SURFACE WARFARE CENTER<br>CRANE, INDIANA | 1245 | CTO 0331 |
| CHECKED BY | DATE | | | APPROVED BY | DATE |
| J. SCHUBERT | 9/23/05 | | | — | — |
| COST/SCHEDULE-AREA | | | | APPROVED BY | DATE |
| | | | | — | — |
| SCALE | | | | DRAWING NO. | REV |
| AS NOTED | | | | FIGURE 4 - 2 | 0 |

P:\GIS\CRANE_NSWC\MAPDOCS\APR\CRANE_REPORTFIGURES.APR STRATAGRAPHIC COLUMN 1245 9/23/05 KMP

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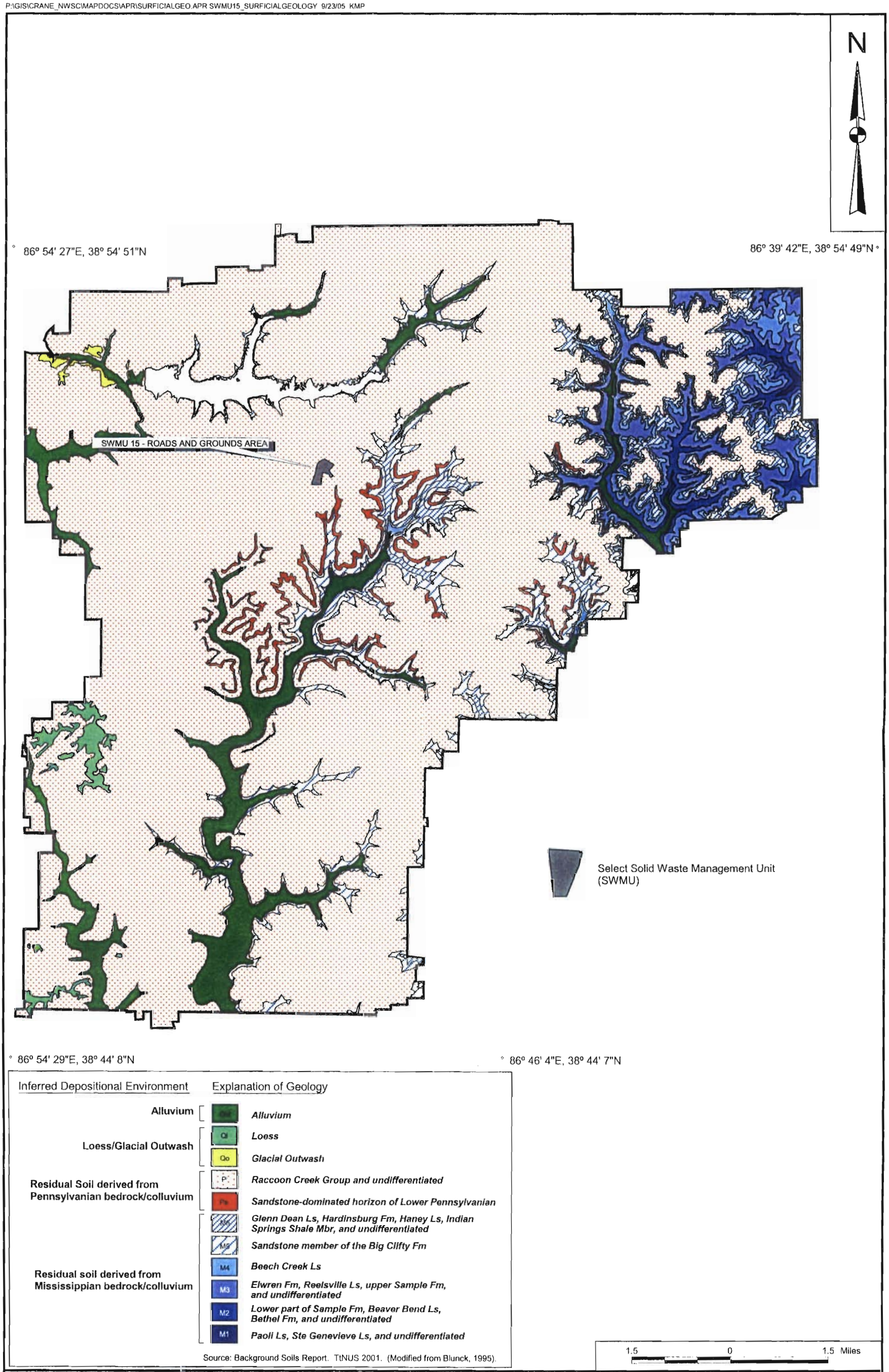



| DRAWN BY | DATE |
|---|---|
| K. PEILA | 9/23/05 |
| CHECKED BY | DATE |
| J. SCHUBERT | 9/23/05 |
| COST/SCHEDULE-AREA | |
| SCALE | |
| AS NOTED | |

NAVFAC

SURFICIAL GEOLOGY MAP

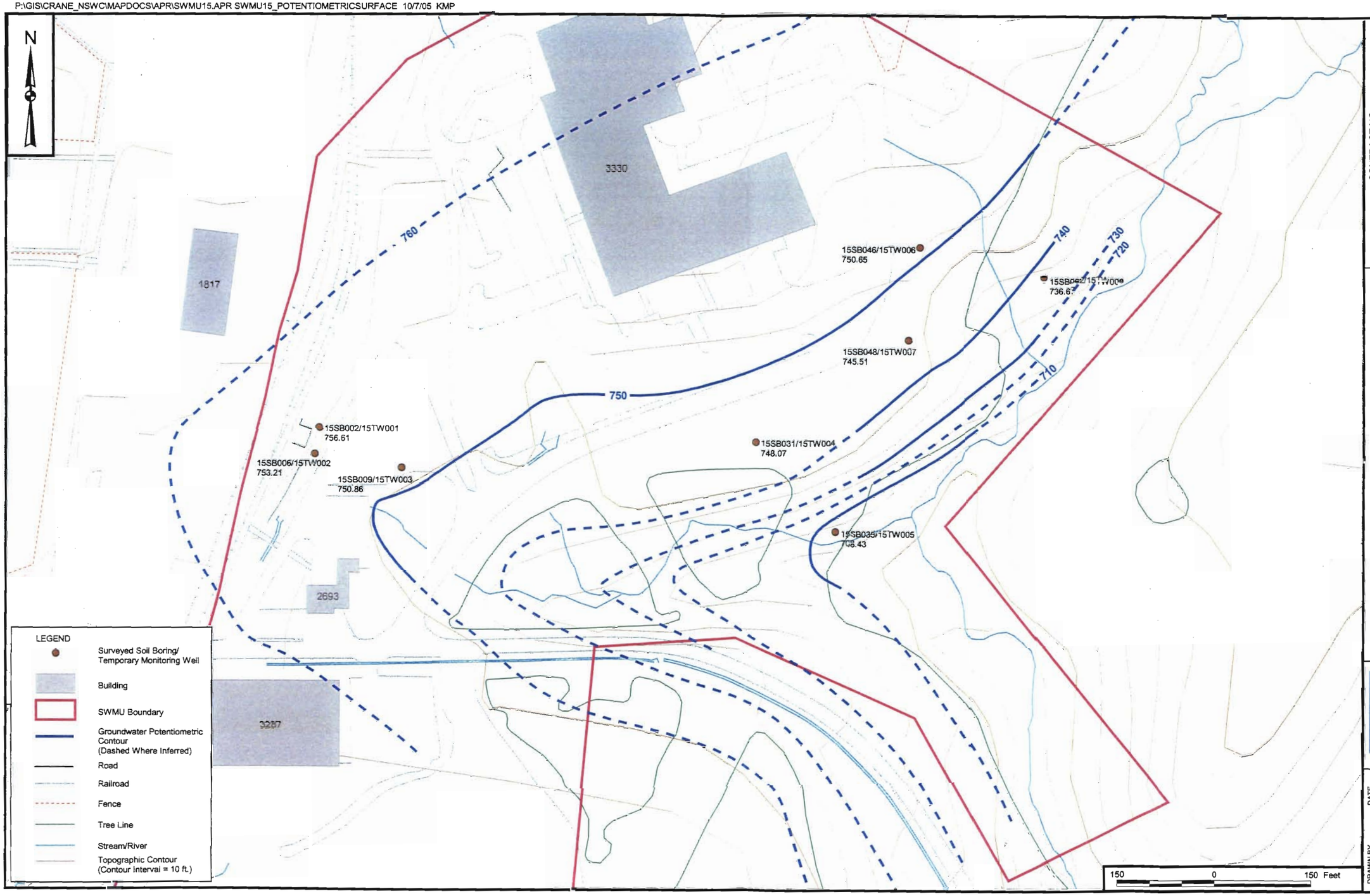
SWMU 15 - ROADS AND GROUNDS AREA

NSWC CRANE

CRANE, INDIANA

| CONTRACT NUMBER | CONTRACT NUMBER |
|---|---|
| 1245 | CTO 0331 |
| APPROVED BY | DATE |
| — | — |
| APPROVED BY | DATE |
| — | — |
| DRAWING NO. | REV |
| FIGURE 4 - 3 | 0 |

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU15.APR SWMU15_POTENTIOMETRICSURFACE 10/7/05 KMP




CONTRACT NO. CTO 0331

APPROVED BY — DATE

APPROVED BY — DATE

DRAWING NO. FIGURE 4 - 4

REV 0

POTENTIOMETRIC SURFACE AND FLOW DIRECTION OF PERCHED GROUNDWATER IN THE OVERBURDEN SOIL
SWMU 15 -ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA

NAVFAC

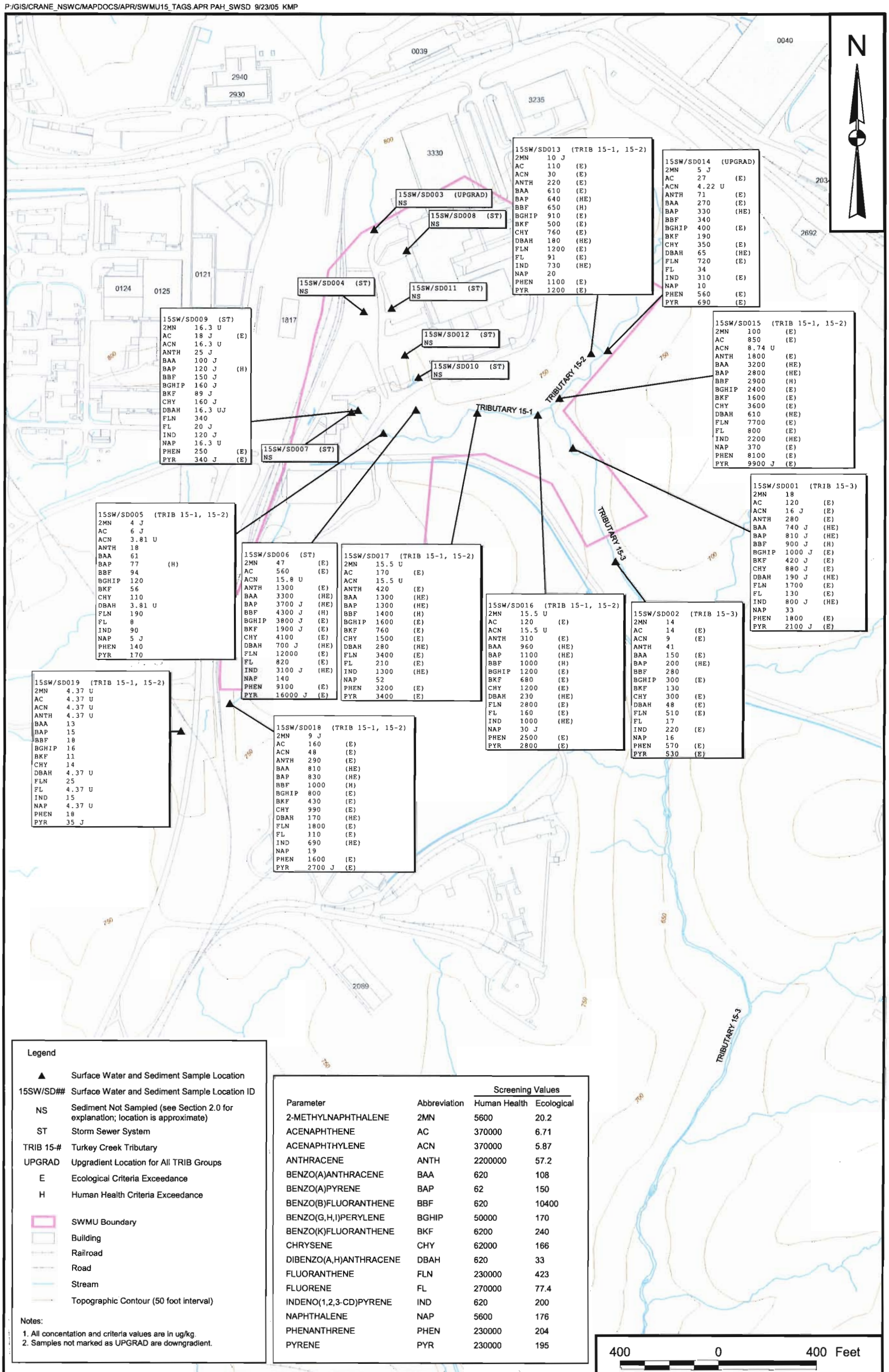
DRAWN BY K. PEILA — DATE 9/26/05

CHECKED BY J. SCHUBERT — DATE 9/26/05

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU15_TAGS.APR PAH_SWSD 9/23/05 KMP




Legend

| | |
|---|---|
| ▲ | Surface Water and Sediment Sample Location |
| 15SW/SD## | Surface Water and Sediment Sample Location ID |
| NS | Sediment Not Sampled (see Section 2.0 for explanation; location is approximate) |
| ST | Storm Sewer System |
| TRIB 15-# | Turkey Creek Tributary |
| UPGRAD | Upgradient Location for All TRIB Groups |
| E | Ecological Criteria Exceedance |
| H | Human Health Criteria Exceedance |
| | SWMU Boundary |
| | Building |
| | Railroad |
| | Road |
| | Stream |
| | Topographic Contour (50 foot interval) |

Notes:

1. All concentation and criteria values are in ug/kg.
2. Samples not marked as UPGRAD are downgradient.

| Parameter | Abbreviation | Screening Values Human Health | Screening Values Ecological |
|---|---|---|---|
| 2-METHYLNAPHTHALENE | 2MN | 5600 | 20.2 |
| ACENAPHTHENE | AC | 370000 | 6.71 |
| ACENAPHTHYLENE | ACN | 370000 | 5.87 |
| ANTHRACENE | ANTH | 2200000 | 57.2 |
| BENZO(A)ANTHRACENE | BAA | 620 | 108 |
| BENZO(A)PYRENE | BAP | 62 | 150 |
| BENZO(B)FLUORANTHENE | BBF | 620 | 10400 |
| BENZO(G,H,I)PERYLENE | BGHIP | 50000 | 170 |
| BENZO(K)FLUORANTHENE | BKF | 6200 | 240 |
| CHRYSENE | CHY | 62000 | 166 |
| DIBENZO(A,H)ANTHRACENE | DBAH | 620 | 33 |
| FLUORANTHENE | FLN | 230000 | 423 |
| FLUORENE | FL | 270000 | 77.4 |
| INDENO(1,2,3-CD)PYRENE | IND | 620 | 200 |
| NAPHTHALENE | NAP | 5600 | 176 |
| PHENANTHRENE | PHEN | 230000 | 204 |
| PYRENE | PYR | 230000 | 195 |

| | | | |
|---|---|---|---|
| DRAWN BY C. SPEHAR | DATE 8/10/05 | DETECTED POLYCYCLIC AROMATIC HYDROCARBON CONCENTRATIONS IN SEDIMENT<br>SWMU 15 ROADS AND GROUNDS AREA<br>NSWC CRANE<br>CRANE, INDIANA | CONTRACT NUMBER CTO 331 |
| CHECKED BY T. JOHNSTON | DATE 8/10/05 | | APPROVED BY — DATE — |
| COST/SCHEDULE-AREA | | | APPROVED BY — DATE — |
| SCALE AS NOTED | | | DRAWING NO. FIGURE 5 - 1 REV 0 |

# 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 15. Where feasible to do so, an attempt is made to identify which chemicals appear to be site-related contaminants and which do not. No evidence was found for the presence of pure phase organic liquids or metals in any environmental medium. All references to chemical contamination in the text below are to contaminants that are dissolved in surface water or groundwater or that are most likely to be adsorbed to soil or sediment particulates.

The range of analyses conducted during this RFI is documented in Section 2.0 and summarized in Table 2-3. Data summary tables are presented in Section 3.0 of this report. Section 3.0 Tables 3-1 through 3-26 reflect the RFI effort and the additional toxicity testing that was conducted. A complete data set for the RFI is presented in Appendix G tables (G-1 through G-4). Some surface water and sediment locations could not be sampled. The approximate locations of these sampling points are marked with "NS" on Figure 5-1, and the reasons for not collecting samples at those locations are described in Section 2.0.

SWMU 15 RFI data sets were subdivided into groups that reflect areas of similar characteristics for particular environmental media. These groupings are described below and are identified in data tables, where appropriate.

Organic chemical contamination is defined for this RFI as chemicals whose concentrations exceed human health or ecological screening values (SVs) and therefore are considered to potentially result in unacceptable human health or ecological risks. Exceedances of SVs are highlighted in the data tables (Tables 3-4 through 3-26, as applicable). Because organic chemicals were assumed not to occur naturally, detections of organic compounds at SWMU 15 were generally 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. Other lesser used chemicals such as freons (chlorofluorocarbons), chloroform, xylenes and may also fit this description, depending on the laboratory and time period in which sample were analyzed. Laboratory contamination is often indicated by low concentrations of a chemical in field blanks or laboratory blanks and in multiple samples, regardless of the origin of the samples. When present as a laboratory contaminant, the concentrations of the contaminating chemical appear to be relatively uniform in magnitude regardless of the location of the sample in which the contamination was reported. All organic target analyte concentrations were

measured using routine methods, except for pentachlorophenol and hexachlorophene. These two compounds were analyzed by an herbicide analytical method even though they are not herbicides, and they are discussed as herbicides in the text below because of this. The herbicide method was used to obtain lower detections limits than are achievable using the routine SVOC analytical method (SW-846 Method 8270C) for these compounds.

Metals contamination was defined as an exceedance of SVs; however, consideration was given to the natural occurrence of metals in environmental media. Concentrations of metals that are within normal background or upgradient levels were not considered to represent site-related contamination although they may be discussed for the sake of completeness. Background and upgradient data sets, which are used for these evaluations, are described in the first subsection below.

Multiple chemicals of environmental interest were detected in multiple areas of SWMU 15 at concentrations greater than SVs. The extent of contamination, however, is best described using representative chemicals whose extent encompasses that of other chemicals. This reduces the complications associated with trying to track multiple chemicals when all chemicals have similar distribution patterns. Therefore, emphasis was given to chemicals that:

- Exceed chemical of potential concern (COPC) SVs (described and evaluated further in Sections 7.0 and 8.0).

- Represent (based on chemical and physical properties) a particular group of chemicals (e.g., explosives).

- Were detected multiple times and generally pervasive, thus representing the greatest extent of contamination for similar chemicals.

- Were detected infrequently but at environmentally significant concentrations. This may occur, for example, when multiple analytes of similar behavior or origin are detected at a small number of locations but at elevated concentrations that are indicative of a chemical release or contamination pattern.

- 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, were judged to adequately represent the nature and extent of similar contaminants at SWMU 15.

If the nature and extent of contamination can be easily described, figures are omitted and the contamination is described in text.

## 5.1 BACKGROUND AND UPGRADIENT LOCATIONS

Each background data set and how it was established is described below.

### 5.1.1 NSWC Crane Soil Background Data Set

Tables 3-1 through 3-4 present summary statistics for metal concentrations in the following soil categories:

- All 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

The background data for these soil groups were generated during the NSWC Crane basewide background soil investigation. Derivation of the Soil Groups is described in detail in the report for that investigation (TtNUS, 2001). Soil Groups 3, 8, and 9 represent all soil samples collected at SWMU 15.

Statistical comparisons were not made between background and SWMU 15 RFI metals concentrations for this investigation. However, NSWC Crane background soil data extracted from TtNUS (2001) were used to estimate whether the concentrations of chemicals observed in SWMU 15 soils represented site-related contamination or not. Upper Tolerance Limits (UTLs) were used as points of comparison to demonstrate that one soil data set was similar to another. These values represent a limit below which 95 percent of the reported concentrations would fall with 95 percent confidence if the soil data represent 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. The background study included soil samples from a large area of NSWC Crane so the chance of this occurring is small. It is more likely that a site data set that is comparable to background concentrations is a subset of the overall Crane data background. This could occur because the site samples are collected from a relatively small area 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 value and data spread. These characteristics could cause the SWMU data set to appear shifted to higher concentrations than the NSWC Crane background data. A statistical comparison in such cases may indicate that the two data sets are different. Therefore, it is useful to compare the maximum values of the data sets to determine whether the SWMU maximum value appears to represent a value that is significantly greater than the maximum background value or is within the range of background values. Even in this regard, caution is required because the data set that has the greater number of values will tend to have the higher concentration values. These issues are described on a case-by-case basis as necessary in the following text.

### 5.1.2 Surface Water and Sediment Upgradient Concentrations

Surface water and sediment samples were grouped into three categories: Storm Sewer and Outfall (or Storm Sewer) System (ST), Tributaries 15-1/15-2, and Tributary 15-3, respectively. These three groups represent drainage channels of significantly different character. The storm sewer system contains water that has run over parking lots, roads, the former wash rack area, and other surfaces. This system heavily influences the chemical composition of samples downgradient of the storm sewer system. The tributaries 15-1 and 15-2 are natural drainage channels that may have ephemeral water flow that is more likely in wetter seasons. These tributary channels drain into tributary 15-3, which is located to the southeast of SWMU 15. The tributary 15-3 channel is more likely to contain water year round and carries a larger volume of water than the other channels.

Sample locations 15SW/SD003 and 15SW/SD014 were intended to represent upgradient surface water conditions for all three categories of drainage channels; however, location 15SW/SD003 was not present due to recent construction activity and could not be sampled. Samples 15SW01401 and 15SD01401 represent upgradient surface water and sediment conditions, respectively, for all three categories of drainage channels. Although the tributaries integrate flow (and contamination, if present) from areas near

but outside of SWMU 15, the sampled locations are believed to represent influence primarily from SWMU 15.

Comparisons of site data to data from upgradient locations are discussed in the surface water and sediment sections, as applicable (Sections 5.3 and 5.4, respectively).

### 5.1.3 Groundwater Upgradient Locations

Groundwater for this project represents perched groundwater at the interface between the soil overburden and the bedrock interface. No upgradient perched water was sampled.

## 5.2 SOIL CONTAMINATION

**Herbicides -** Pentachlorophenol was the only chemical analyzed by the herbicide method to be detected. Detections of pentachlorophenol were limited to surface soils. Only one result (28 µg/kg in sample 15SS0490002) exceeded the 1.4 µg/kg human health and the 1.8 µg/kg ecological SVs in either surface or subsurface soil. Therefore, this compound is not a significant site-related contaminant for purposes of the nature and extent discussion.

**Metals -** Several metals concentrations exceeded human health and ecological SVs in surface and subsurface soils (see Tables 3-6 and 3-8). However, many of the concentrations greater than SVs are consistent with background soil concentrations. This can be seen by comparing the data in Tables 3-2, 3-3, and 3-4 with data in Tables 3-6 and 3-8. Furthermore, the concentration distribution patterns suggest no evidence of a source of contamination consistent with site operations and contaminant migration mechanisms. Table 5-1 is a summary of metal concentrations at locations where SVs were exceeded and the 95 percent background UTL was exceeded by 50 percent or more. Few results exceeded the UTLs and any values that exceeded the UTL were generally within 50 percent of the UTL. Therefore, metals are not considered to be significant site-related contaminants for purposes of the nature and extent discussion.

**Pesticides and PCBs -** Aroclor-1260 was the only chemical in this category to be detected. Aroclor-1260 SV exceedances were limited to the 0- to 2-foot bgs surface soil interval at locations 15SS022 (190 µg/kg), 15SS023 (1,200 µg/kg), 15SB24 (20 µg/kg), and 15SB36 (32 µg/kg). The human health and ecological SVs are 220 and 0.332 µg/kg, respectively. Despite the observed SV exceedances, all but one Aroclor-1260 concentration was less than the conservative cleanup level of 1,000 µg/kg total PCBs that is commonly used for PCB cleanup in soils. The single exceedance of this value was 1,200 µg/kg in sample

15SS0230002. This is a minor exceedance; therefore, pesticides and PCBs are not considered to be significant site-related contaminants for purposes of the nature and extent discussion.

**SVOCs** - Detected SVOCs were limited to PAHs and a few other compounds [acetophenone, bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, di-n-octyl phthalate (surface only), isosafrole (subsurface only), and n-nitrosodiphenylamine]. Of these, benzo(a)pyrene, a PAH, was the only SVOC detected in subsurface soil (150 µg/kg in sample 15SB0230206 and 120 µg/kg in sample 15SB0280206) at concentrations exceeding its human health SV of 62 µg/kg. Ecological SVs do not apply to subsurface soil. Based on the limited nature of the human health SV exceedances, the subsurface soil detections of benzo(a)pyrene are not of significance to this project. By contrast, several SVOC concentrations, primarily PAHs, exceeded SVs in surface soil (see Tables 3-6 and 3-8). The greatest PAH SV exceedances were observed on the upper level of the former two-level Asphalt Batch Plant area (samples 15SB010002, 15SB020002, and 15SB030002). This is consistent with site history because asphalt contains high concentrations of PAHs. Based on these contaminant distribution patterns, the only significant soil SVOC contamination at SWMU 15 is limited to PAHs in surface soil at the former Asphalt Batch Plant and, to a lesser extent, in surface soil at location 15SB049. The sums of individual PAH concentrations in each sample (rounded to the nearest 10 µg/kg) are summarized below for all locations where at least one PAH compound exceeded an SV:

| Location | Total PAH Concentration, µg/kg |
|---|---|
| 15SB001 | 22720 |
| 15SB002 | 10910 |
| 15SB003 | 95270 |
| 15SB004 | 2660 |
| 15SB005 | 11040 |
| 15SB007 | 1420 |
| 15SB023 | 1690 |
| 15SB038 | 680 |
| 15SB043 | 1770 |
| 15SB044 | 690 |
| 15SB046 | 2500 |
| 15SB048 | 150 |
| 15SB049 | 9100 |

These results show that the former Asphalt Batch Plant (locations 15SB001 through 15SB007) is the most contaminated area at SWMU 15 and that other areas have measurably less contamination.

Location 15SB049 has PAH levels approaching the former Asphalt Batch Plant levels, but this location is well bounded in all directions either by soil samples that do not exhibit PAH SV exceedances or by tributary 15-2 located downgradient of 15SB049. Stream sediment contamination is discussed in Section 5.4.

PAH contamination is unbounded west of the former Asphalt Batch Plant, however, it is likely that the railroad in that location also contributes PAH contamination to the soils. The contributions of PAHs from the railroad and past contamination from the former Asphalt Batch Plant may be indistinguishable without more study. Such study is, however, unwarranted given the generally limited magnitude and extent of PAH contamination.

**VOCs** - Except for methylene chloride, VOC concentrations did not exceed SVs at any surface or subsurface soil sampling location. Whereas VOCs in solid matrices exhibited a slight to moderate low bias, the almost complete lack of detectable VOCs is an indication that these chemicals are not significant site-related contaminants. Methylene chloride exceeded the 1.2 µg/kg human health SV at several locations, but all concentrations were less than 100 µg/kg and most were less than 10 µg/kg (see Table 3-6). The lower detected concentrations are comparable to those commonly observed as laboratory contamination levels. In addition, the greatest concentration (97 µg/kg at 15SB00300002) being in surface soil where VOCs are least likely to be present, and a lack of methylene chloride precursor (e.g., chloroform or carbon tetrachloride) detections suggest that the methylene chloride detections are not site related. Therefore, VOCs are concluded not to be significant site-related contaminants for the purpose of nature and extent discussion.

In summary, the only significant contaminants in soil are PAHs. This is consistent with site history. The PAH contamination of primary significance is associated with the former Asphalt Batch Plant. The contamination in that area is unbounded to the west, but the extent of contamination appears to be limited to the former Asphalt Batch Plant and immediate surroundings. The reported PAH concentrations are likely to be less than actual site concentrations because of a slight to moderate low bias.

## 5.3 SURFACE WATER CONTAMINATION

**Herbicides** - Pentachlorophenol was the only chemical analyzed by the herbicide method to be detected. The results for this chemical were generally biased moderately to severely low. However, pentachlorophenol concentrations did not exceed human health or ecological SVs at any location, which is an indication that this chemical is not a significant site-related contaminant for the purposes of the nature and extent discussion.

**Metals -** There was an aluminum SV exceedance in upgradient location 15SW/SD014 surface water (see Table 3-10). The aluminum concentrations in tributaries 15-1 and 15-2 and in tributary 15-3 surface water were slightly elevated compared to upgradient concentrations but generally not by more than a factor of two, except at locations 15SW/SD001 (Table 3-16), 15SW/SD013 (Table 3-15), and 15SW/SD017 (Table 3-15). These locations are not the most downgradient locations, and they are separated by locations that did not have concentrations greater than upgradient concentrations. The surface water metals concentrations in storm sewers were comparable to metals concentrations in the other drainage channels. Therefore, aluminum does not appear to be a significant site-related contaminant, and the extent of this minor contaminant is well bounded. A comparison of Tables 3-10, 3-15, and 3-16 shows that downgradient iron, manganese, and vanadium concentrations also exceeded upgradient concentrations by more than three times (vanadium was detected only in downgradient samples) in multiple locations. However, the most downgradient location, 15SW/SD002 did not have any metals concentrations in excess of SVs, and most metal concentrations were less than upgradient concentrations (see Tables 3-10 and 3-16).

Based on the general magnitude and spatial patterns of contamination, it appears that the observed exceedances of upgradient concentrations for metals are probably a consequence of having collected a single upgradient surface water sample and multiple downgradient samples. Under these conditions, the probability of downgradient concentrations exceeding upgradient concentrations is high even if the downgradient samples represent conditions identical to upgradient conditions.

A comparison of metals concentrations from filtered and unfiltered samples reveals that the majority of the following metals results are associated with the solid portion of surface water samples: aluminum, chromium, iron, lead, vanadium.

**SVOCs -** There were four PAH SV exceedances in upgradient location 15SW/SD014 surface water (see Table 3-10). Downgradient creek tributary surface water samples yielded a few more SV exceedances (highlighted in Tables 3-12 and 3-13), but the PAH concentrations are comparable to upgradient concentrations. This can be seen by comparing the concentrations in Tables 3-15 and 3-16 with concentrations of the same parameters in Table 3-10. Figure 5-1 also shows surface water PAH concentrations.

Whereas the tributary samples exhibited little if any contamination, the chemical composition of the sewer water samples exhibited elevated PAH concentrations (compare Tables 3-14, 3-15, and 3-16). The storm sewer system receives runoff from parking lots, roads, and other surfaces. These surfaces receive

metals, PAHs, and other chemicals from vehicles, vehicle exhaust, the pavement, and other sources. Roads and parking lots, in particular, may release environmentally significant concentrations or PAHs and metals. The elevated concentrations in the sewer system have evidently had little impact on stream surface water concentrations, presumably because runoff draining to the streams dilutes any storm sewer discharges to the streams. In addition, the chemicals detected most frequently or in the highest concentrations tend to preferentially adsorb to sediment and soil. Therefore, the reservoir of contamination is expected to be compartmentalized in sediments rather than in surface water.

## 5.4 SEDIMENT CONTAMINATION

**All Chemicals -** Most of the chemicals detected in upgradient sediment sample 15SD0140006 exceeded human health or ecological sediment SVs (see Table 3-18, highlighted values). A similar situation existed for downgradient sediment samples (Tables 3-22, 3-23, and 3-24, highlighted values). Samples in all three downgradient sediment groups (ST, Tributaries 15-1/15-2, and Tributary 15-3) also consistently exhibited concentrations greater than upgradient concentrations and SVs. Individual chemical groups are discussed below.

**Herbicides -** Pentachlorophenol and 2,4,5-T were the only chemicals analyzed by the herbicide method to be detected. Pentachlorophenol concentrations did not exceed human health or ecological SVs at any location. Although the mean solid MS/MSD pentachlorophenol recoveries were slightly low, the available data indicate that this chemical is not a significant site-related contaminant for the purposes of the nature and extent discussion.

**Metals and Cyanide -** Cyanide was not detected in sediment samples. Except for location 15SW/SD009, metals concentrations in sediment were typically less than upgradient values or exceeded upgradient values by a small margin (see Tables 3-18, 3-22, 3-23, and 3-24). Furthermore, most metals concentrations were less than both human health and ecological SVs at most locations. Lead at location 15SW/SD009 is the greatest exception. The sediment lead concentration was 133 mg/kg at this location. This concentration is approximately three times the ecological SV and about one-third the human health SV, thus indicating that metals contamination in sediments is a minor concern. Because of the limited extent of the metals SV exceedances and exceedances of upgradient concentrations, metals are not discussed further in nature and extent of contamination.

The toxicity testing chemistry data were consistent with the rest of the RFI data in terms of metals concentrations and spatial distribution of metals. Consequently, these data were not plotted.

**Pesticides and PCBs -** The upgradient sample, 15SD0140006, had a detection of 4,4'-DDT (4.2 µg/kg), which is slightly greater than the 4.16 µg/kg ecological SV and much less than the 1,700 µg/kg human health SV. Downgradient samples exhibited more frequent detections of this compound and other pesticides. Aroclors-1254 and 1260 were also detected in downgradient samples 15SD0150006 and 15SD0150006, but not in the most downgradient sample, 15SD0020006. The most frequently detected chemicals from this category were 4,4'-DDT and its degradation products, 4,4'-DDE and 4,4'-DDD. Tables 3-18 through 3-24 show these data. The detections, while exceeding human health and/or ecological SVs in about half of the samples, were generally within two times the SVs and are therefore considered to be minor exceedances.

**SVOCs -** The only SVOCs of significance that were detected in sediments were PAHs. The MS and MSD samples for these compounds in solid matrices exhibited a slight to moderate low bias, which would have affected upgradient and downgradient samples equally. Samples 15SD0060006 and 15SD0240006 had the highest PAH concentrations of all sediment samples. These samples were collected from a road and parking area that drains into the storm sewer near 15SD006 (see Figure 5-1). The road and parking lot appeared to have been paved within months preceding sample collection. Fresh asphalt is expected to produce higher levels of PAH runoff than weathered asphalt that has been washed for months or years with precipitation. Thus, the elevated concentrations appear to represent normal asphalt runoff. Figure 5-1 shows sediment PAH concentrations for every PAH that had a sediment SV exceedance at at least one sampling location.

Overall, the concentrations of PAH and other SVOC target analytes in sediments decreased in the downgradient direction from the SWMU center. This can be seen by reviewing Figure 5-1, which shows that downgradient locations 15SW/SD002 and 15SW/SD019 generally had PAH concentrations comparable to or less than upgradient concentrations. Location 15SW/SD001 had some minor exceedances of upgradient PAH concentrations and SVs, but the PAH concentrations at 15SW/SD002 did not, if allowances are made for uncertainty in the data, especially near detection limits. For example, the phenanthrene and acenaphthylene concentrations at 15SW/SD002 were 570 and 9 µg/kg, respectively, whereas the upgradient (location 15SW/SD014) concentrations were 560 µg/kg and non-detect (4.22 U), respectively. Location 15SW/SD002 bounds reasonably well the more contaminated upgradient sediments. Downgradient location 15SW/SD019 generally had the lowest PAH concentrations observed in all sediment samples and bounds the PAH contamination in the southwestern reaches of the tributary system southwest of SWMU center.

The sediment toxicity testing chemistry data, most of which were collected at locations near previously sampled locations, were consistent with the rest of the RFI data in terms of PAH concentrations and

spatial distributions. Therefore, the sediment chemistry data from the toxicity testing are not presented on Figure 5-1. PAH ratios within a sampling location were consistent from location to location. For example, the pyrene to phenanthrene to fluoranthene ratios were approximately 1:1:1 at all locations. Furthermore, these three PAHs were typically the most concentrated PAHs at a given location. Other PAHs also seem to have a relatively fixed ratio from location to location. This type of pattern is interpreted to mean that contamination at the various sampling locations had a similar source. A source has not been identified, but a general contribution from parking lot and road pavement, road traffic, railroad traffic, and other similar sources is expected. Runoff of surface soil contaminated with historical releases from the former Asphalt Batch Plant and related asphalt spills is also expected.

In summary, the greatest degree of sediment contamination was observed in the eastern half of the sediment sampling pattern at locations 15SW/SD006, 15SW/SD015, 15SW/SD016, and 15SW/SD017. Location 15SW/SD006, near the center of SWMU 15, had the greatest degree of PAH contamination. However, the elevated target analyte concentrations are reasonably well bounded. This bounding is achieved by downgradient concentrations that are generally less than SVs or upgradient concentrations.

## 5.5 PERCHED GROUNDWATER CONTAMINATION

**All Chemicals -** Without a significant reservoir of contamination in soils or sediments that may leach into groundwater, it is not surprising that few chemical contaminants were detected in perched groundwater. Those that were detected belong to the herbicide, SVOC (especially PAHs), and metal groups of analytes. The groundwater was collected from temporary wells used to investigate perched groundwater at the overburden-bedrock interface. Only select SVOCs and metals were detected in groundwater at concentrations exceeding SVs. The only SVOCs detected at concentrations exceeding screening values were the relatively soluble PAHs, naphthalene and 2-methylnaphthalene. These chemicals, which were also detected in sediments and surface at elevated concentrations, exceeded human health SVs at a single groundwater sampling location, 15TW001. One other chemical, dibenzofuran, was detected at the same location in a single perched groundwater sample (15GWTW001), but this chemical is probably not related to site activities because the reported concentration was near detection limits and this chemical was not detected in any other SWMU 15 environmental media. Hence, the detection of this latter chemical was probably a false detection. No other SVOCs were detected in groundwater; consequently, SVOCs are considered not to be significant site-related groundwater contaminants at SWMU 15. Metals were widely detected in the perched groundwater. Several exceedances of human health and/or ecological SVs were observed, but the metals concentrations appear to be within published normal background levels observed elsewhere (Dragun, 1988). Iron and manganese are at the high end of what could be considered a normal range of groundwater concentrations. The groundwater in this case,

however, is perched water. It was analyzed to determine what contaminants might be leaching into groundwater rather than representing potable groundwater. There does not appear to be a site-related source of groundwater metal contamination at SWMU 15 because the degree and spatial extent of contamination detected is very limited. Because much of the soil in this area is fill material, it is not surprising to find an occasional high concentration in groundwater that may represent leaching of debris in the fill that is not operationally related to site activities. There is also little to no evidence of metals contamination in surface water and sediments. This is an indication that slightly elevated groundwater metal concentrations are not affecting other site media. Therefore, the exceedances of SVs are considered to be minor and the detected chemicals are considered not to represent site-related contamination.

A comparison of metals concentrations from filtered and unfiltered samples reveals that the majority of the following metal results are associated with suspended matter in the groundwater: aluminum, beryllium, chromium, cobalt, copper, iron, lead, vanadium, and zinc. Iron is a borderline case. Approximately half of the total iron concentration is attributable to particulate matter and half is attributable to dissolved iron.

## 5.6 EXTENT OF CONTAMINATION SUMMARY

The degree and extent of contamination at SWMU 15 is very limited and reasonably well bounded. The primary contaminants are PAHs in soils and sediments. Soil PAH contamination is essentially limited to surface soils and is unbounded in the area of the former Asphalt Batch Plant, however, the magnitude of the contamination in that area appears to be limited. The extent of influence from the former Asphalt Batch Plant is limited to the west by the adjacent railroad. This railroad is also a likely contributor to soil PAH contamination. A lesser amount of PAH contamination was identified in subsurface and surface soil at location 15SB049, but the degree of contamination is minor compared to the Asphalt Batch Plant contamination.

Surface water and sediment contamination are well bounded. Location 15SW/SD006 had the overall greatest degree of surface water and sediment contamination. The contamination is essentially limited to PAHs and metals near locations 15SW/SD006 and 15SW/SD015 through 15SW/SD017, but even this contamination is minor for an industrial area.

Toxicity testing, described in Section 8.0, was conducted on sediments to determine their toxicity to sediment invertebrates. Based on the results of the testing, as described in Section 8.0, it is apparent that the observed concentrations of all contaminants at SWMU 15 are exerting little to no negative

influence on the environment. Therefore, contamination at SWMU 15 is considered to be minor with the possible exception of soils in the northern portion of the Asphalt Batch Plant, where PAH concentrations were the highest.

Groundwater did not exhibit significant levels of site related contamination.

A comparison of metals concentrations from filtered and unfiltered samples reveals that the majority of the following metals results are associated with the solid portion of surface water samples: aluminum, chromium, copper, iron, lead, and vanadium. A similar comparison reveals that the majority of the following metals results are associated with the solid portion of groundwater samples: aluminum, beryllium, chromium, copper, iron, lead, selenium, vanadium, and zinc. This type of comparison was not conducted for thallium and tin because there were not enough total and dissolved concentrations available to support the comparison.

TABLE 5-1

WORST CASE SURFACE AND SUBSURFACE CHEMICAL CONCENTRATIONS
FOR SELECT CHEMICALS WITH SCREENING VALUE EXCEEDANCES
NSWC CRANE
CRANE, INDIANA

| Parameter | Soil UTL, mg/kg [1] | Sample No. | Soil Concentration, mg/kg | ERA SV Exceedance [2] | HHRA SV Exceedance [2] |
|---|---|---|---|---|---|
| **Surface Soils** | | | | | |
| Aluminum | 19,900 | 15SS0140002 | 27800 | NA | **YES** |
| | | 15SS0150002 | 26300 | NA | **YES** |
| | | 15SS0180002 | 24500 | NA | **YES** |
| | | 15SS0200002 | 29900 | NA | **YES** |
| | | 15SS0310002 | 29900 | NA | **YES** |
| Arsenic | 11.83 | 15SS0360002 | 20.7 | **YES** | **YES** |
| Chromium | 28.7 | 15SS0180002 | 34 | **YES** | **YES** |
| | | 15SS0300002 | 39.9 | **YES** | **YES** |
| | | 15SS0310002 | 31 | **YES** | **YES** |
| | | 15SS0350002 | 34.4 | **YES** | **YES** |
| | | 15SS0360002 | 49.7 | **YES** | **YES** |
| | | 15SS0380002 | 32.3 | **YES** | **YES** |
| | | 15SS0430002 | 40.2 | **YES** | **YES** |
| | | 15SS0440002 | 36.8 | **YES** | **YES** |
| Cobalt | 32.4 | 15SS0350002 | 59.6 | **YES** | **YES** |
| Lead | 27.0 | 15SS0060002 | 29.8 | **YES** | NO |
| | | 15SS0080002 | 155 | **YES** | **YES** |
| | | 15SS0100002 | 31.1 | **YES** | NO |
| Selenium | 0.81 | 15SS0380002 | 1.1 | **YES** | **YES** |
| Thallium | 0.31 | 15SS0350002 | 0.43 | **YES** | **YES** |
| | | 15SS0380002 | 0.47 | **YES** | **YES** |
| Zinc | 65.6 | 15SS0020002 | 626 | **YES** | NO |
| | | 15SS0060002 | 111 | **YES** | NO |
| | | 15SS0070002 | 214 | **YES** | NO |
| **Subsurface Soil (Soil Group 8)** [3] | | | | | |
| Aluminum | 20,600 | 15SB0080610 | 25500 | NA | **YES** |
| | | 15SB0100206 | 23600 | NA | **YES** |
| | | 15SB0230206 | 31100 | NA | **YES** |
| Barium | 115 | 15SB0080206 | 157 | NA | **YES** |
| | | 15SB0090206 | 141 | NA | **YES** |
| | | 15SB0100610 | 157 | NA | **YES** |
| Cobalt | 21 | 15SB0100206 | 54.2 | NA | **YES** |
| Manganese | 704 | 15SB0060206 | 1020 | NA | **YES** |
| | | 15SB0080206 | 1400 | NA | **YES** |
| | | 15SB0090206 | 3570 | NA | **YES** |

ERA - Ecological risk assessment
HHRA - Human health risk assessment
NA - Not applicable
SV - Screening value
UTL - Upper tolerance limit

1 UTL represents the concentration below which 95 percent of concentrations will fall with 95 percent confidence if the corresponding samples represent background concentrations.
2 Exceedances of screening values are indicated by bold "Yes".
3 Subsurface Soil Group 9 data not shown because there was only one sample in that group.

# 6.0 FATE AND TRANSPORT / CONCEPTUAL MODEL

This section presents an overview of the potential movement of contaminants at SWMU 15 among the environmental media. COPCs present at SWMU 15 belong to three primary groups: SVOCs, pesticides, and metals (see Sections 3 and 5). However, the metals, pesticides, and several of the SVOCs are dismissed as COCs in Sections 7 and 8, following this section. Seven of the SVOCs are listed in Tables 6-1 and 6-2 and are considered to be the primary contaminants (i.e., COCs) present at SWMU 15; they were detected at the highest concentrations, were detected at the highest frequencies, and have the highest potentials to cause human or ecological risk. These seven PAHs are identified in Sections 7 and 8 as the COCs for SWMU 15. As a result, the information presented in this section focuses only on the seven COCs. The primary chemical and biological factors which affect the mobility, migration, biodegradation, and persistence of the COCs at SWMU 15 are solubility, adsorption/desorption, biodegradation, and plant uptake.

The information presented in this section supports current and future assessments (e.g., risk assessments) by:

- Describing the chemical and physical properties of PAHs that affect the mobility, migration, biodegradation, and persistence of the principal COCs at SWMU 15.
- Providing a basis for determining 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.
- Providing a basis for determining whether the potential exists for contaminant concentrations to decrease over time in various media.
- Presenting a conceptual site model that identifies contamination sources, contaminant migration pathways, and potential receptors.

## 6.1 PROPERTIES AFFECTING MOBILITY, ATTENUATION, AND PERSISTENCE

### 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 Table 6-1. These

Pathways B2 and D. Between storm events, the majority of water entering the creeks is probably derived from Pathways B2, B3, and C (see Figure 6-1).

Table 6-2 presents a summary of COC concentrations detected in each media at SWMU 15. For each medium or subset of medium, the average and maximum COC 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.

The following conclusions can be made on the basis of information presented in Table 6-2.

- PAHs in surface soil are not migrating.
- Higher concentrations of PAHs are found in surface soils.
- PAH concentrations decrease by one to two orders of magnitude in subsurface soil samples.
- PAH concentrations are elevated in storm sewer sediment and to a lesser extent in tributary sediments.
- PAHs are detected in storm sewer waters and surface water runoff.
- PAHs are only infrequently detected in perched groundwaters with benzo(a)anthracene being the only PAH detected.

### 6.2.1 Historical Operations and Releases

SWMU 15 includes former Buildings 2801, 2716, 2717, 2718, 2774, and existing Buildings 2693 and 3330. There was a 5,000-gallon AST along the northern side of the former boiler house (Building 2801). Approximately, 10,000 gallons of waste oil were removed annually from this AST. No specific information concerning historical operations at Building 2801 is available.

An Asphalt Batch Plant with unknown operational history was removed in the early 1970s. Although there is no supporting documentation, other asphalt plants of this era are known to have mixed waste oils (such as vehicle crankcase oils that might contain metals and hydraulic oils that might contain PCBs) into the liquid tar. NSWC employees have stated that tar spills occurred at the plant. Spills were attributed to boilovers and accidental discharge. One spill occurred as a result of a molten tar storage tank drain valve

### 6.2.3 Groundwater Contamination

Aquifer System: Groundwater at SWMU 15 has only been investigated via eight temporary monitoring wells installed in the overburden soil (see Figure 2-2 for locations). Contaminants have been migrating downward and entering the shallow groundwater flow system (Pathway B in Figure 6-1) probably since the beginning of SWMU 15 operations in the 1940s. The majority of perched groundwater in the overburden soil is moving eastward and southeastward, toward the unnamed creeks (see Figure 4-4). Perched groundwater has four potential paths to migrate: (1) it can be taken up by roots and transpired (Pathway B1), (2) it can flow laterally into a storm sewer and contribute to storm sewer flow (Pathway B2), (3) it can migrate down the hillside through the soil and discharge directly to the creeks through the creek banks (Pathway B3), or (4) it can move vertically downward and enter the bedrock flow system (Pathway C), as diagrammed in Figure 6-1. Ultimately, all pathways (surface or subsurface) will deliver water from SWMU 15 to the unnamed tributary creeks.

A portion of the groundwater is contained in the bedrock and is migrating toward the nearest creeks. However, the primary and secondary permeability of the bedrock is probably less than the overburden soils, and groundwater flow velocities should consequently be slower through the rock.

Contaminant Migration: Concentrations for chemicals detected in downgradient groundwater samples are shown in Table 3-26. Analyses of eight samples collected from the temporary monitoring wells indicated that COCs were virtually absent in perched groundwater (see Table 6-2). Benzo(a)anthracene was the only COC detected in perched groundwater, and it was detected at very low concentrations (maximum concentration = 0.07 µg/L in well 15TW001). Hence, perched groundwater does not appear to be a significant recipient or a transmitter of COCs. If this is the case, then groundwater in the bedrock will also not be a significant pathway for contaminant migration.

### 6.2.4 Surface Water (Storm Sewers and Creeks)

Most of the rainfall and snowmelt at SWMU 15 runs off buildings, parking lots, roads, and grassy areas and enters the storm sewer system. A schematic diagram of potential surface water pathways at SWMU 15 is shown in Figure 6-1. One storm sewer network drains the northwestern portion of SWMU 15 and discharges to the ground surface at location 15SW/SD006. Another storm sewer network drains the railroad tracks and the areas around Building 2693 and the former asphalt plant on the western side of the SWMU; this storm drain discharges to the ground surface at location 15SW/SD009. Together these two storm drains comprise almost the entire flow observed in Tributary 15-1. Most of the flow in Tributary 15-2 comes from further north (upgradient of SWMU 15). These tributaries feed Tributary 15-3.

### 6.2.6 Summary of Conceptual Site Model

Figure 6-1 is a schematic diagram of the conceptual flow and transport model for SWMU 15. The following is a summary of the conceptualized aspects of contaminant migration, fate, and persistence at SWMU 15:

- The northern storm sewer network is a moderately large source of dissolved and particulate COCs entering the creeks.

- Very low concentrations of PAHs in water and sediment were observed emanating from the western side of SWMU 15, which includes the former Asphalt Batch Plant area.

- Perched groundwater is nearly devoid of PAHs, so groundwater flowing to the creeks is not transporting PAHs to the creeks in significant quantities. If COCs are actively being transported to the creeks, it is primarily via surface runoff and the storm sewers outfalls.

**TABLE 6-1**

**CHEMICAL AND DEGRADATION CHARACTERISTICS OF SITE CONTAMINANTS**
**SWMU 15 - ROADS AND GROUNDS AREA**
**NSWC CRANE**
**CRANE, INDIANA**

| Chemical | Solubility (mg/L) | $K_{oc}$ (L/kg) | $K_d$ (L/kg) | Biodegradation Half-Life (years) |
|---|---|---|---|---|
| **PAHs** | | | | |
| benzo(a)anthracene | 0.0094 [1,2] | 231,000 [1], 398,000 [2] | 185 - 318 [3] | 3.73 [4] |
| benzo(a)pyrene | 0.00162 [1,2] | 787,000 [1], 1,020,000 [2] | 630 - 816 [3] | 2.90 [4] |
| benzo(b)fluoranthene | 0.0015 [1,2] | 803,000 [1], 1,230,000 [2] | 642 - 984 [3] | 3.34 [4] |
| benzo(k)fluoranthene | 0.0008 [1,2] | 787,000 [1], 1,230,000 [2] | 630 - 984 [3] | 11.7 [4] |
| chrysene | 0.0016 [1,2] | 236,000 [1], 398,000 [2] | 189 - 318 [3] | 5.48 [4] |
| dibenzo(a,h)anthracene | 0.00103 [1], 0.00249 [2] | 2,620,000 [1], 3,800,000 [2] | 2,096 - 3,040 [3] | 5.15 [4] |
| indeno(1,2,3-cd)pyrene | 0.00019 [1], 0.000022 [2] | 2,680,000 [1], 3,470,000 [2] | 2,144 - 2,776 [3] | 4.0 [4] |

L/kg - Liters per kilogram.
mg/L - milligrams per liter.

References:
1 Oak Ridge National Laboratory (2005).
2 U.S. EPA (2002, Table C-1).
3 Soil-water partition coefficient ($K_d$) calculated by multiplying organic matter-water partition coefficient ($K_{oc}$) times mass fraction of natural organic carbon (foc) value of 0.0008 (average measurement of two SWMU 13 soil samples).
4 Howard et al. (1991); ground water category, high value.

TABLE 6-2

GENERAL LEVELS OF CONTAMINANT CONCENTRATIONS IN EACH MEDIUM
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA

| Medium Type [1] | mg/kg | | | | | | | | | | µg/L | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Surface Soil (45) | | Subsurface Soil (19) | | Storm Sewer Sediment (2) | | Sediment, Tributaries 15-1 and 15-2 (10) | | Sediment, Tributary 15-3 (5) | | Storm Sewers and Outfall (5) | | Tributaries 15-1 and 15-2 (7) | | Tributary 15-3 (2) | | Perched Groundwater (8) | |
| | mean | maximum | mean | maximum | mean | maximum | mean | maximum | mean | maximum | mean | maximum | mean | maximum | mean | maximum | mean | maximum |
| **Contaminant** | | | | | | | | | | | | | | | | | | |
| benzo(a)anthracene | 119 | 4,600 | 21.1 | 110 | 1,700 | 3,300 | 1,209 | 3,700 | 566 | 960 | 0.636 | 1.84 | 0.055 | 0.13 | 0.115 | 0.14 | 0.0304 | 0.07 |
| benzo(a)pyrene | 334 | 10,000 | 22.0 | 150 | 1,910 | 3,300 | 1,285 | 4,500 | 678 | 1,200 | 0.860 | 2.38 | 0.055 | 0.14 | 0.13 | 0.16 | ND | ND |
| benzo(b)fluoranthene | 407 | 12,000 | 27.9 | 230 | 2,225 | 4,300 | 1,509 | 6,000 | 762 | 1,200 | 2.010 | 5.83 | 0.088 | 0.28 | 0.265 | 0.31 | ND | ND |
| benzo(k)fluoranthene | 257 | 6,900 | 14.7 | 86 | 995 | 1,900 | 681 | 2,000 | 396 | 760 | 0.584 | 1.72 | 0.054 | 0.14 | 0.105 | 0.13 | ND | ND |
| chrysene | 325 | 9,500 | 23.6 | 120 | 2,130 | 4,100 | 1,442 | 4,500 | 720 | 1,200 | 1.550 | 4.46 | 0.084 | 0.25 | 0.26 | 0.32 | ND | ND |
| dibenzo(a,h)anthracene | 99 | 3,200 | 5.04 | 31 | 354 | 700 | 238 | 620 | 123 | 200 | 0.167 | 0.460 | ND | ND | ND | ND | ND | ND |
| indeno(1,2,3-cd)pyrene | 370 | 11,000 | 13.2 | 85 | 1,610 | 3,100 | 993 | 2,700 | 546 | 870 | 0.772 | 2.09 | 0.09 | 0.044 | 0.095 | 0.11 | ND | ND |

ND = Not detected.
mg/kg - milligrams per kilogram.
µg/L - micrograms per liter.

1 Number in parentheses indicates the number of samples analyzed.

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## LEGEND:

PATHWAY DISCRIPTIONS:

A – CONTAMINANT SOURCE AREAS (OVERBURDEN SOIL)

B – PERCHED GROUNDWATER FLOW IN OVERBURDEN SOIL

B1 – GROUNDWATER TAKEN UP BY VEGETATION AND TRANSPIRED

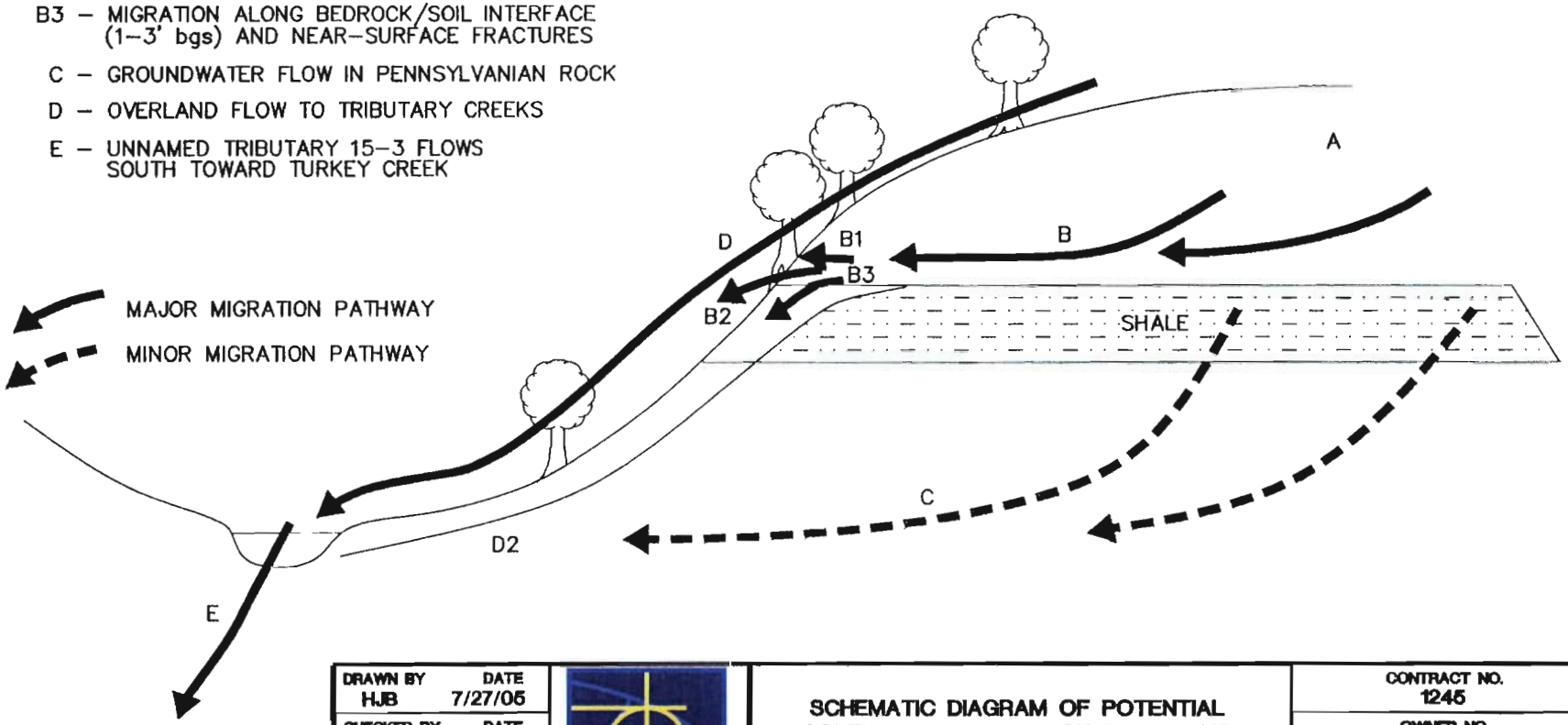
B2 – GROUNDWATER SEEPS INTO STORM SEWERS AND JOINS SEWER OUTFALLS

B3 – MIGRATION ALONG BEDROCK/SOIL INTERFACE (1–3' bgs) AND NEAR–SURFACE FRACTURES

C – GROUNDWATER FLOW IN PENNSYLVANIAN ROCK

D – OVERLAND FLOW TO TRIBUTARY CREEKS

E – UNNAMED TRIBUTARY 15–3 FLOWS SOUTH TOWARD TURKEY CREEK




| | | | |
|---|---|---|---|
| DRAWN BY HJB | DATE 7/27/05 | SCHEMATIC DIAGRAM OF POTENTIAL CONTAMINANT MIGRATION PATHWAYS SWMU 15 - ROADS AND GROUNDS AREA NSWC CRANE CRANE, INDIANA | CONTRACT NO. 1245 |
| CHECKED BY | DATE | | OWNER NO. 0000 |
| REVISED BY | DATE | | APPROVED BY / DATE |
| SCALE AS NOTED | | | DRAWING NO. FIGURE 6-1 / REV. 0 |

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# 7.0 HUMAN HEALTH RISK ASSESSMENT

This section presents the HHRA for the Roads and Grounds Area (SWMU 15) at NSWC Crane. The objective of the HHRA is to determine whether detected concentrations of chemicals within the study area pose a significant threat to potential human receptors under current and/or future land use. The potential risks to human receptors will be estimated based on the assumption that no actions are taken to control contaminant releases.

## 7.1 INTRODUCTION

The following current U.S. EPA, IDEM, and 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, 1993a).
- Soil Screening Guidance: Technical Background Document (U.S. EPA, 1996a).
- 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, 2001).
- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final Guidance (U.S. EPA, 2004b).
- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (U.S. EPA, 2002a).
- Navy Final Policy on the Use of Background Chemical Levels (Navy, 2004).

- Conducting Human Health Risk Assessments under the Environmental Restoration Program (Navy, 2001).

- Risk Integrated System of Closure. User's Guide and Technical Resource Guidance Document (IDEM, 2004a).

This HHRA was prepared using essentially the same methodology that was used to prepare the HHRAs for SWMUs 4, 5, 9, and 10 (TtNUS, 2003a), SWMU 3 (TtNUS, 2003b), and SWMU 13 (TtNUS, 2005).

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 data quality report is included in Section 3.0 that provides information on precision, accuracy, representativeness, completeness, and comparability of the analytical data.

Fixed-base analytical results only for the target analyte lists for the field investigation were used in the quantitative risk evaluation. Typically, unfiltered results for groundwater and surface water are 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. The elimination of data qualified "R" may result in data gaps that may increase the uncertainty in the risk assessment. However, as shown in Section 3.2, the chemicals qualified "R" (2,4-dimethylphenol, 3&4 methylphenol, 3,3'-dichlorobenzidine, 4-chloroaniline, hexachlorocyclopentadiene, acrolein, dichlorodifluoromethane, isobutanol, propionitrile, 2,4-dinitrophenol, 2-nitrophenol, 3,3-dichlorobenzidine, 4,6-dinitro-2-methylphenol, and 4-nitrophenol) are not constituents of concern at SWMU 15. Therefore, it is unlikely that risks have been underestimated by the removal of unreliable data from the data sets.

### 7.2.2 Selection of Chemicals of Potential Concern

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 screening level(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 15. Screening concentrations based on IDEM Risk Integrated System of Closure (RISC) default closure levels (IDEM, 2004a) and U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) (U.S. EPA, 2004a) were used, as well as other U.S. EPA criteria. The IDEM default closure levels for soil include risk-based direct contact criteria, soil attenuation capacity levels, soil saturation concentrations, and migration from soil to groundwater criteria. The IDEM default closure levels for groundwater are based on U.S. EPA Maximum Contaminant Levels (MCLs), if available. If not, the default closure level is the lesser of the risk-based criteria and the solubility limit. The IDEM risk-based default closure levels correspond to a systemic Hazard Quotient (HQ) of 1 for non-carcinogens or an incremental lifetime cancer risk (ILCR) of $1 \times 10^{-5}$ for carcinogens.

The screening levels based on U.S. EPA Region 9 PRGs correspond to HQs of 0.1 for non-carcinogens or an ILCR of $1 \times 10^{-6}$ for carcinogens. The U.S. EPA Region 9 PRGs for non-carcinogens are based on a Hazard Index (HI) of 1 and 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 screening levels to be used for each medium in the risk assessment are briefly discussed below.

Soil

Screening concentrations based on the following criteria were used to select COPCs for surface and subsurface soil:

- IDEM residential default closure levels for direct contact with soil (IDEM, 2004a)
- U.S. EPA Region 9 PRGs for residential soil (U.S. EPA, 2004a).
- U.S. EPA generic Soil Screening Levels (SSLs) for the inhalation of volatiles and fugitive dusts calculated 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, 1996a).

If the maximum concentration of a constituent exceeded screening levels based on any of these criteria, the chemical was selected as a COPC for soil and carried through to the quantitative risk assessment.

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. Otherwise, the risks associated with the inhalation pathway were considered insignificant, and this exposure pathway was eliminated from further evaluation.

Soil Screening Levels for the Protection of Groundwater

Comparisons of chemical concentrations in soil with SSLs for the protection of groundwater were used to indicate the potential for a chemical in soil to adversely impact groundwater. The SSL comparisons were not used to select COPCs for quantitative risk evaluation. Chemicals with maximum concentrations that exceeded the migration to groundwater SSLs are presented and discussed in Sections 7.2.3.1 and 7.2.3.2. The following criteria were used for the SSL comparisons:

- U.S. EPA generic SSLs for migration to groundwater calculated 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, 1996a).

- IDEM residential default closure levels for migration of chemicals from soil to groundwater (IDEM, 2004a).

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.

Sediment

No specific screening levels exist for human exposure to sediment. COPCs for sediment were selected by comparing detected site concentrations to screening levels based on the following:

- IDEM residential default closure levels for direct contact with soil (IDEM, 2004a).
- U.S. EPA Region 9 PRGs for residential soil (U.S. EPA, 2004a).

A chemical detected in sediments was selected as a COPC for sediments if the maximum detected concentration exceeded screening levels based on these criteria. The use of soil screening criteria for sediment COPC identification is regarded as a conservative approach because exposure to sediment is expected to be less intensive and less frequent than exposure to soil. U.S. EPA generic 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.

Surface Water

The screening levels used to select COPCs for surface water were based on the following criteria:

- IDEM residential default closure levels for groundwater (IDEM, 2004a)
- U.S. EPA Region 9 PRGs for tap water (U.S. EPA, 2004a)
- U.S. EPA MCLs (U.S. EPA, 2004b)

If the maximum concentration of a constituent exceeded any screening levels based on these criteria, the chemical was selected as a COPC and carried through the quantitative risk assessment.

Risk-based COPC screening levels for tap water ingestion, which are based on daily, residential exposure assumptions, were conservatively used to select COPCs for surface water. The use of tap water screening levels is regarded as a highly conservative approach to COPC selection for surface water because potential human exposure to the surface water in intermittent ditches and streams located within SWMU 15 is expected to be limited to incidental exposures such as those occurring during trespassing. Such exposures are anticipated to be significantly less than the daily exposure assumed for the tap water ingestion scenario.

Federal Ambient Water Quality Criteria (AWQCs) for the protection of human health assuming routine consumption of water were not used as COPC selection criteria for surface water because of the conservative nature of the IDEM residential closure levels for groundwater, the U.S. EPA Region 9 PRGs for tap water, and U.S. EPA MCLs that were used as COPC selection criteria.

Groundwater

As explained in Section 5.5, groundwater in the perched aquifer is not considered to be a medium of concern at SWMU 15 and is not evaluated in the quantitative risk assessment.

Lead as a COPC

Limited criteria are available to evaluate the potential risks associated with lead. No risk-based criteria are available for lead because the U.S. EPA has not derived toxicity values [i.e., cancer slope factors (CSFs) or reference doses (RfDs)] for this constituent. 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 was used as the screening level for soil and sediment in the HHRA for SWMU 15.

The IDEM default closure level and Safe Drinking Water Act (SDWA) Action 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., 2-methylnaphthalene, benzo(g,h,i)perylene, and phenanthrene]. Appropriate surrogates were selected for some of these chemicals based on similar chemical structures. Pyrene was used as a surrogate for benzo(g,h,i)perylene and phenanthrene, and naphthalene was used as a surrogate for 2-methylnaphthalene. The uncertainty associated with the omission of these chemicals from the quantitative risk assessment is discussed in the uncertainty section of the risk assessment.

Determination of Site-Related Chemicals (Background Evaluation)

The evaluation of chemical concentrations detected in SWMU 15 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 that 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).

Frequency of Detection

Chemicals were eliminated from the COPC list if detected at a frequency of less than 5 percent in a medium. A frequency screen was conducted only when there were 20 or more samples in the medium of concern. The decision to eliminate a chemical because of low detection frequency was also based on site history (i.e., whether there a reason to believe that a chemical may be related to past site activities) and the magnitude of the concentration (i.e., whether the concentration of a chemical indicates a potential hot spot area). No chemicals were eliminated as COPCs for SWMU 15 on the basis of frequency of detection.

#### 7.2.2.2 Decision Rules for Establishing COPCs

The following decision rules were used to select initial lists of COPCs for SWMU 15:

- A chemical detected in soil, surface water, or sediment was selected as a COPC if any detected chemical concentration exceeded the screening levels described in Section 7.2.2.1.

- If a chemical was not detected in any of the samples in a particular medium, but detection limits exceeded the risk-based screening levels, the chemical was not selected as a COPC but is qualitatively discussed in the uncertainty analysis section.

- Individual chemicals may be eliminated as COPCs if they are detected at a frequency of less than 5 percent in any given medium but only if there are no other indications the chemical would pose an unacceptable risk to receptors (e.g., there is no evidence of a contaminant hot spot). Chemicals exhibiting unusually high concentrations or are clearly site-related may be retained as COPCs at the discretion of the human health risk assessor.

### 7.2.3 COPCs Selected for HHRA

COPCs at SWMU 15 were selected for surface soil, subsurface soil, surface water, and sediment using the risk-based COPC screening levels described in Section 7.2.2.1. A discussion of the chemicals identified as COPCs and the rationale for COPC selection are provided in the following subsections. COPC selection tables for each medium are presented as Tables 7-1 through 7-6. Chemicals retained as COPCs for SWMU 15 are presented in Table 7-7. The Risk Assessment Guidance for Superfund (RAGS) Part D tables for COPC selection are included in Appendix I.

#### 7.2.3.1 COPC Selection for Surface Soil (0 to 2 Feet bgs)

This section discusses the COPC selection for chemicals detected in surface soil samples collected during the field investigations conducted in December 2004. Seven VOCs, 23 SVOCs, seven pesticides, one PCB (Aroclor-1260), one herbicide (pentachlorophenol), and 24 metals were detected in surface soil samples. The maximum detected surface soil concentrations were compared to screening levels based on U.S. EPA Region 9 PRGs for residential land use and IDEM residential default closure levels for direct contact. The following chemicals were retained as COPCs for surface soil at SWMU 15:

- PAHs – benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- Aroclor-1260.
- Inorganics – aluminum, arsenic, cadmium, iron, manganese, and vanadium.

Aluminum, cadmium, and vanadium were selected as COPCs because the maximum detected concentrations of these non-carcinogens exceeded screening levels (set at an HI of 0.1). However, they did not exceed the U.S. EPA Region 9 PRGs for residential soil. The COPC selection for direct contact with surface soil is presented in Table 7-1

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 7-2. Concentrations reported for all chemicals were less than the U.S. EPA SSLs for soil to air; therefore, exposures through inhalation of fugitive dust emissions from surface soil were not evaluated quantitatively in the HHRA.

The maximum detected surface soil concentrations were also compared to U.S. EPA SSLs for chemical migration from soil to groundwater and to IDEM residential default closure levels for migration to groundwater in Table 7-2. The following chemicals were detected in surface soil at maximum concentrations exceeding the screening levels for migration from soil to ground water:

- Methylene chloride.
- 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.
- N-nitrosodiphenylamine.
- Pentachlorophenol.
- Inorganics – aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium, and thallium.

The comparisons of site concentrations to screening concentrations presented in Table 7-2 were not used to select COPCs for quantitative risk evaluation but to indicate the potential for chemicals in soil to impact groundwater. Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, n-nitrosodiphenylamine, pentachlorophenol, antimony, arsenic, barium, cadmium, mercury, nickel, selenium, and thallium exceeded U.S. EPA SSLs but not IDEM default closure levels for migration from soil to groundwater. Of the organics chemicals listed above, only methylene chloride is considered to be mobile in soil, and none of the organic chemicals were detected in the perched groundwater samples, indicating that migration from soil to groundwater is not occurring at SWMU 15. In addition, as discussed in Section 5.2, the chemical concentration distribution patterns in

SWMU 15 do not soil suggest a source of contamination consistent with site operations and contaminant migration mechanisms. In regard to metals, Table 5-1 presents an analysis of metals concentrations at locations where screening concentrations were exceeded and the 95/95 background UTL was exceeded by 50 percent or more. Based on the data in Table 5-1, it was concluded in Section 5.2 that metals are not considered to be significant site-related contaminants at SWMU 15 and were not discussed further for soils. Furthermore, as discussed in Section 5.5, a comparison of metals concentrations in filtered and unfiltered groundwater samples indicated that the majority of the metals results in groundwater are associated with suspended matter in the groundwater (especially, aluminum, chromium, cobalt, copper, lead, and vanadium). In addition, the concentration of only one metal (arsenic - 10.4 µg/L) in one filtered groundwater sample slightly exceeded its primary MCL (10 µg/L).

#### 7.2.3.2 COPC Selection for Subsurface Soil (Depths Greater that 2 Feet bgs)

This section discusses the COPC selection for chemicals detected in subsurface soil samples collected during the field investigations conducted in December 2004. Eight VOCs, 20 SVOCs, four pesticides, and 22 metals were detected in subsurface soil samples. The maximum detected subsurface soil concentrations were compared to screening levels based on U.S. EPA Region 9 PRGs for residential land use and IDEM residential default closure levels for direct contact. The following chemicals were retained as COPCs for subsurface soil at SWMU 15:

- Benzo(a)pyrene
- Inorganics – aluminum, arsenic, iron, manganese, and vanadium

Aluminum and vanadium were selected as COPCs because the maximum detected concentrations of these non-carcinogens exceeded screening levels (set at an HI of 0.1), but they did not exceed the U.S. EPA Region 9 PRGs for residential soil. The COPC selection for direct contact with subsurface soil is presented in Table 7-3

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 7-4. Concentrations reported for all chemicals were less than U.S. EPA SSLs for soil to air; therefore, exposures through inhalation of fugitive dust emissions from subsurface soil were not evaluated quantitatively in the HHRA.

The maximum detected subsurface soil concentrations were also compared to U.S. EPA SSLs for chemical migration from soil to groundwater and to IDEM residential default closure levels for migration to

groundwater in Table 7-4. The following chemicals were detected in subsurface soil at maximum concentrations exceeding the screening levels for migration from soil to groundwater:

- Methylene chloride.
- Inorganics – aluminum, arsenic, barium, cadmium, chromium, cobalt, manganese, nickel, selenium, and thallium.

The comparisons of site concentrations to screening concentrations presented in Table 7-4 were not used to select COPCs for quantitative risk evaluation but to indicate the potential for chemicals in soil to impact groundwater. Concentrations of arsenic, barium, cadmium, nickel, selenium, and thallium exceeded U.S. EPA SSLs but not IDEM default closure levels for migration from soil to groundwater. Methylene chloride was the only organic chemical with a maximum concentration exceeding the migration to groundwater SSL, but it was not detected in any of the perched groundwater samples collected at SWMU 15. The discussion regarding the migration of metals in surface soil to groundwater presented in Section 7.2.3.1 above is also applicable to subsurface soil.

Based on the above analyses, it appears that groundwater at SWMU 15 has not been impacted by contaminants migrating from surface or subsurface soil.

#### 7.2.3.3 COPC Selection for Surface Water

Fifteen surface water samples, including one upgradient sample, were collected at SWMU 15 in January 2005. As discussed in Sections 5.1.2, surface water and sediment samples were grouped into three categories: Storm Sewer and Outfall (or Storm Sewer) System (ST), Tributaries 15-1 and 15-2, and Tributary 15-3. These three groups represent drainage channels of significantly different character. The storm sewer system collects surface water run-off from parking lots, roads, the former wash rack area, and other surfaces. This system drains to Tributaries 15-1 and 15-2 and heavily influences samples collected from these downstream areas with regard to chemical composition. Tributaries 15-1 and 15-2 are natural drainage channels that may have intermittent water flow, with water flow being more probable in wetter seasons. These tributary channels drain into Tributary 15-3, which is located southeast of SWMU 15. The Tributary 15-3 channel is more likely to contain water year round and transmits a larger volume of water than the other channels. Although the tributaries integrate flow from areas near but outside of SWMU 15, the sampled locations are believed to represent influence primarily from SWMU 15. The upgradient sample (15SW01401) located on the eastern side of the site is expected to represent background surface water conditions for all three categories of drainage channels. Table 7-5 includes a comparison of maximum site concentrations to concentrations detected in the upgradient sample.

Unfiltered and filtered samples were collected from the 14 surface water locations. A comparison of the filtered and unfiltered sample results showed noticeable differences in the concentrations of some analytes (e.g., aluminum, iron, and vanadium) in several samples, indicating that elevated metals concentrations in unfiltered surface water samples may be the result of turbidity levels in the samples. The turbidity levels in 11 of the 14 surface water samples exceeded 10 NTU, with levels ranging from 12 to 370 NTU.

Suspended particulate matter in some of the unfiltered samples may also have affected the analysis for PAHs. Turbidity levels in the samples in which PAHs were detected ranged from 20 to 90 NTU. In addition, the maximum concentrations of some PAHs [e.g., benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene] detected in the unfiltered samples exceeded published water solubility levels (IDEM, 2004a), indicating that these compounds were probably present on particulate matter and that the concentrations were due to turbidity in the samples. The COPC selection for surface water is presented in Table 7-5.

The following chemicals were retained as COPCs for surface water:

- 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.
- Inorganics(unfiltered) – antimony, arsenic, iron, manganese, and vanadium.
- Inorganics(filtered) – arsenic, iron, manganese, vanadium.

These constituents were identified as COPCs in surface water because the maximum concentrations exceeded one or more of the human health screening levels (i.e., screening concentrations based on U.S. EPA Region 9 PRGs for tap water, federal primary MCLs, and IDEM residential default closure levels for groundwater). Antimony, iron, and vanadium were selected as COPCs in surface water because maximum detected concentrations exceeded the screening levels (set at an HI of 0.1). However, they did not exceed the U.S. EPA Region 9 PRGs or IDEM default closure levels for tap water. The maximum concentration of antimony was also less than the U.S. EPA MCL.

The use of the aforementioned screening levels for COPC selection for surface water assumes that the surface water is used as a drinking source (i.e., potential receptors ingest 2 liters of water per day for 350 days per year). Drinking water criteria were used because surface water criteria for human health are currently not available. The use of these criteria for screening and risk assessment is conservative because it is unlikely that surface water at SWMU 15 would ever be used as a source of drinking water.

#### 7.2.3.4 COPC Selection for Sediment

As with surface water, COPCs for sediment were selected based on samples collected from the Storm Sewer and Outfall, Tributaries 15-1 and 15-2, and Tributary 15-3. Nineteen sediment samples, including two upgradient samples, were collected at SWMU 15 in January 2005. Two VOCs, 21 SVOCs, five pesticides, two PCBs, two herbicides, and 23 metals were detected in the sediment samples. The upgradient sediment samples were collected from locations 15SW/SD014 and 12SW/SD026.

Table 7-6 summarizes the COPC selection process for sediment. The following chemicals were retained as COPCs for sediment:

- PAHs – benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- PCBs – Aroclor-1254, Aroclor-1260.
- Inorganics – aluminum, arsenic, iron, manganese, and vanadium.

These constituents were identified as COPCs in sediment because maximum concentrations exceeded screening levels based on U.S. EPA Region 9 PRGs for residential soil and IDEM residential default closure levels for direct contact. Aluminum was selected as a COPC for sediment because the maximum detected concentrations exceeded the screening level (set at an HI of 0.1), but it did not exceed the U.S. EPA Region 9 PRGs for soil.

The use of U.S. EPA Region 9 and IDEM risk-based concentrations for soil to evaluate chemical concentrations in sediment is conservative because these criteria were established assuming residential land use scenarios (e.g., routine daily contact with soils). However, it is anticipated that a human receptor would be exposed to the sediments in gullies and streams of the site on a less frequent basis than is assumed for typical residential exposure to soil. Consequently, the use of soil criteria for COPC screening is likely to overestimate potential risks from exposure to sediment.

Table 7-7 summarizes the chemicals retained as COPCs for soil, surface water, and sediment at SWMU 15. Table 7-7 also presents the exposure point concentrations (EPCs) for the COPCs used in the quantitative risk evaluation. 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 EPCs for COPCs to which receptors might be exposed, and to estimate chemical intakes under the identified exposure scenarios.

Actual or potential exposures at SWMU 15 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 for SWMU 15. A conceptual site model 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 environmental media contaminated by site activities. A conceptual site model 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 6.2 presents a detailed conceptual site model for SWMU 15. This section summarizes the conceptual site model as it applies to the HHRA. Figure 7-2 illustrates the conceptual site model for SWMU 15.

The elements of the conceptual site model (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 conceptual site model, including how they pertain to SWMU 15, are discussed below. Sources of contamination, contaminant release mechanisms, transport and migration pathways, exposure routes, and potential receptors are defined. Table 7-8 provides a site-specific summary of the potential receptors evaluated for SWMU 15. A summary of the exposure routes addressed quantitatively for each human receptor is also provided in Table 7-8.

**Site Sources of Environmental Contamination**

SWMU 15 is located west of Turkey Creek in the northern half of NSWC Crane (see Figure 1-2). The SWMU is approximately 44.5 acres in size and is accessed via Highway 468. A parking area and a Pyrotechnics Production Area are located west of the SWMU. The eastern and southern edges of the SMWU include or are upgradient of drainage channels that ultimately flow toward the southeast. To the west and north are industrialized areas. The areas of most interest for this investigation are located in the southern half of the SWMU where roads and grounds support activities occurred.

SWMU 15 includes former Buildings 2801, 2716, 2717, 2718, 2774, and existing Buildings 2693 and 3330. A 5,000-gallon AST was located along the northern side of the former boiler house (Building 2801). Approximately 10,000 gallons of waste oil were removed annually from this AST.

An asphalt batch plant with unknown operational history was removed in the early 1970s. Although there is no supporting documentation specific to SWMU 15, other asphalt plants of this era are known to have mixed waste oils (e.g., vehicle crankcase oils with the potential to contain metals) and hydraulic oils with the potential to contain PCBs into the liquid tar. NSWC employees have stated that tar spills occurred at the plant. Spills were attributed to boilovers and accidental discharge. One spill occurred because a molten tar storage tank drain valve was left open overnight. The tar flowed approximately 150 south in the drainageway between Buildings 2693 and 2801.

The types of materials present at SWMU 15 included waste oils, fuel oil, gasoline, asphalt, solvents, paints, lubricants, and pesticide and herbicide residues. General refuse such as drums, containers, and construction debris was dumped on the hillside south of Buildings 2716, 2717, and 2718.

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 15:

- Petroleum hydrocarbons (from waste oils and fuels)
- SVOCs
- VOCs
- Pesticides
- Herbicides
- PCBs (potentially from waste oil storage)
- Metals
- Cyanide (from wash rack activities)

**Potential Contaminant Release Mechanisms and Transport/Migration Pathways**

Media of concern at the Grounds and Road Area have historically included soil, surface water and groundwater (Halliburton NUS, 1992b). Surface water was considered a medium of concern because, reportedly, pesticide and drum residues discharged along the hillside south of Buildings 2716, 2717, and 2718 may have infiltrated the surface soils and been washed into a small intermittent stream located at the base of the hill. Surface water drainage from SWMU 15 enters an intermittently flowing tributary of Turkey Creek, which flows in a general southward direction and exits the southern boundary of NSWC Crane, discharging to the East Fork of the White River. Surface drainage also flows southeast of the Road and Grounds Area and enters intermittent drainageways that also flow into Turkey Creek. Soil and groundwater were considered media of concern because waste oils were observed to have been released to soil in the Roads and Grounds Area. In addition, pesticide residues were reportedly released to the soils and surface water. Based on the historical information, plausible contaminant release and migration mechanisms for SWMU 15 include the following:

- Transport of surface soil contaminants to subsurface soils and groundwater (and from one aquifer to another) via infiltration, percolation, and migration within the groundwater aquifer.

- Overland runoff of surface waters and migration of sediments and surface soil from SWMU 15 via ditches and culverts to intermittent drainageways on the northwestern and southeastern borders of the SWMU, eventually flowing into Turkey Creek and Boggs Creek.

- Migration of fugitive dusts and VOCs from surface soils and subsurface soils (if construction and excavation activities occur).

A more detailed conceptual site model analysis is presented in Section 6.0.

**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. The facility is not expected to close because principal base operations, the demilitarization of munitions, are critical to the support of the United States Naval fleet. SWMU 15 is an active facility, and operations at the facility are expected to continue in the foreseeable future. However, for purposes of completeness, the baseline risk assessment considers 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 areas:

- **Construction Workers** - A plausible receptor under future land use. Construction/excavation workers are evaluated in the risk assessment to account for the possibility that excavation and construction could occur in the study area in the future. This receptor could be exposed to combined surface/subsurface soil (incidental ingestion and dermal contact), and air (inhalation). Routine exposure to surface water and sediments is not expected for the construction worker. Construction workers are not evaluated for exposure to groundwater because groundwater is not considered a medium of concern at SWMU 15.

- **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 area (e.g., groundskeeping activities and storm sewer and drainage maintenance). This receptor could be exposed to surface soil (incidental ingestion and dermal contact), surface water (dermal contact), sediments (incidental ingestion and dermal contact), and air (inhalation).

- **Occupational Workers** - 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 soil (incidental ingestion and dermal contact) and air (inhalation). 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 to soils on a more frequent basis than the maintenance or construction worker.

- **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 area is not limited by any physical constraints. In addition, hunting activities are permitted at the base. Because the study area is relatively remote

and surrounded by forested areas, hunters (particularly adolescents) may trespass within the study area. This receptor may be exposed to potentially contaminated surface soil (incidental ingestion and dermal contact), air (inhalation), and surface water (incidental ingestion and dermal contact) and sediments (incidental ingestion and 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 drainage ditches. Also potential exposures to surface water will be limited to wading because the streams in the vicinity of SWMU 15 are not deep enough for swimming.

- **Recreational Users** - A plausible receptor under future land use. If NSWC Crane closed, 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 (incidental ingestion and dermal contact), air (inhalation), surface water (incidental ingestion and dermal contact), and sediments (incidental ingestion and dermal contact). Exposures to surface water are expected to limited to wading because the streams at the site are not deep enough for swimming. 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 soil (incidental ingestion and dermal contract), surface water (ingestion and dermal contact), air (inhalation), and sediment (incidental ingestion and dermal contact). Potential exposures to surface water will be limited to wading because the streams in the vicinity of SWMU 15 are not deep enough for swimming. Future residents are not evaluated for exposure to groundwater because groundwater is not considered a medium of concern at SWMU 15.

Potential risks are also evaluated for exposure of future occupational workers and residents to combined surface/subsurface soil. This scenario is based on the assumption that subsurface soil may be brought to the surface during future excavation activities and mixed with surface soil. Potential receptors are then assumed to be exposed to the surface/subsurface soil mixture. The results of this evaluation are presented in the uncertainty section (Section 7.6.2).

Details regarding the assumed receptor characteristics (e.g., intake rate, frequency and duration of exposure) are defined in Section 7.3.4.

### 7.3.2 Central Tendency Exposure versus 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, 1992a) 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 15. 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 the 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 EU 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. The following paragraphs discuss the EUs evaluated for SWMU 15 and the guidelines for calculating EPCs.

- The EU for receptors potentially exposed to surface or subsurface soils includes all sampled locations within the study area. At the present time, the parking area of SWMU 15 is covered with asphalt, and access to the soil in this area is not possible. To account for the possibility that the asphalt cover might be removed in the future, the data set used for risk evaluation contains sample data from the covered and uncovered areas of the site (future conditions). Risks were also calculated for current site conditions (i.e., the parking lot is covered). The results of analysis for current conditions are presented in the uncertainty section (Section 7.6.2). The use of one EU to evaluate risks for soil at SWMU 15 is considered adequate because, with the exception of the potential hot spot area around the former Asphalt Batch Plant, constituent concentrations across the site are relatively consistent.

- The EU for receptors potentially exposed to surface water and sediment includes all sampled locations in the surface water bodies downstream of the study area.

The following guidelines were used to calculate the EPCs:

- If a soil, surface water, or sediment data set for an EU contains fewer than 10 samples, the EPC for the RME and CTE cases is defined as the maximum detected concentration.

- If a soil, surface water, or sediment data set for an EU contains 10 or more samples, the 95-percent upper confidence limit (UCL) on the arithmetic mean, which is based on the distribution of the data set, is selected as the EPC for the RME and CTE cases. The EPCs were calculated following U.S. EPA's Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (U.S. EPA, 2002c).

- Data values less than sample-specific detection limits were substituted with one-half the detection limit.

Table 7-7 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 2004b) 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 incremental lifetime exposures, which assumed a life expectancy of 70 years. Assumptions regarding exposure are presented in Tables 7-9 and 7-10 for the RME and CTE scenarios, respectively. The majority of the exposure assumptions used to estimate chemical intakes were based on default assumptions described in the standard U.S. EPA guidance and are summarized in Tables 7-9 and 7-10. The following paragraphs discuss the non-default receptor-specific exposure assumptions that were used in the risk assessment.

#### 7.3.4.1 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, 2004b):

$$Intake_{si} = \frac{(C_{si})(SA)(AF)(ABS)(CF)(EF)(ED)}{(BW)(AT)}$$

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 ($1 \times 10^{-6}$ kg/mg) |
| EF | = | exposure frequency (days/year) |
| ED | = | exposure duration (years) |
| BW | = | body weight (kg) |
| AT | = | averaging time (days); for non-carcinogens, AT = ED x 365 days/year; for carcinogens, AT = 70 years x 365 days/year |

Exposed surface areas of the 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, 1997a and 2004a) were used to develop 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, 2003a, 2003b) 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 squared centimeters ($cm^2$) for the CTE and RME scenarios. These values represent the $50^{th}$-percentile areas for the head, hands, and forearms (U.S. EPA, 2004b).

- For adolescent trespassers (aged 6 to 16), 25 percent of the total body surface area 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, 1997a). 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 area 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 was the U.S. EPA recommended value of 5,700 $cm^2$ for the RME and CTE scenarios (U.S. EPA 2004b). 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, 2004b). 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 for soil adherence factors provided in RAGS Part E (U.S. EPA, 2004b) 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, respectively, for construction workers (U.S. EPA, 2004b 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, 2004b).

- 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, respectively, presented for soccer player (teens) playing in moist conditions (U.S. EPA, 2004b).

- 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, 2004b).

For the constituents identified as COPCs in soil, the following absorption factors were used (U.S. EPA, 2004b):

- PAHs - 0.13
- PCBs - 0.14
- Arsenic - 0.03
- Cadmium - 0.001

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.

#### 7.3.4.2 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):

$$Intake_{si} = \frac{(C_{si})(IR_s)(FI)(EF)(ED)(CF)}{(BW)(AT)}$$

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 (years) |
| CF | = | conversion factor ($1 \times 10^{-6}$ kg/mg) |
| BW | = | body weight (kg) |
| AT | = | averaging time (days); |
| | | for non-carcinogens, 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 were used to estimate exposure via incidental ingestion. 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 was assumed to be 0.5 for both the RME and CTE scenarios.

#### 7.3.4.3 Dermal Contact with Surface Water

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 surface 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 (years) |
| 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 |

Exposure to surface water for maintenance workers, trespassers, and recreational users were assumed to occur each day the receptor visits the study area. For trespassers, maintenance workers, recreational users, and future residents, 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 7-9 and 7-10 summarize exposure parameters used to evaluate exposure to surface water.

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 (hours/event) |
| $t^{*}$ | = | time it takes to reach steady-state conditions (hours) |
| $K_p$ | = | permeability coefficient from water through skin (cm/hour) |
| FA | = | chemical-specific fraction absorbed (dimensionless) |
| $C_{wi}$ | = | concentration of chemical "i" in water (mg/L) |
| $\tau$ | = | lag time (hour) |
| $\pi$ | = | 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 ($t^{*}$, $K_p$, $\tau$, FA, and B) were obtained from RAGS Part E, the current dermal guidance (U.S. EPA, 2004b), and are presented in the risk calculation tables in Appendix I. 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.

#### 7.3.4.4 Incidental Ingestion of Surface Water

Maintenance workers, trespassers, recreational users, and future residents may incidentally ingest surface water while at the site. Intakes associated with ingestion of water were evaluated using the following general equation (U.S. EPA, 1989a):

$$\text{Intake}_{wi} = \frac{(C_{wi})(IR_w)(ET)(EF)(ED)}{(BW)(AT)}$$

where:

| | | |
|---|---|---|
| $\text{Intake}_{wi}$ | = | intake of chemical "i" from water (mg/kg/day) |
| $C_{wi}$ | = | concentration of chemical "i" in water (mg/L) |
| $IR_w$ | = | ingestion rate for 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 non-carcinogens, 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 were used to estimate intakes for ingestion of water.

#### 7.3.4.5 Summary of Exposure Parameters

A summary of the exposure input parameters for all exposure pathways are presented in Tables 7-9 and 7-10 for the identified potential receptor groups at SWMU 15. In general, standard default parameters (e.g., U.S. EPA, 1991 and 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).

## 7.4 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 assessment were integrated with outputs of the exposure assessment 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 RfD; carcinogenic effects are quantified using the CSF.

### 7.4.1 Toxicity Criteria

RfDs and CSFs used in the HHRA for SWMU 15 were obtained from the following primary literature sources (U.S. EPA 2003a):

- Integrated Risk Information System (IRIS) (U.S. EPA, 2005a).
- 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 3 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 15 are presented in Tables 7-11 and 7-12, respectively.

#### 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, 2004b (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 assessment reflect U.S. EPA's current dermal assessment guidance (U.S. EPA, 2004b). The RfDs and CSFs used to evaluate dermal exposure are presented in Tables 7-11 and 7-12, respectively.

#### 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 a CSF is 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 relates 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.

## 7.5 RISK CHARACTERIZATION

This section provides a characterization of the potential human health risks associated with potential exposures to COPCs at SWMU 15. 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 15 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:

$$\text{ILCR} = 1\text{-}[\exp(\text{-Estimated Exposure Intake})(\text{CSF})]$$

An ILCR of $1 \times 10^{-6}$ 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 non-carcinogenic (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" ($1 \times 10^{-6}$ to $1 \times 10^{-4}$), and HIs were evaluated using a value of 1.0.

U.S. EPA has defined the range of $1 \times 10^{-6}$ to $1 \times 10^{-4}$ as the ILCR target range for most hazardous waste facilities addressed under CERCLA and RCRA. IDEM has defined the same range for the non-default evaluation under their RISC program. Individual or cumulative ILCRs greater than $1 \times 10^{-4}$ will typically not be considered as protective of human health, and ILCRs less than $1 \times 10^{-6}$ will typically be regarded as protective. Risk management decisions are necessary when the ILCR is within the $1 \times 10^{-4}$ to $1 \times 10^{-6}$ 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 exceeded 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 the SWMU 15. Quantitative risk estimates for potential human receptors were 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 for future construction workers, child recreational users, adult recreational users, and on-site residents under the RME and CTE scenarios and are summarized in Tables 7-13 and 7-14, respectively. Sample calculations 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

Target organ-specific HIs for all potential receptors were less than unity (1.0) indicating that adverse non-carcinogenic health effects are not anticipated for these receptors under the defined RME exposure conditions.

#### 7.5.2.2 Carcinogenic Risks - RME

Cumulative ILCRs for construction workers, maintenance workers, occupational workers, and adolescent trespassers were within the U.S. EPA target risk range, $1 \times 10^{-6}$ to $1 \times 10^{-4}$. Total ILCRs for recreational users and future residents (child + adult) exceeded the target risk range.

The ILCRs for recreational users and residents were $1x10^{-3}$ and $2x10^{-3}$, respectively. The primary contributors to the elevated ILCRs (i.e., ILCRs greater than $10^{-4}$) were PAHs in surface water, which accounted for almost 95 percent of the total ILCRs. The elevated PAH concentrations were detected in surface water samples 15SW01001 and 15SW01101, which were collected from the storm sewer system. As discussed in Section 5.3, the storm sewer system receives runoff from parking lots, roads, and other surfaces. These surfaces are routinely contaminated by metals, PAHs, and other chemicals from vehicles, vehicle exhaust, pavement, and other sources. Roads and parking lots in particular may release environmentally significant concentrations or PAHs (and metals). However, as also indicated in Section 5.3, the presence of PAHs in site media may also be related to past site activities because waste oils are known to have been released to soil in the Roads and Grounds Area.

Minor contributors to the ILCRs for future residents were PAHs (ILCR = $7x10^{-5}$) and arsenic (ILCR = $3x10^{-5}$) in surface soil. As discussed in Section 5.2, PAH concentrations reported for samples from the upper level of the former two-level Asphalt Batch Plant area (samples 15SB010002, 15SB020002, and 15SB030002) were two to three orders of magnitude greater than concentrations reported for other SWMU 15 locations. The analysis of PAH concentrations in surface soil presented in Section 5.2 indicates that the former Asphalt Batch Plant (locations 15SB001 through 15SB007) is the most contaminated area at SWMU 15 and that other areas have measurably less contamination. This observation is consistent with site history because asphalt contains high concentrations of PAHs. Location 15SB049 also has PAH levels approaching the former Asphalt Batch Plant levels, but this location is well bounded in all directions.

The ILCRs calculated for exposure to soil, surface water, and sediment at SWMU 15 are subject to the following significant sources of uncertainty:

1. The ILCRs for recreational users and future residents exposed to PAHs in surface water exceed $1x10^{-4}$, but are likely to be greatly overestimated for the following reasons:

    - As discussed in Section 7.2.3.3, the concentrations of most carcinogenic PAHs detected in surface water exceeded published water solubility levels, indicating that these compounds were probably present on particulate matter in the samples.

    - The ILCRs presented in the RAGS Part D tables in Appendix I indicate that the risks for dermal contact were two to three orders of magnitude greater than risks by ingestion. The dermal risks were calculated using a U.S. EPA model presented in RAGS Part E (U.S. EPA, 2004b), which, according to the guidance, tends to overestimate intakes and risk for some chemicals (e.g.,

PAHs, PCBs, and dioxins). Appendices A and B of RAGS Part E discuss the uncertainties associated with the permeability coefficients for these chemicals and the limitations of the dermal absorption model when evaluating chemicals such as the PAHs. In addition, as a result of several studies that showed that PAHs in aqueous solutions do not penetrate the skin, TtNUS was instructed by U.S. EPA Region 4 via e-mail not to evaluate risks for dermal contact with PAHs in water. Based on the studies discussed in the e-mail, the uncertainty associated with dermal absorption of PAHs in water is "greater than a billion fold."

- Exposure to the storm sewer surface water is not always a complete exposure pathway. The storm sewer outlets are often dry, and surface water is usually only present after rain events. Therefore, exposure to surface water is often not possible.

2. Background was not considered in the COPC screening process. Therefore, no chemicals were eliminated as COPCs on the basis of background. This will likely result in an overestimation of site-related risks. For example, arsenic was identified as a minor risk driver for surface soil (residential ILCR = $3x10^{-5}$). However, as discussed in Section 5.2, the comparison of site concentrations to background concentrations and the spatial distribution of arsenic across the site indicate that the concentrations of arsenic at SWMU 15 are naturally occurring.

#### 7.5.2.3 Non-Carcinogenic Risks – CTE

Cumulative HIs (Table 7-14) for all potential receptors were less than unity (1.0), indicating that adverse non-carcinogenic health effects are not anticipated for these receptors under the defined RME exposure conditions.

#### 7.5.2.4 Carcinogenic Risks - CTE

Cumulative ILCRs for construction workers were less than the U.S. EPA target risk range, $1x10^{-6}$ to $1x10^{-4}$. Cumulative ILCRs for maintenance workers, occupational workers, and adolescent trespassers were within the U.S. EPA target risk range. Total ILCRs for recreational users and future residents (child + adult) exceeded the target risk range.

The ILCRs for the recreational users and residents were $2x10^{-4}$. As with the RME case, the primary contributors to the elevated ILCRs (i.e., ILCRs greater than $10^{-4}$) were PAHs in surface water, which accounted for almost 95 percent of the total ILCRs. Minor contributors to the ILCRs for future residents were PAHs and arsenic in surface soil.

## 7.6 UNCERTAINTY ANALYSIS

This section presents a summary of uncertainties inherent in the risk assessment and includes a discussion of how they may affect the quantitative risk estimates and conclusions of the risk analysis. The baseline HHRA for SWMU 15 was performed in accordance with current U.S. EPA and IDEM guidance. However, there are varying degrees of uncertainty associated with the baseline HHRA. The following sections discuss general uncertainties in risk assessment and uncertainties specific to the risk assessment for SWMU 15.

Uncertainty in the selection of COPCs was related to the current status of the predictive databases, the grouping of samples, the numbers, types and distributions of samples, data quality, and the procedures used to include or exclude constituents as COPCs. Uncertainty associated with the exposure assessment included the values used as input variables for a given intake route or scenario, the assumptions made to determine EPCs, and the predictions regarding future land use and population characteristics. Uncertainty in the toxicity assessment included 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 was 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 were various sources of random uncertainty and bias, the magnitude of bias and uncertainty and the direction of bias were 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 that considered safety factors were made so that the final calculated risks were 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, the biological mechanism of action of a chemical, or the behavior of a chemical in soil.

After 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 were made to ensure that the particular assumptions were 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 overpredicting 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 of uncertainty 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., $10^{-6}$), 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 Selection of COPCs

The most significant issues related to uncertainty in COPC selection were the usability of existing databases [i.e., the use of validated and unvalidated sample results (only validated data were used in this risk assessment) and the completeness, precision, and accuracy of the data set], the inclusion of chemicals potentially attributable to background in the quantitative risk assessment, the screening levels used, and the absence of screening levels for a few chemicals detected in the site media. A brief discussion of each of these issues is provided in the remainder of this section.

**Usability and Completeness of Existing Databases**

Data from samples collected for the RFI were used to assess risks to potential human receptors. The RFI samples were biased because they were collected in areas of known or suspected contamination. For example, soil samples were collected from the Former Batch Plant Area, the Former UST and Gasoline Pump Area, Former AST Areas (Former Buildings 2717 and 2718), the Hillside Debris Area South of Former Buildings, and several other areas. Surface water and sediment samples were collected from drainage channels downgradient of source areas (e.g., the drainageway south of the Former Asphalt

Batch Plant), from storm sewers, and from catch basins. Because the sampling was biased, the uncertainty is expected to be minimal, and risks are not likely to be underestimated.

The elimination of data qualified "R" may result in data gaps that may increase the uncertainty in the risk assessment. However, as described in Section 3.2, the chemicals qualified "R" (2,4-dimethylphenol, 3&4 methylphenol, 3,3'-dichlorobenzidine, 4-chloroaniline, hexachlorocyclopentadiene, acrolein, dichlorodifluoromethane, isobutanol, propionitrile, 2,4-dinitrophenol, 2-nitrophenol, 4,6-dinitro-2-methylphenol, and 4-nitrophenol) are not constituents of concern at SWMU 15. Therefore, it is unlikely that risks have been underestimated by the removal of the unreliable data from the data sets.

Elimination of Groundwater as a Medium of Concern for SWMU 15

As indicated in Sections 5.5 and 7.2.2.1, groundwater was not considered to be a medium of concern for SWMU 15 and was not evaluated in the quantitative risk assessment. This could result in an underestimation of risks for SWMU 15. However, as discussed in Section 5.5, groundwater at the site is in a perched aquifer, and it is unlikely that it could ever be used as a source of potable water. As shown in Table 3-26, only a few organics compounds (three SVOCs and one herbicide) were detected in the groundwater samples collected from temporary wells, and the concentrations were less than screening levels. Twenty-three metals were detected in the perched groundwater samples, but the metals are not known to be related to past activities at SWMU 15. In addition, a comparison of metals concentrations in filtered and unfiltered samples indicated that the majority of the metal results were associated with suspended matter in the groundwater samples.

**Chemicals Potentially Attributable to Background**

Background was not a consideration in the COPC selection process. If the maximum concentration of a chemical exceeded its respective screening level, it was selected as a COPC and evaluated in the quantitative risk assessment. However, background soil concentrations have been characterized for the facility, and upgradient surface water and sediment samples were collected at SWMU 15.

An analysis of metals concentrations in site soil samples versus facility background concentrations is presented in Section 5.2. This analysis concluded that the concentrations of metals that exceeded risk-based screening concentrations were "consistent with background soil concentrations." Therefore, it is likely that some metals would not have been selected as COPCs if background were used for COPC screening. However, as shown in Table 7-13, only one metal, arsenic, was a minor contributor to risks for

surface soil (i.e., ILCRs for arsenic were less than $1x10^{-4}$). Therefore, it is unlikely that the results of the risk assessment were greatly affected by including arsenic as a COPC.

Upgradient samples were collected for surface water and sediment, and summaries of results from these samples are presented in Tables 7-5 and 7-6, respectively. A comparison of maximum concentrations detected in samples from upgradient surface water locations versus those reported for site-related locations indicates that the concentrations of metals selected as COPCs for surface water were significantly greater than the concentrations in the upgradient samples. However, as shown in Table 7-6, the maximum concentrations of metals selected as COPCs for sediment were within or only slightly exceeded the concentrations in the upgradient samples. If exceedance of background had been a COPC selection criterion, it is likely that several metals (e.g., manganese) would not have been selected as COPCs for sediment. However, as shown in the RAGS Part D Table 9s presented in Appendix I, metals were not significant contributors to risks for surface water or sediment. Therefore, the risks calculated for surface water and sediment were not greatly affected by not using background comparisons for COPC screening.

In summary, inclusion of metals in the quantitative risk assessment for soil, sediment, and surface water without considering background does not appear to greatly affect the calculated risks.

**COPC Screening Levels**

The use of risk-based screening values based on conservative land use scenarios (i.e., residential land use for soil and sediment, and ingestion of tap water for groundwater and surface water) corresponding to an ILCR of $10^{-6}$ and HI of 0.1 ensured that all the significant contributors to risk from a site were evaluated. The elimination of chemicals present at concentrations that correspond to ILCRs less than $10^{-6}$ and HIs less than 0.1 should not have affected the final conclusions of the risk assessment because those chemicals were not expected to cause a potential health concern at the detected concentrations.

**Chemicals Without Established Screening Levels**

Screening levels based on U.S. EPA Region 9 PRGs are currently not available for some constituents [e.g., benzo(g,h,i)perylene and phenanthrene] detected in SWMU 15 media. Appropriate surrogates were selected for these chemicals based on similar chemical structures, if available. For example, pyrene was selected as a surrogate for benzo(g,h,i)perylene and phenanthrene. Applying toxicity values of one compound to another increases the uncertainty in the risk assessment both in regard to the selection of COPCs and the calculated risks. However, as shown in the COPC selection tables, the maximum

concentrations of benzo(g,h,i)perylene and phenanthrene are less than IDEM risk-based concentrations. Consequently, the calculated risks are likely not underestimated by using a surrogate screening value for these two chemicals.

**Effects of Turbidity in Surface Water Samples on COPC Selection and Risks**

As discussed in Sections 7.2.3.3 and 7.5.2.2, the presence of particulate matter in surface water samples may have caused concentrations of PAHs and several metals to be elevated. This could affect both the number of chemicals selected as COPCs and the calculated risks. In addition to turbidity readings, filtered samples were also collected from the surface water locations. A comparison of the filtered and unfiltered sample results showed noticeable differences in the concentrations of some analytes (e.g., aluminum, iron, vanadium, and zinc), indicating that turbidity in the samples may have caused concentrations of total metals to be elevated. For example, the maximum concentrations of three of the five metals selected as COPCs for surface water (arsenic, iron, and vanadium) were detected in sample 15SW/SD018. The turbidity reading for this sample was 70 NTU. In addition, arsenic and vanadium were not detected in the filtered sample (15SW/SD018-F), and the concentration of iron in the filtered sample was less than 10 times the concentration in the unfiltered sample and was also less than the screening level.

Particulate matter in some samples may have also affected the analysis of PAHs as evidenced by the fact that the turbidity levels in the samples in which PAHs were detected ranged from 20 to 90 NTU. In addition, the maximum concentrations of some PAHs [e.g., benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene] exceeded published water solubility levels (IDEM, 2004a), indicating that these compounds were probably present on particulate matter and that the concentrations were due to turbidity in the samples.

Based on filtered and unfiltered data, it appears that the risks for PAHs and metals calculated for surface water may have been overestimated. This is an important factor for SWMU 15 because PAHs in surface water via dermal contact accounted for approximately 95 percent of the total carcinogenic risks (the residential and recreational ILCRs for PAHs were greater than $1 \times 10^{-3}$).

### 7.6.2 Uncertainty in the Exposure Assessment

Uncertainty in the exposure assessment arose because of the methods used to calculate EPCs, 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**

NSWC Crane is an active Naval base and will remain active for the foreseeable future. The facility is not expected to close because principal base operations, the demilitarization of munitions, are critical to the support of the United States Naval fleet. SWMU 15 is an active facility, and operations at the facility are expected to continue in the foreseeable future. Maintenance workers, occupational 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 on-site residents were also estimated for the site.

Evaluation of Current Site Conditions – Soil Not Covered with Asphalt

As discussed in Section 7.3.3, the parking area of SWMU 15 is currently covered with asphalt, and access to the soil in this area is not possible. The risk assessment results presented in Section 7.5.2 and in Tables 7-13 and 7-14 are based on the assumption that the asphalt cover might be removed in the future, and the data set used for risk evaluation contained sample data from the covered and uncovered areas of the site (future conditions). To evaluate risks for current conditions at SWMU 15, risks were also calculated based on the assumption that the parking lot remains covered. The data set used for this evaluation contained data only from areas of the site currently not covered with asphalt. The results of analysis of soil for current site conditions are presented in the following table.

| **Risk Estimates for Exposure (RME) of Future Residents and Occupational Worker to COPCs in Uncovered Soil – Current Land Use** | | |
|---|---|---|
| **Receptor** | **Hazard Index** | **Incremental Lifetime Cancer Risk** |
| Occupational Worker | 0.2 | $3x10^{-5}$ |
| Future Child Resident | 3 | --- |
| Future Adult Resident | 0.3 | --- |
| Total Residential (Child + Adult) | NA | $1x10^{-4}$ |

NA - Not applicable.

The HIs and ILCRs for current land used presented in the above table are the same as those calculated for future land use (Table 7-13). As with the risks calculated for future land use, iron was the main contributor to HI for the child resident, and PAHs and arsenic were the primary contributors to the ILCRs. Based on this analysis, the uncertainty introduced into the risk assessment by assuming future land use (i.e., by including soil data from the asphalt covered area) is negligible.

**Exposure Point Concentrations**

Uncertainty was 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 were most likely overstated because this is a representation of the upper limit that potential receptors would be exposed to over the entire exposure period. In some cases (because data sets contained fewer 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 as the EPC tends to overestimate potential risks because receptors are assumed to be exposed continuously to the maximum concentration for the entire exposure period. Uncertainty was also introduced when the non-detect results were assigned a value of one-half the non-detect quantitation limit in the calculation of the EPC. This may have either overstated or understated the risks to the receptors.

**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 was minimal because they were considered to be well defined.

An important uncertainty issue for the SWMU 15 risk assessment is exposure to surface water because ILCRs for this exposure pathway exceeded $1x10^{-4}$ (see Section 7.5.2.2). Exposure to the surface water in the storm sewers and drainage areas is not always a complete exposure pathway. These surface water channels are often dry, and based on the experiences of field personnel during the RFI, surface water is present only after rain events. Therefore, exposure to surface water at the site is often not possible. In addition, the concentrations of most of the carcinogenic PAHs exceeded published water solubility levels (IDEM, 2004a), indicating that these compounds were probably present on particulate matter in the samples. Furthermore, as discussed in Section 7.5.2.2, the elevated risks calculated for PAHs in surface water were primarily due to dermal absorption, and this exposure route is subject to large uncertainties that can greatly overestimate potential risks. An estimate by U.S. EPA Region 4 indicates that the uncertainty associated with the dermal absorption of PAHs in water is "greater than a billion fold."

Residential and Commercial Evaluation of Surface/Subsurface Soil

As explained in Section 7.3.1, in the risk assessment results presented in Section 7.5.2 and in Tables 7-13 and 7-14, only construction/excavation workers were assumed to be exposed to COPCs in

combined surface/subsurface soil. To account for the possibility that subsurface soil could be brought to the surface in a future excavation project and mixed with surface soil, the potential exposure of future residents and commercial/industrial workers to COPCs in combined surface/subsurface soil were also evaluated. Risk estimates for the RME case are presented in the following table.

| Risk Estimates for Exposure of Future Residents and Occupational Worker to COPCs in Combined Surface/Subsurface Soil (RME) | | |
|---|---|---|
| **Receptor** | **Hazard Index** | **Incremental Lifetime Cancer Risk** |
| Occupational Worker | 0.2 | $2x10^{-5}$ |
| Future Child Resident | 3 | --- |
| Future Adult Resident | 0.3 | --- |
| Total Residential (Child + Adult) | NA | $7x10^{-5}$ |

NA - Not applicable.

The HIs for the occupational worker and adult resident and the target organ-specific HI for the child resident were less than unity (1.0), indicating that adverse non-carcinogenic health effects are not anticipated for these receptors under the defined RME exposure conditions. The cumulative ILCRs for the occupational worker and future residents (child + adult) were within the U.S. EPA target risk range, $1x10^{-6}$ to $1x10^{-4}$. Iron (HI = 1) was the main contributor to HI for the child resident. PAHs (ILCR for future residents = $4x10^{-5}$) and arsenic (ILCR for future residents = $3x10^{-5}$) were the primary contributors to the ILCRs.

**Exposure Parameters**

Each exposure factor (for RME and CTE scenarios) selected for use in the risk assessment had some associated uncertainty. Generally, exposure factors were based on surveys of physiological and lifestyle profiles across the United States. The attributes and activities studied in these surveys generally had a broad distribution. To avoid underestimation of exposure, in most cases, the U.S. EPA guidelines (U.S. EPA, 1991) for the RME receptor were used, which generally specify the use of the 95$^{th}$ percentile value for most parameters. Therefore, the selected values for the RME receptor represented an 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, 2004b) does not provide dermal absorption factors for exposure to most metals (except arsenic and cadmium) in soil. Therefore, risks for dermal contact from soil were not evaluated for most metals in this risk assessment. Consequently, risks from exposure to soil may have been underestimated.

Many of the exposure parameters used to calculate exposures and risks in this report were selected from a distribution of possible values presented in references such as U.S. EPA risk assessment guidance (U.S. EPA, 1991 and 1993a) and U.S.EPA dermal guidance (U.S. EPA, 1997b and 2004b). For the RME scenario, the value representing the 95$^{th}$ percentile was generally selected for each parameter to ensure that the assessment bounds the majority of actual risks from a postulated exposure. The risk estimated for the RME case is typically used to make risk management decisions but does not indicate what a more average exposure might be or what risk range might be expected for typical individuals in the exposed population.

To address these issues, U.S. EPA (1992a) suggested the use of the CTE receptor, whose intake variables are often set at approximately the 50$^{th}$ 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 (1993a).

### 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 was associated with hazard assessment and dose-response evaluations for the COPCs. The hazard assessment dealt 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 was evaluated as a weight-of-evidence determination using 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 non-cancer 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 arose from the nature and quality of the animal and human data. Uncertainty was reduced when similar effects were observed across species, strain, sex, and exposure route; when the magnitude of the response was clearly dose related; when pharmacokinetic data indicated a similar fate in humans and animals; when postulated mechanisms of toxicity were similar for humans and animals; and when the COC was structurally similar to other chemicals for which the toxicity is more completely characterized.

Uncertainty in the dose-response evaluation included the determination of a CSF for the carcinogenic assessment and derivation of an RfD for the non-carcinogenic assessment. Uncertainty was 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 resulted 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 was derived and the database used. For cancer effects, the uncertainty associated with dose-response factors was 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 non-threshold assumption of carcinogenesis. Evidence suggests, however, that epigenetic carcinogens, as well as many genotoxic carcinogens, have a threshold below which they are non-carcinogenic. Therefore, the use of the linearized multistage model was conservative for chemicals that exhibited a threshold for carcinogenicity.

For non-cancer effects, additional uncertainty factors may have been applied in the derivation of the RfD to mitigate poor quality of the key study or gaps in the database. Additional uncertainty for non-cancer effects arose from the use of an effect level in the estimation of an RfD because this estimation was predicated on the assumption of a threshold less than which adverse effects were not expected.

Therefore, an uncertainty factor is usually applied to estimate a no-effect level. Additional uncertainty arose in estimation of an RfD for chronic exposure from subchronic data. Unless empirical data indicated that effects did not worsen with increasing duration of exposure, an additional uncertainty factor was applied to the no-effect level in the subchronic study. Uncertainty in the derivation of RfDs was mitigated by the use of uncertainty and modifying factors that normally ranged between 3 and 10. The resulting combination of uncertainty and modifying factors may have reached 1,000 or more.

The derivation of dermal RfDs and CSFs from oral values may have caused uncertainty. This was particularly the case when no gastrointestinal absorption rates were available in the literature or when only qualitative statements regarding absorption were available.

**Uncertainty Associated with Evaluation of the Dermal Exposure Pathway**

According to RAGS Part E (U.S. EPA, 2004b), risks for dermal absorption of chemicals in soil may be quantitatively evaluated for arsenic, cadmium, chlordane, 2,4-dichlorophenoxyacetic acid, dichloro-diphenyl-trichloroethane (DDT), TCDD (and other dioxins), PAHs, PCBs, pentachlorophenol, and SVOCs only because of the limited information guidance available to evaluate dermal exposure to other constituents. Therefore, risks from dermal exposure to metals in soil and sediment (except for arsenic and cadmium) were not quantified in the risk assessment. Consequently, potential risks may have been underestimated by excluding these constituents from the dermal risk assessment calculations.

The significant uncertainty associated with the evaluation of dermal absorption of chemicals in an aqueous medium is discussed in Sections 7.5.2.2 and 7.6.2.

**Use of Aluminum and Iron Toxicity Criteria**

NCEA provisional RfDs were 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 was some degree of uncertainty associated with the use of the RfDs. 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.

**Alternate RfD for Iron**

As previously discussed, there is uncertainty associated with the toxicity data for iron. The RfD for iron is based on the recommended daily allowance (RDA) for adult human nutrition. Children and adolescents require more iron in their diets than adults do; consequently, using an RfD based on the adult RDA for

iron to evaluate exposures to children results in an overestimation of the risks for children. When the HI for exposures to iron by children exceed unity, U.S. EPA Region 3 recommends recalculating the HI using an RfD of 1.1 mg per kg per day (instead of the 0.3 mg per kg per day provided in IRIS). If this value was used to estimate risks for children, the HQs calculated for iron would decrease by a factor of 3.7 (1.1/0.3). Therefore, the risk estimates calculated for iron may be overestimated. For example, as shown in the RAGS Part D tables in Appendix I, the HI for the future child resident assumed to be exposed to surface soil was 1. If the alternate RfD was used, the HI for the child would be 0.3.

**Alternate RfD for Manganese**

The oral RfD for manganese listed in the Region 9 PRG table (0.024 mg per kg per day) was used to calculate risks for ingestion of surface water. This value includes a modification factor of three and an adjustment factor for the dietary contribution that is applied to the non-dietary RfD (0.14 mg per kg per day) presented in IRIS. IRIS indicates that an adjustment for the dietary contribution should be subtracted from this allowable intake. Using the modified and adjusted RfD results in risk estimates six times higher than if the non-dietary RfD was used. However, the HI calculated for the future child resident for exposure to surface water was less than unity. Therefore, the uncertainty introduced into the risk assessment by using the adjusted RfD is negligible.

**Uncertainty in the Toxicity of Arsenic**

Although the more restrictive basis for evaluating risk associated with exposure to arsenic is to assume it is a carcinogen, carcinogenic effects are not the primary health effects expected to be manifested upon exposure to arsenic. The preponderance of scientific information indicates that humans are capable of metabolizing arsenic to expedite its elimination from the body. Its elimination from the body obviously mitigates the possibility for arsenic to manifest carcinogenic effects. Therefore, evaluating arsenic as a non-carcinogen would be more appropriate. Specifically, the body methylates the arsenic to form monomethyl arsenic and dimethyl arsenic. There is a limited capacity for the body to metabolize methylate arsenic, but this limit is generally only reached when the body's intake of arsenic approximately exceeds 500 µg per day. The maximum detected concentration of arsenic in surface soil at SWMU 15 was 20.7 mg/kg with an average concentration of 8.3 mg/kg. Assuming a soil ingestion rate of 200 mg per day for a small child, exposure to the maximum concentration corresponds to a daily approximate intake of 4 µg per day. Likewise, the maximum detected concentration of arsenic in sediment was 33.8 mg/kg, which corresponds to a daily intake of approximately 7 µg per day. These concentrations result in arsenic intakes that are well within the body's ability to metabolize arsenic. Although some humans may be more sensitive to arsenic, in that they are "poor methylators," the maximum exposure

concentrations for the site are approximately two orders of magnitude less than the normal limit of metabolic saturation and are most likely less than levels that would trigger responses in sensitive individuals.

### 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 existed when summing non-cancer risks for several substances across different exposure pathways. This assumed 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 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.

Finally, 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 overpredicted or underpredicted could not be defined, but the methodology used was based on current U.S. EPA guidance.

## 7.7 SUMMARY AND CONCLUSIONS

This section briefly summarizes the results of the HHRA performed for SWMU 15.

The baseline HHRA for SWMU 15 was performed to characterize the potential risks to likely human receptors under current and potential future land use. Potential receptors under current and future land use are adolescent trespassers, maintenance workers, and occupational workers. Potential receptors under future land use are construction workers, recreational users, and hypothetical residents (children and adults). 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.

Potential risks associated with inhalation exposures were considered to be minimal for soil, sediment, and surface water. Inhalation of volatile emissions and fugitive dust from soils was evaluated qualitatively via a comparison of site data with U.S. EPA generic SSLs for transfers from soil to air. Inhalation exposure was considered to be relatively insignificant because all detected soil concentrations were less than the SSLs. Few VOCs were detected in surface water or sediment, and no VOCs were identified as COPCs for these media.

The list of COPCs for SWMU 15 included the following:

- Surface soil - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1260, aluminum, arsenic, cadmium, iron, manganese, and vanadium.

- Subsurface soil - benzo(a)pyrene, aluminum, arsenic, iron, manganese, and vanadium.

- Surface water - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, antimony, arsenic, iron, manganese, and vanadium.

- Sediment - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1254, Aroclor-1260, aluminum, arsenic, iron, manganese, and vanadium.

Groundwater is not considered a medium of concern at SWMU 15 and was not quantitatively evaluated in the risk assessment.

Quantitative estimates of non-carcinogenic and carcinogenic risks (HIs and ILCRs, respectively) were developed for potential human receptors and are summarized below.

**Exposure to Soil**

Cumulative non-carcinogenic HIs for current and future receptors exposed to COPCs in surface and/or subsurface soil were less than unity (1.0) on a target organ basis, indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

Cumulative ILCRs for all potential receptors exposed to COPCs in soils were within the U.S. EPA target risk range, $1x10^{-6}$ to $1x10^{-4}$. Minor contributors to the ILCRs were carcinogenic PAHs (cPAHs) and arsenic. However, as discussed in Section 5.2, the concentration distribution patterns of arsenic in soil and comparisons with facility background concentrations indicate that arsenic is not a site-related contaminant.

**Exposure to Surface Water**

Construction workers and occupational workers were not evaluated for exposure to surface water in the drainage channels and streams downgradient of SWMU 15.

The cumulative HIs for all potential receptors were less than unity.

Cumulative ILCRs for maintenance workers and adolescent trespassers exposed to COPCs detected in surface water were within the U.S. EPA's target risk range. However, cumulative ILCRs for recreational users and future residents (child + adult) exceeded the U.S. EPA target risk range. PAHs in surface water were the major contributors to the ILCRs (ILCRs greater than $1.0x10^{-4}$). As discussed in Section 7.5.2.2, the risk estimates for surface water are subject to a great deal of uncertainty. The elevated risks calculated for PAHs in surface water were based on a U.S. EPA dermal absorption model that may overestimate the risks from PAHs by several orders of magnitude. (The potential for overestimation of risk is demonstrated by the fact that risk estimates developed for dermal contact with PAHs in surface waters were two to three orders of magnitude greater than those developed for the incidental ingestion of PAHs in surface water.) Additionally, exposure to surface water is not always a complete exposure pathway because some areas of the channels and streams downgradient of SWMU 15 are often dry; surface water is present usually only after rain events. Therefore, exposure to surface water is often not possible in some areas. The concentrations of most carcinogenic PAHs exceeded published water solubility levels. This fact and the fact that samples with higher concentrations of PAHs had elevated turbidity levels (greater than 10 NTU) indicate that the PAHs concentrations may be due to particulate matter in the surface water samples.

**Exposure to Sediment**

Construction workers and occupational workers were not evaluated for exposure to sediment.

Cumulative HIs for current and future receptors exposed to sediment were less than unity (1.0), indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

Cumulative ILCRs for all potential receptors were less than $1x10^{-5}$ within the U.S. EPA target risk range of $1x10^{-6}$ to $1x10^{-4}$.

**Summary**

In summary, for SWMU 15, potential human health risks calculated for soil and sediment were less than or within U.S. EPA goals. Elevated risk estimates were calculated for exposure to PAHs in surface water. However, because of significant uncertainties in the risk estimates, risks for surface water are considered to be overestimated by several orders of magnitude, and it is recommended that PAHs in surface water not be considered COCs for SWMU 15. Groundwater is not considered a medium of concern at SWMU 15 and was not quantitatively evaluated in the risk assessment.

TABLE 7-1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[2] | Concentration Used for Screening[3] | Range of Background Concentrations[4] | U.S. 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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 78-93-3 | 2-Butanone | 2 J | 22 | ug/kg | 15SS0120002 | 10/40 | 0.8 - 1.48 | 22 | NA | 2200000 N | 44000000 | IDEM | No | BSL |
| | 67-64-1 | Acetone | 25 J | 79 J | ug/kg | 15SS0440002 | 7/40 | 0.8 - 39 | 79 | NA | 1400000 N | 4800000 | IDEM | No | BSL |
| | 75-15-0 | Carbon Disulfide | 1 J | 1 J | ug/kg | 15SS0440002 | 1/40 | 0.8 - 1.48 | 1 | NA | 36000 N | 900000 | IDEM | No | BSL |
| | 156-59-2 | cis-1,2-Dichloroethene | 1 J | 5 | ug/kg | 15SS0220002 | 2/40 | 0.8 - 1.48 | 5 | NA | 4300 N | 110000 | IDEM | No | BSL |
| | 75-09-2 | Methylene Chloride | 1 J | 97 J | ug/kg | 15SS0300002 | 29/40 | 0.992 - 10 | 97 | NA | 9100 C | 120000 | IDEM | No | BSL |
| | 1330-20-7 | Total Xylenes | 1.06 J | 1.06 J | ug/kg | 15SS0120002 | 1/40 | 0.8 - 1.48 | 1.06 | NA | 27000 N | 690000 | IDEM | No | BSL |
| | 75-69-4 | Trichlorofluoromethane | 1 J | 5 | ug/kg | 15SS0620002 | 13/40 | 0.8 - 1.48 | 5 | NA | 39000 N | NA | NA | No | BSL |
| | **Semivolatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 5 J | 590 J | ug/kg | 15SS0070002 | 17/45 | 3.63 - 111 | 590 | NA | 5600 N[8] | 3200000 | IDEM | No | BSL |
| | 83-32-9 | Acenaphthene | 5 J | 410 | ug/kg | 15SS0030002 | 10/45 | 3.63 - 111 | 410 | NA | 370000 N | 9500000 | IDEM | No | BSL |
| | 208-96-8 | Acenaphthylene | 4 J | 1200 | ug/kg | 15SS0030002 | 11/45 | 3.63 - 27.5 | 1200 | NA | 370000 N[9] | 1100000 | IDEM | No | BSL |
| | 98-86-2 | Acetophenone | 150 J | 150 J | ug/kg | 15SS0460002 | 1/45 | 71.7 - 310 | 150 | NA | NA | NA | NA | No | NTX |
| | 120-12-7 | Anthracene | 5 J | 1200 | ug/kg | 15SS0030002 | 21/45 | 3.63 - 15.6 | 1200 | NA | 2200000 N | 47000000 | IDEM | No | BSL |
| | 56-55-3 | Benzo(a)anthracene | 5 J | 4600 J | ug/kg | 15SS0030002 | 28/45 | 3.63 - 15.6 | 4600 | NA | 620 C | 5000 | IDEM | Yes | ASL |
| | 50-32-8 | Benzo(a)pyrene | 7 J | 10000 | ug/kg | 15SS0030002 | 24/45 | 3.63 - 27.5 | 10000 | NA | 62 C | 500 | IDEM | Yes | ASL |
| | 205-99-2 | Benzo(b)fluoranthene | 5 J | 12000 | ug/kg | 15SS0030002 | 22/45 | 3.63 - 27.5 | 12000 | NA | 620 C | 5000 | IDEM | Yes | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 14 | 13000 | ug/kg | 15SS0030002 | 23/45 | 3.63 - 27.5 | 13000 | NA | 230000 N[10] | 50000 | IDEM | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 6 J | 6900 | ug/kg | 15SS0030002 | 21/45 | 3.63 - 27.5 | 6900 | NA | 6200 C | 50000 | IDEM | Yes | ASL |
| | 117-81-7 | bis(2-ethylhexyl)phthalate | 79 J | 760 | ug/kg | 15SS0300002 | 11/45 | 71.7 - 301 | 760 | NA | 35000 C | 300000 | IDEM | No | BSL |
| | 218-01-9 | Chrysene | 6 J | 9500 J | ug/kg | 15SS0030002 | 29/45 | 3.63 - 14.1 | 9500 | NA | 62000 C | 500000 | IDEM | No | BSL |
| | 84-74-2 | Di-N-Butyl Phthalate | 91 J | 290 J | ug/kg | 15SS0440002 | 6/45 | 71.7 - 301 | 290 | NA | 61000 N | 18000000 | IDEM | No | BSL |
| | 117-84-0 | Di-N-Octyl Phthalate | 920 J | 920 J | ug/kg | 15SS0300002 | 1/45 | 71.7 - 301 | 920 | NA | 240000 N | 3700000 | IDEM | No | BSL |
| | 53-70-3 | Dibenzo(a,h)anthracene | 18 | 3200 | ug/kg | 15SS0030002 | 6/45 | 3.63 - 111 | 3200 | NA | 62 C | 500 | IDEM | Yes | ASL |
| | 132-64-9 | Dibenzofuran | 95 J | 460 J | ug/kg | 15SS0030002 | 3/45 | 71.7 - 301 | 460 | NA | 15000 N | 370000 | IDEM | No | BSL |
| | 206-44-0 | Fluoranthene | 4 J | 6000 | ug/kg | 15SS0030002 | 36/45 | 3.7 - 4.28 | 6000 | NA | 230000 N | 6300000 | IDEM | No | BSL |
| | 86-73-7 | Fluorene | 6 J | 330 | ug/kg | 15SS0010002 | 9/45 | 3.63 - 111 | 330 | NA | 270000 N | 6300000 | IDEM | No | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 11 J | 11000 | ug/kg | 15SS0030002 | 19/45 | 3.63 - 27.5 | 11000 | NA | 620 C | 5000 | IDEM | Yes | ASL |
| | 86-30-6 | N-Nitrosodiphenylamine | 1500 | 1500 | ug/kg | 15SS0380002 | 1/45 | 71.7 - 301 | 1500 | NA | 99000 C | 870000 | IDEM | No | BSL |
| | 91-20-3 | Naphthalene | 4 J | 280 J | ug/kg | 15SS0070002 | 15/45 | 3.63 - 111 | 280 | NA | 5600 N | 3200000 | IDEM | No | BSL |
| | 85-01-8 | Phenanthrene | 5 J | 2800 | ug/kg | 15SS0010002 | 34/45 | 3.7 - 4.28 | 2800 | NA | 230000 N[10] | 470000 | IDEM | No | BSL |
| | 129-00-0 | Pyrene | 6 J | 14000 J | ug/kg | 15SS0030002 | 34/45 | 3.7 - 4.28 | 14000 | NA | 230000 N | 4700000 | IDEM | No | BSL |
| | **Pesticides/PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 2.7 J | 110 | ug/kg | 15SS0220002 | 4/29 | 1.51 - 1.75 | 110 | NA | 2400 C | 28000 | IDEM | No | BSL |
| | 72-55-9 | 4,4'-DDE | 2 J | 12 | ug/kg | 15SS0490002 | 2/29 | 1.51 - 1.75 | 12 | NA | 1700 C | 20000 | IDEM | No | BSL |
| | 50-29-3 | 4,4'-DDT | 14 | 14 | ug/kg | 15SS0490002 | 1/29 | 1.51 - 1.75 | 14 | NA | 1700 C | 20000 | IDEM | No | BSL |
| | 5103-71-9 | alpha-Chlordane | 1.6 J | 69 | ug/kg | 15SS0200002 | 4/29 | 0.729 - 0.843 | 69 | NA | 1600 C[11] | 17000 | IDEM[11] | No | BSL |
| | 11096-82-5 | Aroclor-1260 | 20 | 1200 | ug/kg | 15SS0230002 | 4/27 | 10.1 - 11.7 | 1200 | NA | 110 N[12] | 1800 | IDEM | Yes | ASL |
| | 5103-74-2 | gamma-Chlordane | 3.6 | 75 | ug/kg | 15SS0200002 | 3/29 | 0.729 - 0.843 | 75 | NA | 1600 C[11] | 17000 | IDEM[11] | No | BSL |
| | 76-44-8 | Heptachlor | 8.5 | 8.5 | ug/kg | 15SS0200002 | 1/29 | 0.729 - 0.843 | 8.5 | NA | 110 C | 930 | IDEM | No | BSL |
| | 1024-57-3 | Heptachlor Epoxide | 4.8 | 4.8 | ug/kg | 15SS0200002 | 1/29 | 0.729 - 0.843 | 4.8 | NA | 53 C | 470 | IDEM | No | BSL |
| | **Herbicides** | | | | | | | | | | | | | | |
| | 87-86-5 | Pentachlorophenol | 28 J | 28 J | ug/kg | 15SS0490002 | 1/36 | 0.482 - 3.8 | 28 | NA | 3000 C | 20000 | IDEM | No | BSL |

TABLE 7-1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[2] | Concentration Used for Screening[3] | Range of Background Concentrations[4] | U.S. 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 15 (Continued) | Inorganics | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum | 1700 J | 29900 J | mg/kg | 15SS0200002, 15SS0310002 | 42/42 | --- | 29900 | 5020 - 17400 | 7600 N | NA | NA | Yes | ASL |
| | 7440-36-0 | Antimony | 1.4 J | 2.7 J | mg/kg | 15SS0060002 | 3/42 | 0.022 - 1.2 | 2.7 | 0.49 - 11.3 | 3.1 N | 140 | IDEM | No | BSL |
| | 7440-38-2 | Arsenic | 0.79 J | 20.7 J | mg/kg | 15SS0360002 | 42/42 | --- | 20.7 | 1.1 - 10.2 | 0.39 C | 3.9 | IDEM | Yes | ASL |
| | 7440-39-3 | Barium | 16 J | 254 J | mg/kg | 15SS0140002 | 42/42 | --- | 254 | 24.8 - 155 | 540 N | 23000 | IDEM | No | BSL |
| | 7440-41-7 | Beryllium | 0.31 J | 2.9 | mg/kg | 15SS0190002 | 38/42 | 0.1 - 0.22 | 2.9 | 0.3 - 0.82 | 15 N | 680 | IDEM | No | BSL |
| | 7440-43-9 | Cadmium | 0.18 J | 6.9 J | mg/kg | 15SS0020002 | 36/42 | 0.16 - 0.34 | 6.9 | 0.05 - 3.6 | 3.7 N | 12 | IDEM | Yes | ASL |
| | 7440-70-2 | Calcium | 170 J | 381000 J | mg/kg | 15SS0050002 | 42/42 | --- | 381000 | 53.6 - 35300 | NA | NA | NA | No | NUT |
| | 7440-47-3 | Chromium | 6 J | 49.7 J | mg/kg | 15SS0360002 | 42/42 | --- | 49.7 | 7.7 - 30.6 | 210 C[13] | 430[14] | IDEM | No | BSL |
| | 7440-48-4 | Cobalt | 0.59 J | 59.6 J | mg/kg | 15SS0350002 | 42/42 | --- | 59.6 | 1.8 - 27.1 | 140 N[12] | NA | NA | No | BSL |
| | 7440-50-8 | Copper | 1.4 J | 20.1 J | mg/kg | 15SS0060002 | 42/42 | --- | 20.1 | 3.5 - 23.8 | 310 N | 13000 | IDEM | No | BSL |
| | 7439-89-6 | Iron | 1870 J | 57600 J | mg/kg | 15SS0360002 | 42/42 | --- | 57600 | 7140 - 40800 | 2300 N | NA | NA | Yes | ASL |
| | 7439-92-1 | Lead | 1.7 J | 155 J | mg/kg | 15SS0080002 | 42/42 | --- | 155 | 6.4 - 21.5 | 400 | 400 | IDEM | No | BSL |
| | 7439-95-4 | Magnesium | 754 J | 42700 J | mg/kg | 15SS0030002 | 42/42 | --- | 42700 | 496 - 2870 | NA | NA | NA | No | NUT |
| | 7439-96-5 | Manganese | 28.6 J | 4400 J | mg/kg | 15SS0350002 | 42/42 | --- | 4400 | 23.2 - 3040 | 180 N | NA | NA | Yes | ASL |
| | 7439-97-6 | Mercury | 0.01 J | 0.13 | mg/kg | 15SS0100002 | 35/42 | 0.006 - 0.007 | 0.13 | 0.04 - 0.14 | 2.3 N | 100 | IDEM | No | BSL |
| | 7440-02-0 | Nickel | 4.2 J | 31.6 J | mg/kg | 15SS0350002 | 42/42 | --- | 31.6 | 4.6 - 23.7 | 160 N | 6900 | IDEM | No | BSL |
| | 7440-09-7 | Potassium | 419 J | 2720 J | mg/kg | 15SS0440002 | 42/42 | --- | 2720 | 280 - 1650 | NA | NA | NA | No | NUT |

TABLE 7-1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects(2) | Concentration Used for Screening(3) | Range of Background Concentrations(4) | U.S. 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 15 (Continued) | 7782-49-2 | Selenium | 0.11 J | 1.1 | mg/kg | 15SS0380002 | 33/42 | 0.06 - 0.5 | 1.1 | 0.28 - 0.88 | 39 N | 1700 | IDEM | No | BSL |
| | 7440-22-4 | Silver | 0.04 J | 0.04 J | mg/kg | 15SS0450002 | 1/42 | 0.041 - 0.35 | 0.04 | 0.04 - 0.11 | 39 N | 1700 | IDEM | No | BSL |
| | 7440-23-5 | Sodium | 76.4 J | 1250 J | mg/kg | 15SS0190002 | 27/42 | 35.3 - 121 | 1250 | 3.7 - 205 | NA | NA | NA | No | NUT |
| | 7440-28-0 | Thallium | 0.21 J | 0.47 J | mg/kg | 15SS0380002 | 14/42 | 0.06 - 0.49 | 0.47 | 0.05 - 0.31 | 0.52 N | 24 | IDEM | No | BSL |
| | 7440-31-5 | Tin | 0.34 J | 2.2 J | mg/kg | 15SS0060002 | 6/42 | 0.21 - 1.2 | 2.2 | NA | 4700 N | NA | NA | No | BSL |
| | 7440-62-2 | Vanadium | 5.3 J | 57.4 | mg/kg | 15SS0360002 | 42/42 | --- | 57.4 | 14.1 - 48.5 | 7.8 N | NA | NA | Yes | ASL |
| | 7440-66-6 | Zinc | 19.4 J | 626 | mg/kg | 15SS0020002 | 42/42 | --- | 626 | 9.4 - 60.2 | 2300 N | 100000 | IDEM | No | BSL |

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 (TtNUS, 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, 2004a).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, 2004).
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.
8 - The value for naphthalene was used as a surrogate for 2-methylnaphthalene.
9 - The value for acenaphthene was 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 - Chlordane is used as a surrogate for alpha- and gamma-chlordane.
12 - One tenth of the non-carcinogenic PRG is less than the carcinogenic PRG; therefore, the one-tenth non-carcinogenic PRG is presented.
13 - The PRG for residential land use for total chromium is presented.
14 - Value is 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
N = Non-carcinogen
NA = Not applicable/not available

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data
NUT = Essential Nutrient

TABLE 7-1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects(2) | Concentration Used for Screening(3) | Range of Background Concentrations(4) | U.S. 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 | | | | | | | | | | | | | | | |
| 15SS0010002 | | 15SS0110002 | 15SS0210002 | | 15SS0310002 | 15SS0410002 | | | | | | | | | |
| 15SS0020002 | | 15SS0120002 | 15SS0220002 | | 15SS0320002 | 15SS0420002 | | | | | | | | | |
| 15SS0030002 | | 15SS0130002 | 15SS0230002 | | 15SS0330002 | 15SS0430002 | | | | | | | | | |
| 15SS0040002 | | 15SS0140002 | 15SS0240002 | | 15SS0340002 | 15SS0440002 | | | | | | | | | |
| 15SS0050002 | | 15SS0150002 | 15SS0250002 | | 15SS0350002 | 15SS0450002 | | | | | | | | | |
| 15SS0060002 | | 15SS0160002 | 15SS0260002 | | 15SS0360002 | 15SS0460002 | | | | | | | | | |
| 15SS0070002 | | 15SS0170002 | 15SS0270002 | | 15SS0370002 | 15SS0470002 | | | | | | | | | |
| 15SS0080002 | | 15SS0180002 | 15SS0280002 | | 15SS0380002 | 15SS0480002 | | | | | | | | | |
| 15SS0090002 | | 15SS0190002 | 15SS0290002 | | 15SS0390002 | 15SS0490002 | | | | | | | | | |
| 15SS0100002 | | 15SS0200002 | 15SS0300002 | | 15SS0400002 | 15SS0620002 | | | | | | | | | |

TABLE 7-2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 78-93-3 | 2-Butanone | 2 J | 22 | ug/kg | 15SS0120002 | 10/40 | 0.8 - 1.48 | 22 | NA | 24000000 sat | 4400 | 35000 | No | BSL |
| | 67-64-1 | Acetone | 25 J | 79 J | ug/kg | 15SS0440002 | 7/40 | 0.8 - 39 | 79 | NA | NA | 6600 | 3800 | No | BSL |
| | 75-15-0 | Carbon Disulfide | 1 J | 1 J | ug/kg | 15SS0440002 | 1/40 | 0.8 - 1.48 | 1 | NA | 720000 sat | 1500 | 10000 | No | BSL |
| | 156-59-2 | cis-1,2-Dichloroethene | 1 J | 5 | ug/kg | 15SS0220002 | 2/40 | 0.8 - 1.48 | 5 | NA | NA | 20 | 400 | No | BSL |
| | 75-09-2 | Methylene Chloride | 1 J | 97 J | ug/kg | 15SS0300002 | 29/40 | 0.992 - 10 | 97 | NA | 13000 C | 1.2 | 23 | Yes | ASL |
| | 1330-20-7 | Total Xylenes | 1.06 J | 1.06 J | ug/kg | 15SS0120002 | 1/40 | 0.8 - 1.48 | 1.06 | NA | 71000 N | 7100 | 210000 | No | BSL |
| | 75-69-4 | Trichlorofluoromethane | 1 J | 5 | ug/kg | 15SS0620002 | 13/40 | 0.8 - 1.48 | 5 | NA | 110000 N | 8000 | NA | No | BSL |
| | **Semivolatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 5 J | 590 J | ug/kg | 15SS0070002 | 17/45 | 3.63 - 111 | 590 | NA | NA | NA | 16000 | No | BSL |
| | 83-32-9 | Acenaphthene | 5 J | 410 | ug/kg | 15SS0030002 | 10/45 | 3.63 - 111 | 410 | NA | NA | 31000 | 130000 | No | BSL |
| | 208-96-8 | Acenaphthylene | 4 J | 1200 | ug/kg | 15SS0030002 | 11/45 | 3.63 - 27.5 | 1200 | NA | NA | NA | 18000 | No | BSL |
| | 98-86-2 | Acetophenone | 150 J | 150 J | ug/kg | 15SS0460002 | 1/45 | 71.7 - 310 | 150 | NA | NA | 890 | NA | No | BSL |
| | 120-12-7 | Anthracene | 5 J | 1200 | ug/kg | 15SS0030002 | 21/45 | 3.63 - 15.6 | 1200 | NA | NA | 650000 | 51000 | No | BSL |
| | 56-55-3 | Benzo(a)anthracene | 5 J | 4600 J | ug/kg | 15SS0030002 | 28/45 | 3.63 - 15.6 | 4600 | NA | NA | 160 | 19000 | Yes | ASL |
| | 50-32-8 | Benzo(a)pyrene | 7 J | 10000 | ug/kg | 15SS0030002 | 24/45 | 3.63 - 27.5 | 10000 | NA | NA | 410 | 8200 | Yes | ASL |
| | 205-99-2 | Benzo(b)fluoranthene | 5 J | 12000 | ug/kg | 15SS0030002 | 22/45 | 3.63 - 27.5 | 12000 | NA | NA | 490 | 57000 | Yes | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 14 | 13000 | ug/kg | 15SS0030002 | 23/45 | 3.63 - 27.5 | 13000 | NA | NA | NA | 16000 | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 6 J | 6900 | ug/kg | 15SS0030002 | 21/45 | 3.63 - 27.5 | 6900 | NA | NA | 490 | 39000 | Yes | ASL |
| | 117-81-7 | bis(2-ethylhexyl)phthalate | 79 J | 760 | ug/kg | 15SS0300002 | 11/45 | 71.7 - 301 | 760 | NA | NA | 180000 | 3600000 | No | BSL |
| | 218-01-9 | Chrysene | 6 J | 9500 J | ug/kg | 15SS0030002 | 29/45 | 3.63 - 14.1 | 9500 | NA | 7500000 C | 160 | 25000 | Yes | ASL |
| | 84-74-2 | Di-N-Butyl Phthalate | 91 J | 290 J | ug/kg | 15SS0440002 | 6/45 | 71.7 - 301 | 290 | NA | NA | 250000 | 5000000 | No | BSL |
| | 117-84-0 | Di-N-Octyl Phthalate | 920 J | 920 J | ug/kg | 15SS0300002 | 1/45 | 71.7 - 301 | 920 | NA | NA | 2400000000 | 67000000 | No | BSL |
| | 53-70-3 | Dibenzo(a,h)anthracene | 18 | 3200 | ug/kg | 15SS0030002 | 6/45 | 3.63 - 111 | 3200 | NA | NA | 1500 | 18000 | Yes | ASL |
| | 132-64-9 | Dibenzofuran | 95 J | 460 J | ug/kg | 15SS0030002 | 3/45 | 71.7 - 301 | 460 | NA | NA | 2400 | 4900 | No | BSL |
| | 206-44-0 | Fluoranthene | 4 J | 6000 | ug/kg | 15SS0030002 | 36/45 | 3.7 - 4.28 | 6000 | NA | NA | 310000 | 880000 | No | BSL |
| | 86-73-7 | Fluorene | 6 J | 330 | ug/kg | 15SS0010002 | 9/45 | 3.63 - 111 | 330 | NA | NA | 41000 | 170000 | No | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 11 J | 11000 | ug/kg | 15SS0030002 | 19/45 | 3.63 - 27.5 | 11000 | NA | NA | 1400 | 3100 | Yes | ASL |
| | 86-30-6 | N-Nitrosodiphenylamine | 1500 | 1500 | ug/kg | 15SS0380002 | 1/45 | 71.7 - 301 | 1500 | NA | NA | 220 | 9700 | Yes | ASL |
| | 91-20-3 | Naphthalene | 4 J | 280 J | ug/kg | 15SS0070002 | 15/45 | 3.63 - 111 | 280 | NA | 17000 N | 3100 | 700 | No | BSL |
| | 85-01-8 | Phenanthrene | 5 J | 2800 | ug/kg | 15SS0010002 | 34/45 | 3.7 - 4.28 | 2800 | NA | NA | NA | 13000 | No | BSL |
| | 129-00-0 | Pyrene | 6 J | 14000 J | ug/kg | 15SS0030002 | 34/45 | 3.7 - 4.28 | 14000 | NA | NA | 230000 | 570000 | No | BSL |
| | **Pesticides/PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 2.7 J | 110 | ug/kg | 15SS0220002 | 4/29 | 1.51 - 1.75 | 110 | NA | NA | 710 | 140000 | No | BSL |
| | 72-55-9 | 4,4'-DDE | 2 J | 12 | ug/kg | 15SS0490002 | 2/29 | 1.51 - 1.75 | 12 | NA | NA | 2200 | 450000 | No | BSL |
| | 50-29-3 | 4,4'-DDT | 14 | 14 | ug/kg | 15SS0490002 | 1/29 | 1.51 - 1.75 | 14 | NA | 750000 C | 1300 | 26000 | No | BSL |
| | 5103-71-9 | alpha-Chlordane[8] | 1.6 J | 69 | ug/kg | 15SS0200002 | 4/29 | 0.729 - 0.843 | 69 | NA | 72000 C | 480 | 9600 | No | BSL |
| | 11096-82-5 | Aroclor-1260 | 20 | 1200 | ug/kg | 15SS0230002 | 4/27 | 10.1 - 11.7 | 1200 | NA | NA | NA | 6200 | No | BSL |
| | 5103-74-2 | Gamma-Chlordane[8] | 3.6 | 75 | ug/kg | 15SS0200002 | 3/29 | 0.729 - 0.843 | 75 | NA | 72000 C | 480 | 9600 | No | BSL |
| | 76-44-8 | Heptachlor | 8.5 | 8.5 | ug/kg | 15SS0200002 | 1/29 | 0.729 - 0.843 | 8.5 | NA | 4200 C | 1100 | 23000 | No | BSL |
| | 1024-57-3 | Heptachlor Epoxide | 4.8 | 4.8 | ug/kg | 15SS0200002 | 1/29 | 0.729 - 0.843 | 4.8 | NA | 4800 C | 33 | 670 | No | BSL |
| | **Herbicides** | | | | | | | | | | | | | | |
| | 87-86-5 | Pentachlorophenol | 28 J | 28 J | ug/kg | 15SS0490002 | 1/36 | 0.482 - 3.8 | 28 | NA | NA | 1.4 | 28 | Yes | ASL |
| | **Inorganics** | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum | 1700 J | 29900 J | mg/kg | 15SS0200002, 15SS0310002 | 42/42 | --- | 29900 | 5020 - 17400 | 686000 N | 8.3 | NA | Yes | ASL |
| | 7440-36-0 | Antimony | 1.4 J | 2.7 J | mg/kg | 15SS0060002 | 3/42 | 0.022 - 1.2 | 2.7 | 0.49 - 11.3 | NA | 0.27 | 5.4 | Yes | ASL |

TABLE 7-2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects(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 15 (Continued) | 7440-38-2 | Arsenic | 0.79 J | 20.7 J | mg/kg | 15SS0360002 | 42/42 | --- | 20.7 | 1.1 - 10.2 | 745 C | 0.29 | 29 | Yes | ASL |
| | 7440-39-3 | Barium | 16 J | 254 J | mg/kg | 15SS0140002 | 42/42 | --- | 254 | 24.8 - 155 | 68600 N | 82 | 1600 | Yes | ASL |
| | 7440-41-7 | Beryllium | 0.31 J | 2.9 | mg/kg | 15SS0190002 | 38/42 | 0.1 - 0.22 | 2.9 | 0.3 - 0.82 | 1330 C | 3.2 | 63 | No | BSL |
| | 7440-43-9 | Cadmium | 0.18 J | 6.9 J | mg/kg | 15SS0020002 | 36/42 | 0.16 - 0.34 | 6.9 | 0.05 - 3.6 | 1780 C | 0.38 | 7.5 | Yes | ASL |
| | 7440-70-2 | Calcium | 170 J | 381000 J | mg/kg | 15SS0050002 | 42/42 | --- | 381000 | 53.6 - 35300 | NA | NA | NA | No | NUT |
| | 7440-47-3 | Chromium(9) | 6 J | 49.7 J | mg/kg | 15SS0360002 | 42/42 | --- | 49.7 | 7.7 - 30.6 | 267 C | 2.1 | NA | Yes | ASL |
| | 7440-48-4 | Cobalt | 0.59 J | 59.6 J | mg/kg | 15SS0350002 | 42/42 | --- | 59.6 | 1.8 - 27.1 | 1140 C | 0.17 | NA | Yes | ASL |
| | 7440-50-8 | Copper | 1.4 J | 20.1 J | mg/kg | 15SS0060002 | 42/42 | --- | 20.1 | 3.5 - 23.8 | NA | 560 | 920 | No | BSL |
| | 7439-89-6 | Iron | 1870 J | 57600 J | mg/kg | 15SS0360002 | 42/42 | --- | 57600 | 7140 - 40800 | NA | NA | NA | No | NTX |
| | 7439-92-1 | Lead | 1.7 J | 155 J | mg/kg | 15SS0080002 | 42/42 | --- | 155 | 6.4 - 21.5 | NA | NA | 81 | Yes | ASL |
| | 7439-95-4 | Magnesium | 754 J | 42700 J | mg/kg | 15SS0030002 | 42/42 | --- | 42700 | 496 - 2870 | NA | NA | NA | No | NUT |
| | 7439-96-5 | Manganese | 28.6 J | 4400 J | mg/kg | 15SS0350002 | 42/42 | --- | 4400 | 23.2 - 3040 | 6860 N | 110 | NA | Yes | ASL |
| | 7439-97-6 | Mercury | 0.01 J | 0.13 | mg/kg | 15SS0100002 | 35/42 | 0.006 - 0.007 | 0.13 | 0.04 - 0.14 | 2.9 sat | 0.1 | 2.1 | Yes | ASL |
| | 7440-02-0 | Nickel | 4.2 J | 31.6 J | mg/kg | 15SS0350002 | 42/42 | --- | 31.6 | 4.6 - 23.7 | NA | 14 | 950 | Yes | ASL |
| | 7440-09-7 | Potassium | 419 J | 2720 J | mg/kg | 15SS0440002 | 42/42 | --- | 2720 | 280 - 1650 | NA | NA | NA | No | NUT |
| | 7782-49-2 | Selenium | 0.11 J | 1.1 | mg/kg | 15SS0380002 | 33/42 | 0.06 - 0.5 | 1.1 | 0.28 - 0.88 | NA | 0.26 | 5.2 | Yes | ASL |
| | 7440-22-4 | Silver | 0.04 J | 0.04 J | mg/kg | 15SS0450002 | 1/42 | 0.041 - 0.35 | 0.04 | 0.04 - 0.11 | NA | 1.6 | 31 | No | BSL |
| | 7440-23-5 | Sodium | 76.4 J | 1250 J | mg/kg | 15SS0190002 | 27/42 | 35.3 - 121 | 1250 | 3.7 - 205 | NA | NA | NA | No | NUT |
| | 7440-28-0 | Thallium | 0.21 J | 0.47 J | mg/kg | 15SS0380002 | 14/42 | 0.06 - 0.49 | 0.47 | 0.05 - 0.31 | NA | 0.056 | 2.8 | Yes | ASL |
| | 7440-31-5 | Tin | 0.34 J | 2.2 J | mg/kg | 15SS0060002 | 6/42 | 0.21 - 1.2 | 2.2 | NA | NA | NA | NA | No | NTX |
| | 7440-62-2 | Vanadium | 5.3 J | 57.4 | mg/kg | 15SS0360002 | 42/42 | --- | 57.4 | 14.1 - 48.5 | NA | 260 | NA | No | BSL |
| | 7440-66-6 | Zinc | 19.4 J | 626 | mg/kg | 15SS0020002 | 42/42 | --- | 626 | 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 (TtNUS, 2001).
5 - U.S. EPA Soil Screening Levels. EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm (soil to air SSLs for non-carcinogens 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, 2004).
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.
8 - The COPC screening criterion for chlordane is used as a surrogate.
9 - The COPC screening value is for total chromium.

**Associated Samples**

| | | | | |
|---|---|---|---|---|
| 15SS0010002 | 15SS0110002 | 15SS0210002 | 15SS0310002 | 15SS0410002 |
| 15SS0020002 | 15SS0120002 | 15SS0220002 | 15SS0320002 | 15SS0420002 |
| 15SS0030002 | 15SS0130002 | 15SS0230002 | 15SS0330002 | 15SS0430002 |
| 15SS0040002 | 15SS0140002 | 15SS0240002 | 15SS0340002 | 15SS0440002 |
| 15SS0050002 | 15SS0150002 | 15SS0250002 | 15SS0350002 | 15SS0450002 |
| 15SS0060002 | 15SS0160002 | 15SS0260002 | 15SS0360002 | 15SS0460002 |
| 15SS0070002 | 15SS0170002 | 15SS0270002 | 15SS0370002 | 15SS0470002 |
| 15SS0080002 | 15SS0180002 | 15SS0280002 | 15SS0380002 | 15SS0480002 |
| 15SS0090002 | 15SS0190002 | 15SS0290002 | 15SS0390002 | 15SS0490002 |
| 15SS0100002 | 15SS0200002 | 15SS0300002 | 15SS0400002 | 15SS0620002 |

**Definitions:**
ARAR/TBC = Applicable or Relevant and Appropriate Requirements/To Be Considered
C = Carcinogen
COPC = Chemical of potential concern
J = Estimated value
N = Non-carcinogen
NA = Not applicable/not available

SSL = Soil Screening Level
sat = Soil saturation limit

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data
NUT = Essential Nutrient

TABLE 7-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[2] | Concentration Used for Screening[3] | Range of Background Concentrations[4] | U.S. 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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 78-93-3 | 2-Butanone | 1 J | 18 | ug/kg | 15SB0461020 | 18/43 | 0.867 - 1.23 | 18 | NA | 2200000 N | 44000000 | IDEM | No | BSL |
| | 591-78-6 | 2-Hexanone | 2 J | 2 J | ug/kg | 15SB0460206 | 1/43 | 0.796 - 1.48 | 2 | NA | NA | NA | NA | No | NTX |
| | 67-64-1 | Acetone | 3 J | 72 | ug/kg | 15SB0210206, 15SB0400206 | 18/43 | 3 - 42 | 72 | NA | 1400000 N | 4800000 | IDEM | No | BSL |
| | 75-15-0 | Carbon Disulfide | 1 J | 3 J | ug/kg | 15SB0461020 | 3/43 | 0.796 - 1.48 | 3 | NA | 36000 N | 900000 | IDEM | No | BSL |
| | 156-59-2 | cis-1,2-Dichloroethene | 2 J | 2 J | ug/kg | 15SB0220206, 15SB0430206 | 2/43 | 0.796 - 1.48 | 2 | NA | 4300 N | 110000 | IDEM | No | BSL |
| | 75-09-2 | Methylene Chloride | 1 J | 54 J | ug/kg | 15SB0450610 | 36/43 | 0.891 - 10 | 54 | NA | 9100 C | 120000 | IDEM | No | BSL |
| | 1330-20-7 | Total Xylenes | 1.13 J | 1.13 J | ug/kg | 15SB0311014 | 1/43 | 0.796 - 1.48 | 1.13 | NA | 27000 N | 690000 | IDEM | No | BSL |
| | 75-69-4 | Trichlorofluoromethane | 1 J | 3 | ug/kg | 15SB0311014, 15SB0450610 | 12/43 | 0.815 - 1.48 | 3 | NA | 39000 N | NA | NA | No | BSL |
| | **Semivolatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 4 J | 47 | ug/kg | 15SB0020206 | 7/19 | 3.85 - 4.3 | 47 | NA | 5600 N[8] | 3200000 | IDEM[8] | No | BSL |
| | 83-32-9 | Acenaphthene | 6 J | 110 | ug/kg | 15SB0020206 | 5/19 | 3.78 - 4.3 | 110 | NA | 370000 N | 9500000 | IDEM | No | BSL |
| | 98-86-2 | Acetophenone | 140 J | 140 J | ug/kg | 15SB0460206 | 1/12 | 72.7 - 130 | 140 | NA | NA | NA | NA | No | NTX |
| | 120-12-7 | Anthracene | 4 J | 120 | ug/kg | 15SB0020206 | 8/19 | 3.78 - 4.3 | 120 | NA | 2200000 N | 47000000 | IDEM | No | BSL |
| | 56-55-3 | Benzo(a)anthracene | 8 | 110 | ug/kg | 15SB0280206 | 9/19 | 3.85 - 4.3 | 110 | NA | 620 C | 5000 | IDEM | No | BSL |
| | 50-32-8 | Benzo(a)pyrene | 8 | 150 | ug/kg | 15SB0230206 | 9/19 | 3.85 - 4.3 | 150 | NA | 62 C | 500 | IDEM | Yes | ASL |
| | 205-99-2 | Benzo(b)fluoranthene | 10 | 230 | ug/kg | 15SB0230206 | 9/19 | 3.85 - 4.3 | 230 | NA | 620 C | 5000 | IDEM | No | BSL |
| | 191-24-2 | Benzo(g,h,i)perylene | 6 J | 120 | ug/kg | 15SB0280206 | 8/19 | 3.79 - 4.3 | 120 | NA | 230000 N[9] | 50000 | IDEM[9] | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 5 J | 86 | ug/kg | 15SB0280206 | 8/19 | 3.78 - 4.3 | 86 | NA | 6200 C | 50000 | IDEM | No | BSL |
| | 117-81-7 | bis(2-ethylhexyl)phthalate | 110 J | 110 J | ug/kg | 15SB0090206 | 1/12 | 72.7 - 86.9 | 110 | NA | 35000 C | 300000 | IDEM | No | BSL |
| | 218-01-9 | Chrysene | 9 | 120 | ug/kg | 15SB0230206, 15SB0280206 | 9/19 | 3.85 - 4.3 | 120 | NA | 62000 C | 500000 | IDEM | No | BSL |
| | 84-74-2 | Di-N-Butyl Phthalate | 100 J | 180 J | ug/kg | 15SB0460206 | 2/12 | 72.7 - 87.4 | 180 | NA | 61000 N | 18000000 | IDEM | No | BSL |
| | 53-70-3 | Dibenzo(a,h)anthracene | 7 J | 31 | ug/kg | 15SB0280206 | 3/19 | 3.78 - 4.3 | 31 | NA | 62 C | 500 | IDEM | No | BSL |
| | 206-44-0 | Fluoranthene | 12 | 370 | ug/kg | 15SB0020206 | 10/19 | 3.85 - 4.3 | 370 | NA | 230000 N | 6300000 | IDEM | No | BSL |
| | 86-73-7 | Fluorene | 4 J | 120 | ug/kg | 15SB0020206 | 7/19 | 3.79 - 4.3 | 120 | NA | 270000 N | 6300000 | IDEM | No | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 6 J | 85 | ug/kg | 15SB0280206 | 8/19 | 3.79 - 4.3 | 85 | NA | 620 C | 5000 | IDEM | No | BSL |
| | 120-58-1 | Isosafrole | 1300 | 6000 | ug/kg | 15SB0460206 | 2/12 | 72.7 - 86.9 | 6000 | NA | NA | NA | NA | No | NTX |
| | 91-20-3 | Naphthalene | 6 J | 42 | ug/kg | 15SB0020206 | 7/19 | 3.79 - 4.3 | 42 | NA | 5600 N | 3200000 | IDEM | No | BSL |
| | 85-01-8 | Phenanthrene | 6 J | 510 | ug/kg | 15SB0020206 | 11/19 | 3.85 - 4.3 | 510 | NA | 230000 N[9] | 470000 | IDEM[9] | No | BSL |
| | 129-00-0 | Pyrene | 12 | 490 | ug/kg | 15SB0280206 | 11/19 | 3.85 - 4.3 | 490 | NA | 230000 N | 4700000 | IDEM | No | BSL |
| | **Pesticides/PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 2.3 J | 2.3 J | ug/kg | 15SB0480206 | 1/5 | 1.53 - 1.64 | 2.3 | NA | 2400 C | 28000 | IDEM | No | BSL |
| | 50-29-3 | 4,4'-DDT | 1.59 J | 1.59 J | ug/kg | 15SB0480206 | 1/5 | 1.53 - 1.64 | 1.59 | NA | 1700 C | 20000 | IDEM | No | BSL |
| | 5103-71-9 | alpha-Chlordane | 1 J | 1 J | ug/kg | 15SB0140206 | 1/5 | 0.744 - 0.788 | 1 | NA | 1600 C[10] | 17000 | IDEM[10] | No | BSL |
| | 5103-74-2 | gamma-Chlordane | 1.1 J | 1.1 J | ug/kg | 15SB0140206 | 1/5 | 0.744 - 0.788 | 1.1 | NA | 1600 C[10] | 17000 | IDEM[10] | No | BSL |
| | **Inorganics** | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum | 14400 J | 31100 J | mg/kg | 15SB0230206 | 12/12 | --- | 31100 | 5020 - 17400 | 7600 N | NA | NA | Yes | ASL |
| | 7440-38-2 | Arsenic | 3.9 J | 14.9 J | mg/kg | 15SB0230206 | 12/12 | --- | 14.9 | 1.1 - 10.2 | 0.39 C | 3.9 | IDEM | Yes | ASL |
| | 7440-39-3 | Barium | 53.7 J | 157 J | mg/kg | 15SB0080206, 15SB0100610 | 12/12 | --- | 157 | 24.8 - 155 | 540 N | 23000 | IDEM | No | BSL |
| | 7440-41-7 | Beryllium | 0.55 | 1.1 J | mg/kg | 15SB0060206, 15SB0100206 | 12/12 | --- | 1.1 | 0.3 - 0.82 | 15 N | 680 | IDEM | No | BSL |

TABLE 7-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects(2) | Concentration Used for Screening(3) | Range of Background Concentrations(4) | U.S. 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 15 (continued) | 7440-43-9 | Cadmium | 0.22 J | 0.95 | mg/kg | 15SB0480206 | 12/12 | --- | 0.95 | 0.05 - 3.6 | 3.7 N | 12 | IDEM | No | BSL |
| | 7440-70-2 | Calcium | 726 J | 22900 J | mg/kg | 15SB0450206 | 9/12 | 301 - 5680 | 22900 | 53.6 - 35300 | NA | NA | NA | No | NUT |
| | 7440-47-3 | Chromium | 16.5 J | 32.6 J | mg/kg | 15SB0060206 | 12/12 | --- | 32.6 | 7.7 - 30.6 | 210 C(11) | 430 | IDEM(12) | No | BSL |
| | 7440-48-4 | Cobalt | 5.4 J | 54.2 J | mg/kg | 15SB0100206 | 12/12 | --- | 54.2 | 1.8 - 27.1 | 140 N(13) | NA | NA | No | BSL |
| | 7440-50-8 | Copper | 6.1 J | 18.7 J | mg/kg | 15SB0230206 | 12/12 | --- | 18.7 | 3.5 - 23.8 | 310 N | 13000 | IDEM | No | BSL |
| | 7439-89-6 | Iron | 16500 J | 35600 J | mg/kg | 15SB0230206 | 12/12 | --- | 35600 | 7140 - 40800 | 2300 N | NA | NA | Yes | ASL |
| | 7439-92-1 | Lead | 9.2 J | 21.7 J | mg/kg | 15SB0480206 | 12/12 | --- | 21.7 | 6.4 - 21.5 | 400 | 400 | IDEM | No | BSL |
| | 7439-95-4 | Magnesium | 1030 J | 3890 J | mg/kg | 15SB0230206 | 12/12 | --- | 3890 | 496 - 2870 | NA | NA | NA | No | NUT |
| | 7439-96-5 | Manganese | 101 | 3570 J | mg/kg | 15SB0090206 | 12/12 | --- | 3570 | 23.2 - 3040 | 180 N | NA | NA | Yes | ASL |
| | 7439-97-6 | Mercury | 0.008 J | 0.055 J | mg/kg | 15SB0100206 | 8/9 | 0.007 | 0.055 | 0.04 - 0.14 | 2.3 N | 100 | IDEM | No | BSL |
| | 7440-02-0 | Nickel | 12 J | 33.2 J | mg/kg | 15SB0060206 | 12/12 | --- | 33.2 | 4.6 - 23.7 | 160 N | 6900 | IDEM | No | BSL |
| | 7440-09-7 | Potassium | 1050 J | 2820 J | mg/kg | 15SB0060206 | 12/12 | --- | 2820 | 280 - 1650 | NA | NA | NA | No | NUT |
| | 7782-49-2 | Selenium | 0.16 J | 0.79 J | mg/kg | 15SB0100206 | 11/12 | 0.28 | 0.79 | 0.28 - 0.88 | 39 N | 1700 | IDEM | No | BSL |
| | 7440-22-4 | Silver | 0.05 J | 0.05 J | mg/kg | 15SB0460206 | 1/12 | 0.044 - 0.08 | 0.05 | 0.04 - 0.11 | 39 N | 1700 | IDEM | No | BSL |
| | 7440-23-5 | Sodium | 79 J | 135 J | mg/kg | 15SB0090206 | 11/12 | 83 | 135 | 3.7 - 205 | NA | NA | NA | No | NUT |
| | 7440-28-0 | Thallium | 0.27 J | 0.39 J | mg/kg | 15SB0230206 | 4/12 | 0.17 - 0.33 | 0.39 | 0.05 - 0.31 | 0.52 N | 24 | IDEM | No | BSL |
| | 7440-62-2 | Vanadium | 23.5 J | 55.9 J | mg/kg | 15SB0230206 | 12/12 | --- | 55.9 | 14.1 - 48.5 | 7.8 N | NA | NA | Yes | ASL |
| | 7440-66-6 | Zinc | 26 J | 61 J | mg/kg | 15SB0230206 | 11/12 | 64.7 | 61 | 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 (TtNUS, 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, 2004a).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, 2004).
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.
8 - The value for naphthalene was used as a surrogate for 2-methylnaphthalene.
9 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
10 - Chlordane is used as a surrogate for alpha- and gamma-chlordane.
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.

**Associated Samples**

| | | | | | |
|---|---|---|---|---|---|
| 15SB0010206 | 15SB0080610 | 15SB0140206-D | 15SB0290206 | 15SB0420206 | 15SB0480206 |
| 15SB0020206 | 15SB0090206 | 15SB0190206 | 15SB0300206 | 15SB0430206 | 15SB0480206-D |
| 15SB0030206 | 15SB0090610 | 15SB0200206 | 15SB0310206 | 15SB0440206 | 15SB0480610 |
| 15SB0040206 | 15SB0100206 | 15SB0210206 | 15SB0310610 | 15SB0450206 | 15SB0481015 |
| 15SB0050206 | 15SB0100610 | 15SB0220206 | 15SB0311014 | 15SB0450610 | 15SB0620206 |
| 15SB0060206 | 15SB0110206 | 15SB0230206 | 15SB0320206 | 15SB0451012 | |
| 15SB0060206-D | 15SB0120206 | 15SB0230206-D | 15SB0350206 | 15SB0460206 | |
| 15SB0070206 | 15SB0130206 | 15SB0280206 | 15SB0370206 | 15SB0460610 | |
| 15SB0080206 | 15SB0140206 | 15SB0280206-D | 15SB0400206 | 15SB0461020 | |

**Definitions:**
ARAR/TBC = Applicable or Relevant and Appropriate Requirements/To Be Considered
C = Carcinogen
COPC = Chemical of potential concern
J = Estimated value
N = Non-carcinogen
NA = Not applicable/not available

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data
NUT = Essential Nutrient

TABLE 7-4

OCCURRENCE, DISTRIBUTION AND SELECTIONOF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SUBSURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 78-93-3 | 2-Butanone | 1 J | 18 | ug/kg | 15SB0461020 | 18/43 | 0.867 - 1.23 | 18 | NA | 24000000 sat | 4400 | 35000 | No | BSL |
| | 591-78-6 | 2-Hexanone | 2 J | 2 J | ug/kg | 15SB0460206 | 1/43 | 0.796 - 1.48 | 2 | NA | NA | NA | NA | No | NTX |
| | 67-64-1 | Acetone | 3 J | 72 | ug/kg | 15SB0210206, 15SB0400206 | 18/43 | 3 - 42 | 72 | NA | NA | 6600 | 3800 | No | BSL |
| | 75-15-0 | Carbon Disulfide | 1 J | 3 J | ug/kg | 15SB0461020 | 3/43 | 0.796 - 1.48 | 3 | NA | 720000 sat | 1500 | 10000 | No | BSL |
| | 156-59-2 | cis-1,2-Dichloroethene | 2 J | 2 J | ug/kg | 15SB0220206, 15SB0430206 | 2/43 | 0.796 - 1.48 | 2 | NA | NA | 20 | 400 | No | BSL |
| | 75-09-2 | Methylene Chloride | 1 J | 54 J | ug/kg | 15SB0450610 | 36/43 | 0.891 - 10 | 54 | NA | 13000 C | 1.2 | 23 | Yes | ASL |
| | 1330-20-7 | Total Xylenes | 1.13 J | 1.13 J | ug/kg | 15SB0311014 | 1/43 | 0.796 - 1.48 | 1.13 | NA | 71000 N | 7100 | 210000 | No | BSL |
| | 75-69-4 | Trichlorofluoromethane | 1 J | 3 | ug/kg | 15SB0311014, 15SB0450610 | 12/43 | 0.815 - 1.48 | 3 | NA | 110000 N | 8000 | NA | No | BSL |
| | **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 4 J | 47 | ug/kg | 15SB0020206 | 7/19 | 3.85 - 4.3 | 47 | NA | NA | NA | 16000 | No | BSL |
| | 83-32-9 | Acenaphthene | 6 J | 110 | ug/kg | 15SB0020206 | 5/19 | 3.78 - 4.3 | 110 | NA | NA | 31000 | 130000 | No | BSL |
| | 98-86-2 | Acetophenone | 140 J | 140 J | ug/kg | 15SB0460206 | 1/12 | 72.7 - 130 | 140 | NA | NA | 890 | NA | No | BSL |
| | 120-12-7 | Anthracene | 4 J | 120 | ug/kg | 15SB0020206 | 8/19 | 3.78 - 4.3 | 120 | NA | NA | 650000 | 51000 | No | BSL |
| | 56-55-3 | Benzo(a)anthracene | 8 | 110 | ug/kg | 15SB0280206 | 9/19 | 3.85 - 4.3 | 110 | NA | NA | 160 | 19000 | No | BSL |
| | 50-32-8 | Benzo(a)pyrene | 8 | 150 | ug/kg | 15SB0230206 | 9/19 | 3.85 - 4.3 | 150 | NA | NA | 410 | 8200 | No | BSL |
| | 205-99-2 | Benzo(b)fluoranthene | 10 | 230 | ug/kg | 15SB0230206 | 9/19 | 3.85 - 4.3 | 230 | NA | NA | 490 | 57000 | No | BSL |
| | 191-24-2 | Benzo(g,h,i)perylene | 6 J | 120 | ug/kg | 15SB0280206 | 8/19 | 3.79 - 4.3 | 120 | NA | NA | NA | 16000 | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 5 J | 86 | ug/kg | 15SB0280206 | 8/19 | 3.78 - 4.3 | 86 | NA | NA | 490 | 39000 | No | BSL |
| | 117-81-7 | bis(2-ethylhexyl)phthalate | 110 J | 110 J | ug/kg | 15SB0090206 | 1/12 | 72.7 - 86.9 | 110 | NA | NA | 180000 | 3600000 | No | BSL |
| | 218-01-9 | Chrysene | 9 | 120 | ug/kg | 15SB0230206, 15SB0280206 | 9/19 | 3.85 - 4.3 | 120 | NA | 7500000 C | 160 | 25000 | No | BSL |
| | 84-74-2 | Di-N-Butyl Phthalate | 100 J | 180 J | ug/kg | 15SB0460206 | 2/12 | 72.7 - 87.4 | 180 | NA | NA | 250000 | 5000000 | No | BSL |
| | 53-70-3 | Dibenzo(a,h)anthracene | 7 J | 31 | ug/kg | 15SB0280206 | 3/19 | 3.78 - 4.3 | 31 | NA | NA | 1500 | 18000 | No | BSL |
| | 206-44-0 | Fluoranthene | 12 | 370 | ug/kg | 15SB0020206 | 10/19 | 3.85 - 4.3 | 370 | NA | NA | 310000 | 880000 | No | BSL |
| | 86-73-7 | Fluorene | 4 J | 120 | ug/kg | 15SB0020206 | 7/19 | 3.79 - 4.3 | 120 | NA | NA | 41000 | 170000 | No | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 6 J | 85 | ug/kg | 15SB0280206 | 8/19 | 3.79 - 4.3 | 85 | NA | NA | 1400 | 3100 | No | BSL |
| | 120-58-1 | Isosafrole | 1300 | 6000 | ug/kg | 15SB0460206 | 2/12 | 72.7 - 86.9 | 6000 | NA | NA | NA | NA | No | NTX |
| | 91-20-3 | Naphthalene | 6 J | 42 | ug/kg | 15SB0020206 | 7/19 | 3.79 - 4.3 | 42 | NA | 17000 N | 3100 | 700 | No | BSL |
| | 85-01-8 | Phenanthrene | 6 J | 510 | ug/kg | 15SB0020206 | 11/19 | 3.85 - 4.3 | 510 | NA | NA | NA | 13000 | No | BSL |
| | 129-00-0 | Pyrene | 12 | 490 | ug/kg | 15SB0280206 | 11/19 | 3.85 - 4.3 | 490 | NA | NA | 230000 | 570000 | No | BSL |
| | **Pesticides PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 2.3 J | 2.3 J | ug/kg | 15SB0480206 | 1/5 | 1.53 - 1.64 | 2.3 | NA | NA | 710 | 140000 | No | BSL |
| | 50-29-3 | 4,4'-DDT | 1.59 J | 1.59 J | ug/kg | 15SB0480206 | 1/5 | 1.53 - 1.64 | 1.59 | NA | 750000 C | 1300 | 26000 | No | BSL |
| | 5103-71-9 | alpha-Chlordane[8] | 1 J | 1 J | ug/kg | 15SB0140206 | 1/5 | 0.744 - 0.788 | 1 | NA | 72000 C | 480 | 9600 | No | BSL |
| | 5103-74-2 | gamma-Chlordane[8] | 1.1 J | 1.1 J | ug/kg | 15SB0140206 | 1/5 | 0.744 - 0.788 | 1.1 | NA | 72000 C | 480 | 9600 | No | BSL |
| | **Inorganics** | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum | 14400 J | 31100 J | mg/kg | 15SB0230206 | 12/12 | --- | 31100 | 5020 - 17400 | 686000 N | 8.3 | NA | Yes | ASL |
| | 7440-38-2 | Arsenic | 3.9 J | 14.9 J | mg/kg | 15SB0230206 | 12/12 | --- | 14.9 | 1.1 - 10.2 | 745 C | 0.29 | 29 | Yes | ASL |
| | 7440-39-3 | Barium | 53.7 J | 157 J | mg/kg | 15SB0080206, 15SB0100610 | 12/12 | --- | 157 | 24.8 - 155 | 68600 N | 82 | 1600 | Yes | ASL |
| | 7440-41-7 | Beryllium | 0.55 | 1.1 J | mg/kg | 15SB0060206, 15SB0100206 | 12/12 | --- | 1.1 | 0.3 - 0.82 | 1330 C | 3.2 | 63 | No | BSL |

TABLE 7-4

OCCURRENCE, DISTRIBUTION AND SELECTIONOF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SUBSURFACE SOIL
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects(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 15 (Continued) | 7440-43-9 | Cadmium | 0.22 J | 0.95 | mg/kg | 15SB0480206 | 12/12 | --- | 0.95 | 0.05 - 3.6 | 1780 C | 0.38 | 7.5 | Yes | ASL |
| | 7440-70-2 | Calcium | 726 J | 22900 J | mg/kg | 15SB0450206 | 9/12 | 301 - 5680 | 22900 | 53.6 - 35300 | NA | NA | NA | No | NUT |
| | 7440-47-3 | Chromium(9) | 16.5 J | 32.6 J | mg/kg | 15SB0060206 | 12/12 | --- | 32.6 | 7.7 - 30.6 | 267 C | 2.1 | NA | Yes | ASL |
| | 7440-48-4 | Cobalt | 5.4 J | 54.2 J | mg/kg | 15SB0100206 | 12/12 | --- | 54.2 | 1.8 - 27.1 | 1140 C | 0.17 | NA | Yes | ASL |
| | 7440-50-8 | Copper | 6.1 J | 18.7 J | mg/kg | 15SB0230206 | 12/12 | --- | 18.7 | 3.5 - 23.8 | NA | 560 | 920 | No | BSL |
| | 7439-89-6 | Iron | 16500 J | 35600 J | mg/kg | 15SB0230206 | 12/12 | --- | 35600 | 7140 - 40800 | NA | NA | NA | No | NTX |
| | 7439-92-1 | Lead | 9.2 J | 21.7 J | mg/kg | 15SB0480206 | 12/12 | --- | 21.7 | 6.4 - 21.5 | NA | NA | 81 | No | BSL |
| | 7439-95-4 | Magnesium | 1030 J | 3890 J | mg/kg | 15SB0230206 | 12/12 | --- | 3890 | 496 - 2870 | NA | NA | NA | No | NUT |
| | 7439-96-5 | Manganese | 101 | 3570 J | mg/kg | 15SB0090206 | 12/12 | --- | 3570 | 23.2 - 3040 | 6860 N | 110 | NA | Yes | ASL |
| | 7439-97-6 | Mercury | 0.008 J | 0.055 J | mg/kg | 15SB0100206 | 8/9 | 0.007 | 0.055 | 0.04 - 0.14 | 2.9 sat | 0.1 | 2.1 | No | BSL |
| | 7440-02-0 | Nickel | 12 J | 33.2 J | mg/kg | 15SB0060206 | 12/12 | --- | 33.2 | 4.6 - 23.7 | NA | 14 | 950 | Yes | ASL |
| | 7440-09-7 | Potassium | 1050 J | 2820 J | mg/kg | 15SB0060206 | 12/12 | --- | 2820 | 280 - 1650 | NA | NA | NA | No | NUT |
| | 7782-49-2 | Selenium | 0.16 J | 0.79 J | mg/kg | 15SB0100206 | 11/12 | 0.28 | 0.79 | 0.28 - 0.88 | NA | 0.26 | 5.2 | Yes | ASL |
| | 7440-22-4 | Silver | 0.05 J | 0.05 J | mg/kg | 15SB0460206 | 1/12 | 0.044 - 0.08 | 0.05 | 0.04 - 0.11 | NA | 1.6 | 31 | No | BSL |
| | 7440-23-5 | Sodium | 79 J | 135 J | mg/kg | 15SB0090206 | 11/12 | 83 | 135 | 3.7 - 205 | NA | NA | NA | No | NUT |
| | 7440-28-0 | Thallium | 0.27 J | 0.39 J | mg/kg | 15SB0230206 | 4/12 | 0.17 - 0.33 | 0.39 | 0.05 - 0.31 | NA | 0.056 | 2.8 | Yes | ASL |
| | 7440-62-2 | Vanadium | 23.5 J | 55.9 J | mg/kg | 15SB0230206 | 12/12 | --- | 55.9 | 14.1 - 48.5 | NA | 260 | NA | No | BSL |
| | 7440-66-6 | Zinc | 26 J | 61 J | mg/kg | 15SB0230206 | 11/12 | 64.7 | 61 | 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 (TtNUS, 2001).
5 - U.S. EPA Soil Screening Levels. EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm (soil to air SSLs for non-carcinogens 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, 2004).
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.
8 - The COPC screening criteira for chlordane is used as a surrogate.
9 - The COPC screening value is for total chromium.

**Associated Samples**

| | | | | |
|---|---|---|---|---|
| 15SB0010206 | 15SB0090206 | 15SB0200206 | 15SB0310610 | 15SB0450610 |
| 15SB0020206 | 15SB0090610 | 15SB0210206 | 15SB0311014 | 15SB0451012 |
| 15SB0030206 | 15SB0100206 | 15SB0220206 | 15SB0320206 | 15SB0460206 |
| 15SB0040206 | 15SB0100610 | 15SB0230206 | 15SB0350206 | 15SB0460610 |
| 15SB0050206 | 15SB0110206 | 15SB0230206-D | 15SB0370206 | 15SB0461020 |
| 15SB0060206 | 15SB0120206 | 15SB0280206 | 15SB0400206 | 15SB0480206 |
| 15SB0060206-D | 15SB0130206 | 15SB0280206-D | 15SB0420206 | 15SB0480206-D |
| 15SB0070206 | 15SB0140206 | 15SB0290206 | 15SB0430206 | 15SB0480610 |
| 15SB0080206 | 15SB0140206-D | 15SB0300206 | 15SB0440206 | 15SB0481015 |
| 15SB0080610 | 15SB0190206 | 15SB0310206 | 15SB0450206 | 15SB0620206 |

**Definitions:**
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical of potential concern
J = Estimated value
N = Non-carcinogen
NA = Not applicable/not available
SSL = Soil Screening Level
sat = Soil saturation limit

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[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] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SWMU 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 67-64-1 | Acetone | 3.1 J | 4 J | ug/L | 15SW/SD002 | 2/14 | 0.5 | 4 | NA | 550 N | NA<br>950 | NA<br>IDEM | No | BSL |
| | **Semivolatile Organic Compounds** | | | | | | | | | | | | | | |
| | 83-32-9 | Acenaphthene | 0.06 J | 0.33 | ug/L | 15SW/SD010 | 2/14 | 0.048 - 0.056 | 0.33 | NA | 37 N | NA<br>460 | NA<br>IDEM | No | BSL |
| | 208-96-8 | Acenaphthylene | 0.43 | 0.43 | ug/L | 15SW/SD010 | 1/14 | 0.048 - 0.056 | 0.43 | NA | 37 N[8] | NA<br>71 | NA<br>IDEM | No | BSL |
| | 120-12-7 | Anthracene | 0.05 J | 0.36 | ug/L | 15SW/SD010 | 4/14 | 0.048 - 0.056 | 0.36 | NA | 180 N | NA<br>43 | NA<br>IDEM | No | BSL |
| | 56-55-3 | Benzo(a)anthracene | 0.09 J | 1.84 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 1.84 | 0.12 | 0.092 C | NA<br>1.2 | NA<br>IDEM | Yes | ASL |
| | 50-32-8 | Benzo(a)pyrene | 0.1 | 2.38 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 2.38 | 0.1 | 0.0092 C | 0.2<br>0.2 | FED-MCL<br>IDEM | Yes | ASL |
| | 205-99-2 | Benzo(b)fluoranthene | 0.21 | 5.83 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 5.83 | 0.2 | 0.092 C | NA<br>1.2 | NA<br>IDEM | Yes | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 0.1 | 2.46 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 2.46 | 0.11 | 18 N[9] | NA<br>12 | NA<br>IDEM | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 0.08 J | 1.72 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 1.72 | 0.1 | 0.92 C | NA<br>0.8 | NA<br>IDEM | Yes | ASL |
| | 117-81-7 | bis(2-ethylhexyl)phthalate | 1.01 J | 1.01 J | ug/L | 15SW/SD010 | 1/14 | 0.952 - 1.06 | 1.01 | NA | 4.8 C | 6<br>6 | FED-MCL<br>IDEM | No | BSL |
| | 218-01-9 | Chrysene | 0.2 | 4.46 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 4.46 | 0.18 | 9.2 C | NA<br>1.6 | NA<br>IDEM | Yes | ASL |
| | 53-70-3 | Dibenzo(a,h)anthracene | 0.3 | 0.46 | ug/L | 15SW/SD010 | 2/14 | 0.048 - 0.056 | 0.46 | NA | 0.0092 C | NA<br>0.12 | NA<br>IDEM | Yes | ASL |
| | 206-44-0 | Fluoranthene | 0.1 | 11.9 | ug/L | 15SW/SD010 | 9/14 | 0.048 - 0.052 | 11.9 | 0.49 | 150 N | NA<br>210 | NA<br>IDEM | No | BSL |
| | 86-73-7 | Fluorene | 0.08 J | 0.34 | ug/L | 15SW/SD010 | 2/14 | 0.048 - 0.056 | 0.34 | NA | 24 N | NA<br>310 | NA<br>IDEM | No | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 0.08 J | 2.09 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 2.09 | 0.09 J | 0.092 C | NA<br>0.022 | NA<br>IDEM | Yes | ASL |
| | 91-20-3 | Naphthalene | 0.05 J | 0.12 | ug/L | 15SW/SD010 | 2/14 | 0.048 - 0.056 | 0.12 | NA | 6.2 N | NA<br>8.3 | NA<br>IDEM | No | BSL |
| | 85-01-8 | Phenanthrene | 0.06 J | 4.73 | ug/L | 15SW/SD010 | 9/14 | 0.048 - 0.052 | 4.73 | 0.32 | 18 N[9] | NA<br>23 | NA<br>IDEM | No | BSL |
| | 129-00-0 | Pyrene | 0.05 J | 8.61 | ug/L | 15SW/SD010 | 11/14 | 0.049 - 0.052 | 8.61 | 0.42 | 18 N | NA<br>140 | NA<br>IDEM | No | BSL |
| | 87-86-5 | Pentachlorophenol | 0.022 J | 0.075 J | ug/L | 15SW/SD006 | 11/13 | 0.013 - 0.013 | 0.075 | 0.037 J | 0.56 C | 1<br>1 | FED-MCL<br>IDEM | No | BSL |
| | **Total Metals** | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum | 54.6 J | 3020 J | ug/L | 15SW/SD018 | 13/14 | 41.6 | 3020 | 421 J | 3600 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-36-0 | Antimony | 2.5 J | 2.5 J | ug/L | 15SW/SD013 | 1/14 | 0.19 - 0.49 | 2.5 | NA | 1.5 N | 6<br>6 | FED-MCL<br>IDEM | Yes | ASL |

TABLE 7-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[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] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SWMU 15 (Continued) | 7440-38-2 | Arsenic | 1.4 J | 1.4 J | ug/L | 15SW/SD018 | 1/14 | 0.26 - 1.2 | 1.4 | NA | 0.045 C | 10<br>50 | FED-MCL<br>IDEM | Yes | ASL |
| | 7440-39-3 | Barium | 25.4 J | 162 J | ug/L | 15SW/SD013 | 14/14 | - | 162 | 40.7 J | 260 N | 2000<br>2000 | FED-MCL<br>IDEM | No | BSL |
| | 7440-70-2 | Calcium | 30400 J | 96900 J | ug/L | 15SW/SD013 | 14/14 | - | 96900 | 40600 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7440-47-3 | Chromium | 1.3 J | 3.6 J | ug/L | 15SW/SD011,<br>15SW/SD018 | 7/14 | 0.42 - 1 | 3.6 | NA | 11 N[10] | 100<br>110 | FED-MCL<br>IDEM[10] | No | BSL |
| | 7440-48-4 | Cobalt | 1.4 J | 5.8 J | ug/L | 15SW/SD006 | 8/14 | 0.16 - 0.91 | 5.8 | NA | 73 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-50-8 | Copper | 1.3 J | 8.1 J | ug/L | 15SW/SD011 | 13/14 | 1.1 - 1.1 | 8.1 | 1.5 J | 150 N | 1300<br>1300 | FED-MCL[11]<br>IDEM | No | BSL |
| | 7439-89-6 | Iron | 306 J | 3330 J | ug/L | 15SW/SD018 | 12/14 | 41 - 49.9 | 3330 | 411 J | 1100 N | NA<br>NA | NA<br>NA | Yes | ASL |
| | 7439-92-1 | Lead | 1.1 J | 2.9 J | ug/L | 15SW/SD018 | 8/14 | 0.279 - 0.633 | 2.9 | NA | NA | 15<br>15 | FED-MCL[11]<br>IDEM | No | BSL |
| | 7439-95-4 | Magnesium | 6630 J | 18900 J | ug/L | 15SW/SD011 | 14/14 | - | 18900 | 9810 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7439-96-5 | Manganese | 6.4 J | 1230 | ug/L | 15SW/SD006 | 14/14 | - | 1230 | 69 | 88 N | NA<br>NA | NA<br>NA | Yes | ASL |
| | 7440-02-0 | Nickel | 1.4 J | 8 J | ug/L | 15SW/SD017 | 13/14 | 0.88 | 8 | 3.8 J | 73 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-09-7 | Potassium | 757 J | 6500 J | ug/L | 15SW/SD011 | 14/14 | - - - | 6500 | 1610 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7782-49-2 | Selenium | 1.3 J | 1.3 J | ug/L | 15SW/SD004 | 1/14 | 0.14 - 0.75 | 1.3 | NA | 18 N | 50<br>50 | FED-MCL<br>IDEM | No | BSL |
| | 7440-23-5 | Sodium | 15600 J | 135000 J | ug/L | 15SW/SD011 | 14/14 | - | 135000 | 23000 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7440-62-2 | Vanadium | 1.2 J | 6.1 | ug/L | 15SW/SD018 | 8/14 | 1.14 | 6.1 | NA | 3.6 N | NA<br>NA | NA<br>NA | Yes | ASL |
| | 7440-66-6 | Zinc | 5.2 J | 102 J | ug/L | 15SW/SD004 | 12/14 | 3.5 - 10.6 | 102 | 7.5 J | 1100 N | NA<br>11000 | NA<br>IDEM | No | BSL |
| | **Dissolved Metals** | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum, Filtered | 10.1 J | 2090 | ug/L | 15SW/SD002 | 7/14 | 8.35 - 10.6 | 2090 | 48.8 J | 3600 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-38-2 | Arsenic, Filtered | 1 J | 17 J | ug/L | 15SW/SD001 | 2/14 | 0.047 - 0.33 | 17 | NA | 0.045 C | 10<br>50 | FED-MCL<br>IDEM | Yes | ASL |
| | 7440-39-3 | Barium, Filtered | 18.7 J | 149 J | ug/L | 15SW/SD013 | 14/14 | - | 149 | 33 J | 260 N | 2000<br>2000 | FED-MCL<br>IDEM | No | BSL |
| | 7440-43-9 | Cadmium, Filtered | 0.09 J | 0.36 J | ug/L | 15SW/SD018 | 2/14 | 0.039 - 0.33 | 0.36 | NA | 1.8 N | 5<br>5 | FED-MCL<br>IDEM | No | BSL |
| | 7440-70-2 | Calcium, Filtered | 25200 J | 99600 J | ug/L | 15SW/SD011,<br>15SW/SD013 | 14/14 | - | 99600 | 40400 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7440-47-3 | Chromium, Filtered | 3.4 J | 4.1 J | ug/L | 15SW/SD002 | 2/14 | 0.32 - 1.3 | 4.1 | NA | 11 N[10] | 100<br>110 | FED-MCL<br>IDEM[10] | No | BSL |

TABLE 7-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[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] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SWMU 15 (Continued) | 7440-48-4 | Cobalt, Filtered | 0.26 J | 6.1 | ug/L | 15SW/SD006 | 14/14 | - | 6.1 | 0.86 J | 73 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-50-8 | Copper, Filtered | 1 J | 5.2 J | ug/L | 15SW/SD002 | 14/14 | - | 5.2 | 1.2 J | 150 N | 1300<br>1300 | FED-MCL[11]<br>IDEM | No | BSL |
| | 7439-89-6 | Iron, Filtered | 299 J | 2860 J | ug/L | 15SW/SD002 | 9/14 | 120 - 210 | 2860 | NA | 1100 N | NA<br>NA | NA<br>NA | Yes | ASL |
| | 7439-92-1 | Lead, Filtered | 0.192 J | 3.1 J | ug/L | 15SW/SD002 | 3/14 | 0.069 - 0.486 | 3.1 | NA | NA | 15<br>15 | FED-MCL[11]<br>IDEM | No | BSL |
| | 7439-95-4 | Magnesium, Filtered | 6410 J | 21700 | ug/L | 15SW/SD011 | 14/14 | - | 21700 | 11000 | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7439-96-5 | Manganese, Filtered | 4.7 J | 1230 | ug/L | 15SW/SD006 | 14/14 | - | 1230 | 41.2 | 88 N | NA<br>NA | NA<br>NA | Yes | ASL |
| | 7440-02-0 | Nickel, Filtered | 2 J | 9 J | ug/L | 15SW/SD017 | 14/14 | - | 9 | 4.3 J | 73 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-09-7 | Potassium, Filtered | 788 J | 7590 J | ug/L | 15SW/SD011 | 14/14 | - | 7590 | 1670 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7782-49-2 | Selenium, Filtered | 0.67 J | 1.1 J | ug/L | 15SW/SD004 | 2/14 | 0.12 - 0.55 | 1.1 | NA | 18 N | 50<br>50 | FED-MCL<br>IDEM | No | BSL |
| | 7440-23-5 | Sodium, Filtered | 14500 J | 141000 J | ug/L | 15SW/SD011 | 14/14 | - | 141000 | 23900 J | NA | NA<br>NA | NA<br>NA | No | NUT |

TABLE 7-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects(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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SWMU 15 (Continued) | 7440-28-0 | Thallium, Filtered | 0.09 J | 0.1 J | ug/L | 15SW/SD018 | 2/14 | 0.043 - 0.13 | 0.1 | NA | 0.24 N | 2<br>2 | FED-MCL<br>IDEM | No | BSL |
| | 7440-62-2 | Vanadium, Filtered | 4.2 | 4.2 | ug/L | 15SW/SD002 | 1/14 | 1.14 - 1.14 | 4.2 | NA | 3.6 N | NA<br>NA | NA<br>NA | Yes | ASL |
| | 7440-66-6 | Zinc, Filtered | 2.1 J | 88 J | ug/L | 15SW/SD004 | 13/14 | 3.4 - 3.4 | 88 | 3.7 J | 1100 N | NA<br>11000 | NA<br>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 15SW/SD014.
5 - The U.S. EPA Region 9 tap water preliminary remediation goal (PRG) is presented. Value represents the risk-based tap water screening level divided by 10 to correspond to a target haz 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, 2004a).
6 - U.S. EPA Primary Drinking Water Standard (U.S. EPA, 2004c).
Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, 2004).
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.
8 - The value for acenaphthene was used as a surrogate for acenaphthylene.
9 - Value is for pyrene.
10 - Values are for hexavalent chromium.
11 - The maximum contaminant level (MCL) for this parameter is actually a treatment technique. The Safe Water Drinking Act (SWDA) 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
N = Non-carcinogen
NA = Not applicable/not available

**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**

| | | |
|---|---|---|
| 15SW/SD004 | 15SW/SD011 | 15SW/SD017 |
| 15SW/SD004 | 15SW/SD005 | 15SW/SD017 |
| 15SW/SD006 | 15SW/SD005 | 15SW/SD018 |
| 15SW/SD006 | 15SW/SD013 | 15SW/SD018 |
| 15SW/SD009 | 15SW/SD013 | 15SW/SD019 |
| 15SW/SD009 | 15SW/SD015 | 15SW/SD019 |
| 15SW/SD010 | 15SW/SD015 | 15SW/SD001 |
| 15SW/SD010 | 15SW/SD016 | 15SW/SD001 |
| 15SW/SD011 | 15SW/SD016 | 15SW/SD002 |
| | | 15SW/SD002 |

TABLE 7-6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - GULLIES
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects[2] | Concentration Used for Screening[3] | Upgradient Concentrations[4] | U.S. 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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 630-20-6 | 1,1,1,2-Tetrachloroethane | 1.03 | 1.03 | ug/kg | 15SD0020006 | 1/11 | 0.948 - 1.54 | 1.03 | NA | 3200 C | 39000 | IDEM | No | BSL |
| | 67-64-1 | Acetone | 2 J | 8 J | ug/kg | 15SD0090006 | 3/11 | 0.948 - 2 | 8 | NA | 1400000 N | 4800000 | IDEM | No | BSL |
| | **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 4 J | 100 | ug/kg | 15SD0150006 | 13/17 | 4.37 - 16.3 | 100 | 5 J | 5600 N[8] | 3200000 | IDEM | No | BSL |
| | 83-32-9 | Acenaphthene | 6 J | 850 | ug/kg | 15SD0150006 | 16/17 | 4.37 - 4.37 | 850 | 27 - 36 | 370000 N | 9500000 | IDEM | No | BSL |
| | 208-96-8 | Acenaphthylene | 6 J | 48 | ug/kg | 15SD0180006 | 8/17 | 3.81 - 16.3 | 48 | NA | 370000 N[9] | 1100000 | IDEM | No | BSL |
| | 98-86-2 | Acetophenone | 110 J | 110 J | ug/kg | 15SD0020006 | 1/11 | 77.4 - 112 | 110 | NA | NA | NA | NA | No | NTX |
| | 120-12-7 | Anthracene | 18 | 1800 | ug/kg | 15SD0150006 | 16/17 | 4.37 - 4.37 | 1800 | 71 - 89 | 2200000 N | 47000000 | IDEM | No | BSL |
| | 56-55-3 | Benzo(a)anthracene | 13 | 3700 J | ug/kg | 15SD0240006 | 17/17 | --- | 3700 | 270 - 330 | 620 C | 5000 | IDEM | Yes | ASL |
| | 50-32-8 | Benzo(a)pyrene | 15 | 4500 J | ug/kg | 15SD0240006 | 17/17 | --- | 4500 | 330 - 390 | 62 C | 500 | IDEM | Yes | ASL |
| | 205-99-2 | Benzo(b)fluoranthene | 18 | 6000 J | ug/kg | 15SD0240006 | 17/17 | --- | 6000 | 340 - 440 | 620 C | 5000 | IDEM | Yes | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 16 | 3800 J | ug/kg | 15SD0060006 | 17/17 | --- | 3800 | 200 - 400 | 230000 N[10] | 50000 | IDEM | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 11 | 2000 J | ug/kg | 15SD0240006 | 17/17 | --- | 2000 | 190 - 310 | 6200 C | 50000 | IDEM | No | BSL |
| | 117-81-7 | bis(2-Ethylhexyl)phthalate | 130 J | 280 J | ug/kg | 15SD0090006 | 6/11 | 83.2 - 112 | 280 | | 35000 C | 300000 | IDEM | No | BSL |
| | 218-01-9 | Chrysene | 14 | 4500 J | ug/kg | 15SD0240006 | 17/17 | --- | 4500 | 350 - 390 | 62000 C | 500000 | IDEM | No | BSL |
| | 84-74-2 | di-n-Butyl Phthalate | 220 J | 220 J | ug/kg | 15SD0190006 | 1/11 | 77.4 - 112 | 220 | NA | 610000 N | 18000000 | IDEM | No | BSL |
| | 53-70-3 | Dibenzo(a,h)anthracene | 48 | 700 J | ug/kg | 15SD0060006 | 14/17 | 3.81 - 16.3 | 700 | 38 - 65 | 62 C | 500 | IDEM | Yes | ASL |
| | 132-64-9 | Dibenzofuran | 89 J | 420 | ug/kg | 15SD0060006 | 4/11 | 77.4 - 88.7 | 420 | | 15000 N | 370000 | IDEM | No | BSL |
| | 206-44-0 | Fluoranthene | 25 | 12000 | ug/kg | 15SD0060006 | 17/17 | --- | 12000 | 720 - 1000 | 230000 N | 6300000 | IDEM | No | BSL |
| | 86-73-7 | Fluorene | 8 | 820 | ug/kg | 15SD0060006 | 16/17 | 4.37 - 4.37 | 820 | 34 - 47 | 270000 N | 6300000 | IDEM | No | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 15 | 3100 J | ug/kg | 15SD0060006 | 17/17 | --- | 3100 | 180 - 310 | 620 C | 5000 | IDEM | Yes | ASL |
| | 91-20-3 | Naphthalene | 5 J | 370 | ug/kg | 15SD0150006 | 15/17 | 4.37 - 16.3 | 370 | 8 J - 10 | 5600 N | 3200000 | IDEM | No | BSL |
| | 85-01-8 | Phenanthrene | 18 | 9100 | ug/kg | 15SD0060006 | 17/17 | --- | 9100 | 560 - 630 | 230000 N[10] | 470000 | IDEM | No | BSL |
| | 129-00-0 | Pyrene | 35 J | 18000 J | ug/kg | 15SD0240006 | 17/17 | --- | 18000 | 690 | 230000 N | 4700000 | IDEM | No | BSL |
| | **Pesticides/PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 1.56 J | 35 | ug/kg | 15SD0180006 | 8/11 | 1.58 - 1.62 | 35 | NA | 2400 C | 28000 | IDEM | No | BSL |
| | 72-55-9 | 4,4'-DDE | 2.5 J | 76 | ug/kg | 15SD0130006 | 6/11 | 1.58 - 1.7 | 76 | NA | 1700 C | 20000 | IDEM | No | BSL |
| | 50-29-3 | 4,4'-DDT | 2.1 J | 100 | ug/kg | 15SD0180006 | 11/11 | --- | 100 | 4.2 | 1700 C | 20000 | IDEM | No | BSL |
| | 5103-71-9 | alpha-Chlordane | 5.3 | 31 | ug/kg | 15SD0150006 | 3/11 | 0.751 - 1.09 | 31 | NA | 1600 C[11] | 17000 | IDEM[11] | No | BSL |
| | 11097-69-1 | Aroclor-1254 | 54 J | 230 J | ug/kg | 15SD0010006 | 2/11 | 10.4 - 15.1 | 230 | NA | 110 N[12] | 1800 | IDEM | Yes | ASL |
| | 11096-82-5 | Aroclor-1260 | 330 | 330 | ug/kg | 15SD0150006 | 1/11 | 10.4 - 15.1 | 330 | NA | 110 N[12] | 1800 | IDEM | Yes | ASL |
| | 5103-74-2 | gamma-Chlordane | 4 J | 28 | ug/kg | 15SD0150006 | 3/11 | 0.751 - 1.09 | 28 | NA | 1600 C[11] | 17000 | IDEM[11] | No | BSL |
| | **Herbicides** | | | | | | | | | | | | | | |
| | 93-76-5 | 2,4,5-T | 5.7 J | 6.8 J | ug/kg | 15SD0150006 | 2/11 | 1.56 - 2.27 | 6.8 | NA | 61000 N | 1800 | IDEM | No | BSL |
| | 87-86-5 | Pentachlorophenol | 1.5 J | 4.9 J | ug/kg | 15SD0090006 | 8/11 | 0.54 - 0.755 | 4.9 | 1.5 J | 3000 C | 20000 | IDEM | No | BSL |
| | **Inorganics** | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum | 3760 J | 17700 J | mg/kg | 15SD0180006 | 15/15 | --- | 17700 | 10100 J - 14400 J | 7600 N | NA | NA | Yes | ASL |
| | 7440-36-0 | Antimony | 0.74 J | 1.4 J | mg/kg | 15SD0220006 | 2/15 | 0.19 - 1.2 | 1.4 | 0.59 J | 3.1 N | 140 | IDEM | No | BSL |
| | 7440-38-2 | Arsenic | 3.6 J | 33.8 J | mg/kg | 15SD0190006 | 15/15 | --- | 33.8 | 7.9 J - 20.9 J | 0.39 C | 3.9 | IDEM | Yes | ASL |
| | 7440-39-3 | Barium | 23.5 J | 131 J | mg/kg | 15SD0150006 | 15/15 | --- | 131 | 109 J - 128 J | 540 N | 23000 | IDEM | No | BSL |
| | 7440-41-7 | Beryllium | 0.34 J | 1.2 J | mg/kg | 15SD0150006 | 12/15 | 0.18 - 0.32 | 1.2 | 0.86 J - 1.8 J | 15 N | 680 | IDEM | No | BSL |
| | 7440-43-9 | Cadmium | 0.16 J | 0.63 J | mg/kg | 15SD0090006 | 12/15 | 0.27 - 0.3 | 0.63 | 0.2 J - 0.65 J | 3.7 N | 12 | IDEM | No | BSL |
| | 7440-70-2 | Calcium | 1610 J | 129000 J | mg/kg | 15SD0090006 | 15/15 | --- | 129000 | 3800 J - 4910 J | NA | NA | NA | No | NUT |
| | 7440-47-3 | Chromium | 10.4 J | 70.1 J | mg/kg | 15SD0190006 | 15/15 | --- | 70.1 | 29.1 J - 46.1 J | 210 C[13] | 430[14] | IDEM | No | BSL |

TABLE 7-6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - GULLIES
SWMU 15 - ROADS AND GROUNDS AREA
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 with Maximum Concentration | Frequency of Detection | Range of Nondetects(2) | Concentration Used for Screening(3) | Upgradient Concentrations(4) | U.S. 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 15 (Continued) | 7440-48-4 | Cobalt | 3.8 J | 36.1 J | mg/kg | 15SD0010006 | 15/15 | --- | 36.1 | 37.1 J - 85.9 J | 140 N(12) | NA | NA | No | BSL |
| | 7440-50-8 | Copper | 4.9 J | 17.8 J | mg/kg | 15SD0130006 | 15/15 | --- | 17.8 | 10.7 J - 17.3 J | 310 N | 13000 | IDEM | No | BSL |
| | 7439-89-6 | Iron | 9670 J | 74200 J | mg/kg | 15SD0190006 | 15/15 | --- | 74200 | 28200 J - 61000 J | 2300 N | NA | NA | Yes | ASL |
| | 7439-92-1 | Lead | 8.9 J | 133 J | mg/kg | 15SD0090006 | 15/15 | --- | 133 | 24.7 J - 35 J | 400 | 400 | IDEM | No | BSL |
| | 7439-95-4 | Magnesium | 1280 J | 17400 J | mg/kg | 15SD0050006 | 15/15 | --- | 17400 | 1210 J - 1780 J | NA | NA | NA | No | NUT |
| | 7439-96-5 | Manganese | 323 J | 1990 J | mg/kg | 15SD0180006 | 15/15 | --- | 1990 | 2160 J - 5160 J | 180 N | NA | NA | Yes | ASL |
| | 7439-97-6 | Mercury | 0.01 J | 0.085 J | mg/kg | 15SD0060006 | 12/15 | 0.007 - 0.008 | 0.085 | 0.035 J | 2.3 N | 100 | IDEM | No | BSL |
| | 7440-02-0 | Nickel | 8.6 J | 35.4 J | mg/kg | 15SD0010006 | 15/15 | --- | 35.4 | 30.3 J - 64.5 J | 160 N | 6900 | IDEM | No | BSL |
| | 7440-09-7 | Potassium | 564 J | 1700 J | mg/kg | 15SD0150006 | 15/15 | --- | 1700 | 993 - 1440 J | NA | NA | NA | No | NUT |
| | 7782-49-2 | Selenium | 0.19 J | 0.8 J | mg/kg | 15SD0190006 | 12/15 | 0.13 - 0.27 | 0.8 | 0.37 J - 0.96 J | 39 N | 1700 | IDEM | No | BSL |
| | 7440-23-5 | Sodium | 20.7 J | 243 J | mg/kg | 15SD0230006 | 7/15 | 83.4 - 146 | 243 | NA | NA | NA | NA | No | NUT |
| | 7440-31-5 | Tin | 0.1 J | 0.3 J | mg/kg | 15SD0180006 | 6/15 | 0.04 - 0.19 | 0.3 | NA | 4700 N | NA | NA | No | BSL |
| | 7440-32-6 | Titanium | 10.2 J | 10.2 J | mg/kg | 15SD0150006 | 1/15 | 0.095 - 0.62 | 10.2 | NA | 31000 N(15) | NA | NA | No | BSL |
| | 7440-62-2 | Vanadium | 12.3 J | 83.6 J | mg/kg | 15SD0190006 | 15/15 | --- | 83.6 | 24.6 J - 42.4 J | 7.8 N | NA | NA | Yes | ASL |
| | 7440-66-6 | Zinc | 39.5 | 163 | mg/kg | 15SD0090006 | 15/15 | --- | 163 | 57.8 J - 161 | 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 samples are from locations 15SW/SD014 and 15SW/SD026.
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, 2004a).
6 - Indiana Department of Environmental Management (IDEM), Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, 2004).
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.
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 - Chlordane is used as a surrogate for alpha- and gamma-chlordane.
12 - One-tenth of the non-carcinogenic PRG is less than the carcinogenic PRG; therefore, the one-tenth non-carcinogenic PRG is presented in the electronic version of the PRG table.
13 - The PRG for residential land use for total chromium is presented.
14 - Value is for hexavalent chromium.
15 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is one-tenth 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 = Non-carcinogen
NA = Not applicable/not available
PRG = Preliminary Remediation Goal

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

**Associated Samples**

| | | |
|---|---|---|
| 15SD0060006 | 15SD0180006 | 15SD0200006 |
| 15SD0090006 | 15SD0190006 | 15SD0210006 |
| 15SD0050006 | 15SD0230006 | 15SD0220006 |
| 15SD0130006 | 15SD0240006 | |
| 15SD0150006 | 15SD0250006 | |
| 15SD0160006 | 15SD0010006 | |
| 15SD0170006 | 15SD0020006 | |

TABLE 7-7

EXPOSURE POINT CONCENTRATIONS FOR COPCs
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA

| Chemical of Potential Concern | Exposure Point Concentration | | | |
|---|---|---|---|---|
| | Surface Soil[1] | Surface/ Subsurface Soil[1] | Sediment[1] | Surface Water[1] |
| | (mg/kg) | (mg/kg) | (mg/kg) | (µg/L) |
| Benzo(a)anthracene | 1.26 | 0.617 | 1.85 | 1.66 |
| Benzo(a)pyrene | 2.56 | 1.81 | 2 | 2.26 |
| Benzo(b)fluoranthene | 3.1 | 2.19 | 2.33 | 5.38 |
| Benzo(K)fluoranthene | | | | 1.55 |
| Chrysene | | | | 4.12 |
| Dibenzo(a,h)anthracene | 0.814 | 0.39 | 0.39 | 0.23 |
| Indeno(1,2,3-cd)pyrene | 2.83 | 2 | 1.52 | 2.02 |
| Aroclor-1254 | | | 0.158 | |
| Aroclor-1260 | 0.5 | 1.2 | 0.329 | |
| Aluminum | 18825 | 19335 | 11297 | |
| Antimony | | | | 1.06 |
| Arsenic | 11 | 10.6 | 11.8 | 1.4[2] |
| Cadmium | 1.26 | 1 | | |
| Iron | 27910 | 27442 | 30793 | 1773 |
| Manganese | 570 | 635 | 1306 | 515 |
| Vanadium | 34.5 | 35.5 | 32.9 | 3.69 |

**BLANK SPACES INDICATE THAT THE CHEMICAL WAS NOT SELECTED AS A COPC FOR THE SPECIFIED MEDIUM**

1 - Upper Confidence Limits (UCLs) calculated by the U.S. EPA's ProUCL software, unless otherwise noted. See RAGS Part D Table 3s in Appendix I for details concerning the UCLs.
2 - The maximum concentration is used as the EPC because there were less than 50 percent positive detections in the data set.
µg/L - Microgram per liter
mg/kg - Millligram per kilogram

**TABLE 7-8**

**RECEPTORS AND EXPOSURE ROUTES FOR QUANTITATIVE EVALUATION**
**SWMU 15 - ROADS AND GROUNDS AREA**
**NSWC CRANE**
**CRANE, INDIANA**

| Receptors | Exposure Routes |
|---|---|
| Construction Workers<br>(future land use) | • Soil dermal contact (surface and subsurface)<br>• Soil ingestion (surface and subsurface)<br>• Inhalation of air/dust/emissions (surface and subsurface) |
| Maintenance Workers<br>(current and future land use) | • Soil dermal contact (surface)<br>• Soil ingestion (surface)<br>• Inhalation of air/dust/emissions (surface)<br>• Surface water/sediment dermal contact<br>• Sediment (Incidental ingestion) |
| Occupational Workers<br>(current and future)(1) | • Soil dermal contact (surface)<br>• Soil ingestion (surface)<br>• Inhalation of air/dust/emissions (surface) |
| Adolescent Trespassers<br>(6 to 17 years)<br>(current/future land use) | • Soil dermal contact (surface)<br>• Soil ingestion (surface)<br>• Inhalation of air/dust/emissions (surface)<br>• Surface water/sediment dermal contact<br>• Surface water/sediment Ingestion |
| Small Child (0 to 6 years) and<br>Adult Recreational Users<br>(future land use) | • Soil dermal contact (surface)<br>• Soil ingestion (surface)<br>• Inhalation of air/dust/emissions (surface)<br>• Surface water/sediment dermal contact<br>• Surface water/sediment ingestion |
| On-Base Residents (Adult/Children)<br>(future land use)(1) | • Soil dermal contact (surface)<br>• Soil ingestion (surface)<br>• Inhalation of air/dust/emissions (surface)<br>• Surface water/sediment dermal contact<br>• Surface water/sediment ingestion |

1 – Occupational workers and residents were also be evaluated for exposures to chemicals of concern in subsurface soil in the uncertainty section of the risk assessments. This scenario was included to account for the possibility that subsurface soil could be brought to the surface in future excavation projects.

TABLE 7-9

SUMMARY OF EXPOSURE INPUT PARAMETERS
REASONABLE MAXIMUM EXPOSURES
SWMU 15 - ROADS AND GROUNDS AREA
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 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] |

TABLE 7-9

SUMMARY OF EXPOSURE INPUT PARAMETERS
REASONABLE MAXIMUM EXPOSURES
SWMU 15 - ROADS AND GROUNDS AREA
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 |
|---|---|---|---|---|---|---|---|---|

1 - U.S. EPA, 2002d. 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, 1993a: 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, 2002a: 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 per year.
9 - Assume 2 days a month for reasonable maximum exposure and 1 per day a month for central tendency exposure.
10 - Assume 1 day a week in warm weather months for reasonable maximum exposure and 1 day every other week for central tendency exposure.
11 - Assume 2 days a week in warm weather months for reasonable maximum exposure and 1 day a week for central tendency exposure.
12 - U.S. EPA, 2004b: 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, 1997a. Exposure Factors Handbook. EPA/600/8-95/002FA.
14 - Assume 50 percent of total body surface area is exposed, U.S. EPA, 2004a.
15 - Assume that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997a.
16 - U.S. EPA, 1996. Soil Screening Guidance: Technical Background Document (PEF values site specific).
17 - U.S. EPA, 1997a. 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, 2004. Virginia Department of Environmental Quality (VDEQ), online -http://www.deq.state.va.us/brownfieldweb/vrp.html.
21 - Foster and Chrostowski, 1987. Inhalation Exposure to Volatile Organic Contaminants in the Shower.
22 - U.S. EPA, 2002a: Supplement Guidance to RAGS: Region 4 Bulletins.

TABLE 7-10

SUMMARY OF EXPOSURE INPUT PARAMETERS
CENTRAL TENDENCY EXPOSURES
SWMU 15 - ROADS AND GROUNDS AREA
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 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] |

**TABLE 7-10**

**SUMMARY OF EXPOSURE INPUT PARAMETERS**
**CENTRAL TENDENCY EXPOSURES**
**SWMU 15 - ROADS AND GROUNDS AREA**
**NSWC CRANE**
**CRANE, INDIANA**


9 - Assume 1 day a week in warm weather months for reasonable maximum exposure (RME) and every other week for central tendency exposure (CTE).
10 - Assume 2 days a week in warm weather months for reasonable maximum exposure (RME) and one day a week for central tendency exposure (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, 1997. Exposure Factors Handbook. EPA/600/8-95/002FA.
13 - Assume 50 percent of total body surface area is exposed, U.S. EPA, 2004a.
14 - Assume that head, arms, hands, lower legs, and feet are exposed (U.S. EPA, 1997a).
15 - U.S. EPA, 1996. Soil Screening Guidance: Technical Background Document [particulate emission factor (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, 2002a. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9365.4-24.
20 - IDEM, 2004 RISC Technical Guide, January Update.
21 - VDEQ, 2004. Virginia Department of Environmental Quality (VDEQ), online -http://www.deq.state.va.us/brownfieldweb/vrp.html.
22 - Foster and Chrostowski, 1987. Inhalation Exposure to Volatile Organic Contaminants in the Shower.
23 - U.S. EPA, 2002a. Supplement Guidance to RAGS: Region 4 Bulletins.

## TABLE 7-11

## NON-CANCER TOXICITY DATA - ORAL/DERMAL
## SWMU 15 - ROADS AND GROUNDS AREA
## 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 |
| **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 |
| Benzo(k)fluoranthene | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chrysene | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 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 |
| **Pesticides/PCBs** | | | | | | | | | | |
| Aroclor-1254 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Aroclor-1260 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **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 | 9/23/2005 |
| Arsenic | Chronic | 3.0E-04 | mg/kg/day | 1 | 3.0E-04 | mg/kg/day | Skin, CVS | 3/1 | IRIS | 9/23/2005 |
| Cadmium[3] | Chronic | 5.0E-04 | mg/kg/day | 0.05 | 2.5E-05 | mg/kg/day | Kidney | 10/1 | IRIS | 9/23/2005 |
| Iron | Chronic | 3.0E-01 | mg/kg/day | 1 | 3.0E-01 | mg/kg/day | NA | 1 | 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 | 9/23/2005 |
| Manganese (Water) | Chronic | 2.4E-02 | mg/kg/day | 0.04 | 9.6E-04 | mg/kg/day | CNS | 3/1 | IRIS | 9/23/2005 |
| Vanadium | Chronic | 1.0E-03 | mg/kg/day | 0.026 | 2.6E-05 | mg/kg/day | Kidney | 300 | NCEA | 10/19/2004 |

Notes:
1 - U.S. EPA, 2004b. Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted dermal reference dose (RfD) = Oral RfD x Oral Absorption Efficiency for Dermal.
3 - Water value for cadmium is listed.

Definitions:
CNS = Central nervous system
CVS = Cardiovascular system
EPA 3 = U.S. EPA Region 3 Risk-Based Concentration Table, October 19, 2004
IRIS = Integrated Risk Information System
NA = Not applicable
NCEA = National Center for Environmental Assessment

## TABLE 7-12

## CANCER TOXICITY DATA -- ORAL/DERMAL
## SWMU 15 - ROADS AND GROUNDS AREA
## 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 |
| **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 | 9/23/2005 |
| Benzo(b)fluoranthene | 7.3E-01 | $(mg/kg/day)^{-1}$ | 1 | 7.3E-01 | $(mg/kg/day)^{-1}$ | B2 | EPA[1] | 7/1993 |
| Benzo(k)fluoranthene | 7.3E-02 | $(mg/kg/day)^{-1}$ | 1 | 7.3E-02 | $(mg/kg/day)^{-1}$ | B2 | EPA[1] | 7/1993 |
| Chrysene | 7.3E-03 | $(mg/kg/day)^{-1}$ | 1 | 7.3E-03 | $(mg/kg/day)^{-1}$ | B2 | EPA[1] | 7/1993 |
| 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 |
| **Pesticides/PCBs** | | | | | | | | |
| Aroclor-1254 | 2.0E+00 | (mg/kg/day)-1 | 1 | 2.0E+00 | (mg/kg/day)-1 | B2 | EPA[2] | 9/23/2005 |
| Aroclor-1260 | 2.0E+00 | (mg/kg/day)-1 | 1 | 2.0E+00 | (mg/kg/day)-1 | B2 | EPA[2] | 9/23/2005 |
| **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 | 9/23/2005 |
| Cadmium | NA | NA | NA | NA | NA | B1 | IRIS | 9/23/2005 |
| Iron | NA | NA | NA | NA | NA | NA | NA | NA |
| Manganese | NA | NA | NA | NA | NA | D | IRIS | 9/23/2005 |
| Vanadium | NA | NA | NA | NA | NA | NA | NA | NA |

Notes:
1 - U.S. EPA, 2004b. 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 non-carcinogenicity.

EPA(1) = U.S. EPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.

EPA(2) = U.S. EPA, PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September 1996b, EPA/600/P-96/001F.

IRIS = Integrated Risk Information System.

NA = Not available.

TABLE 7-13

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Receptor | Media | Exposure Route | Cancer Risk | Chemicals with Cancer Risks > 1E-4 | Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4 | Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5 | Hazard Index (HI) | Chemicals with HI > 1 |
|---|---|---|---|---|---|---|---|---|
| Construction Worker | Surface and Subsurface Soil | Ingestion | 1.E-06 | - - | - - | - - | 0.4 | - - |
| | | Dermal Contact | 3.E-07 | - - | - - | - - | 0.006 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 1.E-06 | - - | - - | - - | 0.4 | - - |
| | | **Total Across All Media** | **1.E-06** | - - | - - | - - | **0.4** | - - |
| Maintenance Worker | Surface Soil | Ingestion | 2.E-06 | - - | - - | - - | 0.02 | - - |
| | | Dermal Contact | 1.E-06 | - - | - - | - - | 0.0007 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 3.E-06 | - - | - - | cPAHs | 0.02 | - - |
| | Surface Water | Ingestion | NA | - - | - - | - - | NA | - - |
| | | Dermal Contact | 1.E-04 | - - | cPAHs | - - | 0.004 | - - |
| | | Total | 1.E-04 | - - | cPAHs | - - | 0.004 | - - |
| | Sediment | Ingestion | 1.E-06 | - - | - - | - - | 0.02 | - - |
| | | Dermal Contact | 8.E-07 | - - | - - | - - | 0.001 | - - |
| | | Total | 2.E-06 | - - | - - | - - | 0.02 | - - |
| | | **Total Across All Media** | **1.E-04** | - - | - - | - - | **0.04** | - - |
| Occupational Worker | Surface Soil | Ingestion | 2.E-05 | - - | cPAHs | - - | 0.2 | - - |
| | | Dermal Contact | 1.E-05 | - - | - - | cPAHs | 0.007 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 3.E-05 | - - | cPAHs | - - | 0.2 | - - |
| | | **Total Across All Media** | **3.E-05** | - - | - - | - - | **0.2** | - - |
| Trespasser | Surface Soil | Ingestion | 1.E-06 | - - | - - | - - | 0.03 | - - |
| | | Dermal Contact | 8.E-07 | - - | - - | - - | 0.001 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 2.E-06 | - - | - - | - - | 0.03 | - - |
| | Surface Water | Ingestion | 1.E-06 | - - | - - | - - | 0.01 | - - |
| | | Dermal Contact | 1.E-04 | - - | cPAHs | - - | 0.02 | - - |
| | | Total | 1.E-04 | - - | cPAHs | - - | 0.03 | - - |
| | Sediment | Ingestion | 1.E-06 | - - | - - | - - | 0.04 | - - |
| | | Dermal Contact | 6.E-07 | - - | - - | - - | 0.002 | - - |
| | | Total | 2.E-06 | - - | - - | - - | 0.04 | - - |
| | | **Total Across All Media** | **1.E-04** | - - | - - | - - | **0.1** | - - |

TABLE 7-13

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Receptor | Media | Exposure Route | Cancer Risk | Chemicals with Cancer Risks > 1E-4 | Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4 | Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5 | Hazard Index (HI) | Chemicals with HI > 1 |
|---|---|---|---|---|---|---|---|---|
| Future Child Resident | Surface Soil | Ingestion | 5.E-05 | - - | cPAHs, Arsenic | - - | 2 | - - |
| | | Dermal Contact | 1.E-05 | - - | - - | cPAHs, Arsenic | 0.04 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 7.E-05 | - - | cPAHs, Arsenic | - - | 3 | - - |
| | Surface Water | Ingestion | 4.E-06 | - - | - - | cPAHs | 0.07 | - - |
| | | Dermal Contact | 4.E-04 | cPAHs | - - | - - | 0.09 | - - |
| | | Total | 4.E-04 | cPAHs | - - | - - | 0.2 | - - |
| | Sediment | Ingestion | 4.E-06 | - - | - - | cPAHs | 0.2 | - - |
| | | Dermal Contact | 2.E-06 | - - | - - | - - | 0.01 | - - |
| | | Total | 6.E-06 | - - | - - | cPAHs, Arsenic | 0.2 | - - |
| | | **Total Across All Media** | **5.E-04** | - - | - - | - - | **3** | - - |
| Future Adult Resident | Surface Soil | Ingestion | 2.E-05 | - - | - - | cPAHs, Arsenic | 0.3 | - - |
| | | Dermal Contact | 8.E-06 | - - | - - | cPAHs | 0.006 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 3.E-05 | - - | cPAHs | Arsenic | 0.3 | - - |
| | Surface Water | Ingestion | 8.E-07 | - - | - - | - - | 0.003 | - - |
| | | Dermal Contact | 1.E-03 | cPAHs | - - | - - | 0.05 | - - |
| | | Total | 1.E-03 | cPAHs | - - | - - | 0.06 | - - |
| | Sediment | Ingestion | 1.E-06 | - - | - - | - - | 0.02 | - - |
| | | Dermal Contact | 1.E-06 | - - | - - | - - | 0.00 | - - |
| | | Total | 2.E-06 | - - | - - | cPAHs | 0.02 | - - |
| | | **Total Across All Media** | **1.E-03** | - - | - - | - - | **0.4** | - - |
| Total Residential Risks | Surface Soil | Ingestion | 7.E-05 | - - | cPAHs, Arsenic | - - | NA | - - |
| | | Dermal Contact | 2.E-05 | - - | cPAHs | Arsenic | NA | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 1.E-04 | - - | cPAHs, Arsenic | - - | NA | - - |
| | Surface Water | Ingestion | 5.E-06 | - - | - - | cPAHs | NA | - - |
| | | Dermal Contact | 1.E-03 | cPAHs | - - | - - | NA | - - |
| | | Total | 1.E-03 | cPAHs | - - | - - | NA | - - |
| | Sediment | Ingestion | 6.E-06 | - - | - - | cPAHs, Arsenic | NA | - - |
| | | Dermal Contact | 3.E-06 | - - | - - | cPAHs | NA | - - |
| | | Total | 8.E-06 | - - | - - | cPAHs, Arsenic | NA | - - |
| | | **Total Across All Media** | **2.E-03** | - - | - - | - - | NA | - - |

cPAHs = Carcinogenic polycyclic aromatic hydrocarbons
NA = Not applicable

TABLE 7-14

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENDENCY EXPOSURE
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Receptor | Media | Exposure Route | Cancer Risk | Chemicals with Cancer Risks > 1E-4 | Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4 | Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5 | Hazard Index (HI) | Chemicals with HI > 1 |
|---|---|---|---|---|---|---|---|---|
| Construction Worker | Surface and Subsurface Soil | Ingestion | 5.E-07 | - - | - - | - - | 0.2 | - - |
| | | Dermal Contact | 9.E-08 | - - | - - | - - | 0.002 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 6.E-07 | - - | - - | - - | 0.2 | - - |
| | | **Total Across All Media** | **6.E-07** | - - | - - | - - | **0.2** | - - |
| Maintenance Worker | Surface Soil | Ingestion | 1.E-07 | - - | - - | - - | 0.005 | - - |
| | | Dermal Contact | 2.E-08 | - - | - - | - - | 0.00004 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 2.E-07 | - - | - - | - - | 0.005 | - - |
| | Surface Water | Ingestion | NA | - - | - - | - - | NA | - - |
| | | Dermal Contact | 2.E-05 | - - | cPAHs | - - | 0.001 | - - |
| | | Total | 2.E-05 | - - | cPAHs | - - | 0.001 | - - |
| | Sediment | Ingestion | 1.E-07 | - - | - - | - - | 0.005 | - - |
| | | Dermal Contact | 1.E-08 | - - | - - | - - | 0.00007 | - - |
| | | Total | 1.E-07 | - - | - - | - - | 0.005 | - - |
| | | **Total Across All Media** | **2.E-05** | - - | - - | - - | **0.01** | - - |
| Occupational Worker | Surface Soil | Ingestion | 3.E-06 | - - | - - | cPAHs | 0.08 | - - |
| | | Dermal Contact | 3.E-07 | - - | - - | - - | 0.0007 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 3.E-06 | - - | - - | cPAHs | 0.08 | - - |
| | | **Total Across All Media** | **3.E-06** | - - | - - | - - | **0.08** | - - |
| Trespasser | Surface Soil | Ingestion | 3.E-07 | - - | - - | - - | 0.008 | - - |
| | | Dermal Contact | 7.E-08 | - - | - - | - - | 0.0001 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 4.E-07 | - - | - - | - - | 0.008 | - - |
| | Surface Water | Ingestion | 4.E-07 | - - | - - | - - | 0.003 | - - |
| | | Dermal Contact | 5.E-05 | - - | cPAHs | - - | 0.004 | - - |
| | | Total | 5.E-05 | - - | cPAHs | - - | 0.007 | - - |
| | Sediment | Ingestion | 1.E-07 | - - | - - | - - | 0.004 | - - |
| | | Dermal Contact | 6.E-08 | - - | - - | - - | 0.0002 | - - |
| | | Total | 2.E-07 | - - | - - | - - | 0.005 | - - |
| | | **Total Across All Media** | **5.E-05** | - - | - - | - - | **0.02** | - - |

TABLE 7-14

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENDENCY EXPOSURE
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA


| Receptor | Media | Exposure Route | Cancer Risk | Chemicals with Cancer Risks > 1E-4 | Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4 | Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5 | Hazard Index (HI) | Chemicals with HI > 1 |
|---|---|---|---|---|---|---|---|---|
| Future Child Resident | Surface Soil | Ingestion | 6.E-06 | - - | - - | cPAHs, Arsenic | 0.83 | - - |
| | | Dermal Contact | 6.E-07 | - - | - - | - - | 0.006 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 6.E-06 | - - | - - | cPAHs, Arsenic | 0.83 | - - |
| | Surface Water | Ingestion | 4.E-07 | - - | - - | cPAHs | 0.02 | - - |
| | | Dermal Contact | 5.E-05 | - - | cPAHs | - - | 0.02 | - - |
| | | Total | 5.E-05 | - - | cPAHs | - - | 0.04 | - - |
| | Sediment | Ingestion | 4.E-07 | - - | - - | - - | 0.05 | - - |
| | | Dermal Contact | 5.E-08 | - - | - - | - - | 0.001 | - - |
| | | Total | 4.E-07 | - - | - - | - - | 0.05 | - - |
| | | **Total Across All Media** | **6.E-05** | - - | - - | - - | **0.9** | - - |
| Future Adult Resident | Surface Soil | Ingestion | 2.E-06 | - - | - - | - - | 0.09 | - - |
| | | Dermal Contact | 2.E-07 | - - | - - | - - | 0.0006 | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 2.E-06 | - - | - - | cPAHs | 0.09 | - - |
| | Surface Water | Ingestion | 6.E-08 | - - | - - | cPAHs | 0.0008 | - - |
| | | Dermal Contact | 1.E-04 | - - | cPAHs | - - | 0.01 | - - |
| | | Total | 1.E-04 | - - | cPAHs | - - | 0.01 | - - |
| | Sediment | Ingestion | 1.E-07 | - - | - - | - - | 0.005 | - - |
| | | Dermal Contact | 2.E-08 | - - | - - | - - | 0.0001 | - - |
| | | Total | 1.E-07 | - - | - - | - - | 0.006 | - - |
| | | **Total Across All Media** | **1.E-04** | - - | - - | - - | **0.1** | - - |
| Total Residential Risks | Surface Soil | Ingestion | 8.E-06 | - - | - - | cPAHs, Arsenic | NA | - - |
| | | Dermal Contact | 9.E-07 | - - | - - | - - | NA | - - |
| | | Inhalation | NA | - - | - - | - - | NA | - - |
| | | Total | 9.E-06 | - - | - - | cPAHs, Arsenic | NA | - - |
| | Surface Water | Ingestion | 4.E-07 | - - | - - | - - | NA | - - |
| | | Dermal Contact | 2.E-04 | cPAHs | - - | - - | NA | - - |
| | | Total | 2.E-04 | cPAHs | - - | - - | NA | - - |
| | Sediment | Ingestion | 5.E-07 | - - | - - | - - | NA | - - |
| | | Dermal Contact | 7.E-08 | - - | - - | - - | NA | - - |
| | | Total | 5.E-07 | - - | - - | - - | NA | - - |
| | | **Total Across All Media** | **2.E-04** | - - | - - | - - | NA | - - |

cPAHs - Carcinogenic polycyclic aromtic hydrocarbons
NA = Not applicable

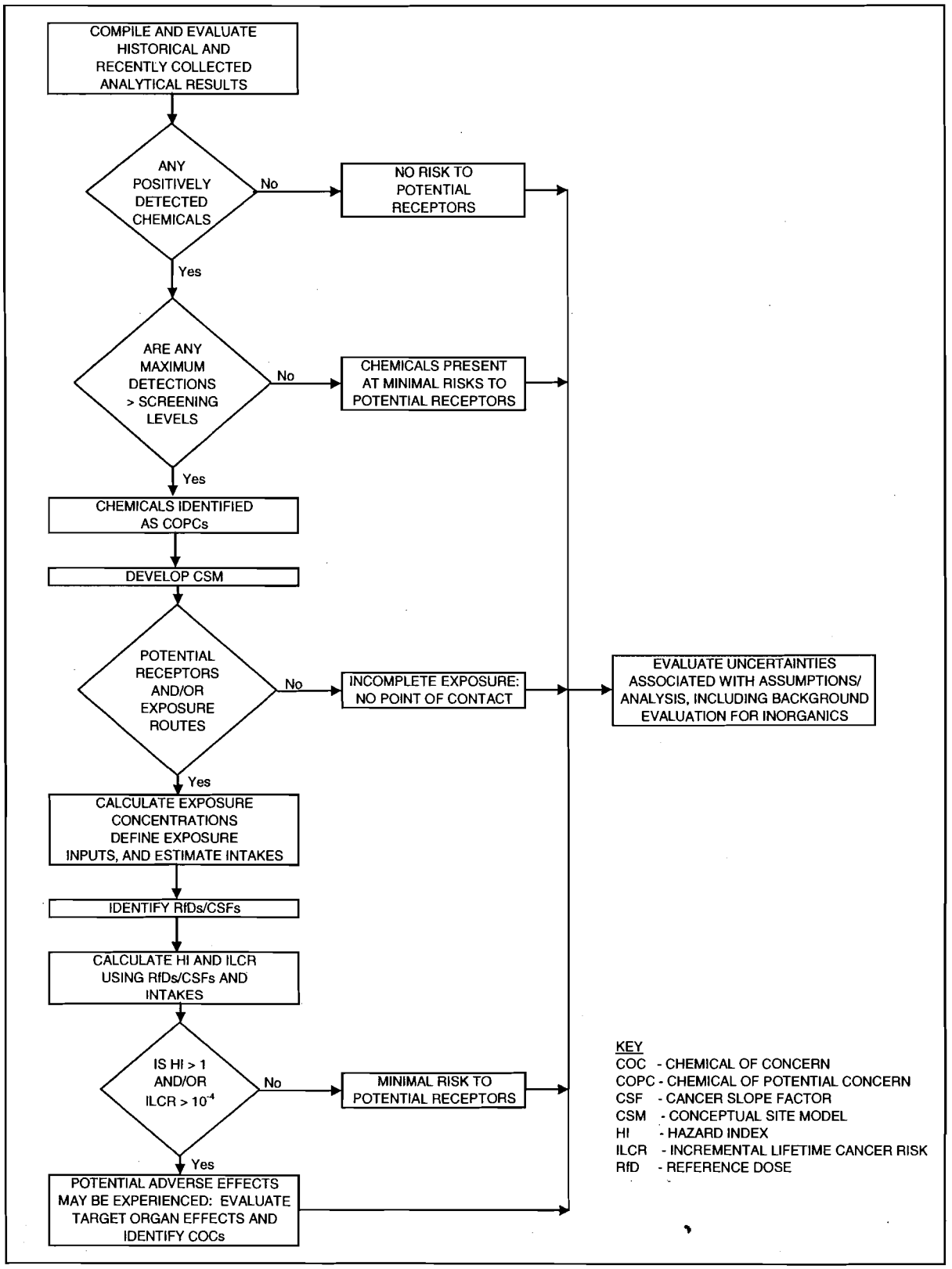
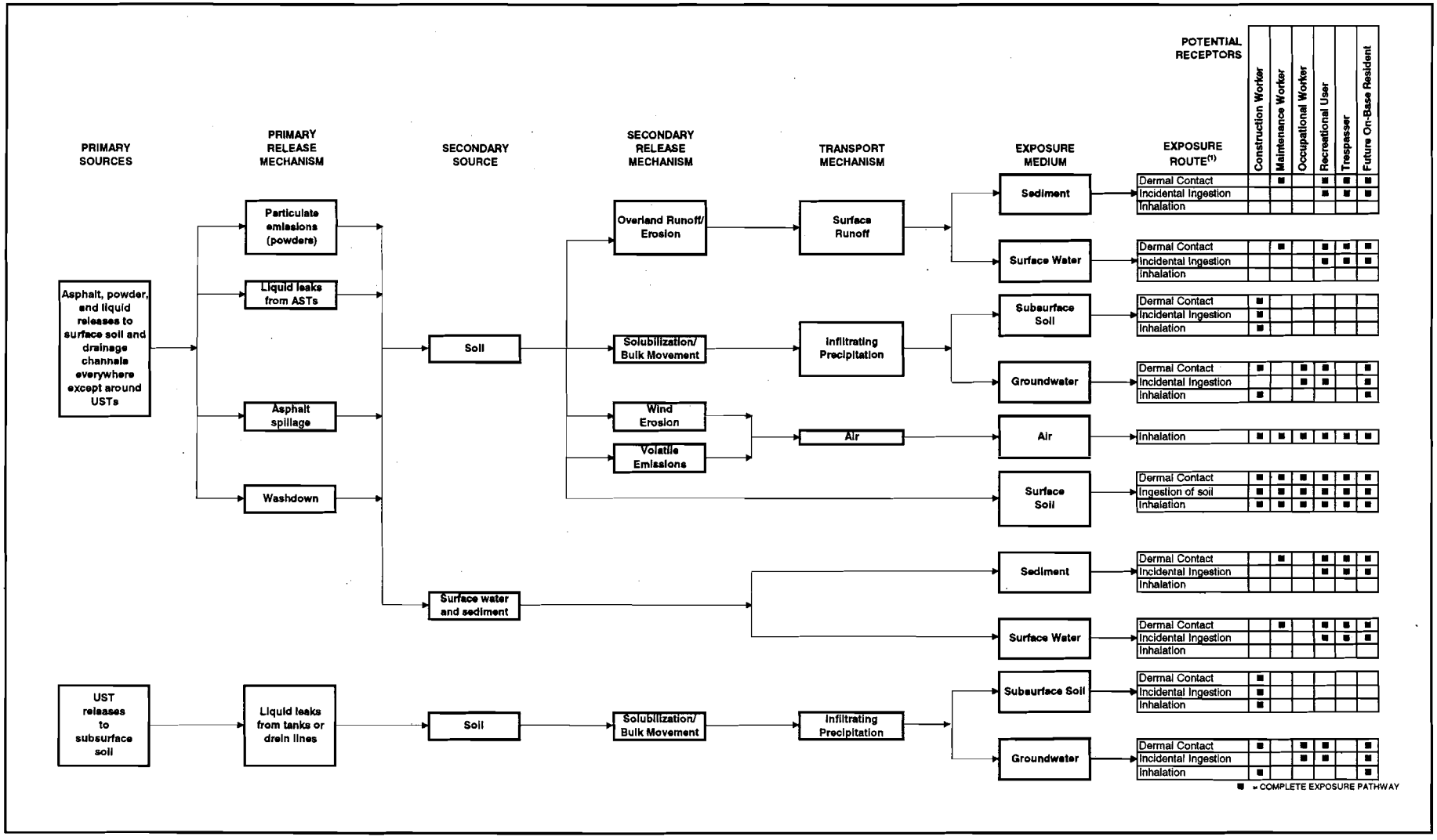



**FIGURE 7-1**

**SUMMARY OF HUMAN HEALTH RISK ASSESSMENT PROCESS**
**SWMU 15 - ROADS AND GROUNDS AREA**
**NSWC CRANE**
**CRANE, INDIANA**

FIGURE 7-2

HUMAN HEALTH CONCEPTUAL SITE MODEL
SWMU 15 - ROADS AND GROUND AREA
NSWC CRANE
CRANE, INDIANA




1- Blank space indicates incomplete exposure pathway or relatively insignificant or not applicable potential exposure.
USTs = Underground storage tanks.
ASTs = Aboveground storage tanks.

# 8.0 ECOLOGICAL RISK ASSESSMENT

The goal of this SERA for SWMU 15 – Roads and Grounds Area is to evaluate the potential for adverse ecological impacts due to site-related contamination. The goal of this SERA was accomplished by identifying 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 15 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, 1997c).

This SERA consists of Steps 1, 2, and 3a of the eight ecological risk evaluation steps required by U.S. EPA guidance (1997c and 1998) and the Navy Policy for Conducting Ecological Risk Assessments (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 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 Region 5 regulators.

A schematic diagram of the general ecological 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. Additionally, supporting information and calculations are presented in Appendices J.1 through J.7.

## 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 were 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 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 and below. The following paragraphs briefly summarize the environmental setting at the base.

Eighty 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), which 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 15 due to a lack of vast expanses of open water (i.e., the preferred hunting habitat for the bald eagle). No mist nets were located at SWMU 15 during the Mist Net and Radiotelemetry Surveys for the Indiana bat; however, two mist net sites were located in the main stream tributary to Boggs Creek adjacent to SWMU 13, which is the nearest SWMU to SWMU 15. 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 15 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 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 Indiana Division of Fish and Wildlife website (http://www.in.gov/dnr/fishwild/endangered/e-list.htm) was reviewed to verify that no changes in the status of these species had occurred since October 2000. This endangered species list is much larger than that presented in Comarco Systems, Inc. (2000) and is not reiterated here.

Boggs Creek and Turkey Creek discharge off site 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 [Indiana Department of natural Resources (IDNR), 2004]. Also, the East Fork of the White River is the site for an ongoing study of lake sturgeon populations, another State endangered species (IDNR, 2004). Finally, spotted darters, a State species of special concern, has been found in the East Fork of the White River (IDNR, 2000). Other threatened, endangered, or special concern species also may be present in the water bodies just outside the Crane facility boundaries. For example, a survey of the freshwater mussel species present in the East Fork of the White River was initiated in 2003; however, results are not yet available.

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 15 and indicates the SWMU boundaries and sample locations. Appendix J.1 presents the ecological assessment checklist and a figure presenting the ecological habitats at the SWMU.

SWMU 15 is located west of Turkey Creek in the northern half of NSWC Crane (Figure 1-2). The SWMU approaches 60 acres in size and is accessed via Highway 468. A parking area and Pyrotechnics Production Area are to the west. The Booster Area is to the south. An instrument calibration and repair building is to the north, and inert and open storage areas are to the east.

Several storage buildings (2801, 2716, 2717, 2718, and 2774) present at SWMU 15 are used to store generally inert materials. A 5,000-gallon above-ground storage tank is located north of Building 2801 and is used to store waste oil. A 5,000-gallon underground storage tank is located west of Building 2801 and is used to store gasoline.

A ravine south of Building 2717 is used for indiscriminant dumping. It is littered with debris including rusted metal containers, ammunition storage containers, construction debris, plumbing fixtures, and general refuse. There are also several 55-gallon drums scattered on the slope, and the contents of some appear to have spilled onto the ground. A ravine is also located east and southeast of the road east of Building 2718. This ravine has been extensively filled with various types of material including two railroad box cars and would no longer be a ravine.

Intermittent surface drainages flow south and southeast across the SWMU and converge into a single drainageway that flows under Highway 99. Surface flow continues to the south, where it gains volume from other intermittent sources until it enters Turkey Creek. Some of the drainage ditches are only wet during and immediately after rain events. Appendix A presents photographs of many of the surface water and sediment sample locations, several of which may have ponded water during some dry periods. The Turkey Creek water body segment was included in the 2004 Indiana Integrated Water Quality Monitoring and Assessment Report but was not assessed because insufficient data or no data were available to determine designated State water uses (i.e., aquatic life support, fish consumption, and primary contact) [Indiana Department of Environmental Management (IDEM), 2004b].

### 8.2.2 Contaminants, Ecotoxicity, and Fate and Transport

Based on site data, the following parameters are among the site-related chemical contaminants known to be present or potentially present in environmental media at SWMU 15:

- SVOCs
- 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 15 media are presented in Appendix J.2.

### 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 15. Section 1.3 presents detailed descriptions of previous investigations and the potential sources of contamination for SWMU 15. 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 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 were 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 was 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 15 via overland flow.

The aquatic habitat at SWMU 15 consists of small and intermittent drainage ditches and tributaries that drain SWMU 15 water runoff to Turkey Creek. Although the small tributaries are typically wet during rain events only, these drainageways contribute water and sediments to Turkey Creek. 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. Although it is somewhat unlikely that piscivorous wildlife will obtain significant portions of their diet from these surface water sources, there is the possibility of several pools of standing water that may contain small fish. Therefore, this exposure pathway was evaluated in the SERA.

#### 8.2.3.4 Air

Inhalation of particulates by mammals and birds is not considered a complete pathway at SWMU 15 because there are no activities causing air contamination. 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 was not evaluated in the SERA.

### 8.2.4 Endpoints

#### 8.2.4.1 Assessment Endpoints

Assessment endpoints are an explicit expression of the environmental value that is to be protected (U.S. EPA, 1997c). 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 discussed in Section 8.2.1.2, the habitat at SWMU 15 consists of grassy and wooded areas; however, much of the SWMU is covered by roads, parking areas, and buildings. The drainageways adjacent to the site are intermittent but may have some pools throughout the year. Based on the habitats at SWMU 15, 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
- Piscivorous 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 15. 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 15 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 15. 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 15. 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.

*Piscivorous Birds and Mammals:* Piscivorous birds and mammals are present throughout the base along the tributaries and drainageways and are present at SWMU 15. These are considered second-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 drainageways that are intermittent will be ephemeral because of a lack of suitable habitat and water flow.

*Fish*: Fish could be present in the drainageways leading away from SWMU 15 because there is the potential for pools of standing water to remain during dry periods. Fish may be exposed to and accumulate contaminants from the food items they consume or from the surface water in which they live.

*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 were evaluated in the SERA. As indicated in U.S. EPA guidance (1997c), "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 predatory species were not selected as assessment endpoints because, with the presence of many roads and paved areas, the contaminated area is much smaller than the home range of these animals. According to the aerial photograph of SWMU 15 (Figure 8-5), many of the samples collected in the contaminated area are under pavement or gravel. These areas are not suitable habitat for the small birds

and mammals that large predatory species consume. Samples were only collected in areas of suspected contamination. Soil samples were not collected in the southern portion of the site because contamination was not noted. Potentially contaminated soil in vegetated areas at SWMU 15 only encompasses approximately 13 acres. Because of the limited amount of food large predators would consume from the contaminated areas of SWMU 15, risks were negligible. 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 were 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 SVs - Mortality, growth, and reproduction of plants and soil invertebrates were evaluated by comparing the measured concentrations of chemicals in surface soil to SVs designed to be protective of ecological receptors.

- Wildlife toxicity reference values (TRVs) - Mortality, reproductive, and/or developmental effects of birds and mammals were 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 SVs - Mortality and other adverse effects (e.g., growth, feeding rates, and behavioral changes) of benthic macroinvertebrates were evaluated by comparing the measured concentrations of chemicals in sediment to SVs designed to be protective of ecological receptors.

- Surface water SVs - Mortality and other adverse effects (e.g., growth, feeding rates, and behavioral changes) of aquatic organisms were evaluated by comparing the measured concentrations of chemicals in the surface water to SVs designed to be protective of ecological receptors.

#### 8.2.4.3 Selection of Receptor Species

Many receptors in the soil environments at SWMU 15 are typically grouped into general categories such as 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 mammal - short tail shrew
- Insectivorous bird - American woodcock
- Piscivorous mammal - mink
- Piscivorous bird - belted kingfisher

Receptor profiles for each of the species above are presented in Appendix J.3.

#### 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 15 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 discharge; waste oil, fuel oil, and gasoline leaks from storage tanks; liquid tar runoff from the Asphalt Batch Plant; and runoff from refuse in the ravines. These contaminants have been released to environmental media via washdown from washracks into the ravine south of SWMU 15 and runoff infiltration into the soil; 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; 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; secondary receptors are birds and mammals. Figure 8-6 presents the conceptual site model for SWMU 15.

## 8.3 ECOLOGICAL EFFECTS EVALUATION/SELECTION OF CONTAMINANTS OF POTENTIAL CONCERN

### 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 (e.g., stressed vegetation, see Appendix J.1). 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 sediment and surface soil samples to Region 5 ecological screening levels (ESLs) (U.S. EPA, 2003b). U.S. EPA has developed Ecological Soil Screening Levels (Eco-SSLs) for a few chemicals. These values were used in place of Region 5 ESLs because they are based on more recent data. For surface water, State of Indiana Water Quality Standards (WQSs) and U.S. EPA Water Quality Criteria (WQCs) were considered. Region 5 ESLs for surface water were used when WQCs and WQSs were not available; however, only WQCs were used in the Step 3a evaluation because these values have been more recently updated. The following rules were 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 effects data. The EEQs for terrestrial receptors were calculated as follows:

$$EEQ = \frac{C_{ss}}{SSSL}$$

where:

$C_{ss}$ = contaminant concentration in surface soil (µg/kg or mg/kg)

SSSL = surface soil screening level (µg/kg or mg/kg)

The EEQs for aquatic receptors were calculated as follows:

$$EEQ = \frac{C_{sw}}{SWSL} \text{ or } \frac{C_{sd}}{SDSL}$$

where:

$C_{sw}$ = contaminant concentration in surface water (µg/L)

$C_{sd}$ = 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 Contaminants of Potential Concern

As discussed in Section 2.5.1, 50 surface soil samples were collected at SWMU 15. Twenty-one of the surface soil samples were collected under pavement or gravel so there is an incomplete exposure pathway for ecological receptors. Therefore, only 29 of the soil samples were evaluated to determine the COPCs in surface soil (Table 8-1). It should be noted that the soil samples collected at locations 15SB011 and 15SB026 were analyzed for SVOCs but not metals. The soil samples collected at locations 15SB014 and 15SB016 were analyzed for metals but not SVOCs. Figure 8-7 shows the surface soil sample locations included in the ecological COPC selection. These locations represent areas where ecological receptors could potentially be exposed to contaminants. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, herbicides, and inorganics.

Sediment and surface water samples were collected from intermittent streams, drainage ditches, catch basins, and surface runoff locations throughout SWMU 15. As discussed in Section 2.5.3, 12 of 19 proposed sediment samples were collected at SWMU 15. Because new construction had taken place in the area, four of the sampling locations could not be found. Also, three other locations were catch basins that did not contain sediment. As discussed in Section 2.5.2, 15 of 19 proposed surface water samples were collected at SWMU 15. As stated above, four of the sampling locations could not be found due to new construction in the area. Figure 8-8 shows the surface water and sediment sample locations included in the ecological COPC selection.

#### 8.3.2.1 Surface Soil

Table 8-2 is the ecological surface soil screening table for SWMU 15. VOCs, SVOCs, pesticides, PCBs, 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 8-2 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 8-2.

Three SVOCs, one herbicide, one PCB, and 13 inorganics were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, one SVOC and one inorganic were selected as COPCs for further evaluation in the Step 3a because no criteria are available. Aluminum and iron were selected as COPCs because no pH data were available for SWMU 15.

One pesticide, one herbicide, one PCB, 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, 2000b) (see Table 8-2).

#### 8.3.2.2 Sediment

Table 8-3 is the ecological sediment screening table for samples collected at SWMU 15. It includes samples from all downgradient tributary segments and the storm sewer system. Seventeen SVOCs, five pesticides, two PCBs, and five inorganics were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, one SVOC and 10 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 samples collected at SWMU 15. It includes samples from all downgradient tributary segments and the storm sewer system. Six SVOCs, three inorganics in unfiltered samples, and three inorganics in filtered samples were selected as COPCs because the maximum detected concentrations exceeded associated screening levels. Additionally, three SVOCs were selected as COPCs for further evaluation in Step 3a because no criteria are available for comparison to the maximum concentrations.

#### 8.3.2.4 Summary

A conservative ecological screening of surface soil, sediment, and surface water data collected as part of the RFI was conducted at SWMU 15. The chemicals selected as COPCs were evaluated further in the Step 3a evaluation.

In summary, based on the results of the SERA performed for SWMU 15, adequate information exists to determine that potential risks are possible for receptors exposed to the selected COPCs. Therefore, the SERA advanced 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 (e.g., 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 were 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 used to evaluate risks to ecological receptors from chemicals in 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 soil screening levels 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 maximum chemical concentrations in soil to "no-effects benchmarks" such as the U.S. EPA Eco-SSLs for plants and invertebrates. Although some of the alternate benchmarks may be based on values such as Effects Concentrations for 20 percent of the test population ($EC_{20}$s), samples with chemical concentrations less than the no-effects benchmarks are not expected to have significant effects. The following decisions were made based on these comparisons:

- 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 was 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 was 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 a less conservative 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 (2000b). 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 decisions were made based on the results of the food-chain model:

- If the EEQ was 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 was greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, and the concentration was 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 was greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, but the concentration of the chemical was less than background, it was 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 two independent flow paths, (1) to further evaluate risks to invertebrates, 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. Because many of the Region 5 sediment screening levels are based on equilibrium partitioning, maximum contaminant concentrations were compared to 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 decisions were made based on these comparisons:

- If the concentration was less than the lower-effects benchmark and greater than the upgradient concentration, 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 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.).

Concurrent with the evaluation of risks to sediment 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 (2000b). 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 decisions were made based on the results of the food-chain model:

- If the EEQ was less than 1.0 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 wildlife and the chemical was not evaluated further in Step 3a.

- If the EEQ was greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, and the concentration was 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 was greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, but the concentration of the chemical was less than background, it was 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.).

**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 total metals samples, or was detected at a concentration less than the screening level in the total metals 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 total metals 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 total metals 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 were retained as site-related COPCs were further evaluated to determine if there are unacceptable risks to terrestrial wildlife. The following decisions were made based on the results of the food-chain model:

- If the EEQ (see Section 8.4) was 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 was 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 was greater than upgradient 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 was greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, but the chemical concentration was less than upgradient concentrations, it was 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 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). 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 this 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. 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, including the specific alternate benchmarks that were used in Step 3a, as necessary.

**Terrestrial Plants and Invertebrates:** The alternate benchmarks used to further evaluate risks to plants and invertebrates are listed below. The ecological endpoint for each benchmark 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 [Canadian Council of Ministers of the Environment (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 (not included in the above documents) were used to evaluate potential risks to terrestrial vegetation and invertebrates from contaminants in surface soil.

**Benthic Organisms:** In addition to the Step 3a factors presented above, additional evaluations for sediment included comparing chemical concentrations in sediment to higher effects levels to show the probability of a range of possible effects. The higher effects levels 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 used in this step represent is provided in the Step 3a. For example, the probable effects concentrations (PECs) were intended to identify contaminant

concentrations above which harmful effects on sediment-dwelling organisms were expected to occur frequently (MacDonald et al., 2000).

**Aquatic Organisms:** In addition to the Step 3a factors presented above, additional evaluations for surface water include comparing chemical concentrations in surface water to acute water quality standards/criteria to show a range of possible effects. More emphasis was placed on dissolved inorganics concentrations (compared to total inorganics concentrations) because dissolved inorganics are a better indicator of potential bioavailability than are total inorganics. Also, emphasis was placed on average concentrations because at least some aquatic organisms (e.g., 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 were 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 COPCs in surface soil are evaluated using the methodologies described above (Section 8.4). Table 8-5 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 bases for the alternate benchmarks are presented below.

Di-n-butyl phthalate

Di-n-butyl phthalate was initially selected as a COPC because the maximum detected surface soil concentration of 0.24 mg/kg at location 15SB048 exceeded the Region 5 ESL (0.15 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 following alternate benchmark was used to further evaluate risks to plants and soil invertebrates:

- ORNL plant benchmark – 200 mg/kg (Efroymson et al., 1997b)

The ORNL plant benchmark was based on a study by Overcash et al. (1982) that evaluated the phytotoxicity of di-n-butyl phthalate on plant growth in two soils. Fescue, corn, and soybeans were grown from seed for 21 days in a clay soil (pH of 5, 1.6 percent organic matter, cation exchange capacity (CEC) 8.7 meq/100g soil] and a sandy loam soil (approximately 1 percent organic matter, CEC approximately 3 meq/100g soil). Both soils were tested at pH of 4 and 6. The treatment levels for di-n-butyl phthalate were 200, 2,000, or 20,000 parts per million (ppm). In the clay soil, no effect was seen on seed germination at the highest concentration. Corn fresh weight was reduced by 23 percent at 200 ppm. Fescue fresh weight was reduced by 73 percent at 2,000 ppm. In the sandy loam soil at a pH of 4, soybean seed germination was reduced by 56 percent at 200 ppm. Corn fresh weight was reduced by 34 percent at 200 ppm. In the sandy loam soil at a pH of 6, no effect on seed germination was noted. Fresh weights of corn and soybean were reduced by 44 percent and 29 percent, respectively, at 200 ppm. Fescue fresh weight was reduced by 56 percent at 2,000 ppm. The maximum concentration of di-n-butyl phthalate is less than the ORNL plant benchmark, therefore, risks to plants are acceptable.

No benchmarks are available for di-n-butyl 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. A lethal concentration for 50 percent of the test population ($LC_{50}$) 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 $LC_{50}$ (1,064 mg/kg) by a safety factor of five (Efroymson et al., 1997a). Although there are uncertainties in comparing the maximum di-n-butyl phthalate concentration to toxicity information available for dimethylphthalate, the maximum di-n-butyl phthalate concentration is less than the ORNL earthworm benchmark for dimethylphthalate, so risks to invertebrates are acceptable. Di-n-butyl phthalate is not retained as a COPC.

Dibenzofuran

Dibenzofuran was initially selected as a COPC because a Region 5 ESL is not available. There are also no alternate benchmarks for dibenzofuran. Therefore, the risks could not be evaluated. However, dibenzofuran was only detected in 1 of 27 samples at a concentration of 0.095 mg/kg at 15SB007. There are several samples near this location where dibenzofuran was not detected, so the detection does not

represent a large area. Therefore, risks to plants and invertebrates are acceptable, and dibenzofuran was not retained as a COPC.

N-Nitrosodiphenylamine

N-Nitrosodiphenylamine was initially selected as a COPC because the maximum detected surface soil concentration of 1.5 mg/kg at location 15SB038 exceeded the Region 5 ESL (0.545 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 following alternate benchmark was used to further evaluate risks to plants and soil invertebrates:

- ORNL earthworm benchmark – 20 mg/kg (Efroymson et al., 1997a)

The N-nitrosodiphenylamine ORNL benchmark for earthworms is based on a study by Neuhauser et al. (1986) using the Organization for Economic Cooperation and Development (OECD) artificial soil (pH 6) to assess the effects of this compound on survival of adults of four earthworm species. The $LC_{50}$s after 14 days showed little difference in sensitivity among the worms; sensitivity decreased in the order *E. eugeniae, P. excavatus, E. fetida,* and *A. tuberculata.* Neuhauser and Callahan (1990) looked at the effect of this compound on growth and reproduction of *E. fetida* after 56 days of growth in horse manure. A concentration of 1,400 ppm (lowest concentration tested) caused a 37 percent reduction in cocoon production. The $LC_{50}$ value of 109 (Neuhauser et al., 1986) was the lowest toxic concentration of the five reported. A safety factor of five was applied to this $LC_{50}$ to obtain the benchmark of 20 mg/kg for N-nitrosodiphenylamine. The maximum concentration is less than the ORNL earthworm benchmark, so risks to soil invertebrates are acceptable. A plant benchmark was not available for this analyte. However, it was only detected in 1 of the 27 samples, at 15SB038. There are several samples surrounding this location within 100 feet that did not have detections of this analyte, so the detection is limited to a small area that is vegetated. Therefore, risks to plants are acceptable, and N-nitrosodiphenylamine was not retained as a COPC.

Naphthalene

Naphthalene was initially selected as a COPC because the maximum detected surface soil concentration of 0.28 mg/kg at location 15SB007 exceeded the Region 5 ESL (0.0994 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 following alternate benchmark was used to further evaluate risks to plants and soil invertebrates:

- Canadian Soil Quality Guideline (SQG) – 0.6 mg/kg [Environment Canada (EC), 1999a]

The Canadian SQG is based on effects concentration for 25 percent of the test population ($EC_{25}$) endpoints based on the following direct soil contact experiments: 61 mg/kg for radish seedling emergence, 3 mg/kg for lettuce seedling emergence, and 54 mg/kg for earthworm survival. The lowest $EC_{25}$ (3 mg/kg) was divided by an uncertainty factor of five, giving the value of 0.6 mg/kg. The maximum concentration is less than the Canadian SQG. Because this value is conservative and based on risks to plants and earthworms, risks are acceptable and naphthalene was not retained as a COPC.

Aroclor-1260

Aroclor-1260 was initially selected as a COPC because the maximum detected surface soil concentration of 0.032 mg/kg at location 15SB036 exceeds the Region 5 ESL (0.000332 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 following alternate benchmark was used to further evaluate risks to plants and soil invertebrates:

- Canadian SQG – 33 mg/kg (EC, 2001a)

The Canadian SQG for total PCBs is based on direct soil contact. Because the maximum concentration of Aroclor-1260 is less than the Canadian SQG, risks to plants and invertebrates are acceptable and Aroclor-1260 was not retained as a COPC.

Because Aroclor-1260 is a bioaccumulative chemical, risks to wildlife from Aroclor-1260 in surface soil were further evaluated as described in Section 8.4.2.

Pentachlorophenol

Pentachlorophenol was initially selected as a COPC because the maximum detected surface soil concentration of 0.028 mg/kg at location 15SB049 exceeds the Eco-SSL of 0.0018 mg/kg. However, this value is based on risks to birds and not risks to plants and invertebrates; therefore, the following alternate benchmarks were used to further evaluate risks to plants and invertebrates:

- Eco-SSL for plants – 5 mg/kg (U.S. EPA, 2005c)
- Eco-SSL for soil invertebrates – 31 mg/kg (U.S. EPA, 2005c)

The Eco-SSL for plants is the geometric mean of the $EC_{20}$ values reported for each of the three test species exposed under similar conditions. The Eco-SSL for soil invertebrates is the geometric mean of the Maximum Acceptable Toxicant Concentration (MATC) values reported for each of the three test species (i.e., Enchytraeid, Springtail, and Earthworm) exposed under similar conditions. The maximum concentration for pentachlorophenol is less than the Eco-SSLs for plants and soil invertebrates; therefore, risks to plants are acceptable and pentachlorophenol was not retained as a COPC.

Because pentachlorophenol is a bioaccumulative chemical, risks to wildlife from pentachlorophenol in the surface soil were further evaluated as described in Section 8.4.2.

Aluminum

Aluminum was initially selected as a COPC because a screening level is not available. According to the U.S. EPA Eco-SSL for aluminum, aluminum is only considered toxic when soil pH is less than 5.5. However, pH information was not available for SWMU 15. The pH levels in the soil at SWMU 12, which is located close to SWMU 15, ranged from 6 to 7.7, with an average of 6.9. Therefore, because aluminum is only considered toxic when pH is less than 5.5, and because aluminum is generally considered a non-toxic metal, it is highly unlikely that plants or soil invertebrates are being impacted by aluminum at the SWMU. Risks to plants and invertebrates from aluminum are acceptable, and aluminum is not retained as a COPC.

Antimony

Antimony was initially selected as a COPC because the maximum detected soil concentration of 2.7 mg/kg at location 15SB006 exceeded the lowest Eco-SSL value of 0.27 mg/kg. However, this Eco-SSL is based on risks to mammals. Therefore, the following alternate benchmarks were used to further evaluate risks to plants and soil invertebrates:

- ORNL plant benchmark – 5 mg/kg (Efroymson et al., 1997b)
- Eco-SSL for soil invertebrates – 78 mg/kg (U.S. EPA, 2005d)

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. The maximum concentration of antimony is less than the ORNL plant value.

The Eco-SSL for soil invertebrates is the geometric mean of the $EC_{20}$ values reported for each of the three test species (i.e., Enchytraeid, Springtail, and Earthworm) exposed under similar conditions. The maximum concentration of antimony is less than the Eco-SSL for soil invertebrates.

In addition, the maximum concentration for antimony in soil at SWMU 15 is less than the maximum background concentration for antimony in Soil Group 3 of 5.6 mg/kg; therefore, site related risks to plants and soil invertebrates are acceptable and antimony was not retained as a COPC.

Arsenic

Arsenic was initially selected as a COPC because the maximum detected soil concentration of 20.7 mg/kg at location 15SB036 exceeded the lowest Eco-SSL value of 18 mg/kg based on risks to plants. The following alternate benchmarks were used to further evaluate risks to plants and soil invertebrates:

- Canadian SQG – 17.1 mg/kg (EC, 1999c)
- ORNL earthworm benchmark – 60 mg/kg (Efroymson et al., 1997a)

The Canadian SQG for soil contact is the geometric mean of effects concentrations for reduction in spinach yields and is the 25$^{th}$ percentile of 46 data points (EC, 1999c). One of the 27 samples had an arsenic detection slightly greater than both the Eco-SSL plant benchmark and the Canadian SQG. Therefore, elevated arsenic levels are not widespread across the site, risks to plants are acceptable, and arsenic was not retained as a COPC for plants.

The ORNL earthworm benchmark of 60 mg/kg is based on a study by Fischer and Koszorus (1992) that tested the effects of arsenic (as potassium arsenate) on growth and reproduction of *Eisenia fetida.* The maximum arsenic concentration is less than this benchmark; therefore, risks to soil invertebrates are acceptable and arsenic was not retained as a COPC for invertebrates.

Because arsenic is a bioaccumulative chemical, risks to wildlife from arsenic in the surface soil were further evaluated as described in Section 8.4.2.

Cadmium

Cadmium was initially selected as a COPC because the maximum soil concentration of 6.9 mg/kg at location 15SB002 exceeded the U.S. EPA Eco-SSL of 0.36 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 following U.S. EPA Eco-SSLs for plants and soil invertebrates to evaluate risks to these receptors:

- Eco-SSL for plants – 32 mg/kg (U.S. EPA, 2005e)
- Eco-SSL for soil invertebrates – 140 mg/kg (U.S. EPA, 2005e)

The U.S. EPA Eco-SSL for plants (32 mg/kg) is the geometric mean of the MATC (based on growth) reported for 14 test species under six different test conditions of pH and percent organic matter (U.S. EPA, 2005e). The maximum cadmium detection is less than the Eco-SSL for plants; therefore, risks to plants are acceptable and cadmium was not retained as a COPC for plants.

The U.S EPA Eco-SSL for soil invertebrates (140 mg/kg) is the geometric mean of the 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, 2005e). The maximum cadmium detection is less than the Eco-SSL for soil invertebrates; therefore, risks to soil invertebrates are acceptable and cadmium was not retained as a COPC for invertebrates.

Because cadmium is a bioaccumulative chemical, risks to wildlife from cadmium were evaluated as described in Section 8.4.2.

Chromium

Chromium was initially selected as a COPC because the maximum soil concentration of 49.7 mg/kg at location 15SB036 exceeded the Eco-SSL of 26 mg/kg based on risks to birds. Because the Eco-SSL used in the conservative COPC screening is based on risks to wildlife and not risks to plants and invertebrates, the following alternate benchmark was used to evaluate risks to plants and soil invertebrates:

- Canadian SQG – 64 mg/kg (EC, 1999d)

As presented in the supporting document for the Canadian SQG for chromium (EC, 1999d), 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 (NECC) value of 52 mg/kg. The TEC is the sixth 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 $EC_{25}$. As detailed in the supporting document (EC, 1999d), 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 that 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 (Eisler, 1986). It is unlikely that most, if any, chromium in SWMU 15 soil is hexavalent chromium. Trivalent chromium is the predominant form of this metal in most soils and is not bioavailable (Eisler, 1986). The maximum concentration is less than the Canadian SQG; therefore, risks to plants and soil invertebrates are acceptable overall and chromium was not retained as a COPC.

Because chromium is a bioaccumulative chemical, risks to wildlife from chromium were evaluated as described in Section 8.4.2.

Cobalt

Cobalt was initially selected as a COPC because the maximum concentration of 59.6 mg/kg at location 15SB035 exceeded the Eco-SSL for plants of 13 mg/kg. Five locations had concentrations of cobalt greater than the Eco-SSL for plants. The concentrations at four of the locations ranged from 13.1 mg/kg to 20.8 mg/kg, which are only slightly greater than the Eco-SSL and are less than the maximum background concentration (27.1 mg/kg). The fifth location (15SB035) had a cobalt concentration approximately three times greater than the Eco-SSL, but the concentration was only about two times greater than the maximum background concentration. Because only one location had a cobalt concentration that was slightly greater than the maximum background concentration and the Eco-SSL for plants, and because the sample is bounded by other samples (see Figure 8-5), risks to plants at SMWU 15 are considered acceptable. Although a benchmark for soil invertebrates is not available, because only one location had a cobalt concentration that was slightly greater than the maximum background concentration, potential risks to soil invertebrates at SWMU 15 are considered acceptable. Therefore, cobalt is not retained as a COPC for plants or soil invertebrates.

Copper

Copper was initially selected as a COPC because the maximum detected soil concentration of 20.1 mg/kg at location 15SB006 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 following alternate benchmark was used to further evaluate the risks to plants and soil invertebrates:

- Canadian SQG – 63 mg/kg (CCME, 1997)

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 seventeenth of 69 data points and corresponds to an effect on radish seedling emergence. Therefore, some studies showed effects at concentrations less than 63 mg/kg, but many more studies did not show effects at this concentration. Copper concentrations less than the Canadian SQG of 63 mg/kg are expected to be protective of plants and invertebrates.

The maximum detected copper concentration is less than the SQG. Therefore, risks to plants and invertebrates from copper are acceptable, and copper is not retained as a COPC for further evaluation in this area.

Because copper is a bioaccumulative chemical, risks to wildlife from copper were evaluated as described in Section 8.4.2.

Iron

Iron was initially selected as a COPC because no Region 5 screening level is available. According to the Eco-SSL for iron (U.S. EPA, 2003c), 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 (U.S. EPA, 2003c). However, pH levels were not available for SWMU 15. The pH levels in the soil at SWMU 12, which is located close to SWMU 15, ranged from 6 to 7.7, with an average of 6.9. Therefore, because iron is not expected to be toxic to plants in soils with pH levels between 5 and 8, and because iron is generally considered a non-toxic metal, it is highly unlikely that plants or soil invertebrates are being impacted by iron at the SWMU. Risks to plants and invertebrates from iron are acceptable, and iron is not retained as a COPC.

Lead

Lead was initially selected as a COPC because the maximum soil concentration of 155 mg/kg at location 15SB008 exceeded the lowest Eco-SSL of 11 mg/kg. Because the Eco-SSL used in the conservative COPC screening is based on risks to birds and not risks to plants and invertebrates, lead concentrations were compared to the following U.S. EPA Eco-SSLs for plants and soil invertebrates to evaluate risks to these receptors:

- Eco-SSL for plants – 120 mg/kg (U.S. EPA, 2005f)
- Eco-SSL for soil invertebrates – 1,700 mg/kg (U.S. EPA, 2005f)

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. The maximum lead concentration at SWMU 15 (at location 15SB008) was the only detection greater than the Eco-SSL for plants. The sample with the maximum detection was collected in an open gravel lot with little habitat (see photograph in Appendix A), and the lead concentrations in two other samples collected within a few yards of 15SB008 were less than the plant benchmark with concentrations of 20.3 mg/kg and 31.1 g/kg. Therefore, the potentially impacted area is relatively small (see Figure 8-5), and risks to plants at SWMU 15 are considered acceptable.

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 of lead at SWMU 15 is less than this benchmark; therefore, risks to soil invertebrates are acceptable and lead was not retained as a COPC for invertebrates.

Because lead is a bioaccumulative chemical, risks to wildlife from lead were evaluated as described in Section 8.4.2 of this ERA.

Manganese

The maximum concentration for manganese of 4,400 mg/kg was detected at 15SB035. Manganese was initially selected as a COPC because no Region 5 ESL is available. The maximum background concentration for manganese in Soil Group 3 is 3,040 mg/kg. Only the maximum concentration exceeded this level, and there are several samples within 100 feet of this location with concentrations less than the background value. Therefore, the detection does not represent a large area. Also, manganese is not generally considered toxic to ecological receptors. Therefore, risks are acceptable and manganese was not retained as a COPC.

Mercury

Mercury was initially selected as a COPC because the maximum soil concentration of 0.13 mg/kg exceeded the Region 5 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, 1999e)

As presented in the supporting document (EC, 1999e), 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 sixth of 22 data points and corresponds to an effects concentration for 50 percent of the test population ($EC_{50}$) for turnip seedling emergence (50 mg/kg). The $EC_{50}$ value of 50 mg/kg was then divided by an uncertainty factor of four considering the importance of definitive effects data. In Appendix VIII of the supporting document, no observed effect concentrations (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 concentration of mercury in SWMU 15 is less than the SQG; therefore, risks to plants and invertebrates are acceptable and mercury was not retained as a COPC.

Because mercury is a bioaccumulative chemical, risks to wildlife from mercury were evaluated as described in Section 8.4.2.

Nickel

Nickel was initially selected as a COPC because the maximum concentration of 31.6 mg/kg at location 15SB035 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 nickel concentration was compared to the following alternate benchmark to evaluate risks to plants and invertebrates:

- Canadian SQG – 50 mg/kg (EC, 1999f)

The Canadian SQG (soil contact) is the 25th percentile (eighth of 31 data points) of 50 mg/kg from a study where unspecified effects on onion growth were noted. The maximum nickel concentration at SWMU 15 is less than the SQG, so risks to plants and invertebrates are acceptable, and nickel was not retained as a COPC.

Because nickel is a bioaccumulative chemical, risks to wildlife from nickel were evaluated as described in Section 8.4.2.

Selenium

Selenium was initially selected as a COPC because the maximum concentration of 1.1 mg/kg at location 15SB038 exceeded the Region 5 ESL of 0.0276 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 selenium concentration was compared to the following alternate benchmark to evaluate risks to these receptors:

- Canadian SQG – 1 mg/kg (EC, 2001b)

The SQG is based on an approximately 60 percent reduction in sorgrass (*Sorghum vulgare)* shoot growth over 42 days. The maximum concentration is slightly greater than the SQG, and all of the other detections were less than the benchmark. The location of the maximum concentration (15SB038) is bounded by several samples with selenium concentrations less than the SQG (see Figure 8-5). Therefore, because the magnitude of the exceedance of the Canadian SQG in one sample is low and the area this sample represents is small, risks to plants and soil invertebrates due to selenium contamination are acceptable and selenium was not retained as a COPC.

Because selenium is a bioaccumulative chemical, risks to wildlife from selenium were evaluated as described in Section 8.4.2.

Thallium

Thallium was initially selected as a COPC because the maximum concentration of 0.47 mg/kg at location 15SB038 exceeded the Region 5 ESL of 0.0569 mg/kg. However, the ESL is based on risks to wildlife (i.e., the masked shrew) and not risks to plants and invertebrates. Therefore, thallium concentrations at SWMU 15 were compared to the following alternate benchmark to evaluate risks to these receptors:

- Canadian SQG – 1.4 mg/kg (EC, 1999g)

The SQG of 1.4 mg/kg is based on a study in which soybean, wheat, buckwheat, alfalfa, and rye grass root development and top development were observed. The maximum thallium concentration at SWMU 15 was less than this benchmark. Therefore, risks to plants and soil invertebrates are acceptable, and thallium was not retained as a COPC.

Vanadium

Vanadium was initially selected as a COPC because the maximum concentration of 57.4 mg/kg at location 15SB036 exceeded the lowest Eco-SSL of 7.8 mg/kg. Because the Eco-SSL is based on risks to birds and not risks to plants and invertebrates, the following alternate benchmark was used to evaluate risks to these receptors:

- Canadian SQG – 130 mg/kg (EC, 1999h)

The Canadian SQG corresponds to the third of 10 data points, which is the 25$^{th}$ percentile based on seedling emergence by lettuce. The maximum vanadium concentration at SWMU 15 is less than the SQG, so risks to plants and invertebrates are acceptable, and vanadium was not retained as a COPC.

Zinc

Zinc was initially selected as a COPC because the maximum soil concentration of 626 mg/kg at location 15SB002 exceeded the Region 5 ESL of 6.62 mg/kg. However, although 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 – 200 mg/kg (EC, 1999i)

The Canadian SQG of 200 mg/kg is the lowest observed effects concentration (LOEC) of the plants and invertebrate data set and is based on an effect on seedling emergence for radish (EC, 1999i). 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, 1999i). As presented in Appendix VI of the Canadian SQG document (EC, 1999i), 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.

The only two detections of zinc that were greater than the SQG were 626 mg/kg and 214 mg/kg at locations 15SB002 and 15SB007, respectively. These samples are both located in a maintained grass area along the base of the railroad tracks (see photograph in Appendix A) that is bounded to the east by a gravel lot (see Figure 8-5). Therefore, the area potentially impacted by zinc is small, and the habitat is not significant. For these reasons, potential risks to plants and soil invertebrates at SWMU 15 from zinc are considered acceptable. Therefore, zinc is not retained as a COPC for plants or soil invertebrates.

Because zinc is a bioaccumulative chemical, risks to wildlife from zinc were evaluated as described in Section 8.4.2.

Summary of Surface Soil Risk

During the Step 3a evaluation at SWMU 15, the following evaluations were conducted:

- Comparisons of chemical concentrations in the site samples to alternate toxicity information (for soil invertebrates and plants) and a discussion of the toxicity data.
- Comparisons of chemical concentrations in the site samples to background concentrations.
- Discussion of the spatial extent of samples with concentrations that were greater than the alternate benchmarks.
- Review of site photographs to determine the habitat at certain locations.

Based on these evaluations, it was determined that potential risks to plants and invertebrates from chemicals in the soil at SWMU 15 were acceptable, so no chemicals were retained as COPCs in surface soil for plants or invertebrates. Risks to wildlife from the bioaccumulative chemicals in the soil were evaluated as described in Section 8.4.2 of this ERA.

#### 8.4.1.2 Benthic Invertebrates – Sediment Risk

After a preliminary review of the sediment analytical data, it was determined that elevated levels of PAHs were found in the tributaries leading away from SWMU 15. Because of that, the Navy decided to conduct sediment toxicity tests so that the results of the toxicity testing could be included in the ERA.

Ten-day toxicity testing using the amphipod *Hyalella azteca* as outlined in Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates [American Society for Testing and Materials (ASTM), 2004] and Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates, Second Edition (U.S. EPA, 2000b) were used to assess mortality and growth of sediment invertebrates. This test was selected because U.S. EPA recognizes it as a standard test for determining acute toxicity to benthic invertebrates.

*Hyalella azteca* was an appropriate test species for this study because it can tolerate a wide range of grain sizes from fine silts to sand and is sensitive to various contaminants (ASTM, 2004, U.S. EPA, 2000b). The length of the test was 10 days to determine if there are any acute toxic effects on benthic organisms. The endpoints of the test were mortality as measured by survival of the invertebrates and growth as measured by the mean dry weight of surviving organisms.

Seven sediment samples (15SD0200006 through 15SD0260006) were collected near or in close proximity to the existing sediment samples collected as part of the RFI for SWMU 15 (see Figure 2-2). Each sample was collected from 0 to 6 inches, homogenized in the field, split, and sent to different laboratories. One portion of each sample was sent to Laucks Testing labs for quick-turn (10 days) analysis of PAHs and held at that laboratory for analysis of metals, TOC, and grain size. The other portion was sent to EnviroSystems, Inc. and held for toxicity testing. The quick-turn analysis was conducted to ensure that the samples selected for toxicity testing had the desired concentration ranges of total PAHs (i.e., a concentration gradient from low to high total PAHs). The following table presents the results of the quick-turn analysis (before data validation):

| Sample Number | Total PAH Concentration (mg/kg) |
|---|---|
| 15SD0200006* | 9.0* |
| 15SD0210006 | 7.8 |
| 15SD0220006* | 16.3* |
| 15SD0230006* | 15.6* |
| 15SD0240006* | 65.8* |
| 15SD0250006 | 9.6 |
| 15SD0260006* | 5.1* |

EnviroSystems, Inc. was instructed Amphipod toxicity test samples to conduct amphipod toxicity tests on the samples indicated (with an asterisk in the above table). Laucks Testing Labs was instructed conduct the metals, pH, TOC, and grain size analysis the same samples. In accordance with the 10-day sediment toxicity test (ASTM 2004), EnviroSystems, Inc. analyzed the overlying water for alkalinity, ammonia, conductivity, DO, hardness, pH, and temperature. These physical characteristics in sediment can influence the toxicity of chemicals by binding the chemicals and hence making them less bioavailable, or conversely by causing the chemicals to be present in forms that are more bioavailable.

In summary, amphipod toxicity tests were conducted on four site-related samples, one reference sample, and one laboratory control sample. 15SD0260006 was considered the reference sample because it was

collected upgradient of the site; this location also had the lowest concentration of total PAHs in the sediment samples.

Table 8-6 summarizes the results of the toxicity tests (see Appendix J.4 for the entire laboratory report). Table 8-6 also indicates the historical sediment locations where the samples for the toxicity tests were collected. Figure 2-2 shows the locations where sediment samples were collected, including the ones collected for the toxicity tests. The analytical results for the toxicity test samples are presented on Table 8-7, along with the Region 5 sediment ESLs. Note that chemical concentrations for PAHs changed slightly after data validation.

Amphipod survival in the laboratory control sample and reference sample were 88.8 and 93.8 percent, respectively (see Table 8-6). Amphipod survival in the site samples ranged from 86.3 percent to 98.8 percent, equal to or greater than amphipod survival in the laboratory control and the reference samples.

Mean growth weight of the amphipods in the laboratory control sample and reference sample were 0.199 mg/amphipod and 0.215 mg/amphipod, respectively. Mean growth weight in the site samples ranged from 0.178 mg/amphipod to 0.230 mg/amphipod, not significantly less than mean growth weight in the laboratory control sample. Two sediment samples had lower amphipod growth than the reference sample. Interestingly, the greatest growth weight was found in the sample with the greatest concentration of PAHs (15SD0240006), so it does not appear that PAHs are impacting amphipod growth. Also, as can be see from Table 8-7, no metals in sample 15SD0240006 (or any of the other toxicity test samples) were detected at concentrations greater than their respective ESLs. Therefore, because amphipod survival and growth in the site samples were not significantly different from amphipod survival and growth in the laboratory control sample, it is concluded that amphipods are not being impacted by chemicals in the sediment at SWMU 15 and none of the samples are considered "severely toxic."

The maximum detected concentrations in the toxicity test samples are considered NOECs because none of the sediment samples were considered to be severely toxic. As seen in Table 8-7, two of the PAH ESLs are greater than the NOECs, and most of the metal ESLs are greater than the NOECs. Because the primary COCs at the site were PAHs, and because the concentrations of metals were relatively low, the sediment samples selected for the toxicity tests focused on obtaining a concentration gradient for PAHs. For that reason, it is not surprising that many of the ESLs are greater than the NOECs.

Table 8-8 presents the maximum detected concentrations in the upgradient and downgradient sediment samples, along with Region 5 ESLs and NOECs. The downgradient data set does not include samples 15SD0180006 and 15SD0190006, which are located in the drainage ditches to the south of the SWMU (see Figure 2-2). Data from these two samples are discussed below.

The maximum detections of several PAHs, pesticides, PCBs, and metals were greater than the Region 5 ESL, the NOEC, and/or the maximum upgradient concentration. The samples used for the toxicity tests were located across the tributaries to obtain a concentration gradient for PAHs and to obtain good spatial representation across the site. As discussed above, the sample locations for the toxicity tests were selected based on previous analytical results for sediment samples at SWMU 15. Therefore, although the chemical concentrations for some parameters were slightly lower in the samples collected for toxicity tests compared to a few of the historical samples, the locations of the toxicity test samples are representative of areas of high, moderate, and low chemical concentrations. Because none of the sediment samples in this area were considered to be severely toxic, risks to sediment invertebrates from chemicals in sediment at SWMU 15 are acceptable.

Lead was detected at two sample locations at concentrations that exceeded its sediment screening level (35.8 mg/kg). At 15SD006, the lead concentration (39.7 mg/kg) was just slightly greater than the screening level so potential impacts to sediment invertebrates are not likely. At 15SD009, the lead concentration (133 mg/kg) was almost four times greater than the screening level. However, 15SD009 was located in a drainage channel that does not support aquatic receptors (see photograph A-2G in Appendix A). Therefore, impacts to sediment invertebrates from lead are not expected.

15SD0180006 and 15SD0190006 were the only sediment samples that were not collected within the tributaries where the sediment samples for the toxicity tests were collected, which were collected in the southern part of SWMU 15. Table 8-9 presents the chemical concentrations from these two samples, along with the Region 5 ESLs, the NOECs, and the maximum upgradient concentrations. A few parameters were detected in samples 15SD0180006 and/or 15SD0190006 at concentrations greater than their respective Region 5 ESLs, the NOECs, and/or maximum upgradient concentrations. As can be seen from Table 8-9, several parameters were detected in the upgradient samples at concentrations that exceeded the Region 5 ESL and/or the NOEC. The concentrations of metals are similar to upgradient concentrations, with the exception of vanadium, which does not have an SV but is typically not considered a very toxic chemical. Therefore, the metals do not appear to be site-related or causing a risks to sediment invertebrates. Three pesticides and one PAH have concentrations greater than Region 5 ESLs at 15SD0180006, but concentrations are much lower in 15SD0190006, which is the next

downstream sample (see Table 8-9). Therefore, any potential risks to sediment invertebrates from PAHs and pesticides will be limited to a small area. Based on the photographs in Appendix A, 15SD0190006 was collected just downstream of a culvert in a grassy drainage ditch, and 15SD0180006 was collected in a small shallow drainage channel. Neither of these two areas contain significant aquatic habitat, and they are likely dry for much of the year. For this reason, in conjunction with the reasons discussed above, risks to sediment invertebrates from chemicals in this southern drainage ditch are acceptable.

#### 8.4.1.3 Aquatic Organisms – Surface Water Risk

Table 8-10 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.

WQSs for surface water have been developed for Indiana (IDEM, 1998). In addition, U.S. EPA has established (AWQCs) for several contaminants (U.S. EPA, 2002e). The AWQCs were used first for further evaluating chemicals initially selected as COPCs, where appropriate, because the AWQCs have been updated more recently than the WQSs. In the absence of AWQCs, the IDEM WQSs were used. Other, non-regulatory surface water SVs were also used to evaluate the data, where necessary. The following sections discuss these values, as appropriate.

PAHs

Benzo(a)anthracene was initially selected as a COPC in surface water because the maximum concentration of 1.84 µg/L located at 15SW/SD010 exceeded the IDEM WQC of 0.025 µg/L (IDEM, 1998). The average concentration (0.271 µg/L) also exceeded the screening level. Therefore, risks to aquatic organisms are possible, and benzo(a)anthracene was retained for further evaluation.

Benzo(a)pyrene was initially selected as a COPC in surface water because the maximum concentration of 2.38 µg/L located at 15SW/SD010 exceeded the Region 5 ESL of 0.014 µg/L, which is based on the ORNL aquatic benchmark (Suter and Tsao, 1996). The average concentration (0.353 µg/L) also exceeded the screening level. Therefore, risks to aquatic organisms are possible, and benzo(a)pyrene was retained for further evaluation.

Benzo(k)fluoranthene, chrysene, and dibenzo(a,h)anthracene were initially selected as COPCs in surface water because screening levels were not available. There are also no alternate benchmarks available for these analytes, so the following benchmark for benzo(a)pyrene was used:

- Region 5 ESL – 0.014 µg/L

The maximum and average concentrations of benzo(k)fluoranthene (1.72 µg/L and 0.25 µg/L, respectively), chrysene (4.46 µg/L and 0.632 µg/L, respectively), and dibenzo(a,h)anthracene (0.46 µg/L and 0.0756 µg/L, respectively) exceeded the ESL. For benzo(k)fluoranthene and chrysene, risks to aquatic organisms are possible and they were retained for further evaluation. Dibenzo(a,h)anthracene was detected in 2 of 14 surface water samples. Both of the detections are located in concrete-lined storm sewers (see photos in Appendix A) that do not provide habitat for aquatic organisms. Therefore, risks to aquatic organisms are acceptable, and dibenzo(a,h)anthracene was not retained as a COPC.

Fluoranthene was initially selected as a COPC in surface water because the maximum concentration of 11.9 µg/L located at 15SW/SD010 exceeded the IDEM WQC of 3.6 µg/L. This analyte was detected in 2 of 14 surface water samples. Both of the detections are located in concrete-lined storm sewers (see photos in Appendix A) that do not provide habitat for aquatic organisms. Therefore, risks to aquatic organisms are acceptable, and fluoranthene was not retained as a COPC.

Phenanthrene was initially selected as a COPC because the maximum sample concentration of 4.73 µg/L located at 15SW/SD010 exceeded the IDEM WQC of 0.93 µg/L. Only the maximum concentration exceeded the screening level. This location is a concrete-lined storm sewer adjacent to a parking lot (see photo in Appendix A) that discharges to a storm sewer outfall where 15SW/SD006 is located. At this location, phenanthrene was detected at a concentration much less than the screening level. Therefore, because of lack of habitat at 15SW/SD010 and because phenanthrene was detected at a concentration less than the screening level in the next downstream sample, risks to aquatic organisms are acceptable and phenanthrene was not retained as a COPC.

Pyrene was initially selected as a COPC because the maximum sample concentration of 8.61 µg/L located at 15SW/SD010 exceeded the Region 5 ESL of 0.3 µg/L. The maximum concentration and the average concentration (1.27 µg/L) exceeded the Region 5 ESL. The locations of screening level exceedances are in the storm sewers and in the tributaries further downstream. Therefore, risks to aquatic organisms are possible, and pyrene was retained for further evaluation.

Because benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene are bioaccumulative chemicals, risks to wildlife from these analytes were evaluated as described in Section 8.4.2.

bis(2-Ethylhexyl) phthalate

bis(2-Ethylhexyl) phthalate was initially selected as a COPC in surface water because the maximum concentration of 1.01 µg/L located at 15SW/SD010 exceeded the Region 5 ESL of 0.3 µg/L. This analyte was only detected in 1 of 14 samples collected. The location with the detection is a concrete-lined storm sewer adjacent to a parking lot (see photograph in Appendix A) that discharges to a storm sewer outfall where 15SW/SD006 is located. bis(2-Ethylhexyl) phthalate was not detected at 15SW/SD006. Therefore, because of lack of habitat at 15SW/SD010 and because bis(2-ethylhexyl) phthalate was not detected in the next downstream sample, risks to aquatic organisms are acceptable and bis(2-ethylhexyl) phthalate was not retained as a COPC.

Aluminum

Aluminum was initially selected as a COPC in unfiltered and filtered metal samples because the maximum concentrations (3,020 µg/L and 2,090 µg/L, respectively) exceeded the screening level of 87 µg/L, which is the chronic U.S. EPA AWQC (U.S. EPA, 2002e). The upgradient aluminum concentrations are 421 µg/L in the unfiltered sample and 48.8 µg/L in the filtered sample.

An emphasis is placed on the filtered samples instead of the unfiltered samples because the filtered samples represent the bioavailable portion of the inorganics (U.S. EPA, 1992b); therefore, filtered surface water results are most indicative of the level of direct risk to aquatic receptors. Aluminum concentrations were greater than the screening level in 2 of the 14 filtered metals samples. The maximum dissolved aluminum concentration was located at 15SW/SD002, but aluminum was not detected in the unfiltered sample from the same location (see Table 3-16). The same pattern was observed for most metals, especially iron and manganese (see Table 3-16), so it appears that the analytical results in the filtered sample represent the results in an unfiltered sample, and vice-versa. The reason this occurred is not known. However, based on the overall results in this sample, risks to aquatic organisms from aluminum are not likely. The other detection that was greater than the screening level was a detection of 187 µg/L at 15SW/SD017. The water was cloudy when the sample was collected (see photograph in Appendix A), which may have contributed to the aluminum concentration in this sample even though it was filtered. However, because samples at the closest upstream (15SW/SD005 and 15SW/SD006) and downstream (15SD/SD016) locations had aluminum concentrations ranging from non-detect (in the two upstream samples) to 21.9 µg/L (in the downstream sample), the sample with the exceedance of the screening level is bounded. Also, the average aluminum concentration in these four samples was 54 µg/L, which is less than the screening level. For these reasons, aluminum is not retained as a COPC.

Iron

Iron was initially selected as a COPC in unfiltered and filtered metals samples because the maximum concentrations (3,330 µg/L and 2,860 µg/L, respectively) at locations 15SW/SD018 and 15SW/SD002, respectively, exceeded the chronic WQC of 1,000 µg/L (U.S. EPA, 2002e). The upgradient iron concentration was 411 µg/L (in the unfiltered sample); iron was not detected in the filtered sample.

As mentioned previously, an emphasis is placed on filtered as opposed to unfiltered samples because filtered samples represent the bioavailable portion of inorganics (U.S. EPA, 1992b).

Dissolved iron was only detected in one sample (15SW/SD002) at a concentration greater than the chronic WQC. As discussed above for aluminum, it appears that the analytical results in the filtered sample represent the results in an unfiltered sample and vice-versa. Therefore, based on the overall results in this sample, risks to aquatic organisms from iron are not likely. For that reason, iron is not retained as a COPC.

Manganese

Manganese was initially selected as a COPC in unfiltered and filtered surface water samples because the maximum concentrations (1,230 µg/L in both the filtered and unfiltered samples) at location 15SW/SD006, exceeded the screening level of 564 µg/L (IDEM, 1998). The upgradient manganese concentrations were 69 µg/L in the unfiltered sample and 41.2 µg/L in the filtered sample.

Manganese was detected at much lower concentrations at 15SW/SD010 (31 µg/L), which is located in the catch basin upstream of 15SW/SD006, and at 15SW/SD017 (398 µg/L), which is the next downstream sample (see Figure 8-5 for sample locations). Therefore, the extent of manganese concentrations greater than the WQC is limited to the area around 15SW/SD006. Also, the U.S. EPA 1986 Quality Criteria for Water (the Gold Book) indicates that ions of manganese are found rarely at concentrations greater than 1 mg/L and, because the tolerance values reported range from 1.5 mg/L to over 1,000 mg/L, manganese is not considered to be a problem in fresh waters (U.S. EPA, 1986). The maximum detected manganese concentration is less than this range. For these reasons, risks to aquatic organisms from manganese are not likely so manganese is not retained as a COPC.

Summary of Surface Water Risk

In summary, the list of chemicals initially selected as surface water COPCs was 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, 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. Benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, and pyrene were retained as COPCs for further evaluation. Many of the surface water samples were turbid indicating that sediment was entrained in the surface water. The sediment is likely to be a source of the PAHs because many of the PAHs are not very water soluble and tend to bind to sediment. Another potential source of PAHs in the water is runoff from the paved areas because much of the area had been recently paved. As discussed in Section 5.3, and as can be seen from comparing the data in Tables 3-14 through 3-16, the greatest concentrations of PAHs were found in the surface water samples collected in the storm sewer and outfall samples (see Table 3-14), especially in samples from 15SD/SW010 and 15SD/SW011. These locations were storm sewer sampling locations immediately downgradient of the paved areas (see Figure 8-5). Therefore, this supports the assertion that runoff from the paved areas as another likely source of PAHs in the surface water. Also, pyrene was the only PAH detected in surface water samples from 15SD/SW005 and 15SD/SW009, which were located immediately downgradient of the former Asphalt Batch Plant. It was detected at very low concentrations (0.05 and 0.06 µg/L) that were less than the ecological risk criteria. In summary, although there may be risks to aquatic organisms from PAHs in the surface water, because the PAHs in the surface water do not appear to be related to site activities, PAHs in surface water are eliminated as COPCs for further evaluation.

### 8.4.2 Mammals and Birds - Food-Chain Modeling Risk

The above-mentioned alternate benchmark values are not designed to evaluate risks to terrestrial wildlife via the ingestion of the soil, sediment, 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, 8-3, 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 USEPA (2000b)] and that also exceeded the Region 5 ESLs, 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. Tables 8-2 (surface soil), 8-3 (sediment), and 8-4 (surface water) list the chemicals 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 total chronic daily intakes (CDIs) (see below) and comparing CDIs 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: $NOAEL_w$ = NOAEL for the surrogate wildlife species
$NOAEL_t$ = NOAEL 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 and Arenal, 1999), 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 shows the exposure factors for mammals, as used for body weight scaling. Tables J.5-2 (maximum mammal TRVs with body weight scaling), J.5-3 (average mammal TRVs with body weight scaling), and J.5-4 (bird TRVs) present the TRVs as they were used in the food-chain modeling. Table J.5-5 shows the sources from which the TRVs were derived. 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 intakes for wildlife exposed to the COPCs in surface soil, sediment, and surface water were estimated as daily doses (mg/kg-day) using exposure equations. The contaminant concentrations in surface soil, sediment, and surface water were used to calculate CDI doses. The following equations presents the CDI equations used in calculating a total daily dose for the surrogate species selected for modeling:

$$\text{Dose, surface soil/sediment (mg/kg - day)} = \frac{(SC * SI)}{BW}$$

$$\text{Dose, surface water (mg/kg - day)} = \frac{(SW * WI)}{BW}$$

$$\text{Dose, food (mg/kg - day)} = \frac{(FC * FI)}{BW}$$

$$\text{Total CDI (mg/kg - day)} = [\text{Dose (surface soil/sediment)} + \text{Dose (surface water)} + \text{Dose (food)}] * H$$

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/sediment ingestion rate (kg/day) |
| | SC | = soil/sediment concentration (mg/kg) |
| | H | = home range/contaminated area (assume to be 1 for maximum exposure) |

For organic constituents in surface soil and inorganics in surface soil and sediment, the contaminant concentration of prey items for insectivorous, herbivorous, and piscivorous species (e.g., earthworms, vegetation, and fish) 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/sediment (mg/kg)
BAF = soil to plant or soil/sediment to invertebrate BAF (unitless)

For organic constituents in sediment, the contaminant concentration of fish for piscivorous species is calculated using the following equation:

$$FC = \frac{SC * BAF * \%Lipids}{\%TOC}$$

Where: FC = contaminant concentration in food (e.g., fish, kg/day)
SC = contaminant concentration in sediment (mg/kg)
BAF = sediment-to-fish BAF (unitless)
%Lipids = percent lipids in fish (see Appendix J.6)
%TOC = average percent TOC in sediment (from Table 8.3)

Contaminant concentrations in food items were calculated using BAFs from the following published sources:

- 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, 1998a).
- Soil Invertebrate BAFs: Development and Validation of Bioaccumulation Models for Earthworms (Sample et al., 1998).
- Fish Biota Sediment Accumulation Factors (BSAFs) (organics): The Incidence and Severity of Sediment Contamination in Surface Waters of the United States, Volume 1:National Sediment Quality Survey (USEPA, 1997d).
- Sediment Invertebrate BSAFs (Inorganics): Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation (ORNL, 1998b).

Tables J.2-1, J.2-2, and J.2-3 in Appendix J.2 present chemical-specific BAFs, BSAFs, and other BAF data from the literature that was 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. Because sediment-to-fish BSAFs were not available for inorganic chemicals, sediment-to-invertebrate BSAFs from ORNL (1998b) were used to estimate tissue concentrations of inorganics in food items for the mink and belted kingfisher.

The lower bound of the threshold effects is based on consistently conservative assumptions and NOAEL toxicity values (U.S. EPA, 1997d). 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, 1997d). 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 Indiana or surrounding states 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 (1993c) 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 (1993c) were converted to dry weight values for the food-chain model calculations. Table 8-11 presents the exposure parameters that were used in the SERA and Appendix J.3 presents the values used to calculate the exposure parameters and how they were calculated. Table J.3-1 in Appendix J.3 shows the exposure parameters used for the food-chain modeling.

An EEQ approach was used to characterize risk to terrestrial receptors. This approach characterizes the potential effects by comparing exposure concentration with 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:

$$EEQ = \frac{\text{Total CDI}}{\text{TRV}}$$

| | | |
|---|---|---|
| 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.7 presents the calculations of the food-chain modeling. Separate discussions are provided below for evaluations of potential risk to herbivorous and insectivorous receptors. Tables 8-12 and 8-13 present the EEQs under both the conservative and average exposure scenarios, respectively, for herbivorous and insectivorous receptors. Tables 8-14 and 8-15 present the EEQs under both the conservative and average exposure scenarios, respectively, for piscivorous receptors. Table 8-16 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 8-12). However, under the average food-chain scenario, all NOAEL-based EEQs were less than 1.0 (Table 8-13); therefore, risks to herbivorous receptors at SWMU 15 are acceptable.

Insectivorous Receptors

Under the conservative food-chain scenario, COPCs with EEQs greater than 1.0 for representative insectivorous receptors included Aroclor-1260, arsenic, and cadmium for the shrew and arsenic, cadmium, chromium, lead, mercury, and zinc for the woodcock (Table 8-12). Under the average food-chain scenario, no NOAEL-based EEQs exceeded 1.0 for the shrew (Table 8-13); therefore, risks to insectivorous small mammals are acceptable. However, NOAEL-based EEQs for chromium, mercury, and zinc exceeded 1.0 for the woodcock under the average food-chain scenario (Table 8-13).

The bird NOAEL and LOAEL for chromium were developed from a study using the Black Duck as the test species. Survival of young black ducks was depressed when administered 10 or 50 ppm (mg/kg) dietary trivalent chromium for 10 weeks (Haseltine et al., 1985). These doses were multiplied by a factor of 0.1 to obtain the chronic NOAEL and LOAEL.

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 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 of zinc, but egg hatchability was less than 20 percent of controls among hens consuming 2,028 mg/kg of 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).

The average background concentration in surface soil for mercury (0.037 mg/kg) (see Table 3-2) is the same as the average concentration of mercury in the SWMU 15 surface soil samples. Therefore, risks from mercury are similar to background risks, and mercury was not retained as a COPC.

The NOAEL EEQs are slightly greater than 1.0 (and similar to the EEQs from the site data) using the maximum background concentrations for chromium and zinc in the food-chain model calculation. Therefore, site risks to insectivorous birds are only slightly greater than background risks. Based on the relatively small range of chromium detections across the 27 site samples (9 mg/kg to 49.7 mg/kg) spatially spread across the site, it does not appear that chromium in surface soil is site related, even though concentrations in several samples were slightly greater than background concentrations. Furthermore, the greatest three zinc concentrations (111 mg/kg, 214 mg/kg, and 626 mg/kg) were found in samples from 15SS002, 15SS006, and 15SS007. These sample locations are within 100 feet of each other in a grassy area between the railroad tracks and a gravel lot (see Figure 8-5 and photograph in Appendix A), so insectivorous birds are unlikely to obtain a significant amount of food from this area. All other detections of zinc in surface soil are less than or very similar to the maximum zinc concentration in the background samples (60.2 mg/kg). Because the EEQs based on the NOAEL for chromium and zinc were low (1.2 and 2.2, respectively), because chromium does not appear to be site related, and because only a few zinc detections in a small area are elevated compared to background concentrations, risks to insectivorous birds from chromium and zinc are acceptable, and neither metal is retained as a COPC for further evaluation.

Piscivorous Receptors

Because there are only intermittent pools of surface water in the drainage ditches and tributaries in SWMU 15, fish and are not very prevalent. Therefore, piscivorous wildlife will not obtain a significant portion of their food from these water bodies and a conservative site use factor (SUF) of 10 percent was

used to evaluate the risks to piscivorous wildlife. The SUF of 10 percent is considered to be conservative because it is not likely that piscivorous wildlife will obtain even 10 percent of their food from this area.

Under the conservative food-chain model scenario, COPCs with EEQs greater than 1.0 for representative piscivorous receptors included eight PAHs, Aroclor-1254, Aroclor-1260, and arsenic for the mink and 4,4'-DDE, 4,4'-DDT, lead, and zinc for the kingfisher (Table 8-14). Under the less conservative food-chain scenario model, NOAEL-based EEQs exceeded 1.0 for three PAHs, Aroclor-1254, Aroclor-1260, and arsenic for the mink and 4,4'-DDE for the kingfisher (Table 8-15). No EEQs based on the LOAEL were greater than 1.0 under the less conservative food-chain scenario model.

As discussed above, body weight scaling was used to convert TRVs for the test species to TRVs for the surrogate wildlife species. The body weight scaling is very conservative when the surrogate species is a larger mammal, at least for PCBs. The TRV for PCBs that was used for the food-chain model (for all mammals) was based on a NOAEL of 0.068 mg/kg-day for a study using old-field mice (Sample et al., 1996). The NOAEL of 0.068 mg/kg-day was then converted to a TRV for the mink using body-weight scaling. This yielded a TRV of 0.00055 mg/kg-day for the mink. Sample et al. (1996) also reported a NOAEL of 0.137 mg/kg-day for PCBs based on a mink study, which is several orders of magnitude greater than the TRV estimated from the mice study. Using the NOAEL of 0.137 mg/kg-day in the food-chain model, all EEQs for the mink model are less than 1.0, so risks to mink from Aroclor-1254 and Aroclor-1260 are acceptable.

A NOAEL for the mink has not been developed for arsenic, but it is likely that body weight scaling is conservative for arsenic as well. Therefore, because the NOAEL EEQ for arsenic in the less conservative food-chain model is slightly greater than 1.0 with an EEQ of 1.5, actual risks to mink from arsenic are not likely considering that the TRV is probably very conservative. Also, the average arsenic concentration in the downgradient samples, 8.8 mg/kg, is less than the average arsenic concentration in the two upgradient samples (14.4 mg/kg). For these reasons, arsenic is not retained as a COPC in sediment for risks to wildlife.

The EEQs for PAHs based on NOAELs in the less conservative food-chain model were relatively low and ranged from 1.1 to 3.3. As discussed above, the TRVs for PAHs are likely to be conservative for the mink because they are based on mice or rats. Also, PAH levels in fish are generally low because they rapidly metabolize PAHs, and high molecular weight PAHs do not readily accumulate in fish (Eisler, 1987). Therefore, the estimated fish tissue levels may be lower than predicted. Also, PAH concentrations

decrease further downstream in areas where fish may be more prevalent. For these reasons, risks to mink from PAHs are acceptable, and they were not retained as COPCs.

For the kingfisher, the NOAEL EEQ for 4,4'-DDE in the less conservative food-chain model is slightly greater than 1.0 with an EEQ of 1.4. The average concentration of 4,4'-DDE used in the less conservative food-chain model was 0.013 mg/kg, which is not indicative of a release from the SWMU. Therefore, because the EEQ is only slightly greater than 1.0 based on the NOAEL, which is a no effects level, because the SUF of 10 percent is likely conservative, and because the 4,4'-DDE level in the sediment is not indicative of a release from the SWMU, risks to the kingfisher are from 4,4'-DDE are acceptable and 4,4'-DDE was not retained as a COPC.

## 8.5 ECOLOGICAL RISK UNCERTAINTY ANALYSIS

This section discusses some of the uncertainties associated with the SWMU 15 SERA.

### 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 to be 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 factors such as ingestion rates, toxicity, food preferences, and home ranges between different species.

Risks to reptiles and amphibians are not quantitatively evaluated because exposure factors are not established for most species and because toxicity data are very limited. Using aquatic organisms as surrogate species, risks to amphibians exposed to surface water are possible. 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 15. 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 15 represent only a small portion of these receptors home range. For

this reason, significant risks are not expected from exposure to chemicals at SWMU 15; 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 the soil, it is expected that they would have greater levels of contaminants at SWMU 15 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. Because there are no risks for the woodcock, risks are not expected for birds that consume aboveground insects. The American bittern is a marshland-loving bird that feeds on fish, frogs, eels, insects, and water snakes. The tributaries at SWMU 15 are not preferred habitat for the bittern, so it is not likely that they will be present in this area. As mentioned in Section 8.2.1.1, the presence of the Indiana bat has not been documented at or surrounding SWMU 15.

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 15, this species may potentially inhabit areas of SWMU 15. Risks to carnivorous reptiles were not specifically calculated; however, risks are unlikely when using insectivorous birds and mammals as surrogates.

### 8.5.2 Exposure Characterization

The contaminant dose to terrestrial wildlife was calculated using an equation that incorporates ingestion rates, body weights, BAFs, and other exposure factors. These exposure factors were 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 (1993c), and an attempt was made to minimize the uncertainties associated with the exposure characterization by selecting exposure parameters from studies conducted in Indiana and surrounding states.

Bioaccumulation of contaminants into various biological media (e.g., plants, invertebrates, small mammals) depends on characteristics of the media such as pH, organic carbon content, 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 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. BAFs for estimating concentrations of 2,4,5-T in fish tissue were not available, so a BAF of 1.0 was used for the food-chain models for the mink and kingfisher. BAFs for estimating concentrations of selenium in sediment invertebrate tissue were not available, so a BAF of 1.0 was used for the food-chain models for the mink and kingfisher.

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 15, samples were deliberately biased toward areas of 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 15 is likely overestimated. In particular, wildlife that typically roam over multiple sample locations are unlikely to obtain all their food from within the most contaminated areas at SMWU 15. Also, because the contaminated areas occupy only a very small portion of the overall ecological habitat at SWMU 15, a discussion of the overall risks to ecological receptors was included in the ERA. A SUF of 10 percent was used to evaluate risks to piscivorous receptors because there are only intermittent drainage ways and tributaries on site as indicated earlier in this ERA.

Fifteen of the surface soil samples were collected under pavement, and six were collected under gravel. There is no habitat at these locations for plants, invertebrates, or terrestrial birds and mammals. Therefore, these samples were removed from the dataset, leaving 29 surface soil samples that were collected in vegetated areas (Table 8-1). There is uncertainty in removing these samples from the data set in the event that the pavement/gravel is removed in the future.

As seen in the photographs in Appendix A, surface water was present at the surface water/sediment sampling locations during the sampling event. However, the water at many locations was turbid indicating the photographs were likely taken after a rain event because sediment was still suspended in the water. Several PAHs had concentrations greater than the screening levels in surface water, so the

risk assessment indicated that there are potential risks to aquatic organisms from these chemicals. Most PAHs are not very water soluble, so it is likely that sediment entrained in the water is the primary source of the PAHs in the samples. Therefore, risks to aquatic organisms from PAHs in surface water may be overestimated. Also, many of the locations are intermittent and will not contain significant amounts of water between rain events, so aquatic organisms will be limited to small pools of water when other stretches of the tributaries are dry. Therefore, this needs to be taken into account when making risk management decisions at the site.

### 8.5.3 Ecological Effects Data

Toxicological data for a few of the chemicals are limited or do not exist. This was the case for several COPCs in 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 bases of the alternate benchmarks when they were used.

Sediment toxicity tests were conducted at SWMU 15 to evaluate potential risks to sediment invertebrates from elevated levels of chemicals (primarily PAHs) in the sediment and to reduce the uncertainties in the ERA regarding risks to sediment invertebrates. Although there are some uncertainties in utilizing toxicity tests in an ERA (e.g., is the species being tested representative of the species at the site, are there confounding factors causing toxicity), the uncertainties in using only literature values to evaluate risks is far greater than the uncertainties of the toxicity tests.

### 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.

An alternate benchmark was not available for di-n-butyl phthalate for risks to soil invertebrates. Therefore, dimethyl phthalate was used as a surrogate, and di-n-butyl phthalate was compared to the ORNL earthworm benchmark for dimethyl phthalate. There is uncertainty in the accuracy of comparing the maximum di-n-butyl phthalate concentration to the ORNL earthworm benchmark.

Alternate benchmarks were not available for some of the PAHs [benzo(k)fluoranthene and chrysene]. Therefore, benzo(a)pyrene was used as a surrogate, and the PAHs were compared to the ORNL benchmark for aquatic organisms for benzo(a)pyrene. There is uncertainty in the accuracy of comparing the maximum PAH concentrations to the ORNL aquatic benchmark.

In surface water sample 15SW00201, several of the dissolved metals were reported at concentrations one or two orders of magnitude higher than the total metals. The maximum dissolved aluminum and iron concentrations were detected in this sample at concentrations two orders of magnitude higher than the total metals. There is uncertainty in the accuracy of the dissolved concentrations are, with the possibility of a field or laboratory error in the sample. It is unlikely that the dissolved metals concentrations in this sample are representative of what is found at the site, and it was assumed in the ERA that the samples were somehow reversed or mislabeled.

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 15, Roads and Grounds Area. Several chemicals were retained as COPCs 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 8-5, 8-10, and 8-16 present summaries of the Step 3a evaluation including whether chemicals initially selected as COPCs are retained as COPCs after the refined evaluation.

**Soil Invertebrates and Terrestrial Vegetation - Surface Soil Risk**

No chemicals initially selected as COPCs in surface soil at SWMU 15 were retained as COPCs for further evaluation for risks to invertebrates or plants.

**Benthic Invertebrates - Sediment Risk**

No chemicals initially selected as COPCs in sediment at SWMU 15 were retained as COPCs for further evaluation for risks to benthic invertebrates.

As part of the review process, IDEM asked Mr. Dan Sparks from the U.S. FWS to review the site data and conduct a site visit to determine whether he agreed with the conclusions of the ERA and to provide recommendations regarding the need to further characterize the site and/or conduct a remedial action. The site visit occurred on October 3, 2006. The minutes/notes from the site visit, along with a follow-up letter dated October 10, 2006 from the U.S. FWS, are provided in Appendix J.8. In summary, the letter from U.S. FWS indicated that there are several factors involved with the stream area that argue against taking any kind of expansive remedial effort.

**Aquatic Organisms - Surface Water Risk**

Several analytes initially selected as COPCs at SWMU 15 were retained for further evaluation for aquatic organisms, including benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, and pyrene. Concentrations of these analytes were greater than alternate toxicity information for aquatic organisms and contamination was prevalent at several locations where surface water was present. However, note that many of the surface water samples were turbid indicating that sediment was entrained in the surface water. The sediment is likely to be a source of the PAHs because many of the PAHs are not very water soluble and tend to bind to sediment. Another potential source of PAHs in the water is runoff from the paved areas because much of the area had been recently paved. As discussed in Section 5.3, and as can be seen from comparing the data in Tables 3-14 through 3-16, the greatest concentrations of PAHs were found in the surface water samples collected in the storm sewer and outfall samples (see Table 3-14), especially in samples from 15SD/SW010 and 15SD/SW011. These locations were storm sewer sampling locations immediately downgradient of the paved areas (see Figure 8-5). Therefore, this supports the assertion that runoff from the paved areas as another likely source of PAHs in the surface water. Also, pyrene was the only PAH detected in surface water samples from 15SD/SW005 and 15SD/SW009, which were located immediately downgradient of the former Asphalt Batch Plant. It was detected at very low concentrations (0.05 µg/L and 0.06 µg/L) which were less than the ecological risk criteria. In summary, although there may be risks to aquatic organisms from PAHs in the surface water, because the PAHs in the surface water do not appear to be related to historical site activities, PAHs in surface water are eliminated as COPCs for further evaluation.

**Mammals and Birds Food-chain Modeling Risk**

Food-chain modeling was conducted for surface soil samples to determine risks to herbivorous and insectivorous receptors; and for sediment and surface water samples to determine risks to piscivorous receptors.

After a review of the refinement of food-chain modeling risks (average exposure scenario) to herbivorous/insectivorous receptors in SWMU 15 surface soil and piscivorous receptors in SWMU 15 sediment/surface water, all potential risks were determined to be acceptable.

TABLE 8-2

ECOLOGICAL COPC SELECTION - SURFACE SOIL SAMPLES
ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | Frequency of Detection | Minimum Concentration | Maximum Concentration | Mean Concentration[1] | Average of Positive Detections | Sample with Maximum Detected Concentration | Region 5 ESL | Ecological Effects Quotient | COPC for Plants/Soil Invertebrates | COPC for Food-Chain Modeling | Rationale for COPC Selection |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-BUTANONE | 2/26 | 3 J | 3 J | 0.713 | 3.00 | 15SS0360002, 15SS0370002 | 89600 | 0.00003 | NO | NO | BSL |
| METHYLENE CHLORIDE | 24/26 | 1 J | 97 J | 18.4 | 19.8 | 15SS0300002 | 4050 | 0.02 | NO | NO | BSL |
| TRICHLOROFLUOROMETHANE | 12/26 | 1 J | 5 | 1.36 | 2.33 | 15SS0620002 | 16400 | 0.0003 | NO | NO | BSL |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 10/27 | 5 J | 590 J | 36.2 | 92.6 | 15SS0070002 | 3240 | 0.18 | NO | NO | BSL |
| ACENAPHTHENE | 3/27 | 6 J | 21 | 4.24 | 12.0 | 15SS0380002 | 682000 | 0.00003 | NO | NO | BSL |
| ACENAPHTHYLENE | 7/27 | 4 J | 87 | 9.35 | 27.9 | 15SS0490002 | 682000 | 0.0001 | NO | NO | BSL |
| ACETOPHENONE | 1/27 | 150 J | 150 J | 51.4 | 150 | 15SS0460002 | 300000 | 0.0005 | NO | NO | BSL |
| ANTHRACENE | 10/27 | 5 J | 120 | 15.9 | 39.0 | 15SS0490002 | 1480000 | 0.00008 | NO | NO | BSL |
| BENZO(A)ANTHRACENE | 16/27 | 5 J | 850 | 84.0 | 140 | 15SS0490002 | 5210 | 0.16 | NO | NO | BSL |
| BENZO(A)PYRENE | 12/27 | 7 J | 1100 J | 90.7 | 200 | 15SS0020002 | 1520 | 0.72 | NO | NO | BSL |
| BENZO(B)FLUORANTHENE | 12/27 | 5 J | 2100 J | 140 | 310 | 15SS0020002 | 59800 | 0.04 | NO | NO | BSL |
| BENZO(G,H,I)PERYLENE | 11/27 | 16 J | 850 J | 82.4 | 197 | 15SS0020002 | 119000 | 0.007 | NO | NO | BSL |
| BENZO(K)FLUORANTHENE | 11/27 | 6 J | 2200 J | 125 | 301 | 15SS0020002 | 148000 | 0.01 | NO | NO | BSL |
| BIS(2-ETHYLHEXYL) PHTHALATE | 10/27 | 79 J | 760 | 98.2 | 194 | 15SS0300002 | 925 | 0.82 | NO | NO | BSL |
| CHRYSENE | 17/27 | 6 J | 1100 | 105 | 165 | 15SS0490002 | 4730 | 0.23 | NO | NO | BSL |
| DI-N-BUTYL PHTHALATE | 3/27 | 100 J | 240 J | 54.4 | 157 | 15SS0480002 | 150 | 1.6 | YES | NO | ASL/NONBIO |
| DI-N-OCTYL PHTHALATE | 1/27 | 920 J | 920 J | 74.2 | 920 | 15SS0300002 | 709000 | 0.001 | NO | NO | BSL |
| DIBENZO(A,H)ANTHRACENE | 4/27 | 18 | 250 J | 23.5 | 141 | 15SS0020002 | 18400 | 0.01 | NO | NO | BSL |
| DIBENZOFURAN | 1/27 | 95 J | 95 J | 43.6 | 95.0 | 15SS0070002 | NA | NA | YES | NO | NC/NONBIO |
| FLUORANTHENE | 20/27 | 5 J | 940 | 93.0 | 125 | 15SS0490002 | 122000 | 0.008 | NO | NO | BSL |
| FLUORENE | 2/27 | 6 J | 10 J | 3.58 | 8.00 | 15SS0020002 | 122000 | 0.00008 | NO | NO | BSL |
| INDENO(1,2,3-CD)PYRENE | 9/27 | 11 J | 770 J | 70.1 | 204 | 15SS0020002 | 109000 | 0.007 | NO | NO | BSL |
| N-NITROSODIPHENYLAMINE | 1/27 | 1500 | 1500 | 95.7 | 1500 | 15SS0380002 | 545 | 2.75 | YES | NO | ASL/NONBIO |
| NAPHTHALENE | 8/27 | 7 J | 280 J | 19.7 | 59.5 | 15SS0070002 | 99.4 | 2.82 | YES | NO | ASL/NONBIO |
| PHENANTHRENE | 19/27 | 5 J | 520 | 53.5 | 75.2 | 15SS0060002 | 45700 | 0.01 | NO | NO | BSL |
| PYRENE | 20/27 | 6 J | 1600 | 133 | 179 | 15SS0490002 | 78500 | 0.02 | NO | NO | BSL |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | | |
| 4,4'-DDD | 2/21 | 2.7 J | 3.3 J | 1.03 | 3.00 | 15SS0480002 | 758 | 0.004 | NO | NO | BSL |
| 4,4'-DDE | 1/21 | 12 | 12 | 1.35 | 12.0 | 15SS0490002 | 596 | 0.02 | NO | NO | BSL |
| 4,4'-DDT | 1/21 | 14 | 14 | 1.45 | 14.0 | 15SS0490002 | 170 | 0 | NO | NO | BSL |
| ALPHA-CHLORDANE | 1/21 | 3.7 | 3.7 | 0.555 | 3.70 | 15SS0290002 | 224 | 0.02 | NO | NO | BSL |
| AROCLOR-1260 | 2/20 | 20 | 32 | 7.54 | 26.0 | 15SS0360002 | 0.332 | 96.4 | YES | YES | ASL/BIO |
| GAMMA-CHLORDANE | 1/21 | 3.6 | 3.6 | 0.550 | 3.60 | 15SS0290002 | 224 | 0.02 | NO | NO | BSL |
| **Herbicides (ug/kg)** | | | | | | | | | | | |
| PENTACHLOROPHENOL | 1/24 | 28 J | 28 J | 1.43 | 28.0 | 15SS0490002 | 1.8 [2] | 15.6 | YES | YES | ASL/BIO |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| ALUMINUM | 27/27 | 2850 J | 29900 J | 16867 | 16867 | 15SS0310002 | pH [2,3] | NA | YES | NO | NC/NONBIO |
| ANTIMONY | 3/27 | 1.4 J | 2.7 J | 0.352 | 1.87 | 15SS0060002 | 0.27 [2] | 10 | YES | NO | ASL/NONBIO |
| ARSENIC | 27/27 | 3.4 J | 20.7 J | 8.62 | 8.62 | 15SS0360002 | 18 [2] | 1.15 | YES | YES | ASL/BIO |
| BARIUM | 27/27 | 35.8 J | 254 J | 90.8 | 90.8 | 15SS0140002 | 330 [2] | 0.77 | NO | NO | BSL |
| BERYLLIUM | 25/27 | 0.31 J | 2 J | 0.797 | 0.853 | 15SS0020002 | 21 [2] | 0.10 | NO | NO | BSL |
| CADMIUM | 25/27 | 0.19 J | 6.9 J | 0.685 | 0.732 | 15SS0020002 | 0.36 [2] | 19.2 | YES | YES | ASL/BIO |
| CALCIUM | 27/27 | 170 J | 345000 J | 39972 | 39972 | 15SS0090002 | NA | NA | NO | NO | NUT |
| CHROMIUM | 27/27 | 9 J | 49.7 J | 24.4 | 24.4 | 15SS0360002 | 26 [2] | 1.91 | YES | YES | ASL/BIO |
| COBALT | 27/27 | 1.6 J | 59.6 J | 9.86 | 9.86 | 15SS0350002 | 13 [2] | 4.58 | YES | NO | ASL/NONBIO |
| COPPER | 27/27 | 5.4 J | 20.1 J | 11.2 | 11.2 | 15SS0060002 | 5.4 | 3.72 | YES | YES | ASL/BIO |

TABLE 8-2

ECOLOGICAL COPC SELECTION - SURFACE SOIL SAMPLES
ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | Frequency of Detection | Minimum Concentration | Maximum Concentration | Mean Concentration[1] | Average of Positive Detections | Sample with Maximum Detected Concentration | Region 5 ESL | Ecological Effects Quotient | COPC for Plants/Soil Invertebrates | COPC for Food-Chain Modeling | Rationale for COPC Selection |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inorganics (mg/kg) (Continued)** | | | | | | | | | | | |
| IRON | 27/27 | 4900 J | 57600 J | 25597 | 25597 | 15SS0360002 | pH [2,4] | NA | YES | NO | NC/NONBIO |
| LEAD | 27/27 | 10 J | 155 J | 23.4 | 23.4 | 15SS0080002 | 11 [2] | 14.1 | YES | YES | ASL/BIO |
| MAGNESIUM | 27/27 | 754 J | 19600 J | 3590 | 3590 | 15SS0090002 | NA | NA | NO | NO | NUT |
| MANGANESE | 27/27 | 50.1 J | 4400 J | 590 | 590 | 15SS0350002 | NA | NA | YES | NO | NC/NONBIO |
| MERCURY | 25/27 | 0.01 J | 0.13 | 0.0366 | 0.0392 | 15SS0100002 | 0.1 | 1.3 | YES | YES | ASL/BIO |
| NICKEL | 27/27 | 8.6 J | 31.6 J | 15.3 | 15.3 | 15SS0350002 | 13.6 | 2.32 | YES | YES | ASL/BIO |
| POTASSIUM | 27/27 | 699 J | 2190 J | 1360 | 1360 | 15SS0140002 | NA | NA | NO | NO | NUT |
| SELENIUM | 24/27 | 0.11 J | 1.1 | 0.465 | 0.506 | 15SS0380002 | 0.0276 | 39.9 | YES | YES | ASL/BIO |
| SILVER | 1/27 | 0.04 J | 0.04 J | 0.0276 | 0.0400 | 15SS0450002 | 4.04 | 0.01 | NO | NO | BSL |
| SODIUM | 13/27 | 87.7 J | 183 J | 84.9 | 140 | 15SS0100002 | NA | NA | NO | NO | NUT |
| THALLIUM | 14/27 | 0.21 J | 0.47 J | 0.238 | 0.340 | 15SS0380002 | 0.0569 | 8.26 | YES | NO | ASL/NONBIO |
| TIN | 3/27 | 0.34 J | 2.2 J | 0.322 | 1.02 | 15SS0060002 | 7.62 | 0.29 | NO | NO | BSL |
| VANADIUM | 27/27 | 14.6 J | 57.4 | 32.6 | 32.6 | 15SS0360002 | 7.8 [2] | 7.36 | YES | NO | ASL/NONBIO |
| ZINC | 27/27 | 19.4 J | 626 | 72.4 | 72.4 | 15SS0020002 | 6.62 | 94.6 | YES | YES | ASL/BIO |

Notes:
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
NA - Not applicable or not available.
J - Estimated concentration.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
2 - U.S. EPA Ecological Soil Screening Level
3 - Aluminum is only considered a COPC when the soil pH is less than 5.5. However, pH information was not available for SWMU 15 soils, so risks to plants and invertebrates could not be quantified.
4 - Iron is not expected to be toxic to plants with a soil pH between 5 units and 8 units. However, pH information was not available for SWMU 15 soils, so risks to plants and invertebrates could not be quantified.

Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NC = No Screening Level Available
BIO = Bioaccumulative Chemical
NONBIO = Non-bioaccumulative Chemical
NUT = Essential Nutrient

TABLE 8-3

ECOLOGICAL COPC SELECTION - ALL DOWNGRADIENT
SEDIMENT SAMPLES
ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | Frequency of Detection | Minimum Concentration | Maximum Concentration | Mean Concentration[1] | Average of Positive Detections | Sample with Maximum Detected Concentration | Region 5 ESL | Ecological Effects Quotient | COPC for Benthic Invertebrates | COPC for Food-Chain Modeling | Rationale for COPC Selection |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inorganics (mg/kg) (Continued)** | | | | | | | | | | | |
| COPPER | 15/15 | 4.9 J | 17.8 J | 10.8 | 10.8 | 15SD0130006 | 31.6 | 0.56 | NO | NO | BSL |
| IRON | 15/15 | 9670 J | 74200 J | 23825 | 23825 | 15SD0190006 | NA | NA | YES | NO | NC/NONBIO |
| LEAD | 15/15 | 8.9 J | 133 J | 27.9 | 27.9 | 15SD0090006 | 35.8 | 3.72 | YES | YES | ASL/BIO |
| MAGNESIUM | 15/15 | 1280 J | 17400 J | 7695 | 7695 | 15SD0050006 | NA | NA | NO | NO | NUT |
| MANGANESE | 15/15 | 323 J | 1990 J | 1090 | 1090 | 15SD0180006 | NA | NA | YES | NO | NC/NONBIO |
| MERCURY | 12/15 | 0.01 J | 0.085 J | 0.0274 | 0.0333 | 15SD0060006 | 0.174 | 0.49 | NO | NO | BSL |
| NICKEL | 15/15 | 8.6 J | 35.4 J | 18.6 | 18.6 | 15SD0010006 | 22.7 | 1.56 | YES | YES | ASL/BIO |
| POTASSIUM | 15/15 | 564 J | 1700 J | 1067 | 1067 | 15SD0150006 | NA | NA | NO | NO | NUT |
| SELENIUM | 12/15 | 0.19 J | 0.8 J | 0.344 | 0.408 | 15SD0190006 | NA | NA | YES | YES | NC/BIO |
| SODIUM | 7/15 | 20.7 J | 243 J | 88.1 | 132 | 15SD0230006 | NA | NA | NO | NO | NUT |
| THALLIUM | 6/15 | 0.1 J | 0.3 J | 0.102 | 0.175 | 15SD0180006 | NA | NA | YES | NO | NC/NONBIO |
| TIN | 1/15 | 10.2 J | 10.2 J | 0.853 | 10.2 | 15SD0150006 | NA | NA | YES | NO | NC/NONBIO |
| VANADIUM | 15/15 | 12.3 J | 83.6 J | 25.5 | 25.5 | 15SD0190006 | NA | NA | YES | NO | NC/NONBIO |
| ZINC | 15/15 | 39.5 | 163 | 62.2 | 62.2 | 15SD0090006 | 121 | 1.35 | YES | YES | ASL/BIO |
| **Miscellaneous Parameters** | | | | | | | | | | | |
| PERCENT SILT/CLAY (%) | 4/4 | 3 | 28 | 14.3 | 14.3 | 15SD0220006 | NA | NA | NO | NO | NZ |
| SIEVE 1" (%) | 4/4 | 0 | 0 | --- | --- | 4 Samples | NA | NA | NO | NO | NZ |
| SIEVE 1-1/2" (%) | 4/4 | 0 | 0 | --- | --- | 4 Samples | NA | NA | NO | NO | NZ |
| SIEVE 2" (%) | 4/4 | 0 | 0 | --- | --- | 4 Samples | NA | NA | NO | NO | NZ |
| SIEVE 3" (%) | 4/4 | 0 | 0 | --- | --- | 4 Samples | NA | NA | NO | NO | NZ |
| SIEVE 3/4" (%) | 4/4 | 0 | 5 | 1.75 | 1.75 | 15SD0230006 | NA | NA | NO | NO | NZ |
| SIEVE 3/8" (%) | 4/4 | 1 | 23 | 8.50 | 8.50 | 15SD0230006 | NA | NA | NO | NO | NZ |
| SIEVE NO. 004 (%) | 4/4 | 1 | 15 | 6.50 | 6.50 | 15SD0230006 | NA | NA | NO | NO | NZ |
| SIEVE NO. 010 (%) | 4/4 | 4 | 20 | 11.3 | 11.3 | 15SD0230006 | NA | NA | NO | NO | NZ |
| SIEVE NO. 020 (%) | 4/4 | 6 | 19 | 14.5 | 14.5 | 15SD0200006 | NA | NA | NO | NO | NZ |
| SIEVE NO. 040 (%) | 4/4 | 10 | 30 | 17.5 | 17.5 | 15SD0240006 | NA | NA | NO | NO | NZ |
| SIEVE NO. 060 (%) | 4/4 | 4 | 11 | 8.75 | 8.75 | 15SD0240006 | NA | NA | NO | NO | NZ |
| SIEVE NO. 140 (%) | 4/4 | 3 | 26 | 12.3 | 12.3 | 15SD0220006 | NA | NA | NO | NO | NZ |
| SIEVE NO. 200 (%) | 4/4 | 1 | 12 | 5.25 | 5.25 | 15SD0220006 | NA | NA | NO | NO | NZ |
| TOTAL ORGANIC CARBON (mg/kg) | 4/4 | 10000 J | 17000 J | 13250 | 13250 | 15SD0220006 | NA | NA | NO | NO | 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.
J - Estimated concentration.
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 = Non-bioaccumulative Chemical
NUT = Essential Nutrient
NZ = Field/Miscellaneous Parameters are not considered as COPCs

TABLE 8-4

ECOLOGICAL COPC SELECTION - ALL DOWNGRADIENT SURFACE WATER SAMPLES
ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | Frequency of Detection | Minimum Concentration | Maximum Concentration | Mean Concentration[1] | Average of Positive Detections | Sample with Maximum Detected Concentration | U.S. EPA WQC (unless otherwise noted) | Ecological Effects Quotient | COPC for Aquatic Invertebrates | COPC for Wildlife | Rationale for COPC Selection |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (ug/L)** | | | | | | | | | | | |
| ACETONE | 2/14 | 3.1 J | 4 J | 0.721 | 3.55 | 15SW00201 | 1700 [2] | 0.002 | NO | NO | BSL |
| **Semivolatile Organics (ug/L)** | | | | | | | | | | | |
| ACENAPHTHENE | 2/14 | 0.06 J | 0.33 | 0.0493 | 0.195 | 15SW01001 | 27 [2] | 0.012 | NO | NO | BSL |
| ACENAPHTHYLENE | 1/14 | 0.43 | 0.43 | 0.0540 | 0.430 | 15SW01001 | 4840 [3] | 0.00009 | NO | NO | BSL |
| ANTHRACENE | 4/14 | 0.05 J | 0.36 | 0.0665 | 0.170 | 15SW01001 | 0.68 [2] | 0.5 | NO | NO | BSL |
| BENZO(A)ANTHRACENE | 7/14 | 0.09 J | 1.84 | 0.271 | 0.517 | 15SW01001 | 0.025 [2] | 73.6 | YES | YES | ASL/BIO |
| BENZO(A)PYRENE | 7/14 | 0.1 | 2.38 | 0.353 | 0.681 | 15SW01001 | 0.014 [3] | 170 | YES | YES | ASL/BIO |
| BENZO(B)FLUORANTHENE | 7/14 | 0.21 | 5.83 | 0.799 | 1.57 | 15SW01001 | 9.07 [3] | 0.64 | NO | NO | BSL |
| BENZO(G,H,I)PERYLENE | 7/14 | 0.1 | 2.46 | 0.366 | 0.707 | 15SW01001 | 7.64 [3] | 0.32 | NO | NO | BSL |
| BENZO(K)FLUORANTHENE | 7/14 | 0.08 J | 1.72 | 0.250 | 0.476 | 15SW01001 | NA | NA | YES | YES | NC/BIO |
| BIS(2-ETHYLHEXYL) PHTHALATE | 1/14 | 1.01 J | 1.01 J | 0.533 | 1.01 | 15SW01001 | 0.3 [3] | 3.37 | YES | NO | ASL/NONBIO |
| CHRYSENE | 7/14 | 0.2 | 4.46 | 0.632 | 1.24 | 15SW01001 | NA | NA | YES | YES | NC/BIO |
| DIBENZO(A,H)ANTHRACENE | 2/14 | 0.3 | 0.46 | 0.0756 | 0.380 | 15SW01001 | NA | NA | YES | YES | NC/BIO |
| FLUORANTHENE | 9/14 | 0.1 | 11.9 | 1.53 | 2.37 | 15SW01001 | 3.6 [2] | 3.31 | YES | YES | ASL/BIO |
| FLUORENE | 2/14 | 0.08 J | 0.34 | 0.0514 | 0.210 | 15SW01001 | 2.4 [2] | 0.14 | NO | NO | BSL |
| INDENO(1,2,3-CD)PYRENE | 7/14 | 0.08 J | 2.09 | 0.311 | 0.597 | 15SW01001 | 4.31 [3] | 0.48 | NO | NO | BSL |
| NAPHTHALENE | 2/14 | 0.05 J | 0.12 | 0.0336 | 0.0850 | 15SW01001 | 26 [2] | 0.005 | NO | NO | BSL |
| PHENANTHRENE | 9/14 | 0.06 J | 4.73 | 0.659 | 1.01 | 15SW01001 | 0.93 [2] | 5.09 | YES | YES | ASL/BIO |
| PYRENE | 11/14 | 0.05 J | 8.61 | 1.27 | 1.61 | 15SW01001 | 0.3 [3] | 28.7 | YES | YES | ASL/BIO |
| **Herbicides (ug/L)** | | | | | | | | | | | |
| PENTACHLOROPHENOL | 11/13 | 0.022 J | 0.075 J | 0.0412 | 0.0475 | 15SW00601 | 6.9 [4] | 0.01 | NO | NO | BSL |
| **Total Metals (ug/L)** | | | | | | | | | | | |
| ALUMINUM | 13/14 | 54.6 J | 3020 J | 806 | 866 | 15SW01801 | 87 | 34.71 | YES | NO | ASL/NONBIO |
| ANTIMONY | 1/14 | 2.5 J | 2.5 J | 0.323 | 2.50 | 15SW01301 | 80 [2] | 0.03 | NO | NO | BSL |
| ARSENIC | 1/14 | 1.4 J | 1.4 J | 0.408 | 1.40 | 15SW01801 | 148 [2] | 0.009 | NO | NO | BSL |
| BARIUM | 14/14 | 25.4 J | 162 J | 67.8 | 67.8 | 15SW01301 | 473 [5] | 0.34 | NO | NO | BSL |
| CALCIUM | 14/14 | 30400 J | 96900 J | 62721 | 62721 | 15SW01301 | NA | NA | NO | NO | NUT |
| CHROMIUM | 7/14 | 1.3 J | 3.6 J | 1.47 | 2.57 | 15SW01101, 15SW01801 | 91.4 [5] | 0.04 | NO | NO | BSL |
| COBALT | 8/14 | 1.4 J | 5.8 J | 1.63 | 2.65 | 15SW00601 | 19 [2] | 0.31 | NO | NO | BSL |
| COPPER | 13/14 | 1.3 J | 8.1 J | 2.83 | 3.00 | 15SW01101 | 9.9 [5] | 0.82 | NO | NO | BSL |
| IRON | 12/14 | 306 J | 3330 J | 1272 | 1480 | 15SW01801 | 1000 | 3.33 | YES | NO | ASL/NONBIO |
| LEAD | 8/14 | 1.1 J | 2.9 J | 1.15 | 1.86 | 15SW01801 | 7 [5] | 0.41 | NO | NO | BSL |
| MAGNESIUM | 14/14 | 6630 J | 18900 J | 12486 | 12486 | 15SW01101 | NA | NA | NO | NO | NUT |
| MANGANESE | 14/14 | 6.4 J | 1230 | 283 | 283 | 15SW00601 | 564 [5] | 2.18 | YES | NO | ASL/NONBIO |
| NICKEL | 13/14 | 1.4 J | 8 J | 3.09 | 3.29 | 15SW01701 | 55.4 [5] | 0.14 | NO | NO | BSL |
| POTASSIUM | 14/14 | 757 J | 6500 J | 2221 | 2221 | 15SW01101 | NA | NA | NO | NO | NUT |
| SELENIUM | 1/14 | 1.3 J | 1.3 J | 0.289 | 1.30 | 15SW00401 | 5 | 0.26 | NO | NO | BSL |
| SODIUM | 14/14 | 15600 J | 135000 J | 51293 | 51293 | 15SW01101 | NA | NA | NO | NO | NUT |
| VANADIUM | 8/14 | 1.2 J | 6.1 | 1.78 | 2.69 | 15SW01801 | 12 [2] | 0.51 | NO | NO | BSL |
| ZINC | 12/14 | 5.2 J | 102 J | 27.5 | 31.4 | 15SW00401 | 127 [5] | 0.80 | NO | NO | BSL |

TABLE 8-4

ECOLOGICAL COPC SELECTION - ALL DOWNGRADIENT SURFACE WATER SAMPLES
ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Parameter | Frequency of Detection | Minimum Concentration | Maximum Concentration | Mean Concentration[1] | Average of Positive Detections | Sample with Maximum Detected Concentration | U.S. EPA WQC (unless otherwise noted) | Ecological Effects Quotient | COPC for Aquatic Invertebrates | COPC for Wildlife | Rationale for COPC Selection |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dissolved Metals (ug/L)** | | | | | | | | | | | |
| ALUMINUM | 7/14 | 10.1 J | 2090 | 173 | 342 | 15SW00201-F | 87 | 24.02 | YES | -- | ASL |
| ARSENIC | 2/14 | 1 J | 17 J | 1.36 | 9.00 | 15SW00101-F | 148 [2] | 0.11 | NO | -- | BSL |
| BARIUM | 14/14 | 18.7 J | 149 J | 65.5 | 65.5 | 15SW01301-F | 473 [5] | 0.32 | NO | -- | BSL |
| CADMIUM | 2/14 | 0.09 J | 0.36 J | 0.0745 | 0.225 | 15SW01801-F | 2.36 [5,6] | 0.15 | NO | NO[3] | BSL |
| CALCIUM | 14/14 | 25200 | 99600 J | 62214 | 62214 | 15SW01101-F, 15SW01301-F | NA | NA | NO | -- | NUT |
| CHROMIUM | 2/14 | 3.4 J | 4.1 J | 0.801 | 3.75 | 15SW00201-F | 78.6 [5] | 0.05 | NO | -- | BSL |
| COBALT | 14/14 | 0.26 J | 6.1 | 1.61 | 1.61 | 15SW00601-F | 19 [2] | 0.32 | NO | -- | BSL |
| COPPER | 14/14 | 1 J | 5.2 J | 2.25 | 2.25 | 15SW00201-F | 9.5 [5] | 0.55 | NO | -- | BSL |
| IRON | 9/14 | 299 J | 2860 J | 511 | 751 | 15SW00201-F | 1000 | 2.86 | YES | -- | ASL |
| LEAD | 3/14 | 0.192 J | 3.1 J | 0.321 | 1.16 | 15SW00201-F | 5.5 [5] | 0.56 | NO | -- | BSL |
| MAGNESIUM | 14/14 | 6410 J | 21700 | 13191 | 13191 | 15SW01101-F | NA | NA | NO | -- | NUT |
| MANGANESE | 14/14 | 4.7 J | 1230 | 265 | 265 | 15SW00601-F | 564 [5] | 2.18 | YES | -- | ASL |
| NICKEL | 14/14 | 2 J | 9 J | 4.29 | 4.29 | 15SW01701-F | 55.3 [5] | 0.16 | NO | -- | BSL |
| POTASSIUM | 14/14 | 788 J | 7590 J | 2202 | 2202 | 15SW01101-F | NA | NA | NO | -- | NUT |
| SELENIUM | 2/14 | 0.67 J | 1.1 J | 0.279 | 0.885 | 15SW00401-F | 5 | 0.22 | NO | -- | BSL |
| SODIUM | 14/14 | 14500 J | 141000 J | 51386 | 51386 | 15SW01101-F | NA | NA | NO | -- | NUT |
| THALLIUM | 2/14 | 0.09 J | 0.1 J | 0.0459 | 0.0950 | 15SW01801-F | 6 [2,6] | 0.02 | NO | NO[3] | BSL |
| VANADIUM | 1/14 | 4.2 | 4.2 | 0.829 | 4.20 | 15SW00201-F | 12 [2] | 0.35 | NO | -- | BSL |
| ZINC | 13/14 | 2.1 J | 88 J | 17.7 | 18.9 | 15SW00401-F | 126 [5] | 0.70 | NO | -- | BSL |
| **Field Parameters** | | | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | 12/12 | 7.33 | 11.5 | 10.3 | 10.3 | 15SW00101 | NA | NA | NO | NO | NZ |
| OXIDATION REDUCTION POTENTIAL (MV) | 14/14 | -15.7 | 115.5 | 36.2 | 36.2 | 15SW01101 | NA | NA | NO | NO | NZ |
| PH (S.U.) | 14/14 | 7.03 | 7.93 | 7.67 | 7.67 | 15SW01501 | NA | NA | NO | NO | NZ |
| SPECIFIC CONDUCTANCE (MS/CM) | 14/14 | 0.237 | 1.08 | 0.678 | 0.678 | 15SW00501 | NA | NA | NO | NO | NZ |
| TEMPERATURE (°C) | 14/14 | 6.73 | 13.33 | 10.4 | 10.4 | 15SW01101 | NA | NA | NO | NO | NZ |
| TURBIDITY (NTU) | 14/14 | 5.3 | 370 | 64.4 | 64.4 | 15SW01301 | NA | NA | NO | NO | 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.
J - Estimated concentration.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
2 - IDEM Water Quality Criterion.
3 - Region 5 Ecological Screening Level.
4 - Calculated based on pH.
5 - Calculated based on hardness.
6 - Cadmium and thallium were detected in dissolved samples but not total samples.

Rationale:
ASL = Above Screening Level
BSL = Below Screening Level
NC = No Screening Level Available
BIO = Bioaccumulative Chemical
NONBIO = Non-bioaccumulative Chemical
NUT = Essential Nutrient
NZ = Field/Miscellaneous Parameters are not considered as COPC

TABLE 8-5

STEP 3A EVALUATION FOR RISKS TO PLANTS AND INVERTEBRATES
HISTORICAL SAMPLE SURFACE SOIL COPCs
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Chemical of Potential Concern (COPC) | Frequency of Detection | Maximum Detected Concentration | Ecological Screening Level (ESL)[1] | Maximum EEQ[2] | Number of Samples > ESL[3] | Step 3a Evaluation[5] | | | | | | Risk Determination (Acceptable/ Unacceptable) | Retained as a COPC? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Alternate Benchmarks | | | | | Other Step 3a Factors Considered in Evaluation | | |
| | | | | | | Eco-SSL (soil inverts) | Eco-SSL (plants) | Canadian SQG[4] | ORNL Benchmarks[4] Plants | ORNL Benchmarks[4] Earthworms | | | |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | | | |
| DI-N-BUTYL PHTHALATE | 3/27 | 240 | 150 | 1.60 | 1 | NA | NA | NA | 200000 | NA | - Maximum concentration is less than the alternate benchmark for plants.<br>- Alternate benchmark for invertebrates not available; dimethylphthalate was used as a surrogate. Maximum concentration is less than the invertebrate benchmark for invertebrates (200,000 ug/kg) | Acceptable | No |
| DIBENZOFURAN | 1/27 | 95 | NA | NA | NA | NA | NA | NA | NA | NA | - No alternate benchmarks available.<br>- Detected in 1 of 27 samples; contamination is bounded. | Acceptable | No |
| N-NITROSODIPHENYLAMINE | 1/27 | 1500 | 545 | 2.75 | 1 | NA | NA | NA | NA | 20000 | - Maximum concentration is less than the alternate benchmark for invertebrates.<br>- Detected in 1 of 27 samples; contamination is bounded. | Acceptable | No |
| NAPHTHALENE | 8/27 | 280 | 99.4 | 2.82 | 1 | NA | NA | 600 | NA | NA | - Maximum concentration is less than the alternate benchmark for plants and invertebrates. | Acceptable | No |
| **PCBs (ug/kg)** | | | | | | | | | | | | | |
| AROCLOR-1260 | 2/20 | 32 | 0.332 | 96 | 2 | NA | NA | 33000 | NA | NA | - Maximum concentration is less than the alternate benchmarks for plants and invertebrates. | Acceptable | No |
| **Herbicides (ug/kg)** | | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 1/24 | 28 | 1.8 | 16 | 1 | 31000 | 5000 | NA | NA | NA | - Maximum concentration is less than the alternate benchmarks for plants and invertebrates. | Acceptable | No |
| **Inorganics (mg/kg)** | | | | | | | | | | | | | |
| ALUMINUM | 27/27 | 29,900 | NA | NA | NA | [7] | [7] | NA | NA | NA | - pH information not available for SWMU 15; pH at a nearby SWMU (SWMU 12) ranged from 6 to 7.7, with an average of 6.9.<br>- Aluminum is only considered toxic with pH less than 5.5.<br>- Aluminum is generally not considered toxic to ecological receptors. | Acceptable | No |
| ANTIMONY | 3/27 | 2.7 | 0.27[6] | 10 | 3 | 78 | NA | NA | 5 | NA | - Maximum concentration is less than the alternate benchmarks for plants and invertebrates.<br>- Maximum concentration is less than the maximum background concentration in soil group 3 (5.6 mg/kg). | Acceptable | No |
| ARSENIC | 27/27 | 20.7 | 18[6] | 1.15 | 1 | NA | 18 | 17.1 | NA | 60 | - Maximum concentration is less than the alternate benchmark for invertebrates.<br>- 1 of 27 samples exceed the Eco-SSL for plants; contamination is bounded to this sample. | Acceptable | No |
| CADMIUM | 25/27 | 6.9 | 0.36[6] | 19 | 10 | 140 | 32 | NA | NA | NA | - Maximum concentration is less than the alternate benchmarks for plants and invertebrates. | Acceptable | No |
| CHROMIUM | 27/27 | 49.7 | 26[6] | 1.91 | 8 | NA | NA | 64 | NA | NA | - Maximum concentration is less than the alternate benchmark for plants and invertebrates. | Acceptable | No |
| COBALT | 27/27 | 59.6 | 13[6] | 4.58 | 5 | NA | 13 | NA | NA | NA | - 5 of 27 samples exceeded the Eco-SSL for plants.<br>- Concentrations at 4 of the locations only slightly exceeded the Eco-SSL for plants.<br>- Concentration at location 15SB035 slightly greater than the maximum background concentration; this sample is bounded by other samples. | Acceptable | No |
| COPPER | 27/27 | 20.1 | 5.4 | 3.72 | 26 | NA | NA | 63 | NA | NA | - Maximum concentration is less than the alternate benchmark for plants and invertebrates. | Acceptable | No |
| IRON | 27/27 | 57600 | NA | NA | NA | [7] | [7] | NA | NA | NA | - pH information not available for SWMU 15; pH at a neraby SWMU (SWMU 12) ranged from 6 to 7.7, with an average of 6.9.<br>- Iron is not expected to be toxic to plants with soil pH between 5 and 8.<br>- Iron is generally not considered toxic to ecological receptors. | Acceptable | No |
| LEAD | 27/27 | 155 | 11[6] | 14.1 | 24 | 1700 | 120 | NA | NA | NA | - Maximum concentration is less than the Eco-SSL for invertebrates.<br>- 1 of 27 samples exceed the Eco-SSL for plants; this sample was collected in an open gravel lot with little habitat.<br>- Several samples collected nearby with concentrations below the Eco-SSL for plants. | Acceptable | No |

TABLE 8-5

STEP 3A EVALUATION FOR RISKS TO PLANTS AND INVERTEBRATES
HISTORICAL SAMPLE SURFACE SOIL COPCs
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| Chemical of Potential Concern (COPC) | Frequency of Detection | Maximum Detected Concentration | Ecological Screening Level (ESL)[1] | Maximum EEQ[2] | Number of Samples > ESL[3] | Step 3a Evaluation[5] | | | | | | Risk Determination (Acceptable/ Unacceptable) | Retained as a COPC? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Alternate Benchmarks | | | | | Other Step 3a Factors Considered in Evaluation | | |
| | | | | | | Eco-SSL (soil inverts) | Eco-SSL (plants) | Canadian SQG[4] | ORNL Benchmarks[4] | | | | |
| | | | | | | | | | Plants | Earthworms | | | |
| **Inorganics (mg/kg) (Continued)** | | | | | | | | | | | | | |
| MANGANESE | 27/27 | 4400 | NA | NA | NA | NA | NA | NA | NA | NA | - Only 1 of 27 samples exceeded the maximum background concentration in soil group 3 (3,040 mg/kg); detection does not represent a large area.<br>- Manganese is generally not considered toxic to ecological receptors. | Acceptable | No |
| MERCURY | 25/27 | 0.13 | 0.1 | 1.30 | 1 | NA | NA | 12 | NA | NA | - Maximum concentration is less than the alternate benchmark for plants and invertebrates. | Acceptable | No |
| NICKEL | 27/27 | 31.6 | 13.6 | 2.32 | 16 | NA | NA | 50 | NA | NA | - Maximum concentration is less than the alternate benchmark for plants and invertebrates. | Acceptable | No |
| SELENIUM | 24/27 | 1.1 | 0.0276 | 39.9 | 24 | NA | NA | 1 | NA | NA | - 1 of 27 samples exceed the alternate benchmark; detection does not represent a large area. | Acceptable | No |
| THALLIUM | 14/27 | 0.47 | 0.0569 | 8.26 | 14 | NA | NA | 1.4 | NA | NA | - Maximum concentration is less than the alternate benchmark for plants and invertebrates. | Acceptable | No |
| VANADIUM | 27/27 | 57.4 | 7.8[6] | 7.36 | 27 | NA | NA | 130 | NA | NA | - Maximum concentration is less than the alternate benchmark for plants and invertebrates. | Acceptable | No |
| ZINC | 27/27 | 626 | 6.62 | 94.6 | 27 | NA | NA | 200 | NA | NA | - 2 of 27 samples exceed the alternate benchmark for plants and invertebrates.<br>- The 2 exceedances (at 15SB002 and 15SB007) are located in a maintained grass area along the base of railroad tracks and is bounded to the east by a gravel lot.<br>- Potentially impacted area is small and the habitat is not significant. | Acceptable | No |

Footnotes:
1 ESL is the Region 5 Ecological Screening Level, unless a U.S. EPA Ecological Soil Screening Level is available, as noted.
2 Maximum EEQ = Maximum detection divided by the screening level.
3 Number of samples with concentrations greater than the screening level.
4 Canadian and Oak Ridge National Laboratory benchmarks were used only in the absence of U.s. EPA Ecological Soil Screening Level.
5 See Section 8.4.1.1 for a more detailed discussion of the Step 3a evaluation.
6 U.S. EPA Ecological Soil Screening Level.
7 Aluminum is only considered a COPC when the soil pH is <5. Iron is not expected to be toxic to plants with a soil pH between 5 and 8.

EEQ = Ecological Effects Quotient.
NA = Not available or not applicable.
SQG = Soil Quality Guideline.

TABLE 8-11

EXPOSURE PARAMETERS FOR THE TERRESTRIAL WILDLIFE MODEL
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, INDIANA

| Species/Exposure Inputs | Conservative Inputs | | Average Inputs | | Source |
|---|---|---|---|---|---|
| | Values | Units | Values | Units | |
| ***Meadow Vole*** | | | | | |
| Body Weight = BW | 3.290E-02 | kg | 3.663E-02 | kg | USEPA, 1993 |
| Food Ingestion Rate = If | 1.920E-03 | kg/day | 1.785E-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 (3.2%, 1.2%) | 6.144E-05 | kg/day | 2.142E-05 | kg/day | USEPA, 2005e |
| 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 (3%, 0.9%) | 7.776E-05 | kg/day | 1.483E-05 | kg/day | USEPA, 2005e |
| 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(16.4%, 6.4%) | 4.972E-03 | kg/day | 1.617E-03 | kg/day | USEPA, 2005e |
| 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 | 2.460E-03 | kg/day | 2.160E-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 (13.9%, 6.1%) | 3.419E-04 | kg/day | 1.318E-04 | kg/day | USEPA, 2005e |
| Home Range = HR | Assume 100% on site | | 2.860E+01 | acres | USEPA, 1993 |
| ***Mink*** | | | | | |
| Body Weight = BW | 8.730E-01 | kg | 1.351E+00 | kg | USEPA, 1993 |
| Food Ingestion Rate = If | 5.245E-02 | kg/day | 4.638E-02 | kg/day | USEPA, 1993 |
| Water Ingestion Rate = Iw | 5.100E-02 | kg/day | 3.780E-02 | kg/day | USEPA, 1993 |
| Sediment Ingestion Rate - Is (4.3%, 1.3%) | 2.255E-03 | kg/day | 6.029E-04 | kg/day | USEPA, 2005e |
| Home Range = HR | Assume 100% on site | | 3.484E+01 | acres | USEPA, 1993 |
| ***Belted Kingfisher*** | | | | | |
| Body Weight = BW | 1.360E-01 | kg | 1.520E-01 | kg | USEPA, 1993 |
| Food Ingestion Rate = If | 1.895E-02 | kg/day | 1.723E-02 | kg/day | USEPA, 1993 |
| Water Ingestion Rate = Iw | 1.870E-02 | L/day | 1.670E-02 | L/day | USEPA, 1993 |
| Sediment Ingestion Rate - Is (3.3%) | 6.254E-04 | kg/day | 5.684E-04 | kg/day | Beyer, 1994 |
| Home Range = HR | Assume 100% on site | | 1.160E+00 | km | USEPA, 1993 |

TABLE 8-12

TERRESTRIAL WILDLIFE MODEL-MAXIMUM CONCENTRATIONS, MAXIMUM BAF, AND MAXIMUM EXPOSURE PARAMETERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, INDIANA

| | Herbivorous Wildlife | | | | Insectivorous Wildlife | | | |
|---|---|---|---|---|---|---|---|---|
| | Meadow Vole | | Bobwhite Quail | | Short-Tailed Shrew | | American Woodcock | |
| Parameter | NOAEL EEQ | LOAEL EEQ | NOAEL EEQ | LOAEL EEQ | NOAEL EEQ | LOAEL EEQ | NOAEL EEQ | LOAEL EEQ |
| **Semivolatiles** | | | | | | | | |
| BENZO(A)ANTHRACENE | 2.3E-02 | 2.3E-03 | 1.2E-03 | 1.2E-04 | 3.8E-01 | 3.8E-02 | 6.5E-02 | 6.5E-03 |
| BENZO(A)PYRENE | 4.3E-03 | 4.3E-04 | 1.4E-03 | 1.4E-04 | 8.4E-02 | 8.4E-03 | 8.4E-02 | 8.4E-03 |
| BENZO(K)FLUORANTHENE | 9.2E-04 | 9.2E-05 | 2.5E-03 | 2.5E-04 | 2.3E-02 | 2.3E-03 | 1.7E-01 | 1.7E-02 |
| CHRYSENE | 3.3E-02 | 3.3E-03 | 1.6E-03 | 1.6E-04 | 5.0E-01 | 5.0E-02 | 8.4E-02 | 8.4E-03 |
| DIBENZO(A,H)ANTHRACENE | 6.2E-04 | 6.2E-05 | 3.0E-04 | 3.0E-05 | 1.4E-02 | 1.4E-03 | 1.9E-02 | 1.9E-03 |
| FLUORANTHENE | 7.9E-04 | 3.9E-04 | 2.2E-03 | 2.2E-04 | 5.9E-03 | 2.9E-03 | 7.2E-02 | 7.2E-03 |
| PHENANTHRENE | 6.0E-03 | 6.0E-04 | 1.2E-03 | 1.2E-04 | 4.0E-02 | 4.0E-03 | 4.0E-02 | 4.0E-03 |
| PYRENE | 1.8E-03 | 1.1E-03 | 3.0E-03 | 3.0E-04 | 1.6E-02 | 9.9E-03 | 1.2E-01 | 1.2E-02 |
| **PCBs** | | | | | | | | |
| AROCLOR-1260 | 2.7E-03 | 2.7E-04 | 3.8E-04 | 3.8E-05 | 1.7E+00 | 1.7E-01 | 5.2E-01 | 5.2E-02 |
| **Herbicides** | | | | | | | | |
| PENTACHLOROPHENOL | 4.3E-05 | 4.3E-06 | NA | NA | 1.1E-03 | 1.1E-04 | NA | NA |
| **Inorganics** | | | | | | | | |
| ARSENIC | 1.4E+01 | 1.4E+00 | 1.6E-01 | 5.3E-02 | 9.9E+00 | 9.9E-01 | 1.1E+00 | 3.5E-01 |
| CADMIUM | 1.7E-01 | 1.7E-02 | 2.4E-01 | 1.8E-02 | 3.0E+00 | 3.0E-01 | 3.6E+01 | 2.6E+00 |
| CHROMIUM | 1.1E-02 | 2.9E-03 | 1.7E-01 | 3.4E-02 | 4.5E-01 | 1.1E-01 | 3.0E+01 | 6.0E+00 |
| COPPER | 2.6E-03 | 2.0E-03 | 5.0E-03 | 3.8E-03 | 8.8E-03 | 6.8E-03 | 1.3E-01 | 1.0E-01 |
| LEAD | 6.3E-02 | 6.3E-03 | 1.3E+00 | 1.3E-01 | 2.8E-01 | 2.8E-02 | 4.2E+01 | 4.2E+00 |
| MERCURY | 4.7E-02 | 9.3E-03 | 1.6E+00 | 1.6E-01 | 2.7E-01 | 5.5E-02 | 7.7E+01 | 7.7E+00 |
| NICKEL | 7.4E-03 | 3.7E-03 | 9.6E-03 | 7.0E-03 | 3.5E-02 | 1.8E-02 | 3.6E-01 | 2.6E-01 |
| SELENIUM | 1.1E-01 | 6.6E-02 | 1.3E-01 | 6.6E-02 | 7.0E-02 | 4.3E-02 | 7.6E-01 | 3.8E-01 |
| ZINC | 4.7E-02 | 2.4E-02 | 1.3E+00 | 1.4E-01 | 4.7E-01 | 2.4E-01 | 1.0E+02 | 1.1E+01 |

**Notes:**
Cells are shaded black if the Ecological Effects Quotient (EEQ) is greater than 1.0.
NA - Not applicable.
NOAEL - No Observed Adverse Effects Level.
LOAEL - Lowest Observed Adverse Effects Level.

TABLE 8-13

TERRESTRIAL WILDLIFE MODEL-AVERAGE CONCENTRATIONS, AVERAGE BAF, AND AVERAGE EXPOSURE PARAMETERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, INDIANA

| | Herbivorous Wildlife | | | | Insectivorous Wildlife | | | |
|---|---|---|---|---|---|---|---|---|
| | Meadow Vole | | Bobwhite Quail | | Short-Tailed Shrew | | American Woodcock | |
| Parameter | NOAEL EEQ | LOAEL EEQ | NOAEL EEQ | LOAEL EEQ | NOAEL EEQ | LOAEL EEQ | NOAEL EEQ | LOAEL EEQ |
| **Semivolatiles** | | | | | | | | |
| BENZO(A)ANTHRACENE | 1.3E-03 | 1.3E-04 | 5.5E-05 | 5.5E-06 | 7.4E-03 | 7.4E-04 | 1.8E-03 | 1.8E-04 |
| BENZO(A)PYRENE | 2.0E-04 | 2.0E-05 | 5.8E-05 | 5.8E-06 | 1.4E-03 | 1.4E-04 | 2.0E-03 | 2.0E-04 |
| BENZO(K)FLUORANTHENE | 2.4E-05 | 2.4E-06 | 6.3E-05 | 6.3E-06 | 2.6E-04 | 2.6E-05 | 2.7E-03 | 2.7E-04 |
| CHRYSENE | 1.9E-03 | 1.9E-04 | 8.4E-05 | 8.4E-06 | 9.4E-03 | 9.4E-04 | 2.3E-03 | 2.3E-04 |
| DIBENZO(A,H)ANTHRACENE | 2.9E-05 | 2.9E-06 | 1.3E-05 | 1.3E-06 | 2.6E-04 | 2.6E-05 | 5.0E-04 | 5.0E-05 |
| FLUORANTHENE | 5.6E-05 | 2.8E-05 | 1.5E-04 | 1.5E-05 | 1.2E-04 | 6.2E-05 | 2.1E-03 | 2.1E-04 |
| PHENANTHRENE | 4.4E-04 | 4.4E-05 | 8.1E-05 | 8.1E-06 | 8.6E-04 | 8.6E-05 | 1.2E-03 | 1.2E-04 |
| PYRENE | 1.1E-04 | 6.4E-05 | 1.6E-04 | 1.6E-05 | 2.8E-04 | 1.7E-04 | 2.9E-03 | 2.9E-04 |
| **PCBs** | | | | | | | | |
| AROCLOR-1260 | 2.1E-04 | 2.1E-05 | 3.3E-05 | 3.3E-06 | 8.7E-02 | 8.7E-03 | 3.8E-02 | 3.8E-03 |
| **Herbicides** | | | | | | | | |
| PENTACHLOROPHENOL | 3.9E-06 | 3.9E-07 | NA | NA | 3.0E-05 | 3.0E-06 | NA | NA |
| **Inorganics** | | | | | | | | |
| ARSENIC | 2.0E-01 | 2.0E-02 | 4.2E-03 | 1.4E-03 | 8.8E-01 | 8.8E-02 | 1.3E-01 | 4.5E-02 |
| CADMIUM | 2.4E-03 | 2.4E-04 | 3.7E-03 | 2.7E-04 | 2.9E-02 | 2.9E-03 | 4.9E-01 | 3.5E-02 |
| CHROMIUM | 2.0E-03 | 5.0E-04 | 3.1E-02 | 6.1E-03 | 1.1E-02 | 2.8E-03 | 1.2E+00 | 2.4E-01 |
| COPPER | 2.3E-04 | 1.8E-04 | 5.5E-04 | 4.2E-04 | 8.3E-04 | 6.4E-04 | 1.8E-02 | 1.4E-02 |
| LEAD | 7.6E-04 | 7.6E-05 | 2.5E-02 | 2.5E-03 | 3.8E-03 | 3.8E-04 | 9.1E-01 | 9.1E-02 |
| MERCURY | 1.4E-03 | 2.7E-04 | 5.0E-02 | 5.0E-03 | 3.2E-03 | 6.4E-04 | 1.3E+00 | 1.3E-01 |
| NICKEL | 6.0E-05 | 3.0E-05 | 1.9E-04 | 1.4E-04 | 1.9E-03 | 9.6E-04 | 3.0E-02 | 2.1E-02 |
| SELENIUM | 8.1E-03 | 4.9E-03 | 1.0E-02 | 5.2E-03 | 1.1E-02 | 6.6E-03 | 1.6E-01 | 8.1E-02 |
| ZINC | 8.8E-04 | 4.4E-04 | 2.6E-02 | 2.9E-03 | 6.8E-03 | 3.4E-03 | 2.2E+00 | 2.4E-01 |

**Notes:**
Cells are shaded black if the Ecological Effects Quotient (EEQ) is greater than 1.0.
NA - Not applicable.
NOAEL - No Observed Adverse Effects Level.
LOAEL - Lowest Observed Adverse Effects Level.

TABLE 8-14

TERRESTRIAL WILDLIFE MODEL
MAXIMUM CONCENTRATIONS AND MAXIMUM INPUTS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, INDIANA

| Parameter | Mink | | Belted Kingfisher | |
|---|---|---|---|---|
| | NOAEL EEQ 10% SUF | LOAEL EEQ 10% SUF | NOAEL EEQ 10% SUF | LOAEL EEQ 10% SUF |
| **Semivolatile Organics** | | | | |
| ACENAPHTHENE | 9.3E-02 | 4.7E-02 | 1.9E-02 | 1.9E-03 |
| ACENAPHTHYLENE | 1.3E-03 | 1.3E-04 | 1.1E-03 | 1.1E-04 |
| ANTHRACENE | 3.5E-02 | 3.5E-03 | 4.1E-02 | 4.1E-03 |
| BENZO(A)ANTHRACENE | 4.2E+01 | 4.2E+00 | 8.4E-02 | 8.4E-03 |
| BENZO(A)PYRENE | 8.6E+00 | 8.6E-01 | 1.0E-01 | 1.0E-02 |
| BENZO(G,H,I)PERYLENE | 1.0E+00 | 1.0E-01 | 8.6E-02 | 8.6E-03 |
| BENZO(K)FLUORANTHENE | 5.3E-01 | 5.3E-02 | 4.5E-02 | 4.5E-03 |
| CHRYSENE | 5.1E+01 | 5.1E+00 | 1.0E-01 | 1.0E-02 |
| DIBENZO(A,H)ANTHRACENE | 1.0E+00 | 1.0E-01 | 1.6E-02 | 1.6E-03 |
| FLUORANTHENE | 1.8E+00 | 9.2E-01 | 2.7E-01 | 2.7E-02 |
| FLUORENE | 1.3E-01 | 6.3E-02 | 1.9E-02 | 1.9E-03 |
| INDENO(1,2,3-CD)PYRENE | 8.3E-01 | 8.3E-02 | 7.0E-02 | 7.0E-03 |
| PHENANTHRENE | 1.7E+01 | 1.7E+00 | 2.1E-01 | 2.1E-02 |
| PYRENE | 4.6E+00 | 2.8E+00 | 4.1E-01 | 4.1E-02 |
| **Pesticides** | | | | |
| 4,4'-DDD | 6.9E-03 | 1.4E-03 | 1.7E-01 | 2.9E-02 |
| 4,4'-DDE | 4.1E-01 | 8.2E-02 | 1.0E+01 | 1.7E+00 |
| 4,4'-DDT | 1.2E-01 | 2.3E-02 | 2.9E+00 | 5.0E-01 |
| ALPHA-CHLORDANE | 2.1E-01 | 1.1E-01 | 1.1E-02 | 2.1E-03 |
| GAMMA-CHLORDANE | 8.9E-02 | 4.4E-02 | 4.5E-03 | 9.0E-04 |
| **PCBs** | | | | |
| AROCLOR-1254 | 8.8E+01 | 8.8E+00 | 3.7E-01 | 3.7E-02 |
| AROCLOR-1260 | 1.3E+02 | 1.3E+01 | 5.2E-01 | 5.2E-02 |
| **Inorganics** | | | | |
| ARSENIC | 1.2E+02 | 1.2E+01 | 1.4E-01 | 4.6E-02 |
| CHROMIUM | 5.5E-01 | 1.4E-01 | 4.9E-01 | 9.8E-02 |
| LEAD | 5.5E-01 | 5.5E-02 | 1.0E+00 | 1.0E-01 |
| NICKEL | 1.1E-01 | 5.3E-02 | 1.5E-02 | 1.1E-02 |
| SELENIUM | 2.1E-01 | 1.3E-01 | 2.9E-02 | 1.4E-02 |
| ZINC | 3.9E-01 | 1.9E-01 | 1.2E+00 | 1.3E-01 |

**Notes:**
Cells are shaded black if the Ecological Effects Quotient (EEQ) is greater than 1.0.
NA - Not applicable.
NOAEL - No Observed Adverse Effects Level.
LOAEL - Lowest Observed Adverse Effects Level.
SUF - Site use factor.

TABLE 8-15

TERRESTRIAL WILDLIFE MODEL
AVERAGE CONCENTRATIONS AND AVERAGE INPUTS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, INDIANA

| | Mink | | Belted Kingfisher | |
|---|---|---|---|---|
| Parameter | NOAEL EEQ 10% SUF | LOAEL EEQ 10% SUF | NOAEL EEQ 10% SUF | LOAEL EEQ 10% SUF |
| **Semivolatile Organics** | | | | |
| ACENAPHTHENE | 4.3E-03 | 2.2E-03 | 3.2E-03 | 3.2E-04 |
| ACENAPHTHYLENE | 6.2E-05 | 6.2E-06 | 1.9E-04 | 1.9E-05 |
| ANTHRACENE | 1.7E-03 | 1.7E-04 | 7.2E-03 | 7.2E-04 |
| BENZO(A)ANTHRACENE | 2.7E+00 | 2.7E-01 | 2.0E-02 | 2.0E-03 |
| BENZO(A)PYRENE | 5.1E-01 | 5.1E-02 | 2.2E-02 | 2.2E-03 |
| BENZO(G,H,I)PERYLENE | 6.7E-02 | 6.7E-03 | 2.1E-02 | 2.1E-03 |
| BENZO(K)FLUORANTHENE | 3.8E-02 | 3.8E-03 | 1.2E-02 | 1.2E-03 |
| CHRYSENE | 3.3E+00 | 3.3E-01 | 2.4E-02 | 2.4E-03 |
| DIBENZO(A,H)ANTHRACENE | 7.1E-02 | 7.1E-03 | 4.0E-03 | 4.0E-04 |
| FLUORANTHENE | 9.8E-02 | 4.9E-02 | 5.2E-02 | 5.2E-03 |
| FLUORENE | 6.8E-03 | 3.4E-03 | 3.6E-03 | 3.6E-04 |
| INDENO(1,2,3-CD)PYRENE | 5.6E-02 | 5.6E-03 | 1.7E-02 | 1.7E-03 |
| PHENANTHRENE | 1.1E+00 | 1.1E-01 | 4.7E-02 | 4.7E-03 |
| PYRENE | 2.5E-01 | 1.5E-01 | 7.9E-02 | 7.9E-03 |
| **Pesticides** | | | | |
| 4,4'-DDD | 3.6E-04 | 7.2E-05 | 3.2E-02 | 5.5E-03 |
| 4,4'-DDE | 1.6E-02 | 3.2E-03 | 1.4E+00 | 2.5E-01 |
| 4,4'-DDT | 4.6E-03 | 9.2E-04 | 4.0E-01 | 7.0E-02 |
| ALPHA-CHLORDANE | 6.6E-03 | 3.3E-03 | 1.2E-03 | 2.4E-04 |
| GAMMA-CHLORDANE | 2.7E-03 | 1.3E-03 | 4.9E-04 | 9.8E-05 |
| **PCBs** | | | | |
| AROCLOR-1254 | 2.6E+00 | 2.6E-01 | 3.9E-02 | 3.9E-03 |
| AROCLOR-1260 | 3.0E+00 | 3.0E-01 | 4.5E-02 | 4.5E-03 |
| **Inorganics** | | | | |
| ARSENIC | 1.5E+00 | 1.5E-01 | 7.2E-03 | 2.4E-03 |
| CHROMIUM | 9.5E-03 | 2.4E-03 | 3.6E-02 | 7.3E-03 |
| LEAD | 3.4E-03 | 3.4E-04 | 2.9E-02 | 2.9E-03 |
| NICKEL | 2.7E-03 | 1.3E-03 | 1.4E-03 | 1.0E-03 |
| SELENIUM | 2.0E-02 | 1.2E-02 | 1.0E-02 | 5.0E-03 |
| ZINC | 8.7E-03 | 4.3E-03 | 9.6E-02 | 1.1E-02 |

**Notes:**
Cells are shaded black if the Ecological Effects quotient (EEQ) is greater than 1.0.
NA - Not applicable.
NOAEL - No Observed Adverse Effects Level.
LOAEL - Lowest Observed Adverse Effects Level.
SUF - Site use factor.

TABLE 8-16

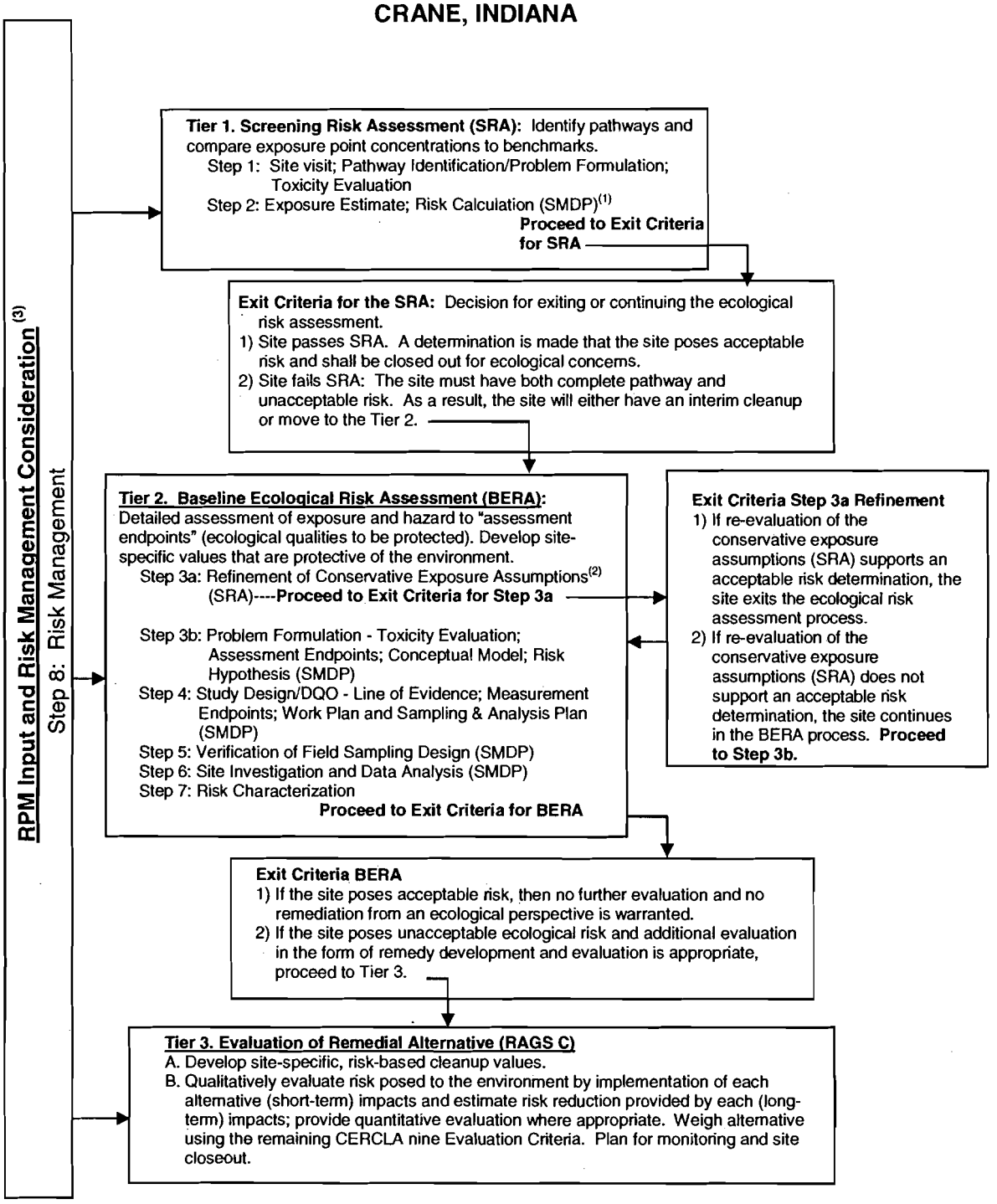
STEP 3A EVALUATION FOR RISKS TO TERRESTRIAL WILDLIFE
SURFACE SOIL AND SEDIMENT COPCS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA

| Chemical of Potential Concern (COPC) | Frequency of Detection[1] | Maximum Detected Concentration (mg/kg)[1] | EEQs Using Average Concentrations and Average Exposure Parameters | | | | 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** | | | | | | | | | | |
| Chromium | 27/27 | 49.7 | 1.2 | Woodcock | None | NA | Black duckling survival was reduced at a dose level of 50 mg/kg, and no differences were observed at a dose level of 10 mg/kg. | - Site risks to insectivorous birds are only slightly greater than background risks. Relatively small range of chromium detections across the site (9 mg/kg to 49.7 mg/kg), so it does not appear that chromium in surface soil is site related. | Acceptable | No |
| Mercury | 25/27 | 0.13 | 1.3 | Woodcock | None | NA | Fewer eggs and ducklings were produced in mallard ducks fed a 0.5 mg/kg/day dose (LOAEL). | - The average background concentration in surface soil (0.037 mg/kg) is the same as the average concentration in surface soil samples at SWMU 15. Risks are similar to background. | Acceptable | No |
| Zinc | 27/27 | 626 | 2.2 | Woodcock | None | NA | No effects were observed among hens consuming 48 and 228 mg/kg of zinc, but egg hatchability was reduced by 20% among hens consuming 2,028 mg/kg zinc. | - The three greatest zinc concentrations (111 mg/kg, 214 mg/kg, and 626 mg/kg) were found in samples 15SS002, 15SS006, and 15SS007, respectively. These are located within 100 feet of each other in a grassy area between railroad tracks and a gravel lot. Insectivorous birds are unlikely to obtain significant amount of food from this area. All other detections are very similar to or less than the maximum background concentration, so zinc does not appear to be site related. | Acceptable | No |
| **Piscivorous Wildlife** | | | | | | | | | | |
| Benzo(a)anthracene | 17/17 | 3.7 | 2.7 | Mink | None | NA | Based on tumor induction in mice. | - EEQs for PAHs are relatively low. TRVs for PAHs are likely conservative for the mink because they are based on mice. PAH levels in fish are generally low because they rapidly metabolize PAHs, and high molecular weight PAHs do not readily accumulate in fish. The estimated fish tissue levels may be lower than predicated. Also, PAH concentrations in sediment decrease further downstream in areas where fish may be more prevalent. | Acceptable | No |
| Chrysene | 17/17 | 4.5 | 3.3 | Mink | None | NA | Based on tumor induction in mice. | | Acceptable | No |
| Phenanthrene | 17/17 | 9.1 | 1.1 | Mink | None | NA | Benzo(a)pyrene was used as a surrogate. Based on 10, 40, and 160 mg/kg-day exposure to mice during 7-16 days of gestation. Total sterility observed in 97% of offspring for 40 and 160 mg/kg-day groups. Fertility was impaired in 10 mg/kg-day group. Chronic LOAEL is 10 mg/kg-day. | | Acceptable | No |
| 4,4'-DDE | 6/11 | 0.076 | 1.4 | Kingfisher | None | NA | Based on reproductive effects in brown pelicans. | - EEQ is slightly greater than 1.0. The average concentration of 4,4'-DDE used in the less conservative food-chain model was 0.013 mg/kg, which is not indicative of a release from the SWMU. Also, the SUF of 10% is likely conservative. | Acceptable | No |
| Aroclor-1254 | 2/11 | 0.23 | 2.6 | Mink | None | NA | Reproductive system and developing embryos are adversely affected by acute and chronic exposure. A dietary LOAEL of 0.5 ppm was noted for old-field mice exposed to 0.68 mg/kg per day for 12 months. | - Sample et al. (1996) reported a NOAEL of 0.137 mg/kg-day for PCBs based on a mink study, which is several orders of magnitude greater than the TRV developed for the mice study. Using the NOAEL of 0.137 mg/kg-day in the food-chain model, the EEQs for Aroclor-1254 and Aroclor-1260 are less than 1.0. | Acceptable | No |
| Aroclor-1260 | 1/11 | 0.33 | 3.0 | Mink | None | NA | | | Acceptable | No |
| Arsenic | 15/15 | 33.8 | 1.5 | Mink | None | NA | Declining litter sizes over multiple mice generations when fed 5 mg/L arsenic in their drinking water and 0.06 mg/kg in their food (LOAEL). | - A NOAEL for the mink has not been developed for arsenic, but it is likely that the body weight scaling is conservative. NOAEL EEQ is slightly greater than 1.0, so actual risks to mink from arsenic are not likely. Also, the average arsenic concentration in the downgradient samples (8.8 mg/kg) is lower than the average concentration in the upgradient samples (14.4 mg/kg). | Acceptable | No |

Footnotes:
1 - These columns present the frequencies of detection and maximum concentrations in soil for insectivorous/herbivorous receptors and in sediment for piscivorous receptors.
2 - See Section 8.4.2.2 for a more detailed discussion of the Step 3a evaluation.

COPCs - Chemicals of Potential Concern.
EEQ - Ecological Effects Quotient.
NA - Not available or not applicable.
NOAEL - No Observed Adverse Effect Level.
LOAEL - Lowest Observed Adverse Effect Level.
SUF - Site Use Factor.
PAH - Polycyclic Aromatic Hydrocarbons.
TRV - Toxixity Reference Value.

# FIGURE 8-1
# NAVY ECOLOGICAL RISK ASSESSMENT TIERED APPROACH
# SWMU 15
# NSWC CRANE
# CRANE, INDIANA




Notes:
1 See U.S. EPA's eight Step ERA Process for requirements for each Scientific Management Decision Point (SMDP).
2 Refinement includes background, bioavailability, detection frequency, etc.
3 Risk management is incorporated throughout the tiered approach.

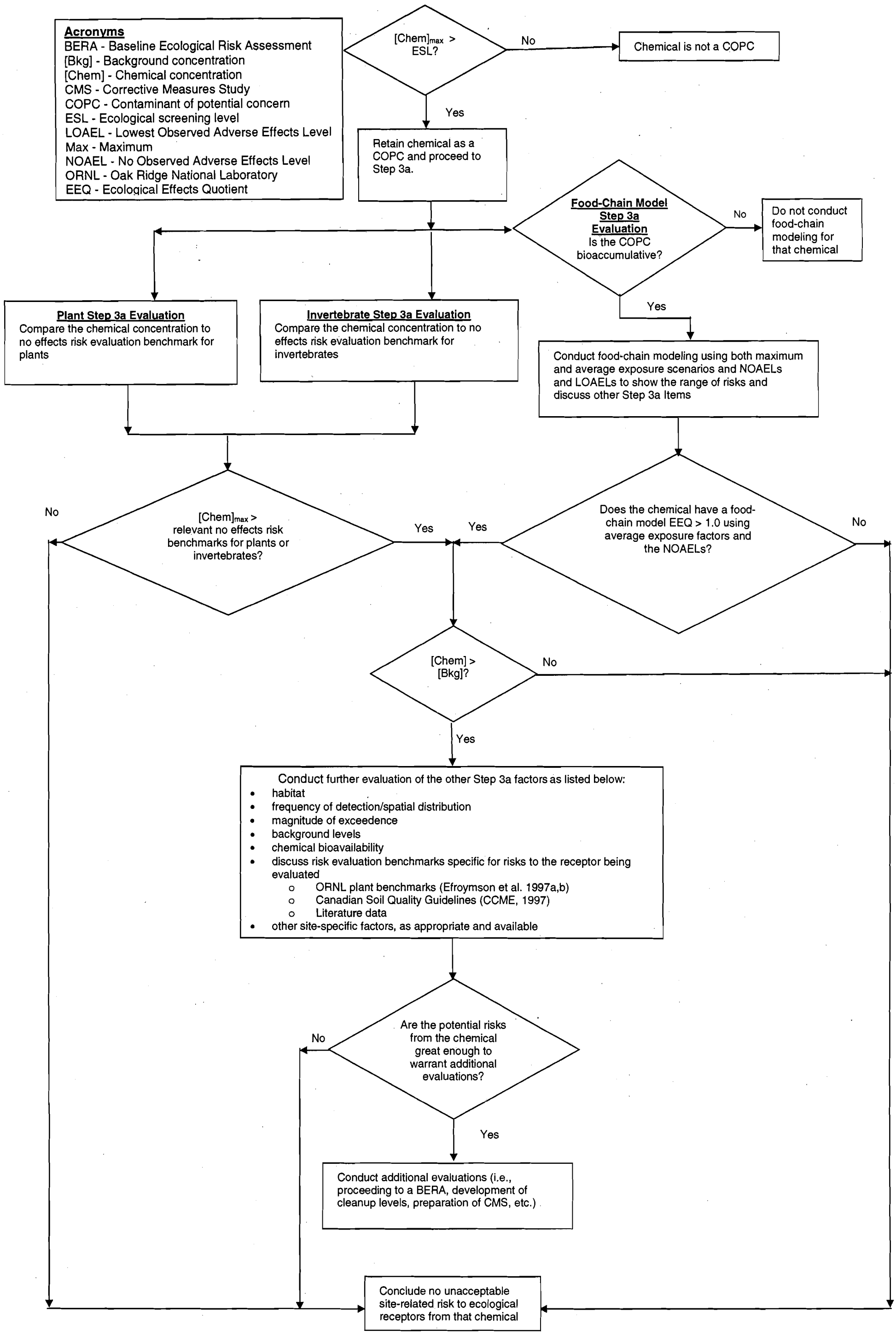



**FIGURE 8-2**

**GENERAL ERA PROCESS FOR EVALUATION OF RISKS FROM CHEMICALS IN SURFACE SOIL**
**SWMU 15 - ROADS AND GROUNDS AREA**
**NSWC CRANE**
**CRANE, INDIANA**

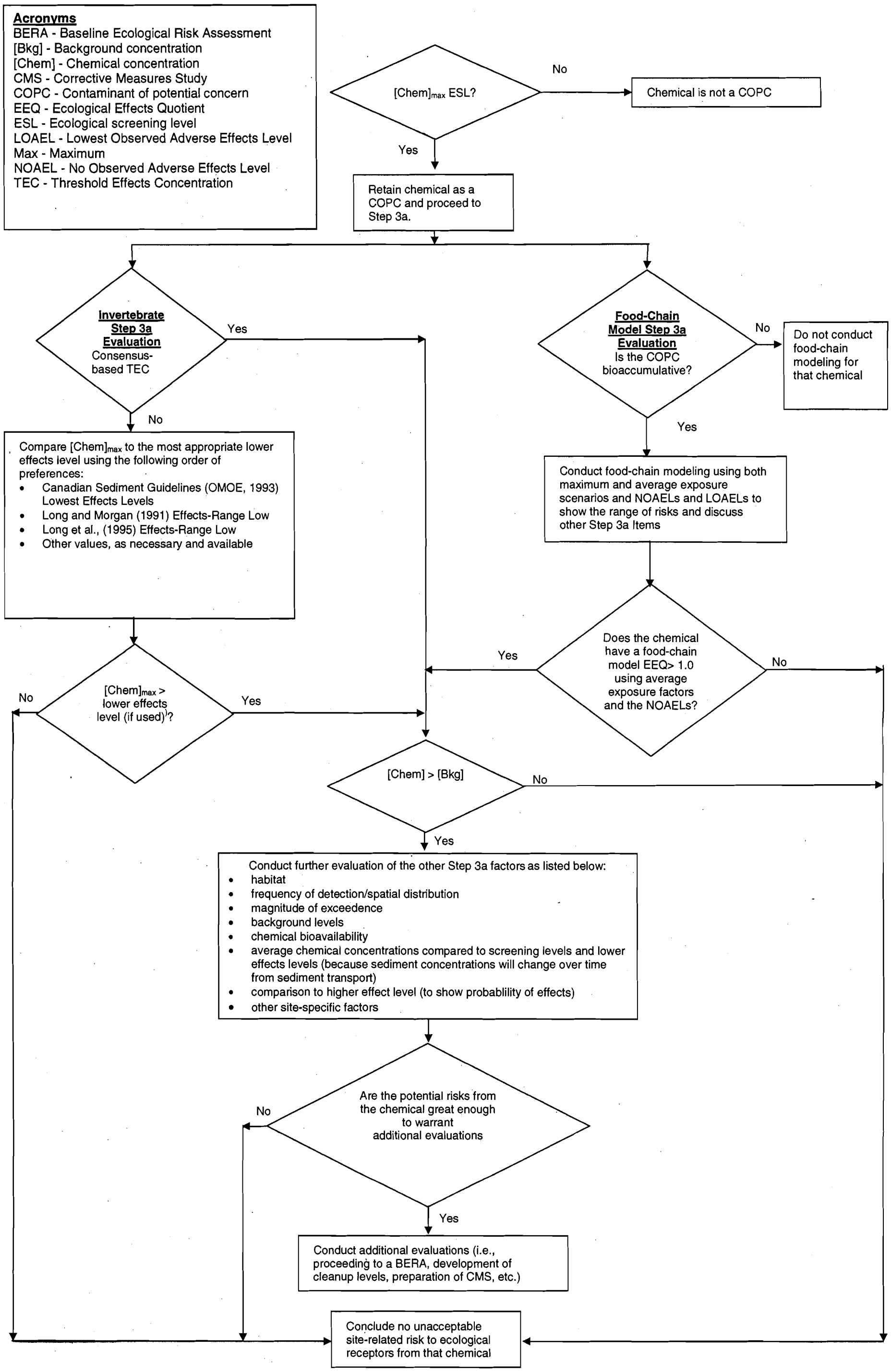
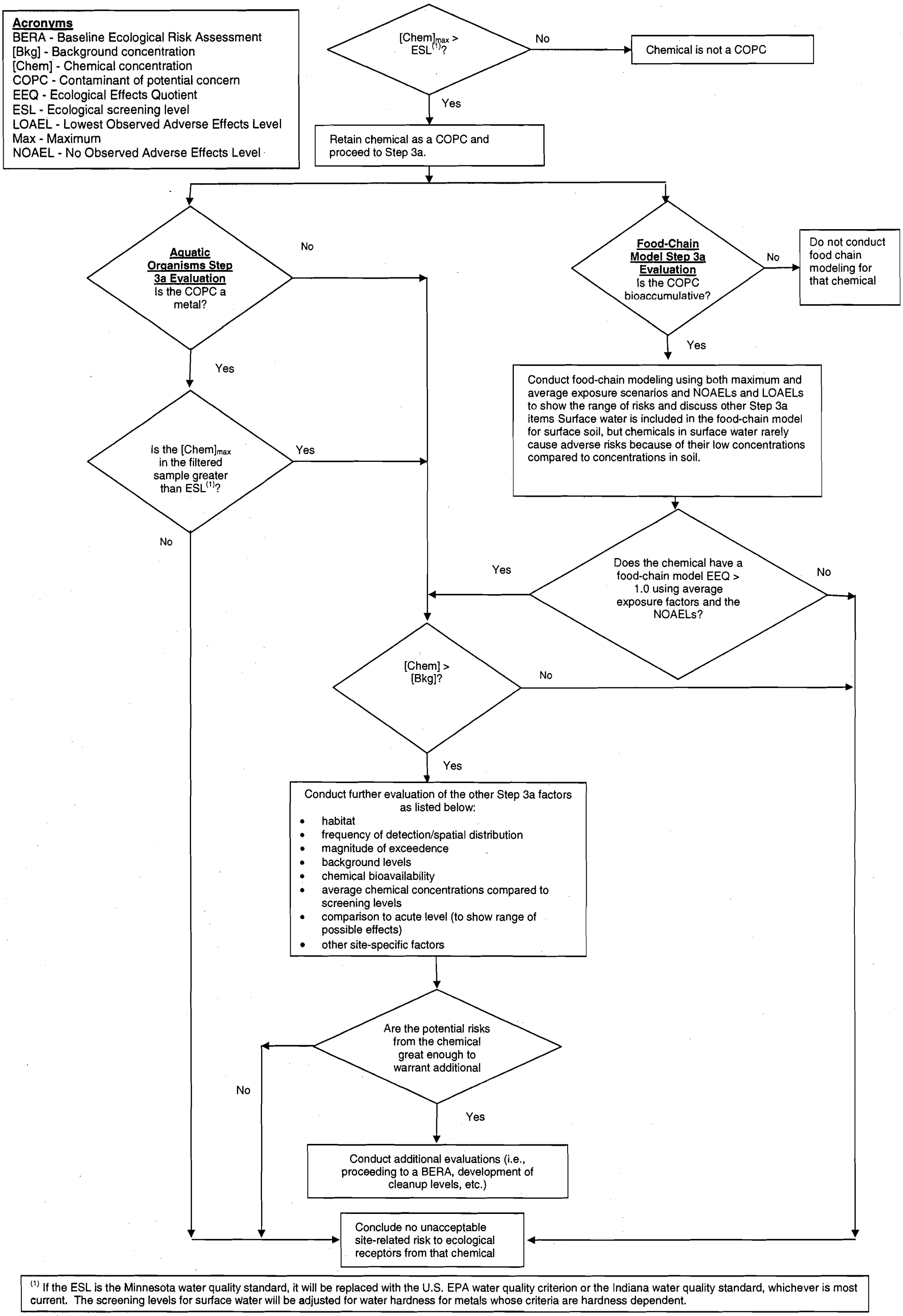



**FIGURE 8-3**

**GENERAL ERA PROCESS FOR EVALUATION OF RISKS FROM CHEMICALS IN SEDIMENT**
**SWMU 15 - ROADS AND GROUNDS AREA**
**NSWC CRANE**
**CRANE, INDIANA**




(1) If the ESL is the Minnesota water quality standard, it will be replaced with the U.S. EPA water quality criterion 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**

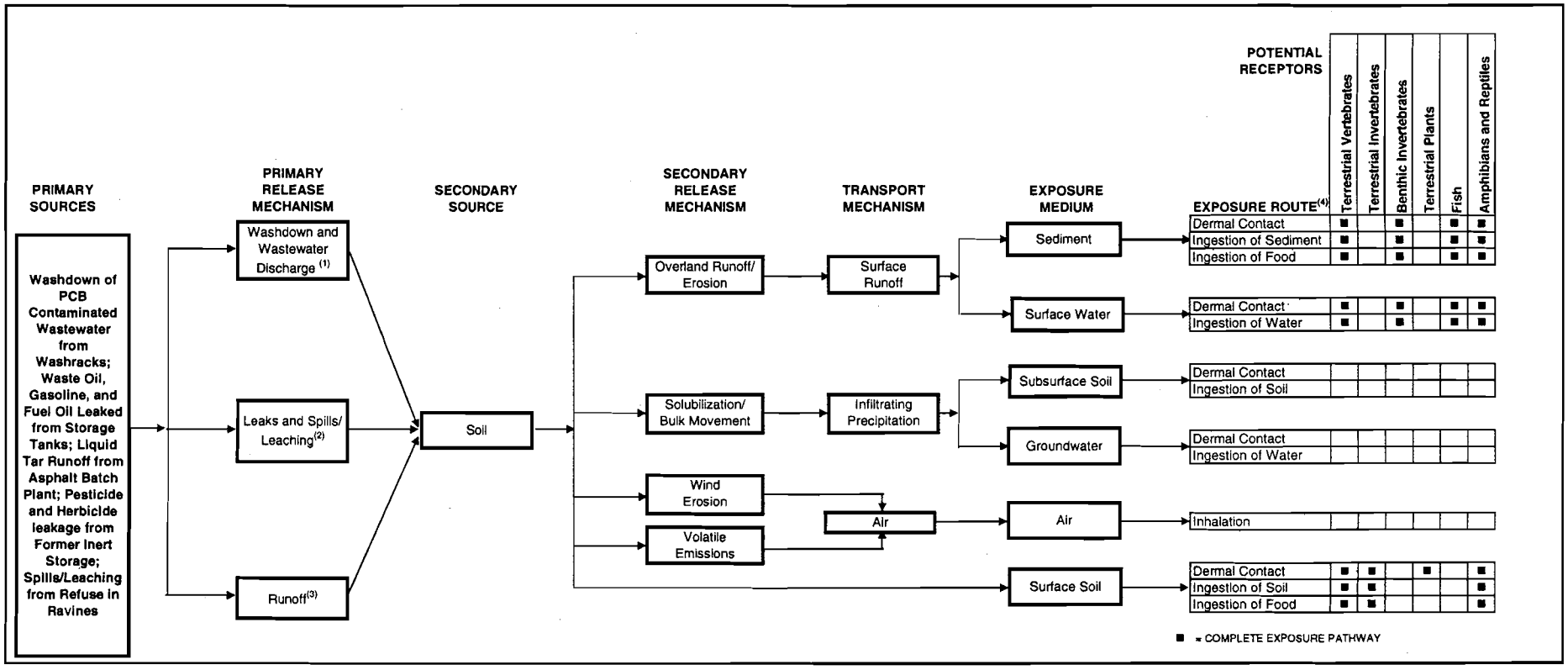
**GENERAL ERA PROCESS FOR EVALUATION OF RISKS FROM CHEMICALS IN SURFACE WATER**
**SWMU 15 - ROADS AND GROUND AREA**
**NSWC CRANE**
**CRANE, INDIANA**

P:\GIS\NSWC_CRANE\APR\SWUM15_AERIAL.APR SWMU15_SURFACETYPE 10/5/05 KMP

| | | | |
|---|---|---|---|
| DRAWN BY C. SPEHAR | DATE 9/8/05 | SAMPLE LOCATIONS<br>SWMU 15 - ROADS AND GROUNDS AREA<br>NSWC CRANE<br>CRANE, INDIANA | CONTRACT NUMBER CTO 0331 |
| CHECKED BY E. LEE | DATE 9/28/05 | | APPROVED BY / DATE |
| COST/SCHEDULE-AREA | | | APPROVED BY / DATE |
| SCALE AS NOTED | NAVFAC | | DRAWING NO FIGURE 8 - 5 / REV 0 |

FIGURE 8-6

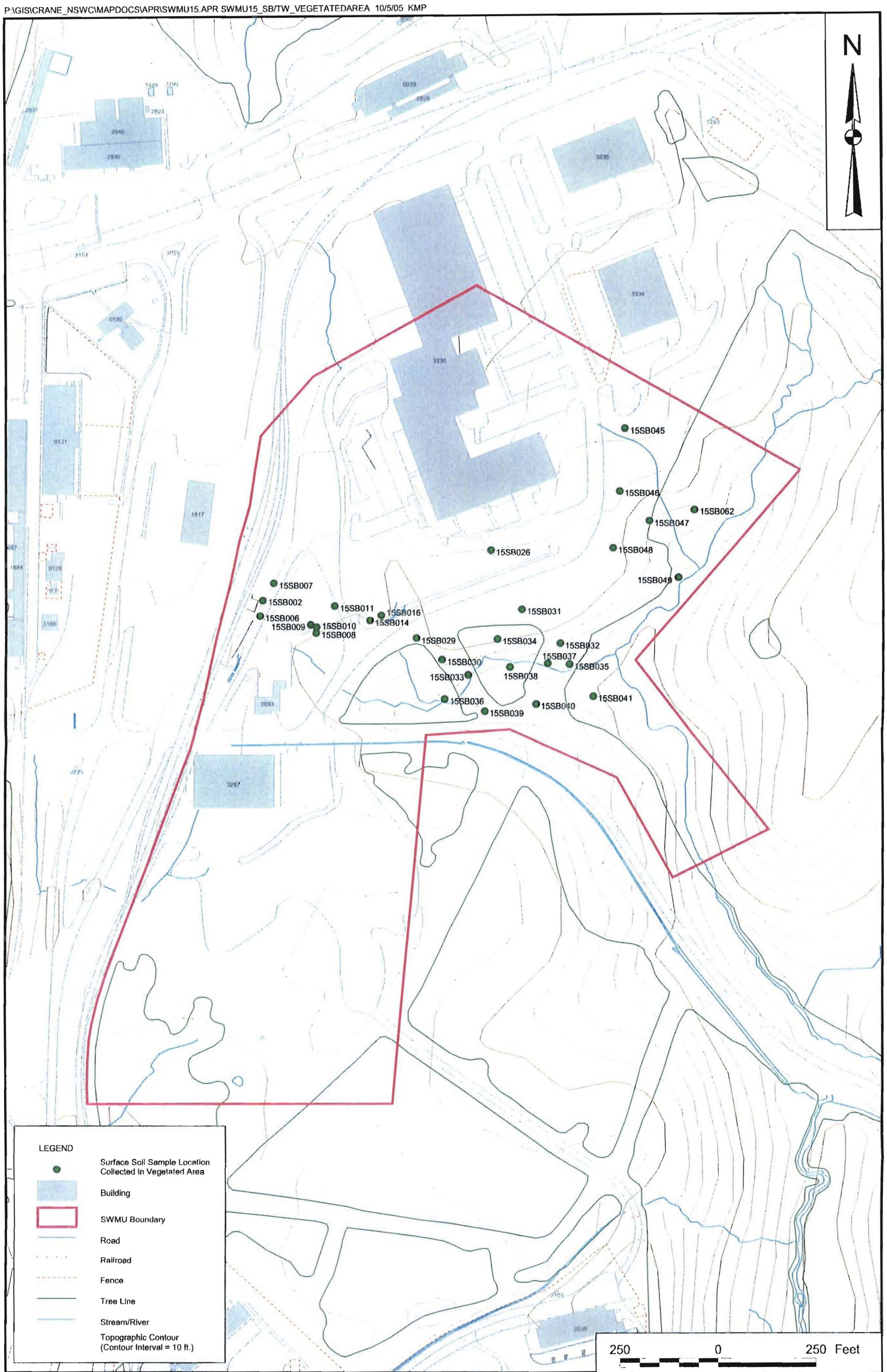
ECOLOGICAL CONCEPTUAL SITE MODEL
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA




1. Washdown wastewater was discharged to the ravine south of SWMU 15.
2. Leaks from storage tanks and spills/leaching from refuse in the ravines.
3. Runoff of tar and related materials from Asphalt Batch Plant.
4. Blank space indicates incomplete exposure pathway or relatively insignificant or not applicable potential exposure.

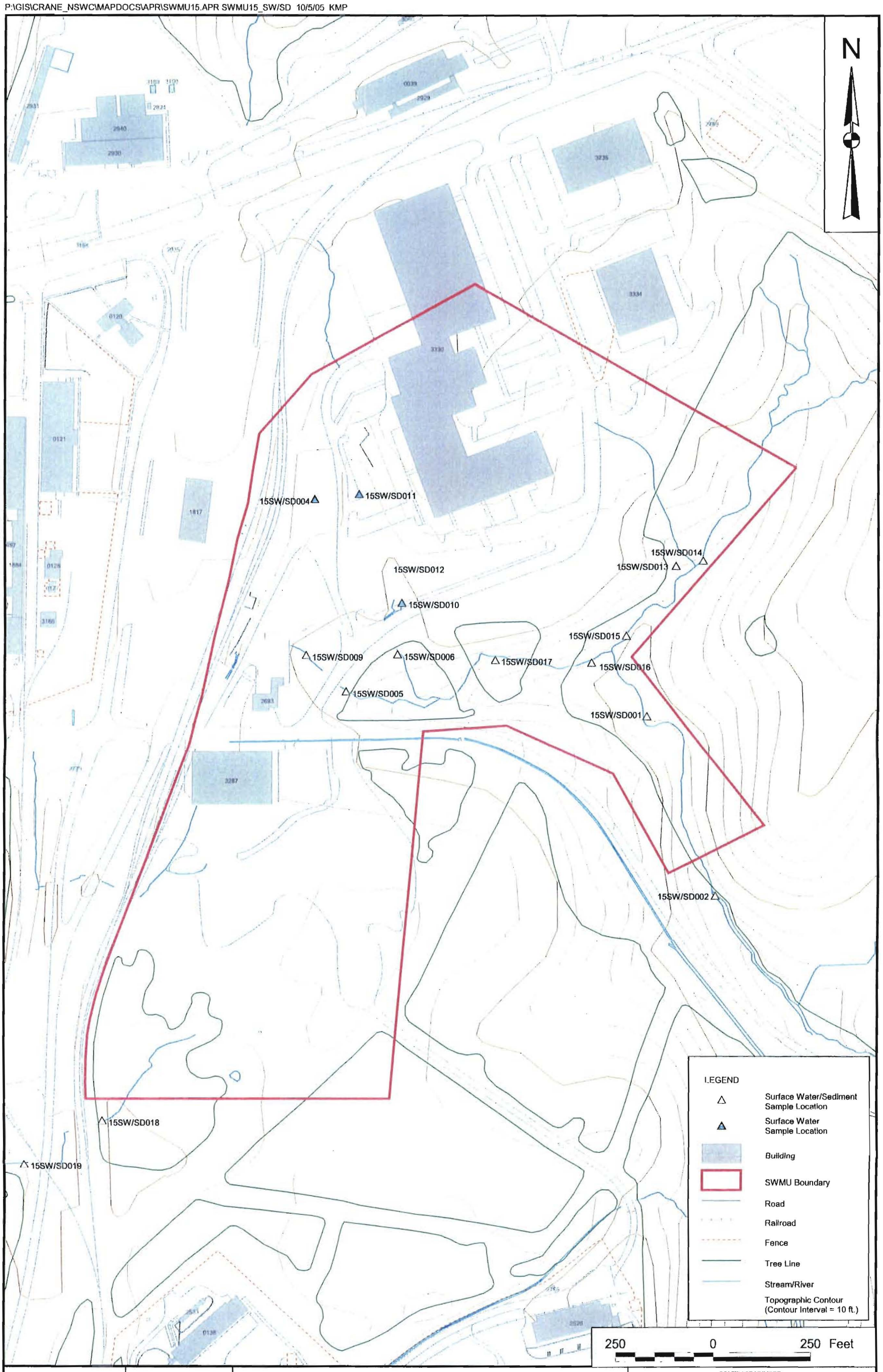
PCB - Polychlorinated Biphenyl.

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU15.APR SWMU15_SB/TW_VEGETATEDAREA 10/5/05 KMP




| | | | |
|---|---|---|---|
| DRAWN BY K. PEILA — DATE 9/28/05 | NAVFAC | SURFACE SOIL SAMPLE LOCATIONS IN VEGETATED AREA SWMU 15 - ROADS AND GROUNDS AREA NSWC CRANE CRANE, INDIANA | CONTRACT NUMBER CTO 0331 |
| CHECKED BY E. LEE — DATE 9/28/05 | | | APPROVED BY — DATE — |
| COST/SCHEDULE-AREA | | | APPROVED BY — DATE — |
| SCALE AS NOTED | | | DRAWING NO. FIGURE 8 - 7 — REV 0 |

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU15.APR SWMU15_SW/SD 10/5/05 KMP




| | | | |
|---|---|---|---|
| DRAWN BY K. PEILA | DATE 9/28/05 | SURFACE WATER/SEDIMENT SAMPLE LOCATIONS<br>SWMU 15 - ROADS AND GROUNDS AREA<br>NSWC CRANE<br>CRANE, INDIANA | CONTRACT NUMBER CTO 0331 |
| CHECKED BY E. I FF | DATE 9/28/05 | | APPROVED BY — DATE — |
| COST/SCHEDULE-AREA | | | APPROVED BY — DATE — |
| SCALE AS NOTED | NAVFAC | | DRAWING NO. FIGURE 8 - 8 / REV 0 |

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Comprehensive Long-term Environmental Action Navy

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11/17/06

# Resource Conservation and Recovery Act Facility Investigation Report
for
# Roads and Grounds Area (SWMU 15)

## VOLUME II OF II - APPENDICES A - J

## Naval Surface Warfare Center Crane
## Crane, Indiana

## Contract Task Order 0331

## November 2006

NAVFAC
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TETRA TECH NUS, Inc.

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# ACRONYMS

| | |
|---|---|
| °F | Degrees Fahrenheit |
| °C | Degrees Celsius |
| amsl | Above mean sea level |
| AOC | Area of concern |
| AST | Aboveground storage tank |
| ASTM | American Society for Testing and Materials |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| AWQC | Ambient Water Quality Criterion |
| BAF | Bioaccumulation Factor |
| BERA | Baseline Ecological Risk Assessment |
| bgs | Below ground surface |
| BSAF | Biota Sediment Accumulation Factor |
| BTOR | Below top of riser |
| Cal EPA | California Environmental Protection Agency |
| CCME | Canadian Council of Ministers of the Environment |
| CDI | Chronic daily intake |
| CEC | Cation exchange capacity |
| CSF | Cancer slope factor |
| CLEAN | Comprehensive Long-term Environmental Action Navy |
| CMS | Corrective Measures Study |
| cm | Centimeter |
| $cm^2$ | Square centimeters |
| COC | Chemical of concern |
| COPC | Chemical of potential concern |
| cPAH | Carcinogenic polycyclic aromatic hydrocarbon |
| CSF | Cancer slope factor |
| CSM | Conceptual site model |
| CTE | Central tendency exposure |
| CTO | Contract Task Order |
| $DA_{event}$ | Absorbed dose per event |
| DDT | Dichloro diphenyl-trichloroethane |
| DI | Deionized |
| DO | Dissolved oxygen |

| | |
|---|---|
| DPT | Direct Push Technology |
| DRMO | Defense Reutilization and Marketing Office |
| EC | Environment Canada |
| $EC_{10}$ | Effects Concentration for 10% of the test population |
| $EC_{20}$ | Effects Concentration for 20% of the test population |
| $EC_{25}$ | Effects Concentration for 25% of the test population |
| $EC_{50}$ | Effects concentration for 50% of the test population |
| Eco-SSL | U.S. EPA Ecological Soil Screening Level |
| EDQL | Environmental Data Quality Levels |
| EEQ | Ecological Effects 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 |
| gpm | Gallons per minute |
| HA | Hand augering |
| HASP | Health and Safety Plan |
| HEAST | Health Effects Assessment Summary Tables |
| HHRA | Human health risk assessment |
| HI | Hazard Index |
| HQ | Hazard Quotient |
| IA | Installation Assessment |
| IAS | Initial Assessment Study |
| ILCR | Incremental lifetime cancer risk |
| IDEM | Indiana Department of Environmental Management |
| IDNR | Indiana Department of Natural Resources |
| IRIS | Integrated Risk Information System |
| $K_d$ | Soil-water partition coefficient |
| $K_g$ | Kilogram |
| $K_{oc}$ | Organic matter-water partition coefficient |
| $LC_{50}$ | Lethal Concentration (for 50% of the test population) |

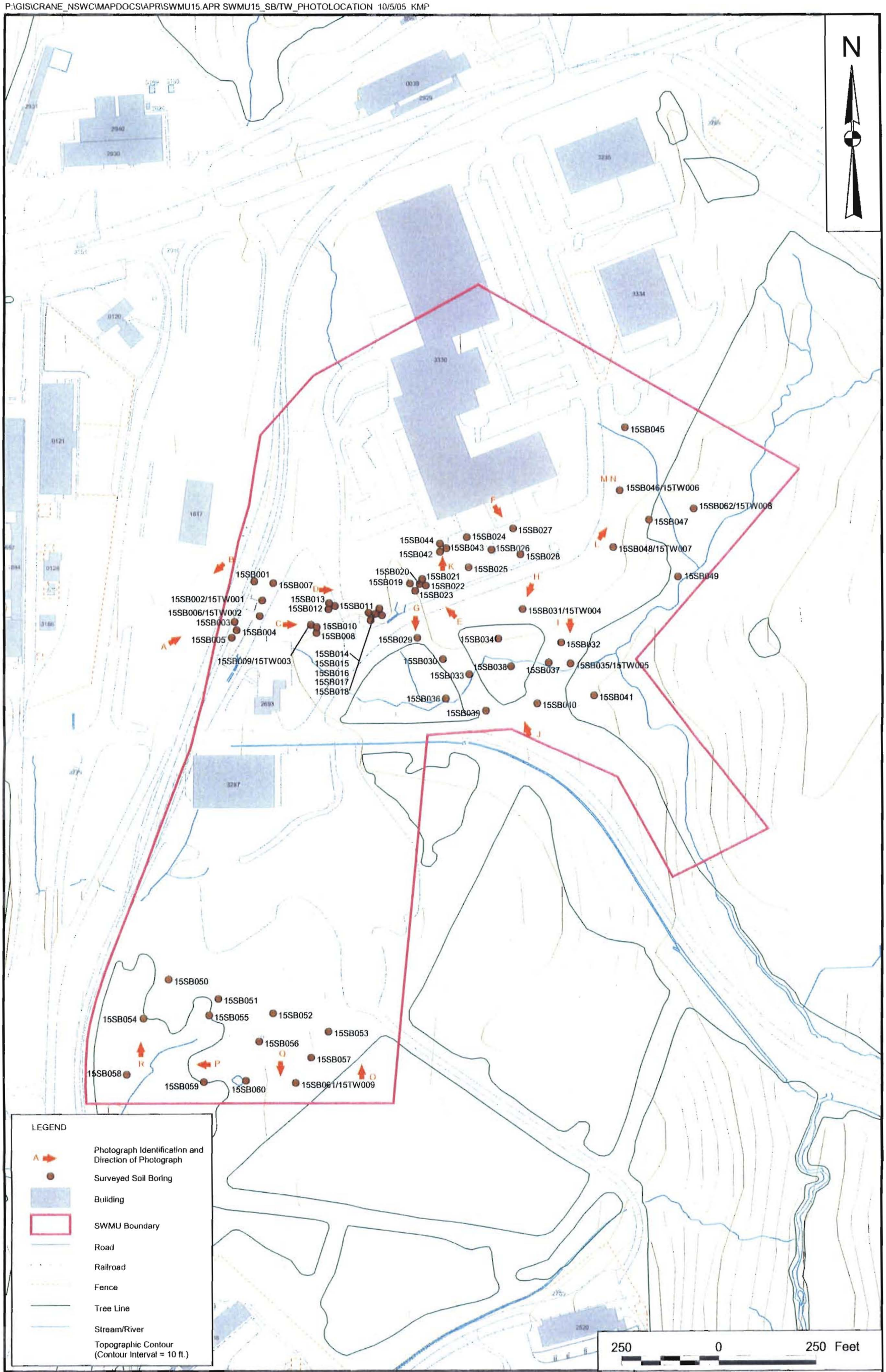
| | |
|---|---|
| LCS | Laboratory control sample |
| LOAEL | Lowest observable adverse effects level |
| LOEC | Lowest observed effect concentration |
| MATC | Maximum Acceptable Toxicant Concentration |
| MCL | Maximum Contaminant Level |
| mg | milligrams |
| mg/kg | milligrams per kilogram |
| mg/L | milligram per liter |
| MI/HR | miles per hour |
| MRL | Minimal Risk Level |
| MS | Matrix Spike |
| MSCM | milliSiemens per centimeter |
| MSD | Matrix spike duplicate |
| MV | millivolts |
| NAD27 | 1927 North American Datum |
| NAVD88 | 1988 North American Vertical Datum |
| NAVFAC EFD SOUTH | Naval Facilities Engineering Field Division South |
| NCEA | National Center for Environmental Assessment |
| NECC | Nutrient and energy cycling check |
| NEESA | Naval Energy and Environmental Support Activity |
| NOAA | National Oceanic and Atmospheric Administration |
| NOAEL | No Observable Adverse Effects Level |
| NOEC | No Observed Effect Concentration |
| NSWC | Naval Surface Warfare Center |
| NTU | Nephelometric turbidity unit |
| OECD | Organization of Economic Cooperation and Development |
| OMOE | Ontario Ministry of the Environment |
| OPPTS | Office of Prevention, Pesticides, and Toxic Substances |
| ORNL | Oak Ridge National Laboratory |
| ORP | Oxidation-reduction potential |
| OSWER | Office of Solid Waste and Emergency Response |
| PAH | Polycyclic aromatic hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PEC | Probable effects concentration |
| PEF | Particulate emission factor |
| PID | Photo ionization detector |

| | |
|---|---|
| PPE | Personal protective equipment |
| ppm | Parts per million |
| PPRTV | Provisional Peer Reviewed Toxicity Value |
| PRG | Primary Remediation Goal |
| PVC | Polyvinyl chloride |
| QA | Quality assurance |
| QAPP | Quality assurance project plan |
| QC | Quality control |
| RAGS | Risk Assessment Guidance for Superfund |
| RBTL | Risk-based target level |
| RCRA | Resource Conservation and Recovery Act |
| RDA | recommended daily allowance |
| RfD | Reference dose |
| RFI | RCRA Facility investigation |
| RISC | Risk Integrated System of Closure |
| RME | Reasonable maximum exposure |
| RPD | Relative percent difference |
| RQD | Rock quality designation |
| SERA | Screening Level Ecological Risk Assessment |
| SDWA | Safe Drinking Water Act |
| SOP | Standard operating procedure |
| SQG | Soil Quality Guideline |
| SSL | Soil Screening Level |
| ST | Storm Sewer and Outfall System |
| SUF | Site Use Factor |
| SV | Screening value |
| SVOC | Semivolatile Organic Compound |
| SWMU | Solid Waste Management Unit |
| TEC | Threshold Effects Concentration |
| TOC | Total organic carbon |
| TOM | Task Order Manager |
| TRV | Toxicity Reference Value |
| TtNUS | Tetra Tech NUS, Inc. |
| µg/kg | microgram per kilogram |
| UCL | Upper confidence limit |
| U.S. EPA | United States Environmental Protection Agency |

| | |
|---|---|
| U.S. FWS | United States Fish and Wildlife Service |
| USACE | United States Army Corps of Engineers |
| UTL | Upper tolerance limit |
| VOC | Volatile Organic Compound |
| WQC | Water Quality Criteria |
| WQS | Water Quality Standard |

# APPENDIX A
# PHOTOGRAPHS AND PHOTOGRAPH DIRECTION FIGURE

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU15.APR SWMU15_SB/TW_PHOTOLOCATION 10/5/05 KMP




| DRAWN BY | DATE |
|---|---|
| K. PEILA | 3/23/05 |
| CHECKED BY | DATE |
| J. GOERDT | 3/23/05 |
| COST/SCHEDULE-AREA | |
| SCALE | |
| AS NOTED | |

NAVFAC

PHOTOGRAPH DIRECTION MARKERS
SURVEYED SOIL BORING/TEMPORARY GROUNDWATER
WELL LOCATIONS
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA

| CONTRACT NUMBER | |
|---|---|
| CTO 0331 | |
| APPROVED BY | DATE |
| APPROVED BY | DATE |
| DRAWING NO. FIGURE A - 1 | REV 0 |

# FIGURE A-1
# SWMU 15 PHOTOGRAPHS

Figure A-1A 15SB001/003/004/005 (27 NE) Open gravel area parallel with railroad tracks which slope down to gravel lot. (12/9/04)

Figure A-1B 15SB02/06/07 (219 SW) Slope at base of railroad tracks along the open gravel lot (12/8/04)

Figure A-1C 15SB08/09/10 (68 E) Open gravel lot. Location of former USTs. (12/8/04)

Figure A-1D 15SB11/12/13 (111 E) Open gravel lot. (12/8/04)

# FIGURE A-1
# SWMU 15 PHOTOGRAPHS

Figure A-1E 15SB19/20/21/22/23 (305 NW) Open grass power line with woods on each side. (12/10/04)

Figure A-1F 15SB027 (126 SE) 4" Thick concrete pad between building 3330 and asphalt parking lot. (12/11/04)

Figure A-1G 15SB029 (199 S) Open grassy area next to tree line on upper slope. (12/9/04)

Figure A-1H 15SB031 (218 SW) Open grassy area next to tree line on upper slope. (12/9/04)

# FIGURE A-1
# SWMU 15 PHOTOGRAPHS

Figure A-1I 15SB032/035 (167 S) Open Grassy Slope on Power Line Down to Stream. Tree lined on both sides. (12/9/04)

Figure A-1J 15SB39/40 (347 N) Open grass power lines with woods on each side. (12/10/04)

Figure A-1K 15SB042/043/044 (17 N) Asphalt Parking Lot at Building 3330.

Figure A-1L 15SB045/046/047/048 (46 NE) Open grassy area with power line between road and tree line. (12/10/04)

# FIGURE A-1
# SWMU 15 PHOTOGRAPHS

Figure A-1M 15SB046 Peat Material. (12/10/04)

Figure A-1N 15SB046 Peat Type Material.

Figure A-1O 15SB53/57/61 (18 N) Open grassy power line bordered by woods on both sides. (12/04)

Figure A-1B 15SB59 284 W
Just inside woods near wet depression (12/04)

# FIGURE A-1
# SWMU 15 PHOTOGRAPHS

Figure A-1C 15SB61 (193 S) Just inside woods. Medium tree canopy. (12/04)

Figure A-1D AOC W (10 N)
Typical setting at the SWMU 15 landfill.
Medium canopy with grassy understory.

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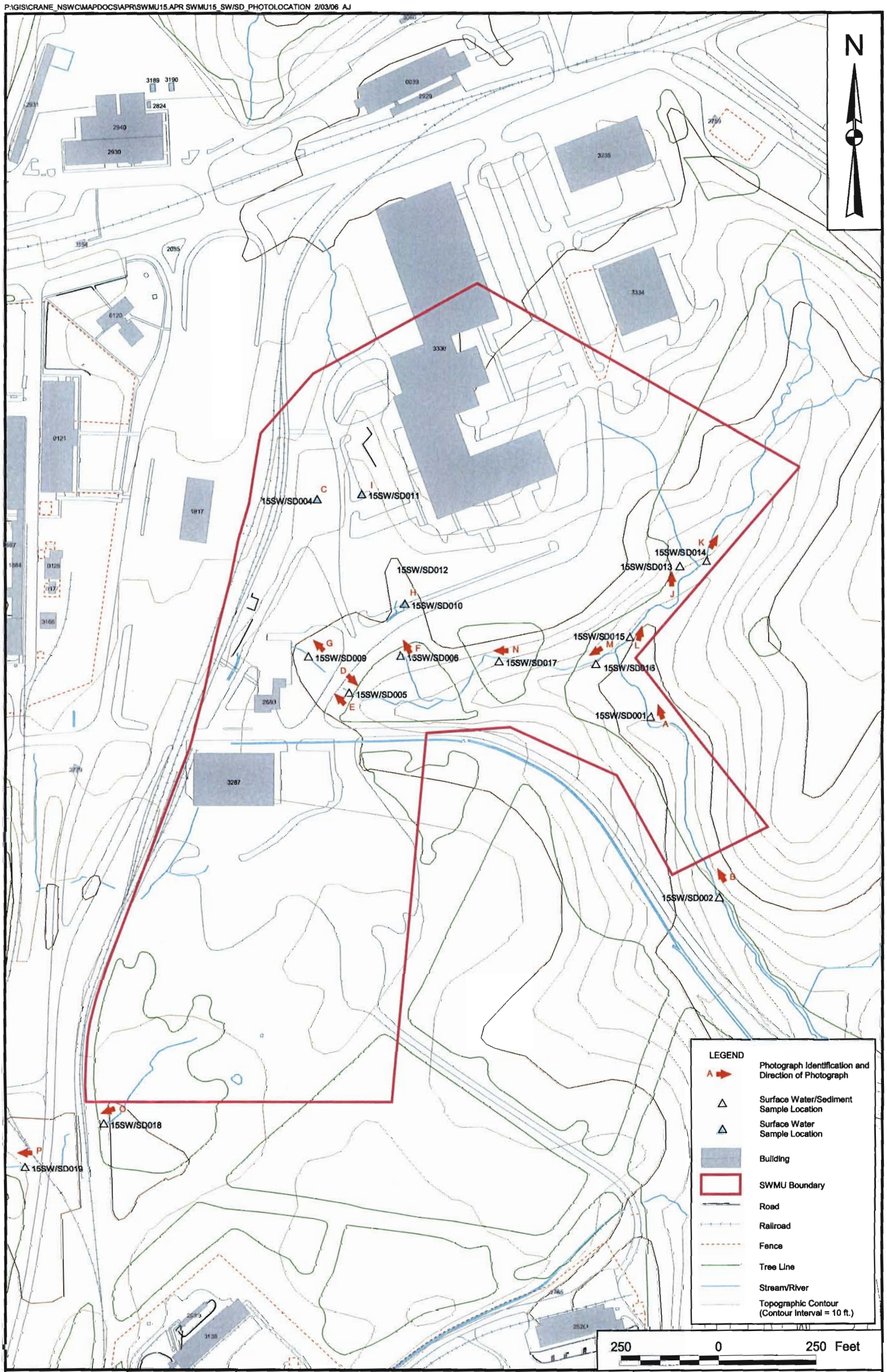


| DRAWN BY | DATE |
|---|---|
| K. PEILA | 9/28/05 |
| CHECKED BY | DATE |
| J. LUCAS | 2/03/06 |
| COST/SCHEDULE-AREA | |
| SCALE AS NOTED | |

NAVFAC

PHOTOGRAPH DIRECTION MARKERS
SURFACE WATER/SEDIMENT LOCATIONS
SWMU 15 - ROADS AND GROUNDS AREA
NSWC CRANE
CRANE, INDIANA

| CONTRACT NUMBER | |
|---|---|
| CTO 0331 | |
| APPROVED BY | DATE |
| APPROVED BY | DATE |
| DRAWING NO. FIGURE A - 2 | REV 0 |

# FIGURE A-2
# SWMU 15 PHOTOGRAPHS

Figure A-2A: Upstream 15SWSD001

Figure A-2B: Upstream 15SWSD002

Figure A-2C: Storm sewer 15ST004 at location 15SWSD004

Figure A2D: Downstream 15SWSD005

# FIGURE A-2
# SWMU 15 PHOTOGRAPHS

Figure A-2E: Upstream 15SWSD005

Figure A-2F: Upstream 15SWSD006

Figure A-2G: Upstream 15SWSD009

Figure A-2H: Storm sewer 15ST010 at location 15SWSD010

# FIGURE A-2
# SWMU 15 PHOTOGRAPHS

Figure A-2I: Storm sewer 15ST011 at location 15SWSD011

Figure A-2J: Upstream 15SWSD013

Figure A-2K: Upstream 15SWSD014

Figure A-2L: Upstream 15SWSD015

# FIGURE A-2
# SWMU 15 PHOTOGRAPHS

Figure A-2M: Upstream 15SWSD016

Figure A-2N: Upstream 15SWSD017

Figure A-2O: Upstream 15SWSD018

Figure A-2P: Upstream 15SWSD019

# FIGURE A-2
# SWMU 15 PHOTOGRAPHS
# (Not Used Directory)

IMG_1082: Close-up of 15TW005 at location 15SB035

Figure A-2A: Showing sampling of 15TW005 at 15SB035

# APPENDIX B
# BORING LOGS, TEMPORARY WELL CONSTRUCTION DIAGRAMS, AND RELATED MATERIALS

# APPENDIX B.1
# BORING LOGS AND TEMPORARY WELL CONSTRUCTION DIAGRAMS

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB001
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | | LOOSE | BRN GRAY | CLAY, SAND AND ROAD GRAVEL | CL/SC | (FILL) TOOK MOIST [15SS0010002] SLIGHT ODOR | .5 | | | |
| 0 to | 2 | | | | | | | | | 3 | | | |
| | | | | 3 | | | | | | | | | |
| S-2 @ | | | 4/4 | | M DENSE | ORANG BRN | CLAYEY SAND - TR ROCK FRAGS TR NEWSPAPER | SC | MOIST TOOK [15SB0010206] | | | | |
| 0 to 15 | | | | | | | | | | | | | |
| | 6 | | | | | | | | (FILL) | | | | |
| | | | | BOTM @ 6' | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB002
DATE: 12/8/04
GEOLOGIST: CONTI
DRILLER: Mc FAUL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | 1 | M DENSE | GRAY | CLAYEY SAND - TR | SC | MOIST → WET | 0 | | | |
| 1400 | 2 | | | 2' | | | ROCK FR AND ROOTS | | (FILL) TOOK [15SS0020002] | 0 | | | |
| | | | | | | | | | | 0 | | | |
| S-2 e | | | 1/4 | | SOFT | GRAY | CLAYEY SILT | SC/ML | POOR REC TRIED TWICE SLIGHT ODOR | 4 | | | |
| 1405 | | | | 6 | | | | | TOOK PETROLEUM [15SB0020206] | 0 | | | |
| | 6 | | | BOTM @ 6' | | | | | | 0 | | | |
| | | | | | | | | | SCREEN 1'-6' | | | | |

* 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. #: 15TW002

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB003
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | LOOSE | BRN | CLAY, SAND AND | SC | MOIST (FILL) | 0 | | | |
| 0935 | 2 | | | 2' | | GRAY | ROAD GRAVEL | | TOOK [15SS0030002] | 0 | | | |
| | | | | | M DENSE | GRAY BRN | CLAYEY SAND TO | | | 0 | | | |
| S-2 e | | | 4/4 | | M STIFF | | SANDY CLAY-TR | | (FILL) MOIST | 0 | | | |
| 0940 | | | | | TO SOFT | | ROCK FRAGS | | TOOK [15SB0030266] | 0 | | | |
| | 6 | | | 6' | | | | | | 0 | | | |
| | | | | BOT @ 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): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB004
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: McFAUL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | | LOOSE | BRN TAN | SAND AND ROAD | SM | MOIST (FILL) | 0 | | | |
| @ 0955 | 2 | | | 2' | | | GRAVEL - TR CLAY | | TOOK [15SB0040002] | 0 | | | |
| | | | | | M DENSE | YELLOW BRN | CLAYEY SAND TO | SC | MOIST | 0 | | | |
| S-2 @ | | | 3.8/4 | | TO | GRAY | | | | 0 | | | |
| 1000 | | | | | SOFT | | SANDY/SILTY CLAY TR ROCK FRAGS | | TOOK [15SB0040006] | 0 | | | |
| | 6 | | | 6' | | | | | (FILL) | 0 | | | |
| | | | | BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB005
DATE: 12/8/04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | LOOSE | TAN BRN | SAND AND ROAD | | MOIST (FILL) | 0 | | | |
| 1520 | 2 | | | | | | GRAVEL | | TOOK [15SS0050002] | 0 | | | |
| | | | | 3'± | | | | | | 0 | | | |
| S-2 e | | | | | SOFT | GRAY TO | SILTY CLAY - TR | | MOIST (FILL)? | 0 | | | |
| 1525 | | | | | | YELLOW BRN | GRAVEL | | TOOK | 0 | | | |
| | 6 | | | | | | | | [15SB0050206] | 0 | | | |
| | | | | BOTM @ 6' | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB06
DATE: 12/8/04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | LOOSE | BRN | TOPSOIL (2") | | | | | | |
| 1430 | 2 | | | 1 | | GRAY | SILTY SAND - SOME ROCK FRAGS-TR ROOTS FINE GRAVEL | SM | MOIST → WET TOOK FILL (15SS0060002) | 0 | | | |
| | | | | 3' | | | (F) ? 3' | | | 0 | | | |
| S-2 e | | | 4/4 | 4'± | M. STIFF | GRAY | CLAYEY SAND | SC | MOIST → WET | 0 | | | |
| 1435 | | | | | DENSE | BRN GRAY | CLAYEY SAND - SOME WEATHERED ROCK FRAG AND SANDSTONE | SC | MOIST TOOK [15SB0060206] | 0 | | | |
| | 6 | | | 6' | | | | | | 0 | | | |
| | | | | BOTM @ 6' | | | | | | | | | |
| | | | | | | | | | TOOK DUP 15FD12080401 AT 0206 AND MS/MSD | | | | |
| | | | | | | | | | 0206 ALSO | | | | |
| | | | | | | | | | SET 15TW006 | | | | |
| | | | | | | | | | SCREEN 1 → 6' | | | | |

* 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. #: 15TW006

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15 SB007
DATE: 12/8/04
GEOLOGIST: CONTI
DRILLER: MC.FALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | 1'± | SOFT | GRAY | CLAY, SAND ROOTS | SM | WET | 0 | | | |
| 1335 | 2 | | | | M STIFF | YELLOW BRN | CLAYEY SAND-TR | SC | TOOK [15SS0070002] MOIST | 0 | | | |
| | | | | | | | SUB ROUND GRAVEL | | TOOK [15SB0070206] | 0 | | | |
| S-2 @ | | | 4/4 | | | | TO CLAYEY SAND-TR | SC | MOIST | 0 | | | |
| 1340 | | | | | | | WEATHERED ROCK FRAGS | | | 0 | | | |
| | 6 | | | 6' | | | | | | 0 | | | |
| | | | | BOTM @ 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):

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB008
DATE: 12/8/04
GEOLOGIST: CONTI
DRILLER: MC. FAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | | M DENSE | BRN | TOP SOIL CLAYEY SAND-SOME | SC | MOIST | 0 | | | |
| @ 1255 | 2 | | | | | | ROAD GRAVEL TR ROOTS | | TOOK [15SS008 0002] | 0 | | | |
| | | | | 3'± | STIFF/ | | | | FILL TO 3'± | 0 | | | |
| S-2 @ | | | 4/4 | 4' | M DENSE | GRAY | CLAYEY SILT | ML | MOIST | 0 | | | |
| 1300 | | | | | SOFT | BRN GRAY | SILTY CLAY | CL | TOOK [15SB0080206] MOIST → WET | 0 | | | |
| | 6 | | | | | | | | | 0 | | | |
| | | | | | | | | | | 0 | | | |
| S-3 @ | | | 3/4 | 7.5 | DENSE | ORANG | CLAYEY SAND-SOME | | TOOK | 0 | | | |
| 1305 | 9 | | | 9' | | BRN | SANDSTONE FRAGS. | | [15SB0080610] | 0 | | | |
| | | | | REF @ BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB009
DATE: 12/8/04
GEOLOGIST: CONTI
DRILLER: Mc FAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 1120 | 0 | | 2/2 | | M DENSE | GRAY BRN | SANDY CLAY SOME ROAD GRAVE FRAGS | SC | MOIST FILL TOOK 15SB0090002 | 0 | | | |
| | 2 | | | | | | | | | 0 | | | |
| | | | | | STIFF | GRAY | SANDY SILT - TR ROOTS | ML | MOIST | 0 | | | |
| S-2 @ 1125 | | | 3.5/4 | | TO SOFT | | | | | 0 | | | |
| | | | | 4.5 | | | 5.5? | | WET 4.5 - 5.5 TOOK 15SB0090206 | 0 | | | |
| | 6 | | | 5.5 | | | ↓ FILL | | | | | | |
| | | | | | SOFT | MOTTLED BRN GRAY | SILTY CLAY | CL | MOIST | 0 | | | |
| | | | | | | | | | TO WET | 0 | | | |
| S-3 @ 1130 | | | 3.2/4 | | | | | | TOOK 15SB0090610 | 0 | | | |
| | | | | 8.5 | M DENSE | ORANG BRN | SILTY SAND - TR ROCK FRAG | | | 0 | | | |
| | 9.5 | | | 9.5 REF & BOTM | | | | | | | | | |
| | | | | | | | | | SET TEMP WELL | | | | |
| | | | | | | | | | SCREEN 4.5-9.5 | | | | |
| | | | | | | | | | 5' SCR | | | | |
| | | | | | | | | | 5' RISER | | | | |

* 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. #: 15TW009

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15 SB010
DATE: 12-8-04
GEOLOGIST: CONTI
DRILLER: MC FAUL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 1240 | 0 | | 2/2 | | M DENSE | BRN GRAY | CLAYEY TO SILTY SAND SOME ROAD GRAVEL TR ROOTS | | MOIST (FILL) TOOK [15SS0100002] | 0 | | | |
| | 2 | | | | | | | | | 0 | | | |
| | | | | 3 | | | | | | 0 | | | |
| S-2 @ 1245 | | | 3.3/4 | | SOFT | GRAY | SANDY CLAY/CLAYEY SAND (FILL ?) | SC | MOIST → WET TOOK [15SB0100206] | 0 | | | |
| | | | | 5.5 | | | | | | | | | |
| | 6 | | | | M STIFF | MOTTLED GRAY BRN | SILTY CLAY | CL | MOIST → WET NATC 5.5 ? | 0 | | | |
| S-3 @ 1250 | | | 3.6/4 | 8.0 | DENSE | ORANGE BRN | CLAYEY SAND AND SANDSTONE FRAG. | SC | MOIST → WET TOOK [15SB0100610] | 0 | | | |
| | 9.5 | | | 9.5 REF & BOTM | | | | | | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB011
DATE: 12/8/04
GEOLOGIST: CONTI
DRILLER: Mc. FALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | | M STIFF | ORANG BRN | SILTY CLAY-TR ROOTS | CL | MOIST | 0 | | | |
| 1035 | 2 | | | | | | TO GRAVEL-SOME SILTY CLAY | | [15SS0110002] FILL | 0 | | | |
| | | | | | M | | TO | ML | | 0 | | | |
| S-2 @ | | | 3.5/4 | 4± | STIFF TO | | SANDY SILT | | ? FILL | 0 | | | |
| 1040 | | | | | SOFT | BRN GRAY | SILTY CLAY | CL | [15SB0110206] | 0 | | | |
| | 6 | | | 6' | | | | | | 0 | | | |
| | | | | BOTM @ 6' | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB012
DATE: 12-8-04
GEOLOGIST: CONTI
DRILLER: MC FALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | | M DENSE | GRAY | ROAD GRAVEL SANDY SILT/SILTY | SM | MOIST (FILL)? | 0 | | | |
| 1000 | 2 | | | 2'± | | | F. SAND | | TOOK [15SS0120002] | 0 | | | |
| | | | | 3'± | SOFT | GRAY TO | CLAYEY SAND TO | SC | MOIST → WET | 0 | | | |
| S-2 @ | | | 3.7/4 | | | GRAY BRN | CLAYEY SILTY TR | ML | MOIST | 0 | | | |
| 1010 | | | | | M STIFF | | SAND | CL | TOOK [15SB0120206] | 0 | | | |
| | 6 | | | BOTM @ 6' | | | | | | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB013
DATE: 12-8-04
GEOLOGIST: CONTI
DRILLER: MCFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | M DENSE | GRAY | ROAD GRAVEL TO SANDY SILT | ML | MOIST TOOK | 0 | | | |
| 1020 | 2 | | | | | | (FILL?) | | [15550130002] | 0 | | | |
| | | | | 3'± | | MOTTLED | | | WET ZONE ≈ 3' | 0 | | | |
| S-2 e | | | | | | GRAY BRN | SILTY CLAY - CLAYEY | ML | MOIST | 0 | | | |
| 1030 | | | | | | | SILT | CL | TOOK [15580130206] | 0 | | | |
| | 6 | | | | | | | | | 0 | | | |
| | | | | BOTM @ 6' | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB014
DATE: 12-11-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | | SOFT | BRN TO | 3" TOPSOIL TO | | [15SB014 0002] | 0 | | | |
| @ 0935 | 2 | | | | | YELLOW BRN | SILTY CLAY - TR ROCK FRAG | CL | MOIST TO WET | 0 | | | |
| | | | | | | | | | | 0 | | | |
| S-2 @ | | | 3/4 | | | | | | | 0 | | | |
| 0940 | | | | 5'± | | | ? (FILL) | | [15SB014 0206] | 0 | | | |
| | 6 | | | 6 | M DENSE | ORANG TAN BRN | SILTY SAND - SOME ROCK FRAGS | SM | MOIST | 0 | | | |
| | | | | BOTM | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | TOOK FD12110401 | | | | |
| | | | | | | | | | @ 2-6' ALSO MS/MSD | | | | |
| | | | | | | | | | HERE | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB015
DATE: 12-11-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 1.2/2 | | LOOSE | GRAY | 3" ASPHALT/GRAVEL TO | | MOIST | 0 | | | |
| 9/15 | 2 | | | | SOFT | YELLOW BRN | SILTY CLAY-TR ROOTS TR ROCK FR | CL | ↓ [15SS015000 2] WET (FILL) | 0 | | | |
| | | | | | M | GRAY | CLAYEY SAND -SOME | SC | MOIST → WET | 0 | | | |
| S-2 e | | | 2/4 | | STIFF | ORANGE BRN | GRAVEL AND ROCK FRAGS | | [15SB015020G] | 0 | | | |
| 0920 | | | | | | | | | | 0 | | | |
| | 6 | | | 6' | | | ? (FILL) | | LOOKS LIKE FILL TO 6' | 0 | | | |
| | | | | BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB016
DATE: 12-11-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | | SOFT | YELLOW | 4" TOPSOIL SILTY CLAY-TR | CL | [15SS0160002] | 0 | | | |
| 3/5 | 2 | | | | TO | BRN | ROOTS AND ROCK FRAGS | | MOIST → WET (FILL) | 0 | | | |
| | | | | | M STIFF | | CLAYEY SAND/SANDY | SC | MOIST | | | | |
| S-2 @ | | | 4/4 | | TO | TR GRAY | CLAY -TR ROCK FRAGS | | | | | | |
| 9/10 | | | | | STIFF | | | | [15SB0160206] | | | | |
| | 6 | | | 6' BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB017
DATE: 12-11-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | 1.' | M STIFF | YELLOW | 2" ASPHALT & GRAVEL SILTY CLAY | CL | MOIST [15SS0170002] | 0 | | | |
| 0855 | 2 | | | 2' | TO | BRN | TR ROOTS TO | | FILL TO 2'±? | 0 | | | |
| | | | | | STIFF | | CLAYEY SAND | SC | MOIST – TR | 0 | | | |
| S-2 @ | | | 4/4 | • | | | | | GRAY STAINS @ 4'± | 0 | | | |
| 900 | | | | BTM | | | | | [15SB0170206] | 0 | | | |
| | 6 | | | @ 6' | | | | | | 0 | | | |

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: • Sample Loc. ≃ 4'

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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB018
DATE: 12-11-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 1.5/2 | 1 | LOOSE | GRAY | ASPHALT AND SANDY GRAVEL | | MOIST [15SS018000C2] | 0 | | | |
| 0925 | 2 | | | | SOFT | GRAY BRN | SANDY CLAY - TR ROCK FRAGS AND ROOTS. | SC | MOIST → WET | 0 | | | |
| S-2 e | | | 2.6/4 | | | | | | [15SB018020C6] | 0 | | | |
| 0930 | | | | 5 | | | | | FILL TO 5'± ? | 0 | | | |
| | 6 | | | 6 | M DENSE | ORANGE BRN | SILTY SAND - TR WEATH ROCK FRAG | SM | MOIST (SANDSTONE) | 0 | | | |
| | | | | BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB019
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: MCFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | 1.0 | LOOSE | GRAY | ~3" ASPHALT SAND/ROAD GRAVEL | | [15SS0190002] | 0 | | | |
| @ 1235 | 2 | | | 3.0 | STIFF | BLK TO YELLOW BRN | ASH TO SILTY CLAY | CL | MOIST (FILL) | 0 | | | |
| | | | | | M STIFF | YELLOW BRN | SANDY CLAY - TR | SC | ? FILL. | 0 | | | |
| S-2 @ | | | 4/4 | | TO | | GRAVEL AND ROCK FRAGS | | | 0 | | | |
| 1240 | | | | | STIFF | | | | MOIST [15SB0190206] | 0 | | | |
| | 6 | | | 6' BOTTM | | | | | | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB020
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | 1 | LOOSE | | 3" ASPHALT CLAY GRAVEL, SAND | | MOIST (FILL) | 0 | | | |
| @ 1315 | 2 | | | 3 | STIFF | GRAY ORANG BRN | SANDY CLAY -TR ROOTS | SC CL | [15SS020 0002] | 0 | | | |
| | | | | | M STIFF | YELLOW BRN | CLAYEY SAND -TR ROOTS | SC | MOIST | 0 | | | |
| S-2 @ | | | 4/4 | | | TR. GRAY | | | LOOKS NAT @ 2' ? | 0 | | | |
| 1320 | | | | | | | | | [15SB0200206] | 0 | | | |
| | 6 | | | 6' BTM | | | | | | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB021
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: MCFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | 1 | LOOSE | GRAY | ASPHALT SILTY CLAY, SOME ROAD GRAVEL | CL | MOIST (FILL) | 0 | | | |
| 1340 | 2 | | | | M STIFF | GRAY YELLOW BRN GRAY | CLAYEY SAND TR ROOTS | SC | [15SS0210002] | 0 | | | |
| | | | | | | | | | FILL? NOT SURE | 0 | | | |
| S-2 e | | | 4/4 | | | | | | MOIST | 0 | | | |
| 1345 | | | | 5 | | | | | [15SB0210206] | 0 | | | |
| | 6 | | | 6' | V DENSE | RED BRN | CLAYEY SAND TO REDDISH SANDSTONE FRAGS | SC | MOIST | 0 | | | |
| | | | | BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB022
DATE: 10-12-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | 1'± | LOOSE | TAN GRAY | ASPHALT GRAVEL SAND & CLAY - TR ROCK FRAG | | MOIST | 0 | | | |
| @ 1330 | 2 | | | | SOFT | GRAY | SILTY CLAY (FILL) | CL | [15SS0220002] | 0 | | | |
| | | | | | TO | | TR ROCK FRAG TO 3 or 4' | | | 0 | | | |
| S-2 @ | | | 4/4 | 4 | M STIFF | | | | | 0 | | | |
| 1335 | | | | | M STIFF | BRN | TO SANDY CLAY | SC | MOIST | 0 | | | |
| | 6 | | | 6' | STIFF | YELLOW BRN | SANDY CLAY CLAYEY SAND - TR ROCK FRAG | SC | [15SB0220206] | 0 | | | |
| | | | | BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB023
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: MCFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | | STIFF | BRN GRAY | 3" ASPHALT SILTY CLAY-TR SAND | CL/ML | MOIST (FILL) | 0 | | | |
| 1250 | 2 | | | | | | AND ROCK FRAGS | | [15SS0230002] | 0 | | | |
| | | | | | | | | | | 0 | | | |
| S-2 @ | | | 4/4 | 4 | | | | | MOIST SL ODOR @ 4' | 1.5 | | | |
| 1255 | | | | | M STIFF | YELLOW BRN | SANDY CLAY/CLAYEY | | [15SB0230206] | 0 | | | |
| | 6 | | | 6' BOTM | | TR GRAY | SAND | | | 0 | | | |
| | | | | | | | | | FD12100401 @ 0206 ALSO 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): 0

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB024
DATE: 12-11-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | 1 | LOOSE | GRAY | ASPHALT AND SANDY GRAVEL | | MOIST → WET [15SS0240002] | 0 | | | |
| 1020 | 2 | | | | SOFT | YELLOW BRN | SILTY CLAY-TR ROCK FRAGS | CL | (FILL) TO 3'± | 0 | | | |
| | | | | 3 | | | | | | 0 | | | |
| S-2 e | | | 3/3 | | M SOFT | GRAY BRN | WEATH SANDSTONE | VBR | MOIST | 0 | | | |
| 1025 | 5' | | | 5' | | | (LAMINATED) | | [15SB0240206] | 0 | | | |
| | | | | BOTM & REF | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB025
DATE: 12-11-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | 1 | LOOSE | GRAY | 3" ASPHALT/GRAVEL | | MOIST [15SS0250002] | 0 | | | |
| e 10 10 | | | | | M STIFF | GRAY ORANG BRN | CLAYEY SAND TR ROOTS | SC | | 0 | | | |
| | 2 | | | | | YELLOW BRN | | | | 0 | | | |
| S-2 e | | | 3/3 | 3.5 | | | ? (FILL) | | MOIST | | | | |
| 10 15 | | | | | M DENSE | YELLOW BRN | CLAYEY SAND - SOME TR RED REDDISH SANDSTONE FRAGS | | [15SB0250206] | 0 | | | |
| | | | | 5' REF & BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB026
DATE: 12/11/04
GEOLOGIST: CONTI
DRILLER: McFAUL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e 1030 | 0 | | 2/2 | 1 | SOFT | BRN | 3" TOPSOIL AND CLAYEY SILT | ML | MOIST [15SS0260002] | 0 | | | |
| | 2 | | | | M SOFT | BRN TAN | WEATHERED | | | 0 | | | |
| | | | | | | GRAY | SANDSTONE | | MOIST | 0 | | | |
| S-2 e 1035 | | | 1.5/1.5 | 3.5 REF & BOTM | | | | | [15SB0260206] | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB027
DATE: 12-11-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 C | 0 | | 2/2 | 1' | LOOSE | | CONCRETE PAD (4") SUB GRAVEL | | MOIST | 0 | | | |
| 1100 | 2 | | | | M STIFF | ORANG BRN | CLAYEY SAND-WEATH | | [15SB027 0002] | 0 | | | |
| S-2 | 3' | | | 3' | | | SHALY SANDSTONE | | MOIST | 0 | | | |
| C 1105 | | | | REF & BOTM | | | | | [15SB027 0206] | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB028
DATE: 12/11/04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | 1.0 | LOOSE | GRAY | ASPHALT - SANDY GRAVEL | | MOIST [15SS0280002] | 0 | | | |
| 1040 | 2 | | | | | TAN BRN GRAY | WEATHERED SANDSTONE | VBR | | 0 | | | |
| | | | 2/2 | | | | | | | 0 | | | |
| S-2 c | 4 | | | 4.0 | | | | | MOIST [15SB0280206] | 0 | | | |
| 1045 | | | | REF & BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB029
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | M STIFF | BRN | 2" TOPSOIL SILTY CLAY - TR ROOTS | CL | MOIST (FILL) | 0 | | | |
| 1025 | 2 | | | 2 | | | AND LIMESTONE GRAVEL FRAGS | | TOOK ? [15SS029 0002] | 0 | | | |
| | | | | | M STIFF | YELLOW BRN | CLAYEY SAND/ | SC | | 0 | | | |
| S-2 e | | | 2.3/3 | | | GRAY | SANDY CLAY - SOME ROCK FRAGS | | MOIST | 0 | | | |
| 1030 | | | | 5' | | | | | [15SB029D206] | 0 | | | |
| | | | | REF. & BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB030
DATE: 12/14/04
GEOLOGIST: CONTI
DRILLER: JG

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 0915 | 0 | | | | SOFT | BRN | 3" TOPSOIL TO CLAYEY SILT - TR ROOTS | ML | MOIST | 0 | | | |
| | 2 | | | | TO M STIFF | YELLOW BRN | | CL | [15SB030 0002] | 0 | | | |
| S-2 0920 | 3 | | | 3' | | | SILTY CLAY - TR ROOTS | CL | MOIST | 0 | | | |
| | | | | BOTM | | | | | [15SB030 0206] | | | | |
| | | | | | | | | | HAND AUGER TO 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): 0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB031
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 1050 | 0 | | 2/2 | | M DENSE | YELLOW BRN | 3" TOPSOIL CLAYEY SAND-SOME ROCK FRAGS | SC | MOIST TOOK (FILL?) [15SS0310002] | 0 | | | |
| | 2 | | | | | | | | | 0 | | | |
| | | | | | | | TO | | | 0 | | | |
| S-2 @ 1055 | | | 4/4 | | SOFT | | SANDY CLAY-TR ROCK FRAGS | SC | TOOK | 0 | | | |
| | | | | 5.0'± | | | SOIL IS WET ≈ 4.5 (4" ZONE) | | [15SB0310206] (FILL) | 0 | | | |
| | 6 | | | | M STIFF TO SOFT | BRN GRAY | SILTY CLAY | CL | MOIST | 0 | | | |
| | | | | | | | TO | | | 0 | | | |
| S-3 @ 1100 | | | 3.8/4 | | | | SOME ROCK FRAGS | | SLIGHT ODOR ≈8' | 0 | | | |
| | | | | | | | | | TOOK [15SB0310610] | 0 | | | |
| | 10 | | | 9 10 | | | | | NAT AT 10'± | 0 | | | |
| | | | | | SOFT | GRAY | CLAYEY SILT-TR ROOTS | ML/CL | MOIST → WET | 0 | | | |
| S-4 @ 1105 | | | | | | | | | | 0 | | | |
| | 14 | | | 14' | | | LAST 2" STIFF SILTY CLAY | | TOOK [15SB0311014] | 0 | | | |
| | | | | REF & BOTM | | | BRN SANDSTONE IS IN DRIVE SHOE | | | | | | |
| | | | | | | | 5' SCREEN 14-9 | | | | | | |
| | | | | | | | 10' RISER | | | | | | |

* 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. #: 15TW031

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB032
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: MC FAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | 1.0 | M STIFF | BRN | SILTY CLAY-TR ROOTS | CL | TOOK MOIST | 0 | | | |
| 1130 | 2 | | | | SOFT | YELLOW BRN | SANDY CLAY-TR SILT | SC | [15SS0320002] | 0 | | | |
| | 3 | | 1/1 | 2.5 3.0 | DENSE | ORANG BRN | SILTY SAND AND SANDSTONE FRAGS | SM | MOIST TOOK | 0 | | | |
| S-2 @ | | | | REF & BOTM @ 3' | | | | | [15SB0320206] | | | | |
| 1135 | | | | | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15 SB033
DATE: 12/14/04
GEOLOGIST: CONTI
DRILLER: JG

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | | | SOFT TO | BRN RED | 0-3" TOPSOIL | | MOIST | | | | |
| 8/50 | 2 | | | 2' | M STIFF | BRN | SILTY CLAY TR- ROOTS AND REDDISH SANDSTONE FRAGS | | [15SS0330002] MOIST | 0 | | | |
| | | | | REF W/ HAND AUGER | | | | | | 0 | | | |
| | | | | | | | | | HAND AUGER MOVED CLOSER TO STREAM THAN ORIG. LOCATION. | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB034
DATE: 12-14-04
GEOLOGIST: CONTI
DRILLER: JG

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | | | M STIFF | ORANG BRN | CLAYEY SAND-TR ROOTS | SC | MOIST [15SS034002] | 0 | | | |
| 10'15 | 2 | | | 2' | | | AND SANDSTONE FRAGS | | | 0 | | | |
| | | | | REF | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | HAND AUGER REF @ 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:

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB035
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 1.5/2 | 1 | SOFT | BRN | 2" TOPSOIL SILTY CLAY - TR ROOTS | CL | MOIST | 0 | | | |
| 1150 | 2 | | | 2 | | | | | TOOK [15SS0350002] | 0 | | | |
| | | | | | M DENSE | YELLOW BRN | CLAYEY SAND AND ROCK FRAGS | SC | MOIST | 0 | | | |
| S-2 @ 1155 | | | 3.5/4 | | | | | | TOOK | 0 | | | |
| | | | | | | | | | [15SB0350206] | 0 | | | |
| | 6 | | | 5.5 6 | SOFT | GRAY BRN | WEATHERED ROCK (SANDSTONE) | | | 0 | | | |
| | | | | BOTM @ 6' | | | | | | | | | |
| | | | | | | | | | SCREEN 1-6 | | | | |
| | | | | | | | | | THIS LOCATION | | | | |
| | | | | | | | | | CLOSE TO NEARBY STREAM | | | | |

* 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. #: 15TW035

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB036
DATE: 12-14-04
GEOLOGIST: CONTI
DRILLER: JG

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | | | M STIFF | BRN | CLAYEY SAND-TR | | MOIST | 0 | | | |
| 1000 | 2 | | | 2 | | | ROOTS-TR ROCK FRAGS | | [15SS036D002] | 0 | | | |
| | | | | REF W/H. AUGER | | | | | | | | | |
| | | | | | | | | | HAND AUGER | | | | |
| | | | | | | | | | REF @ 2' | | | | |
| | | | | | | | | | MOVED CLOSER TO STREAM THAN ORIG LOG. | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB037
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: MCFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | | M STIFF | BRN | 2" TOPSOIL± CLAYEY SILT-TR ROOTS | ML | MOIST TOOK | 0 | | | |
| @ 1205 | 2 | | | 2 | | | | | [15550370002] | 0 | | | |
| S-2 @ | | | 2/2 | | SOFT | BRN GRAY | SILTY CLAY-SOME | CL | TOOK | 0 | | | |
| 1210 | 4 | | | 4' | | | ROCK FRAGS SANDSTONE IN SHOE | | [15580370206] | 0 | | | |
| | | | | REF @ 4' | | | TD | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB038
DATE: 12-14-04
GEOLOGIST: CONTI
DRILLER: JG.

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | | | M | BRN | TOPSOIL TO | | MOIST | 0 | | | |
| 1145 | 2 | | | 2' | STIFF | ORANG BRN | SANDY CLAY TR ROOTS TR ROCK FRAGS | | [15S50380002] | 0 | | | |
| | | | | REF | | | | | | | | | |
| | | | | | | | | | HAND | | | | |
| | | | | | | | | | AUGER REF @ 2' | | | | |
| | | | | | | | | | LOCATED CLOSER TO STREAM THAN ORIG LOC. | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB039
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | | | SOFT | BRN | TOP 3" TOPSOIL TO | | MOIST [15SS039 0002] | 0 | | | |
| @ 1510 | | | 2.5/3 | | | | SILTY CLAY TR ROOTS TO | CL | ↓ WET | 0 | | | |
| | 3 | | | 2.5 3' | M DENSE | TAN BRN | CLAYEY SAND SILTY SAND-TR CLAY AND REDDISH SANDSTONE FRAG | SM | ↓ MOIST | 0 | | | |
| | | | | REF @ BOTM | | | | | | | | | |
| | | | | | | | | | TOOK DPT 0-3 - REF @ 3' - DECIDE TO TAKE JUST 1 SAMPLE 0-5 → 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

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB040
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 1445 | 0 | | 2/2 | | SOFT | BRN | 2" TOPSOIL CLAYEY SAND - TR ROCK FRAGS TR ROOTS | | MOIST → WET [15SB040D002] | 0 | | | |
| | 2 | | | | | | | | | 0 | | | |
| | | | | 3 | | | | | | 0 | | | |
| S-2 @ 1450 | | | 2/4 | | M DENSE | ORANG BRN | SILTY SAND - TR TO SOME TR CLAY ROCK FRAGS | | MOIST [15SB040D006] | 0 | | | |
| | 6 | | | 6' BOTM | | | | | | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB041
DATE:
GEOLOGIST: CONTI
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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 0 | 0 | | | | M STIFF | YELLOW BRN | SANDY CLAY - TR ROOTS AND ROCK FRAGS. | | MOIST | 0 | | | |
| 10 50 | 2 | | | 2' REF | | | | | [15SS041000 2] | 0 | | | |
| | | | | | | | | | AUGER REF @ 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

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB042
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 1100 | 0 | | 2/2 | | M STIFF | BRN | 2" ASPHALT SILTY CLAY -TR | | MOIST (FILL) | 0 | | | |
| | 2 | | | | | TO | SAND-ROCK FR. AND ROOTS | | [15SS0420002] | 0 | | | |
| | | | | | | GRAY | | | | 0 | | | |
| S-2 @ 1105 | | | 4/4 | 3.5 | | RED TAN | | | FILL | 0 | | | |
| | | | | | M DENSE | BRN | SANDY CLAY GRADES TO WEATHERED SANDSTONE | | MOIST [15SB042020006] | 0 | | | |
| | | | | 6' BOTM | | | | | | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB043
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: MCFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 1/2 | | M STIFF | YELLOW BRN | ASPHALT ≈ 2" SILTY CLAY - TR | | MOIST (FILL) | 0 | | | |
| @ 1045 | 2 | | | | | | ROCK FRAGS | | [15SS043000Z] | 0 | | | |
| | | | | 3.0 | | | | | FILL TO AT LEAST 3' | 0 | | | |
| S-3 @ | | | 3/3 | 4.0± | SOFT | GRAY | SILTY CLAY - TR | | MOIST → WET | 0 | | | |
| 1050 | 5 | | | 5' | M STIFF | GRAY BRN | ROOTS WEATH SANDSTONE | | [15SB043020C] | 0 | | | |
| | | | | BOTM REF @ 5' | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB044
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: Mc FAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 1115 | 0 | | 2/2 | | M STIFF | YELLOW | 2" ASPHALT± SILTY CLAY-TR | CL | FILL (MOIST) | 0 | | | |
| | 2 | | | | TO | BRN | ROCK FRAGS TR SAND | | [15SS044002] | 0 | | | |
| | | | | | STIFF | | | | | 0 | | | |
| S-2 @ 1120 | | | 2.5/2.5 | 3.5 | | | | | FILL ? 3.5 | | | | |
| | | | | | M STIFF | GRAY | YELLOW SANDY CLAY TO | | | 0 | | | |
| | 4.5 | | | 4.5 | SOFT | BRN | WEATHERED SANDSTONE | | MOIST [15SB044020] | 0 | | | |
| | | | | REF & BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB045
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | M DENSE | BRN | SILTY CLAY - ROCK FRAGS | CL | FILL (MOIST) | 0 | | | |
| 1000 | 2 | | | | | | ROOTS | | TOOK [15SS0450002] | 0 | | | |
| | | | | | M STIFF | | CLAYEY SAND - SOME | SC | MOIST | 0 | | | |
| S-2 e | | | 4/4 | 4 | | | ROCK FRAGS | | (FILL) | 0 | | | |
| 1005 | | | | | SOFT | GRAY | SILTY CLAY - TR | | TOOK [15SB0450206] | 0 | | | |
| | 6 | | | | | | ROCK FRAGS | | | 0 | | | |
| | | | | | | | | | | 0 | | | |
| S-3 e | | | 4/4 | 8' | | | | | | 0 | | | |
| 1010 | | | | | STIFF | YELLOW BRN | SANDY CLAY - SOME | SC | MOIST - NAT ? | 0 | | | |
| | 10 | | | | | | ROCK FRAGS (WEATHERED) | | [15SB0450610 | 0 | | | |
| | | | | 11' | | | | | [15SB0451012] | 0 | | | |
| | | | | | M SOFT | BRN GRAY | WEATHERED SHALE | V BR | MOIST | 0 | | | |
| S-4 e | | | 4/4 | | | | | | | 0 | | | |
| 1015 | 14 | | | 14 | | | | | | 0 | | | |
| | | | | REF & BOTM | | | | | | 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):

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB046
DATE: 12-10-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | M STIFF | YELLOW BRN | SILTY CLAY - TR ROOTS | CL | MOIST | 0 | | | |
| 0850 | 2 | | | | | | TR ROCK FR | | TOOK [15SS046 0002] | 0 | | | |
| | | | | | | TO | | | (FILL ?) | 0 | | | |
| S-2 e | | | 4/4 | | | BRN GRAY | | | | 0 | | | |
| 0855 | | | | 5 | | | | | | 0 | | | |
| | 6 | | | | SOFT | GRAY | SILTY CLAY - TR ROOTS | CL | LOOKS NAT, MOIST BUT FILL | 0 | | | |
| | | | | | | | TR ORG MATL | | TOOK [15SB046 0206] | 5 | | | |
| S-3 e | | | 4/4 | | TO | | TR ROCK FRAGS | | WITH ODOR (CHEMICAL) | 0 | | | |
| 0900 | | | | | M STIFF | | CLAY, ROCK FRAG MIX. | | FILL | 0 | | | |
| | 10 | | | 10 | | | | | TOOK [15SB046 0610] | 0 | | | |
| | | | | | | BRK | SILTY CLAY - TR ROCK FRAG | CL | MOIST | 0 | | | |
| S-4 e | | | | | | | | | (FILL) | 0 | | | |
| 0905 | | | 4/5 | 13 | | | | | | 0 | | | |
| | | | | 14 | SOFT | DK BRN | PEAT MATERIAL | | BUT FILL | 0 | | | |
| | 15 | | | | SOFT | OLIVE BRN | SANDY CLAY TR ROOTS | SC CL | MOIST → WET | 0 | | | |
| | | | | | M STIFF | | SILTY CLAY - TR ROOTS AND ROCK FRAGS | CL | MOIST | 0 | | | |
| S-5 | | | | | | | | | STILL LOOKS LIKE FILL. | 0 | | | |
| 0915 | | | 4/5 | Sample Depth ± | | | | | TOOK [15SB046 1020] | 0 | | | |
| | | | | 19.0 | | | | | | 0 | | | |
| | 20 | | REF e 20.5 | 20 | SOFT | GRAY | CLAYEY SILT TR ROOTS SILTY CLAY | CL/ML | WET - LOOKS NAT | 0 | | | |

SHOE HAD SOME REDDISH SANDSTONE FRAGS

* 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 TW 10-20 SCREEN

Converted to Well: Yes ✓ No _____ Well I.D. #: 15TW046

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB047
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | .5 | SOFT TO | BRN | 0-6" SILTY CLAY-TR ROOTS | CL | MOIST → WET | 0 | | | |
| @ 1610 | 2 | | | 2' | STIFF | YELLOW BRN | SILTY CLAY-SOME ROCK FRAGS | CL | MOIST | 0 | | | |
| | | | | BOTM | | | | | TOOK [15SS047 0002] | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB048
DATE: 12-9-04
GEOLOGIST: CONTI
DRILLER: Mc FALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 1520 | 0 | | 2/2 | | LOOSE | GRAY TO | SILTY CLAY - SOME | CL | MOIST - TOOK [15SS04800002] | 0 | | | |
| | 2 | | | | SOFT | YELLOW BRN | ROCK FRAGS - TR ROOTS | | (FILL) | 0 | | | |
| | | | | | M | | SILTY CLAY - SOME | | MOIST (FILL) | 0 | | | |
| S-2 @ 1525 | | | 4/4 | | STIFF | TO | ROCK FRAGS | | TOOK [15SB0450206] | 0 | | | |
| | | | | | | GRAY | | | ALSO [FD12090401] | 0 | | | |
| | 6 | | | | | | | | AND DO MS/MSD | 0 | | | |
| | | | | | | | | | | 0 | | | |
| S-3 @ 1530 | | | 4/4 | 7.5 | LOOSE | TAN | CLAYEY SAND | SC | MOIST | 0 | | | |
| | | | | 8.5 | | | | | | 0 | | | |
| | | | | | SOFT | GRAY BRN | SILTY CLAY - TR OIL STAINS OR TAR | | TOOK SAMPLE HERE [15SB048D610] | 0 | | | |
| | 10 | | | 10 | | | | | | | | | |
| | | | | 11' | | | | | FILL TO 10' ± ? | 0 | | | |
| | | | | | SOFT | GRAY | CLAYEY SILT / SILTY CLAY | Y / ML | LOOKS WATE 11' MOIST → WET | 0 | | | |
| S-4 1550 | | | 4.5/5 | | | | TR ROOTS/ORANICS | | | 0 | | | |
| | | | | 14' | | | | | TOOK [15SB0481015] | 0 | | | |
| | 15 | | | 15 | M STIFF | YELLOW BRN | SILTY CLAY TO SANDSTONE FRAGS | | | 0 | | | |
| | | | | REF @ 15 | | | | | | | | | |
| | | | | | | | | | NOT MAKING MUCH WATER | | | | |
| | | | | | | | SCREEN 10-15 | | DECIDE TO SET TW | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

* 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. #: 15TW048

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB049
DATE: 12-14-04
GEOLOGIST: CONTI
DRILLER: JG

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | | 1.0 | M STIFF | BRN | SILTY/CLAYEY SAND | SC | MOIST | 0 | | | |
| 1430 | 2 | | | REF | | | TR- ROCK & ROOTS | | [15SS049002] | 0 | | | |
| | | | | | | | | | | | | | |
| | | | | | | | HAND AUGER | | | | | | |
| | | | | | | | REF ≈ 1' | | | | | | |
| | | | | | | | | | MOVED CLOSER TO STREAM CHANNEL THAN ORIGINAL LOC. | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB050
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: MCFAUL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ 1355 | 0 | | 2/2 | | STIFF | YELLOW GRAY | CLAYEY SAND - TR ROOTS | SC | MOIST | 0 | | | |
| | 2 | | | | | BRN | (MOTTLD) | | CLEAN | 0 | | | |
| | | | | | | | | | | 0 | | | |
| S-2 @ 1400 | | | 4/4 | 3.5 | DENSE | BRN | WEATH SANDSTONE | | MOIST → DAMP | 0 | | | |
| | | | | | | YELLOW | AND CLAYEY SAND | | CLEAN | 0 | | | |
| | 6 | | | BOTM @ 6' | | | | | | 0 | | | |
| | | | | | | | NOT REF | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB51
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | 1.0 | LOOSE | BRN TO GRAY | 3" TOPSOIL TO SILTY CLAY TO SILTY SAND & | SM | MOIST CLEAN | 0 | | | |
| @ 1410 | 2 | | | | STIFF | GRAY YELLOW | ROAD GRAVEL CLAYEY SAND | SC | MOIST | 0 | | | |
| | | | | | | BRN | TR ROOTS (MOTTLD) | | ↓ | 0 | | | |
| S-2 @ | | | 4/4 | | | | TO | | DAMP (CLEAN) | 0 | | | |
| 1415 | | | | | | | | | | 0 | | | |
| | 6 | | | BOTM 6' | | | TR SANDSTONE FRAG LAST 6" NOT REF | | DRY | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB052
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: McFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | 1 | SOFT TO | | TOP 3" TOPSOIL | | MOIST-CLEAN | 0 | | | |
| @ 1430 | 2 | | | 2 | M STIFF | YELLOW BRN | SANDY CLAY -TR ROOTS | SC | | 0 | | | |
| | | | | | STIFF | YELLOW GRAY | CLAYEY SAND/ | | | 0 | | | |
| S-2 @ | | | 4/4 | | | BRN | SANDY CLAY - TR ROOTS | | MOIST-CLEAN | 0 | | | |
| 1435 | | | | | | | (MOTTLD) | | | 0 | | | |
| | 6 | | | 6' | | | TR ROCK FRAGS | | | 0 | | | |
| | | | | BOTM | | | NOT REF | | DRY | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB053
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: MCFAUL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | | SOFT TO | BRN | 2" TOPSOIL CLAYEY SILT - TR | ML | MOIST | 0 | | | |
| e 0915 | 2 | | | 2 | M STIFF | GRAY | ROOTS | | LOOKS NAT. AND (CLEAN) | 0 | | | |
| | | | | | STIFF | ORANG BRN | CLAYEY SAND - TR | SC | MOIST | 0 | | | |
| S-2 e | | | 28/4 | | | GRAY | ROOTS | | (CLEAN) | 0 | | | |
| 0920 | | | | | | | | | | 0 | | | |
| | 6 | | | 6' | | BRN | SANSTONE IN SHOE | | | 0 | | | |
| | | | | REF | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB054
DATE: 12/13/04
GEOLOGIST: CONTI
DRILLER: MCFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 C | 0 | | 2/2 | | SOFT | YELLOW BRN | SANDY CLAY - TR ROOTS | SC | MOIST → WET | 0 | | | |
| 1340 | 2 | | | | TO | | | | CLEAN | 0 | | | |
| | | | | | M | YELLOW BRN | CLAYEY SAND | SC | MOIST | 0 | | | |
| S-2 C | | | 4/4 | | STIFF | GRAY | (MOTTLED) | | CLEAN | 0 | | | |
| 1345 | | | | 5 | | | CLAYEY SAND AND | SC | | 0 | | | |
| | 6 | | | 6' | DENSE | | WEATHERED SANDSTONE | VBR | NOT REF | 0 | | | |
| | | | | BOTM | | | | | | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB055
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 C | 0 | | 2/2 | | SOFT TO | YELL BRN | 3" TOPSOIL TO SANDY CLAY-TR | SC | MOIST-CLEAN | 0 | | | |
| 1550 | 2 | | | 2 | M STIFF | | ROOTS-TR ROCK FRAGS | | | 0 | | | |
| | | | | | TO | YELLOW GRAY | CLAYEY SAND - | SC | MOIST | 0 | | | |
| S-2 C | | | 3.5/4 | | STIFF | BRN | TR ROOTS TR ROCK FRAGS | | "CLEAN" | 0 | | | |
| 1600 | | | | | | | (MOTTLD) | | | 0 | | | |
| | 6 | | | 6' | | | | | | 0 | | | |
| | | | | BOTM | | | NOT REF. | | HOLE DRY. | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB056
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: McFAUL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | 2/2 | | SOFT | BRN | 3" TOPSOIL SANDY CLAY-TR ROOTS | SC | MOIST | 0 | | | |
| C 1540 | 2 | | | 2 | | | | | CLEAN | 0 | | | |
| | | | | | SOFT | BRN GRAY | CLAYEY SILT-TR ROOTS | ML | MOIST → WET | 0 | | | |
| S-2 C | | | 3.8/4 | | | TO GRAY | | | (CLEAN) | 0 | | | |
| 1545 | | | | | | | | | | 0 | | | |
| | 6 | | | 6' | | | | | | 0 | | | |
| | | | | BOTM | | | NOT REF | | | | | | |
| | | | | | | | | | HOLE IS DRY | | | | |
| | | | | | | | | | POSSIBLE CHANNEL HERE | | | | |
| | | | | | | | | | GRAY MATL IS DIFFERENT THAN | | | | |
| | | | | | | | | | OTHER BORINGS BUT LOOKS | | | | |
| | | | | | | | | | NAT AND "CLEAN" | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB057
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | SOFT TO | BRN | TOP 3" TOPSOIL | | MOIST - CLEAN | 0 | | | |
| 0925 | 2 | | | 2'± | M STIFF | | CLAYEY SILT - TR ROOTS TO | | | 0 | | | |
| | | | | | TO STIFF | ORANG BRN | CLAYEY SAND - TR ROOTS | | MOIST - CLEAN | 0 | | | |
| S-2 e | | | 4/4 | | | GRAY | (MOTTLD) | | | 0 | | | |
| 0930 | | | | | | | | | | 0 | | | |
| 6 | | | | | | | | | | 0 | | | |
| | | | | 7'± | | | | | | 0 | | | |
| S-3 e | | | 4/4 | | LOOSE | ORANG BRN | WEATHERED SANDSTONE | | MOIST - CLEAN | 0 | | | |
| 0935 | | | | | DENSE | | AND SOME CLAYEY SAND SEAMS | | HOLE IS DRY | 0 | | | |
| 9.5 | 9.5 | | | 9.5 REF @ BOTM | | | | | | 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. #: ____

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB058
DATE: 12/13/04
GEOLOGIST: CONTI
DRILLER: MCFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 @ | 0 | | 2/2 | | M STIFF | BRN | CLAYEY SAND | SC | MOIST- | 0 | | | |
| 1300 | 2 | | | | | | TR ROOTS | | (CLEAN) | 0 | | | |
| | | | | | STIFF | YELLOW BRN | CLAYEY SAND/ | SC | MOIST (CLEAN) | 0 | | | |
| S-2 @ | | | 4/4 | | | GRAY | SANDY CLAY TR REDDISH | | | 0 | | | |
| 1325 | | | | | | | (MOTLD) SANDSTONE IN | | | 0 | | | |
| | 6 | | | 6' | | | SHOE | | | 0 | | | |
| | | | | BOTM | | | | | NOT REFUSAL | | | | |
| | | | | | | | | | DRY HOLE. | | | | |

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 10° N PHOTO

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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 1558059
DATE: 12/13/04
GEOLOGIST: CONTI
DRILLER: McFAU

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | STIFF | GRAY YELLOW | CLAYEY SAND- | SC | MOIST CLEAN | 0 | | | |
| 10 45 | 2 | | | | | BRN | TR ROOTS TR ROCK FRAGS | | | 0 | | | |
| | | | | | TO | | (MOTTLD) | | | 0 | | | |
| S-2 e | | | 3.8/4 | | M STIFF | | CLAYEY SAND/ SANDY CLAY MIX | SC | MOIST CLEAN | 0 | | | |
| 10 50 | | | | | | | TR ROOTS TR ROCK | | | 0 | | | |
| | 6 | | | 6 | | | FRAG. | | | 0 | | | |
| | | | | BOTM | | | | | NOT REF STOP AT 6' | | | | |
| | | | | | | | | | PER QAP | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB060
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: MCFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 e | 0 | | 2/2 | | M STIFF | YELLOW BRN | SANDY CLAY-TR | SC | MOIST | 0 | | | |
| 10 15 | 2 | | | | | | ROOTS TR ROCK FRAGS | | "CLEAN" | 0 | | | |
| | | | | | M STIFF | GRAY YELLOW | SANDY CLAY | SC | MOIST | 0 | | | |
| S-2 e | | | 4/4 | | | BRN | TR ROOTS - TR ROCK FRAG | | "CLEAN" | 0 | | | |
| 20 | | | | | | | (MOTTLD) | | | 0 | | | |
| | 6 | | | 6' BOTTM | | | | | DRY HOLE | 0 | | | |
| | | | | | | | | | NOT REFUSAL | | | | |

* 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: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15 SB061
DATE: 12-13-04
GEOLOGIST: CONTI
DRILLER: MCFALL

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 C | 0 | | 2/2 | 5 | STIFF | YELLOW | 3" TOPSOIL | | MOIST | 0 | | | |
| 8140 | 2 | | | 1 | | BRN GRAY | CLAYEY SAND TR ROOTS | SC | (CLEAN) | 0 | | | |
| | | | | | | | TR ROCK FR TO | | | 0 | | | |
| S-2 C | | | 4/4 | 4'½ | | | SILTY SAND-TR CLAY AND ROCK FRAGS | | MOIST (CLEAN) | 0 | | | |
| 0945 | | | | 5' | M DENSE | | (MOTLD) | SM | WET ZONE@5' | 0 | | | |
| | 6 | | | 6 | DENSE | ORANG BRN | CLAYEY SAND SOME SANDSTONE FRAG. | | | 0 | | | |
| | | | | BSM REF | | | | | | | | | |
| | | | | | | | | | HOLE DRY BUT DECIDE TO | | | | |
| | | | | | | | | | SET WELL | | | | |
| | | | | | | | | | SCREEN 1-6 | | | | |
| | | | | | | | | | BASED ON | | | | |

* 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. #: 15TW061

Tetra Tech NUS, Inc.

# BORING LOG



PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N1245
DRILLING COMPANY: EFS, INC.
DRILLING RIG: DPT RIG

BORING No.: 15SB062
DATE: 12-14-04
GEOLOGIST: CONTI
DRILLER: JG

| 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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 0 | | | | M STIFF | YELLOW BRN | SILTY/SANDY CLAY | SC | MOIST [15SS0620002] | 0 | | | |
| 1330 | 2 | | | | SOFT | | TR ROOTS SILTY CLAY | CL | WET | 0 | | | |
| S-2 0 | | | | | | | | | [15SB0620206] | 0 | | | |
| 1340 | 3.5 | | | 3.5 REF | | | | | | | | | |
| | | | | | | | HAND AUGER REF @ 3.5 | | | | | | |
| | | | | | | | | | MOVED 062 TO STREAM CHANNEL - WAS INSTALLED AS ALT TO SB047 | | | | |
| | | | | | | | | | MS/MSD ON 0002 | | | | |
| | | | | | | | | | FD12140201 ALSO 0002 | | | | |

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

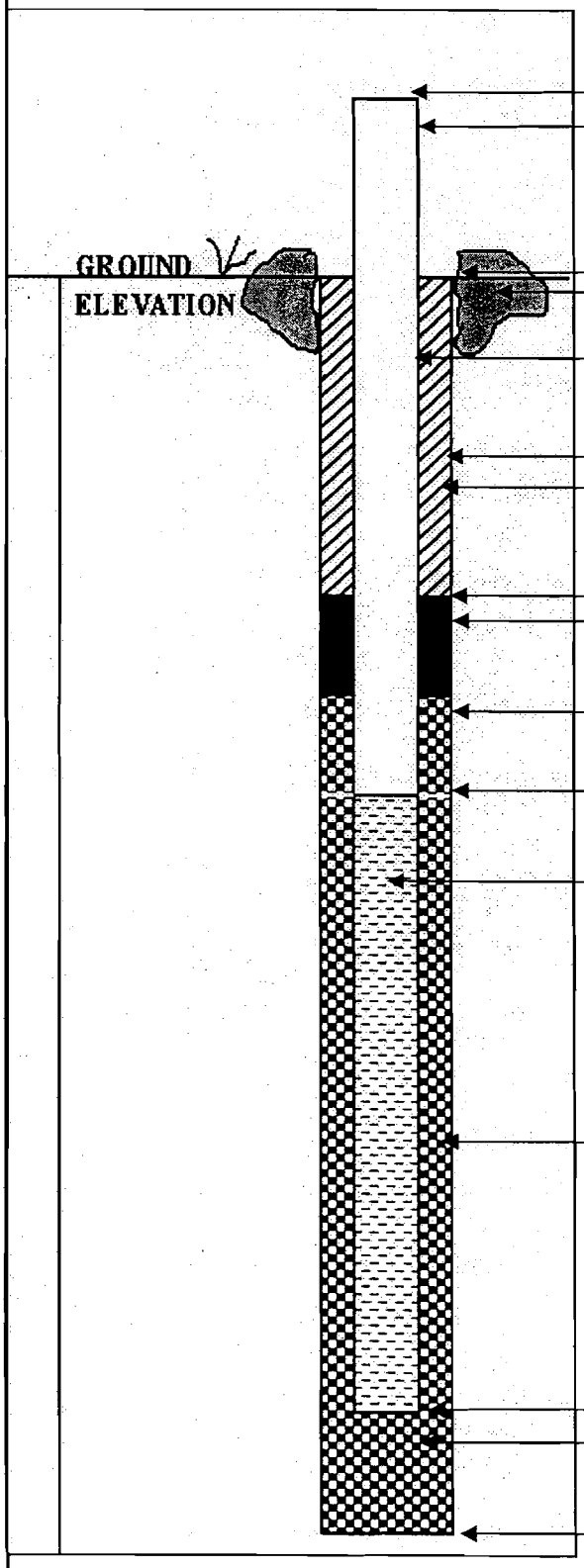
Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: 15TW062

BORING NO.: ~~15TW002~~ 15TW001 SB

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | ~~15TW002~~ SB |
| PROJECT No.: | N1245 | DRILLER: | McFAU | DATE COMPLETED: | 12/8/04 |
| SITE: | 15 | DRILLING METHOD: | DPT | NORTHING: | 1317491.74 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 3027519.72 |




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE: NA

GROUND ELEVATION: 758.07

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: 757.07 / 1

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10 SL x 5'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA

ELEVATION / DEPTH BOTTOM OF SCREEN: 752.07 / 6

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL: NA

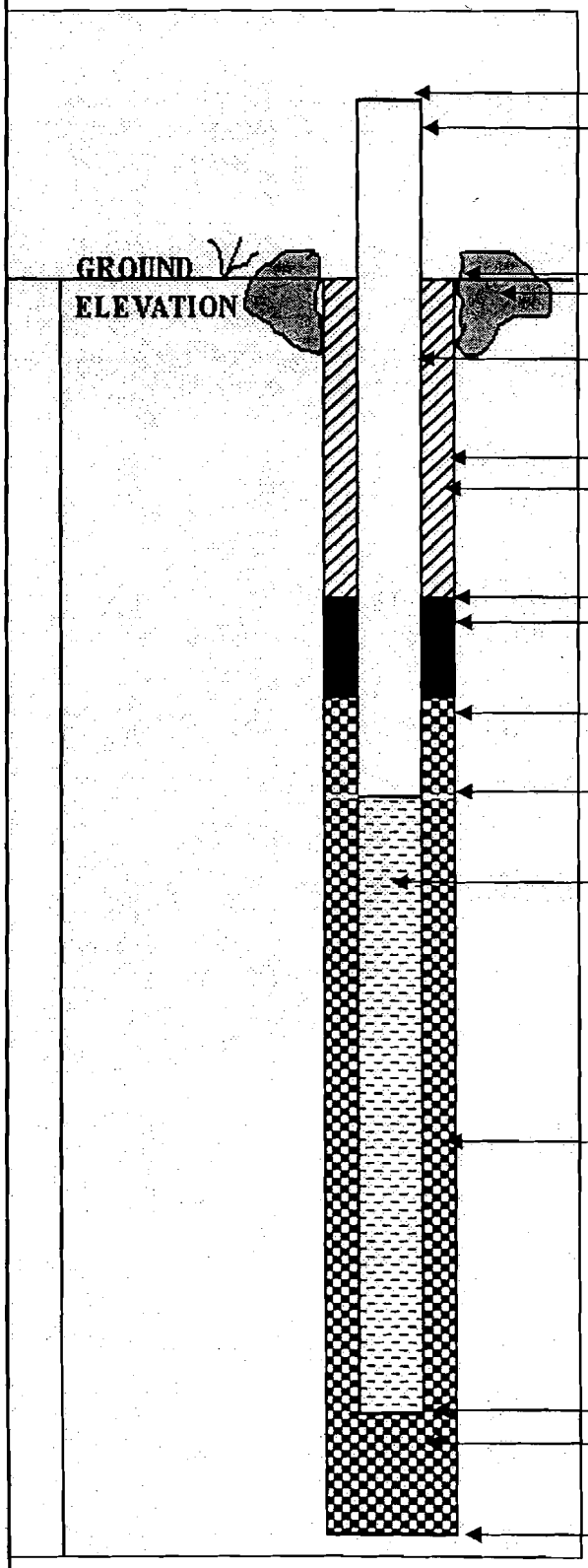
ELEVATION / DEPTH OF BOREHOLE: 752.07 / 6

15TW002

BORING NO.: ~~15TW006~~

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | 15~~TW~~006 SB |
| PROJECT No.: | N1245 | DRILLER: | Mc FALL | DATE COMPLETED: | 12/8/04 |
| SITE: | 15 | DRILLING METHOD: | DPT | NORTHING: | 1317451.19 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 302751 2.32 |




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE:

755.64

GROUND ELEVATION: NA

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: 754.64 / 1

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10 SLK 5'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA

ELEVATION / DEPTH BOTTOM OF SCREEN: 749.64 / 6

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL: NA

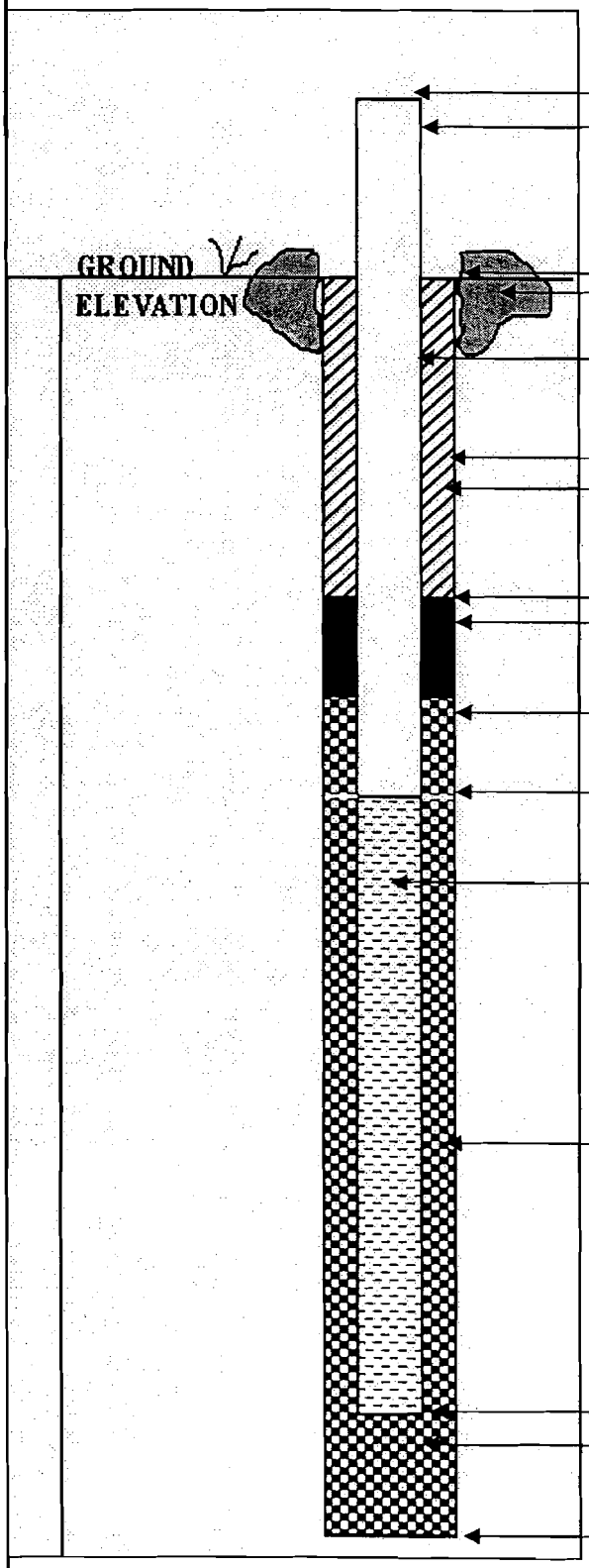
ELEVATION / DEPTH OF BOREHOLE: 749.64 / 6

15TW003

BORING NO.: ~~15TW009~~

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | 15SB009 |
| PROJECT No.: | N1245 | DRILLER: | McFALL | DATE COMPLETED: | 12/8/04 |
| SITE: | 15 | DRILLING METHOD: | DPT | NORTHING: | 1317429.64 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 3027643.80 |




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE:

GROUND ELEVATION: 752.08 NA

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: 747.58 / 4.5

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10 SL X 5'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA

ELEVATION / DEPTH BOTTOM OF SCREEN: 742.58 / 9.5

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL: NA

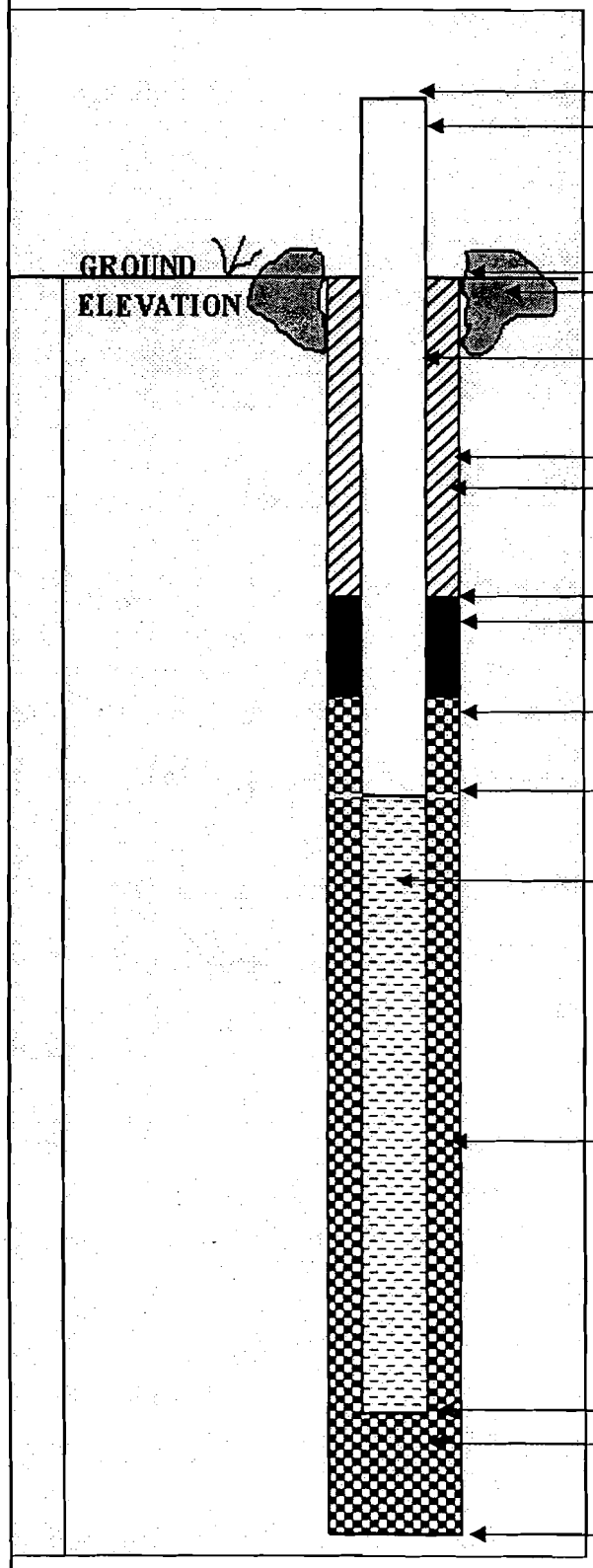
ELEVATION / DEPTH OF BOREHOLE: 742.58 / 9.5

15TW004

BORING NO. ~~15TW031~~

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | 15~~TW~~SB031 |
| PROJECT No.: | N1245 | DRILLER: | McFAU | DATE COMPLETED: | 12/9/04 |
| SITE: | 15 | DRILLING METHOD: | DPT | NORTHING: | 1317470.44 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 3028187.10 |




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE:

GROUND ELEVATION: 756.32 NA

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: 747.32 / 9

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10SL X 5'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA

ELEVATION / DEPTH BOTTOM OF SCREEN: 742.32 / 14

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL: NA

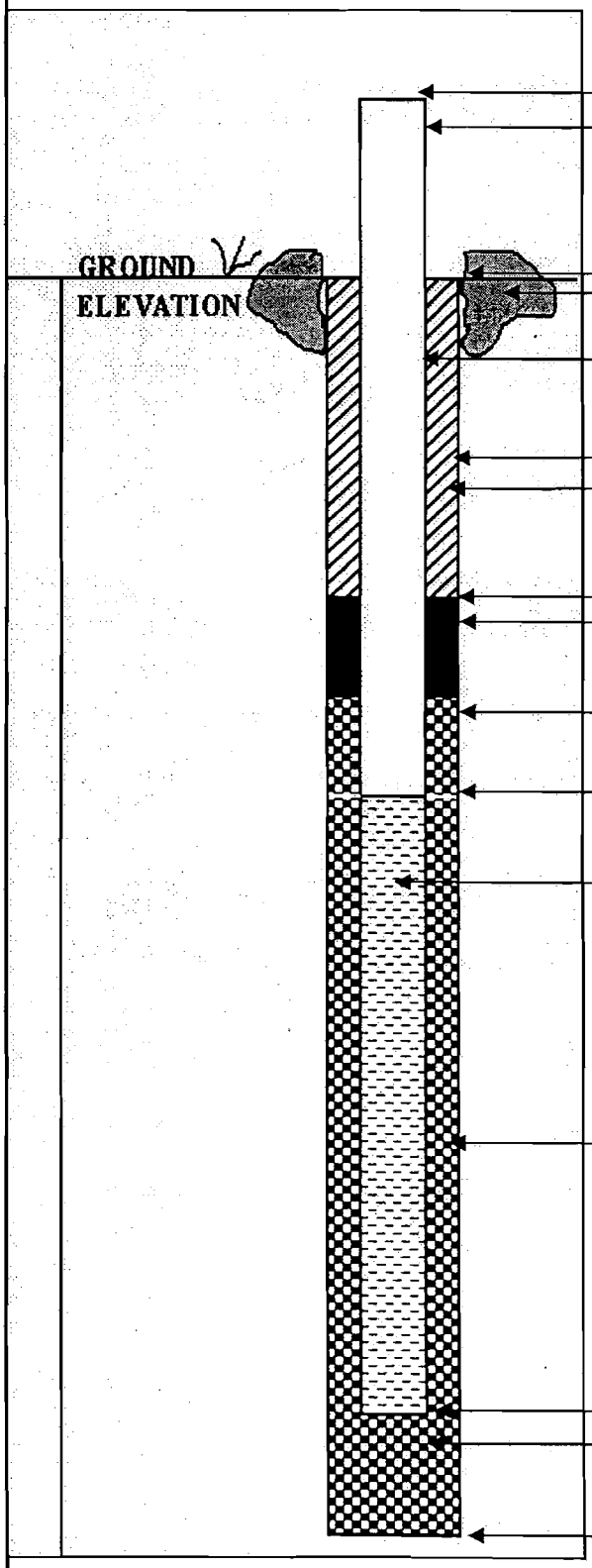
ELEVATION / DEPTH OF BOREHOLE: 742.32 / 14'

15TW005

BORING NO.: ~~15TW035~~

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | 15SB035 |
| PROJECT No.: | N1245 | DRILLER: | McFALL | DATE COMPLETED: | 12-9-04 |
| SITE: | 15 | DRILLING METHOD: | DPT | NORTHING: | 1317331.38 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 3028308.96 |




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE:

GROUND ELEVATION: 708.40 NA

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: 707.40 / 1

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10SL x 5'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA

ELEVATION / DEPTH BOTTOM OF SCREEN: 702.40 / 6

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL: NA

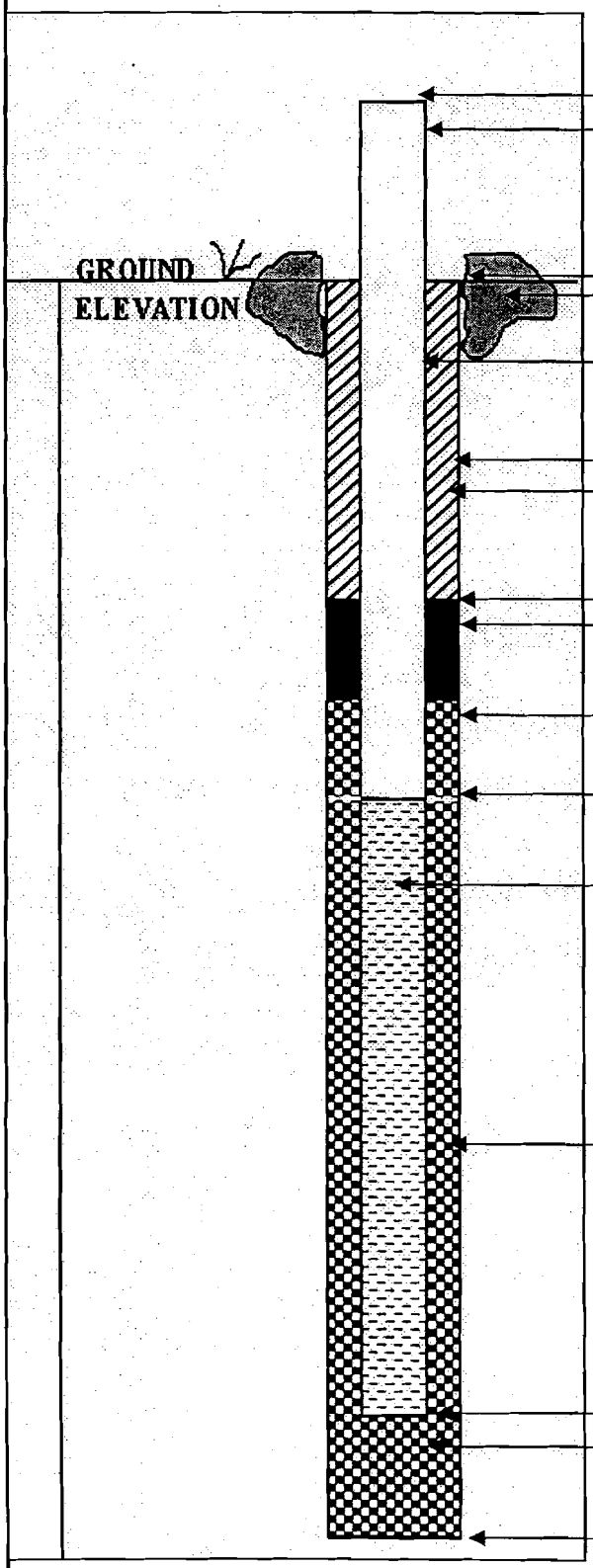
ELEVATION / DEPTH OF BOREHOLE: 702.40 / 6

15TW006

BORING NO.: ~~15TW016~~

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | SB 15TW006 |
| PROJECT No.: | N1245 | DRILLER: | McFAU | DATE COMPLETED: | 12-10-09 |
| SITE: | 15 | DRILLING METHOD: | DPT | NORTHING: | 1317772.54 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 3028437.38 |




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE:

763.18

GROUND ELEVATION: NA

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: 753.18 / 10

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10SLx10'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA

ELEVATION / DEPTH BOTTOM OF SCREEN: 743.18 / 20

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL: NA

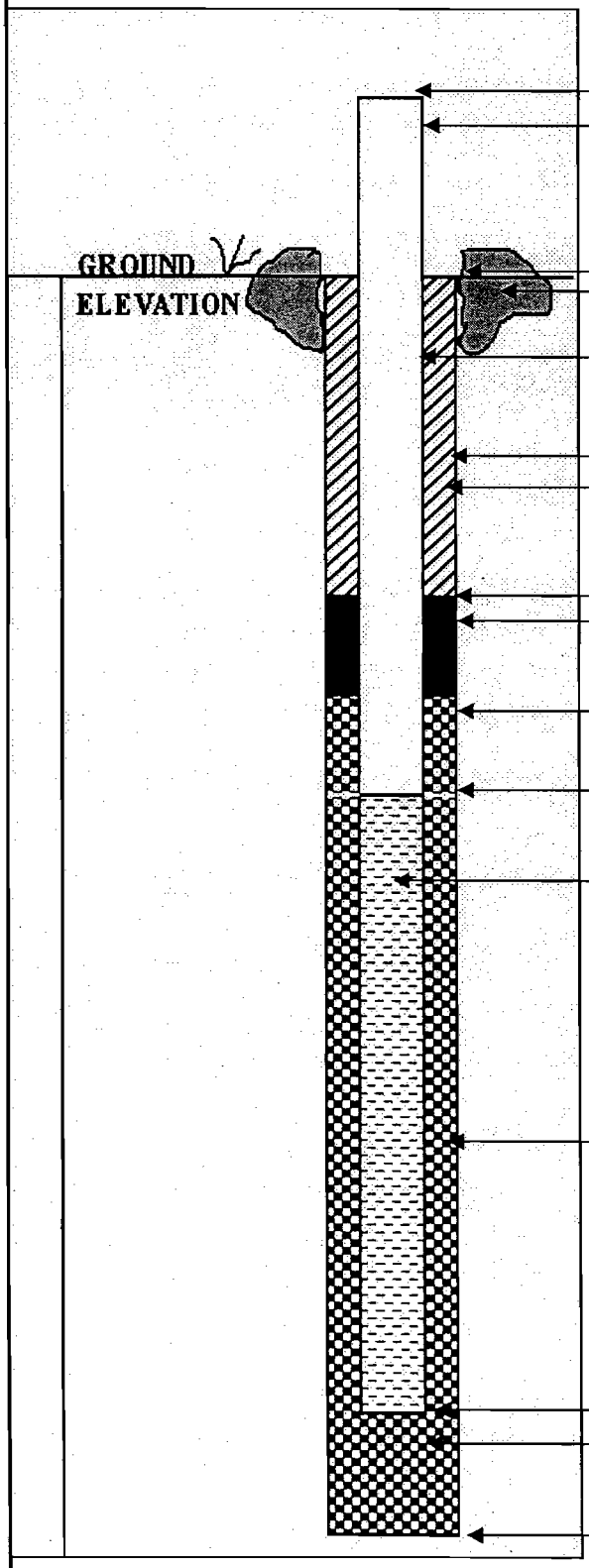
ELEVATION / DEPTH OF BOREHOLE: 743.18 / 20

15TW007

BORING NO.: ~~15TW0048~~

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | 15SB0048 |
| PROJECT No.: | N1245 | DRILLER: | McFALL | DATE COMPLETED: | 12-9-04 |
| SITE: | 15 | DRILLING METHOD: | DPT | NORTHING: | 1317628.25 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 3028920.25 |




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE:

755.69

GROUND ELEVATION: NA

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: 745.69 / 10

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10SLX 5'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA.

ELEVATION / DEPTH BOTTOM OF SCREEN: 740.69 / 15

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL: NA

ELEVATION / DEPTH OF BOREHOLE: 740.69 / 15

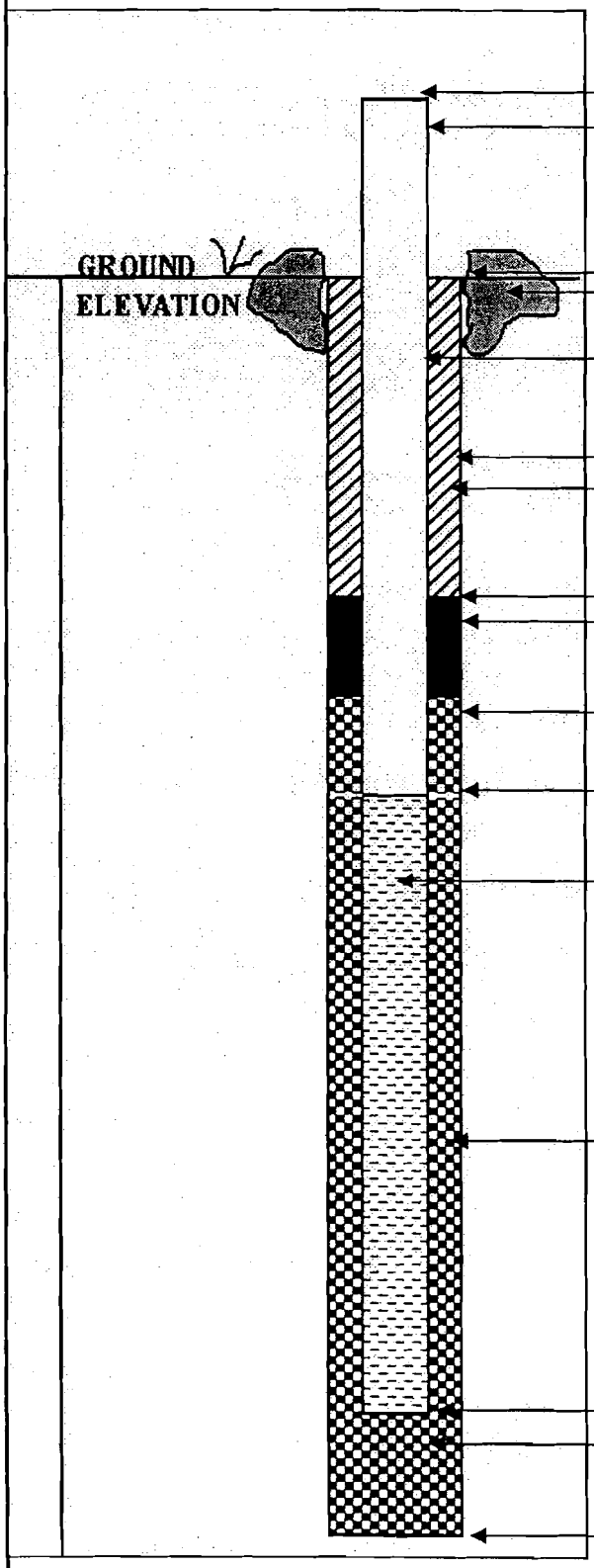
15TW009

BORING NO.: ~~15TW0061~~

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | 15TW0061 |
| PROJECT No.: | N1245 | DRILLER: | MCFAUL | DATE COMPLETED: | 12-13-04 |
| SITE: | 15 | DRILLING METHOD: | DPT | NORTHING: | 1316269.81 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 3027606.24 |

NOT SAMPLED!




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE:

765.62

GROUND ELEVATION: NA

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: 764.62 / 1

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10 SL x 5'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA

ELEVATION / DEPTH BOTTOM OF SCREEN: 759.62 / 6

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL: NA

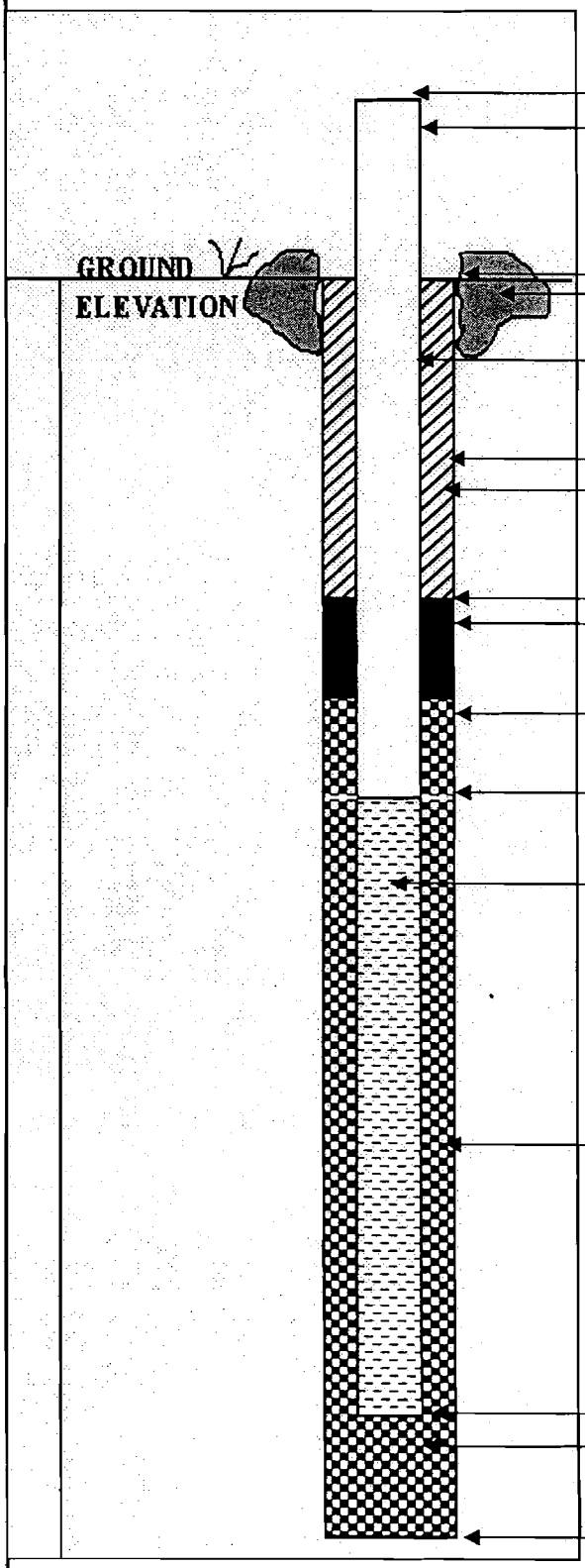
ELEVATION / DEPTH OF BOREHOLE: 759.62 / 6

15TW008

BORING NO.: ~~15TW062~~

Tetra Tech NUS, Inc. **TEMPORARY MONITORING WELL SHEET**

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | NSWC Crane | DRILLING Co.: | EFS | BORING No.: | 15TW062 |
| PROJECT No.: | N1245 | DRILLER: | SJC | DATE COMPLETED: | 12-14-02 |
| SITE: | 15 | DRILLING METHOD: | HAND AUG | NORTHING: | 1317725.72 |
| GEOLOGIST: | Conti | DEV. METHOD: | NA | EASTING: | 3028627.22 |




ELEVATION OF TOP OF RISER PIPE: NA

RISER STICK-UP ABOVE GROUND SURFACE:

GROUND ELEVATION: NA

TYPE OF SURFACE SEAL: NA

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 3"

TYPE OF SEAL: NA

ELEVATION / DEPTH OF SEAL: / NA

TYPE OF SEAL: NA

ELEVATION / DEPTH TOP OF FILTER PACK: / NA

ELEVATION / DEPTH TOP OF SCREEN: / 1

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 10 SL X 2.5'

I.D. OF SCREEN: 3/4"

TYPE OF FILTER PACK: NA

ELEVATION / DEPTH BOTTOM OF SCREEN: / 3.5

ELEVATION / DEPTH BOTTOM OF FILTER PACK: / NA

TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: / 3.5

# APPENDIX B.2
# DIGGING PERMITS

**DIGGING PERMIT**
**NSWC CRANE 11000/3 (REV. 8/02)**

4669

| | |
|---|---|
| REQUESTED BY: TetraTech / Terry Rojah 412-921-8857 | DATE: 11/18/04 |
| WORK REQUEST ON E/S NO. | Bldg 106 Area |
| WORK WILL BE PERFORMED BY: TetraTech NUS, Inc. | DATE (Start - on or about): 12/3/04 |

WORK DESCRIPTION
Soil borings to obtain surface & subsurface samples. Locations are: North, East, & South of Building 106. Locations are marked with stakes with pink ribbon or white paint, & are solid circles on attached drawing.

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed CROP2 11/18/04 **UNDERGROUND UTILITIES LOCATED IN WORK SITE**

| UTILITY | PRESENT | MARKED | NOT LOCATED | REMARKS |
|---|---|---|---|---|
| COMPRESSED AIR CROP 2 | N/A | | | RJ 11-23-04 |
| HIGH VOLTAGE ELECTRICAL | NA | | | S.P. 11-23-04 |
| FIRE ALARM CROP 2 | Yes | Yes | | MA 11-22-04 |
| GROUNDING CROP 2 | N/A | | | 11-22-04 BR |
| 2' ~~Exp 12/19~~ TURAL GAS 0411190560 | YES | YES | | 11-22-04 DEH |
| SECURITY ALARM CROP 2 | NA | | | 11-20 MA |
| SEWER | yes | yes | | 12-1-04 M Wagoner |
| STEAM | Yes | Not Pink Lines + Flags | | 11-19-04 JCD |
| TELEPHONE Faxed 11/18/04 | N/A | | | 11-29-04 |
| WATER | Yes | yes | | 12-1-04 M. Wagoner |
| SECOND ELECTRICAL CROP 2 | N/A | | | 11-22-04 BR |
| Faxed 11/18/04 GENERAL DYNAMICS/NMCI | N/A | NO | Not in Area | 11-29-04 |

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

* Exp 12/27 0412071315

| | |
|---|---|
| PERMIT HOLDER SIGNATURE: Terry Rojah | DATE: 12/07/04 |
| GING PERMIT APPROVED BY: Donna L. Dillman | DATE: 12/7/04 |

**DISTRIBUTION:**
ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

**DIGGING PERMIT**
**NSWC CRANE 11000/3 (REV. 8/02)**

4667

| REQUESTED BY | DATE |
|---|---|
| Tetra Tech / Terry Rojahn 412-921-8857 | 11/17/04 |

WORK REQUEST ON/E/S NO.: E side H-45, S of B-3287 & N of

| WORK WILL BE PERFORMED BY | DATE (Start - on or about) |
|---|---|
| Tetra Tech NUS, INC. | 12/3/04 |

WORK DESCRIPTION
Soil borings to obtain surface & subsurface soil samples. Locations are marked with wooden staked with pink ribbon. Location are annotated by solid circles on attached drawing.

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed CROP2 11/17/04 **UNDERGROUND UTILITIES LOCATED IN WORK SITE**

| UTILITY | PRESENT | MARKED | NOT LOCATED | REMARKS |
|---|---|---|---|---|
| COMPRESSED AIR CROP2 | N/A | | | DN 11-18-04 |
| HIGH VOLTAGE ELECTRICAL | NA | | | S.P. 11-23-04 |
| FIRE ALARM CROP2 | NA | | | MH 11-20 |
| GROUNDING CROP2 | N/A | | | 11-18-04 BR |
| NATURAL GAS | N/A | | | 11/17/04 dm |
| SECURITY ALARM CROP2 | NA | | | MH 11-20 |
| SEWER | N/A | | | 12-1-04 M. Wagoner |
| STEAM | N/A | | | 11-19-04 JCD |
| TELEPHONE Faxed 11/17/04 | N/A | | | YP 12-6-04 |
| WATER | N/A | | | 12-1-04 M Wagoner |
| SECOND ELECTRICAL CROP2 | N/A | | | 11-18-04 BR |
| GENERAL DYNAMICS/NMCI Faxed 11/17/04 | NA | | | 11-18-04 |

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

| PERMIT HOLDER SIGNATURE | DATE |
|---|---|
| Terry Rojahn | 12/07/04 |

| DIGGING PERMIT APPROVED BY | DATE |
|---|---|
| Donna L. Zellman | 12/7/08 |

**DISTRIBUTION:**
ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

# DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4668

REQUESTED BY: Tetra Tech / Terry Rojahn 412-921-8857

DATE: 11/17/04

WORK REQUEST ON E/S NO.:

Hwy 555, B-3330, B-2693 Areas

WORK WILL BE PERFORMED BY: Tetra Tech NUS, Inc.

DATE (Start - on or about): 12/3/04

WORK DESCRIPTION:

Soil borings to obtain surface & subsurface samples. Location are: south & east off Highway 555; south & west of Building 3330; north, east & west of Building 2693. Marked with stakes with pink ribbon, or white paint. Locations are solid circles on attached drawing.

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed CROP1&2 11/17/04

## UNDERGROUND UTILITIES LOCATED IN WORK SITE

| UTILITY | PRESENT | MARKED | NOT LOCATED | REMARKS |
|---|---|---|---|---|
| COMPRESSED AIR CROP1 | N/A | 3334 | | KG 12-2-04 |
| HIGH VOLTAGE ELECTRICAL | yes | yes | see note * | S.Q. 11-23-04 |
| FIRE ALARM CROP1 | N/A | N/A | | SEG 11-18-04 |
| GROUNDING CROP1 | N/A | | | KG 12-2-04 |
| NATURAL GAS See Below | YES | YES | | DEH 11-22-04 |
| SECURITY ALARM CROP2 | NA | | | MH 11-20 |
| SEWER | yes | yes | | 12-1-04 M.W. Agnew |
| STEAM 3330 | N/A | | | 11-18-04 GCD |
| TELEPHONE Faxed 11/17/04 | N/A | | | 11-29-04 |
| WATER | yes | yes | | 12-1-04 M.W. Agnew |
| SECOND ELECTRICAL CROP1 | yes | yes | | 11-30-04 KG |
| GENERAL DYNAMICS/NMCI Faxed 11/17/04 | NA | | | 11-18-04 |

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

0412071308, 0412071310, 0412071312
~~0411190569~~, ~~0411190572~~, 0411190582 Exp ~~12/9~~ 12/27

* marked at 412-463-4141

PERMIT HOLDER SIGNATURE: Terry Rojahn

DATE: 12/07/04

DIGGING PERMIT APPROVED BY: Warren F. Sullivan

DATE: 12/7/04

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site

# APPENDIX B.3
# HEALTH AND SAFETY DOCUMENTATION

**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

**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, an[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. 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.**
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**

*CERTIFICATE OF TRAINING*

THIS CERTIFIES THAT

**Colin A. Doolan**

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

**December 23, 2004**
Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

# WORK STATUS REPORT

Employer Copy

**TYPE OF EXAMINATION:** Baseline Examination **UPDATE**

| | | | |
|---|---|---|---|
| **EMPLOYEE:** | Doolan, Colin | **COMPANY:** | TT/NUS |
| **SSN:** | XXX-XX-8351 | **POSITION:** | Earth Scientist |
| **DATE OF EXAM:** | 12/02/2004 | **LOCATION:** | TT/NUS-Pittsburgh |
| **EXPIRATION DATE:** | 12/02/2006 | **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:** ***Status changed to Biennial.***

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: 12/07/04

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

APPLIED EDUCATIONAL SERIES

James D. Goerdt

A. LIED ASSOCIATES INTERNATIONAL I. C.

# 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
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 22, 2004

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

**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. Lafley
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 J. Conti

Office Location: PIT

| 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: 12-6-04

***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

February 25, 2005

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

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

# WORK STATUS REPORT

Employer Copy

**TYPE OF EXAMINATION:** **Periodic Examination**

| | | | |
|---|---|---|---|
| **EMPLOYEE:** | **Rojahn, Terry** | **COMPANY:** | **TT/NUS** |
| **SSN:** | **XXX-XX-8670** | **POSITION:** | **Environmental Sampling** |
| **DATE OF EXAM:** | **11/05/2004** | **LOCATION:** | **TT/NUS-Pittsburgh** |
| **EXPIRATION DATE:** | **11/05/2006** | **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: 11/10/04

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

Compliance Environmental Resources, Inc.
7002 Graham Road
Suite 202
Indianapolis, IN 46220
317-863-0008

# Jay McFall

Has completed the 40 Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) course in compliance with 29 CFR 1910.120 (e). He will have met the criteria for certification upon completion of 24 hours of supervised training.

Christopher A. Kinsey, CHMM, CET
Instructor
Completion Date: 02/19/04

# MEDICAL APPROVAL FORM
## For Employees of Environmental Field Services, Inc.

Participant Name: Jay McFall Date & Time of Examination: July 30, 2004

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, T Perri, have examined Jay McFall

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):

   (N)

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 : TR

Address: 5604 W. 74th
Indpls

Phone Number: 317 290 1551

## 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 | |
|---|---|---|---|---|---|---|---|
| 1245 | Jay McFall | 12/7/04 | 2/19/04 | N/A | N/A | 7/30/04 | |
| SWMU 9 | DON WOSTOLHOFF | " | 1/93 | 8/04 | 8/04 | 2/12/03 | |
| | TERRY ROWAHN | " | 10/85 | 1/04 | 1/04 | 11/10/04 | ALSO SWMU 9 |
| 1245 6878 7448 | [illegible] | 12/8/04 | 12/91 | 10/04 | NA | 11/7/04 | |
| | Stan Conti | 12/8/04 | 8/83 | 5/04 | 8/84 | 12/6/04 | |
| | Colin Doolan | 1/6/05 | 5/99 | 12/04 | NA | 12/04 | |
| | | | | | | | |
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| | | | | | | | |

# APPENDIX C
# SAMPLE LOG SHEETS AND OTHER FIELD FORMS

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[x] SURFACE SOIL [] SEDIMENT
[x] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): [signature]

SAMPLER (S): SJC / JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern A

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volitiles 8260B | SVOCs w/PAHs & Herbicides | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS0010002 | DPT | 0-2 | 12/9 | 0910 | L | G | 5 | 3 | 1 | 1 | | | | FILL | 3 | CLAY, SAND - MOIST ROAD GRAVEL |
| 15SB0010206 | " | 2-6 | " | 0915 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAYEY SAND - TR ROCK |
| 15SS0030002 | " | 0-2 | " | 0935 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY SAND ROAD GRAVEL |
| 15SB0030206 | " | 2-6 | " | 0940 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAYEY SAND / SANDY CLAY |
| 15SS0040002 | " | 0-2 | " | 0955 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SAND - TR CLAY ROAD GRAVEL |
| 15SB0040206 | " | 2-6 | " | 1000 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SANDY SILTY CLAY - TR ROCK FR |
| | | | | | | | | | | | | | | | | |
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REMARKS: See Figure 3-2

LABORATORY: Laucks Testing Laboratories

COC No.: 0144

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[X] SURFACE SOIL [] SEDIMENT
[X] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): SJConti

SAMPLER (S): SJC/JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern A

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volitiles 8260B | SVOCs w/PAHs & Herbicides | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS0070002 | DPT | 0-2 | 12/8 | 1335 | L | G | 5 | 3 | 1 | 1 | | | | 3 | 0 | SAND, CLAYEY |
| 15SB0070206 | " | 2-6 | " | 1340 | " | " | 5 | 3 | 1 | 1 | | | | 9 | 0 | SAND, CLAYEY |
| 15SS0020002 | " | 0-2 | " | 1400 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SAND (FILL)? |
| 15SB0020206 | " | 2-6 | " | 1405 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | SILT |
| 15SB0060002 | " | 0-2 | " | 1430 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SAND |
| 15SB0060206 | " | 2-6 | " | 1435 | " | " | 13 | 9 | 2 | 2 | | | | 9 | 0 | DO MS/MSD - SAND |
| FD12080401 | " | 2-6 | " | 0000 | " | " | 5 | 3 | 1 | 1 | | | | — | 0 | DUP OF [15SB0060206] |
| 15SS0050002 | " | 0-2 | " | 1520 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SAND/ROAD GRAVEL |
| 15SB0050206 | " | 2-6 | " | 1525 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY/GRAVEL |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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REMARKS: See Figure 3-2
(O) DO MS/MSD

LABORATORY: Laucks Testing Laboratories

COC No.: 0141

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[X] SURFACE SOIL [] SEDIMENT
[X] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): SJ Conte

SAMPLER (S): SJC/JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern B & O

| | SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volitiles 8260B | SVOCs w/PAHs | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15SS0090002 | DPT | 0-2 | 12/8 | 1120 | L | G | 5 | 3 | 1 | 1 | | | | FILL | 0 | SANDY CLAY - ROAD GRAVEL |
| TW | 15SB0090206 | " | 2-6 | " | 1125 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SILT |
| TW | 15SB0090610 | " | 6-9.5 | " | 1130 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | CLAY |
| | 15SS0100002 | " | 0-2 | " | 1240 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SAND |
| | 15SB0100206 | " | 2-6 | " | 1245 | " | " | 5 | 3 | 1 | 1 | | | | " | 0 | CLAY |
| | 15SB0100610 | " | 6-9.5 | " | 1250 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | CLAY, SAND, ROCK |
| | 15SS0080002 | " | 0-2 | " | 1255 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SAND |
| | 15SB0080206 | " | 2-6 | " | 1300 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | SILT/CLAY |
| | 15SB0080610 | " | 6-9 | " | 1305 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | CLAY, ROCK FRAGS |
| | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | |

REMARKS: See Figure 3-2

LABORATORY: Laucks Testing Laboratories

COC No.: 0138 & 0140 (TR)

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[X] SURFACE SOIL [X] SEDIMENT
[] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): S. Conti

SAMPLER (S): SJC / JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern C

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volitiles 8260B | ANALYSES: SVOCs w/PAHs & PCBs | ANALYSES | ANALYSES | ANALYSES | ANALYSES | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS0120002 | DPT | 0-2 | 12/8 | 1000 | L | G | 4 | 3 | 1 | | | | | FILL | 0 | SANDY SILT - SILTY SAND |
| 15SB0120206 | " | 2-6 | " | 1010 | " | " | 4 | 3 | 1 | | | | | 9 | 0 | CLAYEY SAND " SILT MOIST |
| 15SS0130002 | " | 0-2 | " | 1020 | " | " | 4 | 3 | 1 | | | | | FILL | 0 | SILT - MOIST |
| 15SB0130206 | " | 2-6 | " | 1030 | " | " | 4 | 3 | 1 | | | | | 8 | 0 | CLAY - " |
| 15SS0110002 | " | 0-2 | " | 1035 | " | " | 4 | 3 | 1 | | | | | FILL | 0 | CLAY - GRAVEL MOIST |
| 15SB0110206 | " | 2-6 | " | 1040 | " | " | 4 | 3 | 1 | | | | | 8 | 0 | CLAY (POSSIBLY FILL) " |

REMARKS: See Figure 3-2

LABORATORY: Laucks Testing Laboratories

COC No.: 0138

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[x] SURFACE SOIL [] SEDIMENT
[x] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): SJ Conte

SAMPLER (S): SJC/JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern G & H

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volitiles 8260B | SVOCs w/PAHS, PCBs, Pesticides & Herbicides | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS0290002 | DPT | 0-2 | 12/9 | 1025 | L | G | 5 | 3 | 1 | 1 | | | | FILL | 0 | SILTY CLAY - L.S FRAGS |
| 15SB0290206 | " | 2-5 | " | 1030 | " | " | 5 | 3 | 1 | 1 | | | | 9 | 0 | CLAYEY SAND - ROCK FRAGS |
| 15SS0310002 | " | 0-2 | " | 1050 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAYEY SAND |
| 15SB0310206 | " | 2-6 | " | 1055 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY - ROCK FR |
| 15SB0310610 | " | 6-10 | " | 1100 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY |
| 15SB0311014 | " | 10-14 | " | 1105 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | SILT |
| 15SS0320002 | " | 0-2 | " | 1130 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | CLAY |
| 15SB0320206 | " | 2-3 | " | 1135 | " | " | 5 | 3 | 1 | 1 | | | | 9 | 0 | SAND |
| 15SS0350002 | " | 0-2 | " | 1150 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | CLAY |
| 15SB0350206 | " | 2-6 | " | 1155 | " | " | 5 | 3 | 1 | 1 | | | | 9 | 0 | SAND |
| 15SS0370002 | " | 0-2 | " | 1205 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | SILT |
| 15SB0370206 | " | 0-4 | " | 1210 | " | " | 5 | 3 | 1 | 1 | | | | 9 | 0 | CLAY/ROCK FRAGS |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

REMARKS: See Figure 3-2

LABORATORY: Laucks Testing Laboratories

COC No.: 0143

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[x] SURFACE SOIL [] SEDIMENT
[x] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): SJConti

SAMPLER (S): STC / JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern E, U & W

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volatiles 8260B | SVOCs w/PAHs, PCBs, Pesticides & Herbicides | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS0480002 | DPT | 0-2 | 12-9 | 1520 | L | G | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY/ROCK FRAGS |
| 15SB0480206 | " | 2-6 | " | 1525 | " | " | 13 | 9 | 2 | 2 | | | | FILL | 0 | CLAY/ROCK FRAGS |
| FD12090401 | " | 2-6 | " | ~~0000~~ | " | " | 5 | 3 | 1 | 1 | | | | — | 0 | DUP OF 15SB0480206 |
| 15SB0480610 | " | 6-10 | " | 1530 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY |
| 15SB0481015 | " | 10-15 | " | 1550 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | CLAY / ROCK FRAGS (SANDSTONE) |
| 15SB0470002 | " | 0-2 | " | 1610 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | SILTY CLAY |

REMARKS: See Figure 3-2

○ - MS/MSD
□ - DUP

LABORATORY: Laucks Testing Laboratories

COC No.: 0144

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[x] SURFACE SOIL [ ] SEDIMENT
[x] SUBSURFACE SOIL [ ] LAGOON / POND
[ ] OTHER _____

SIGNATURE(S): SJ Lowe

SAMPLER (S): JG / SJC

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern E, U & W

| | SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volatiles 8260B | SVOCs w/PAHs, PCBs, Pesticides & Herbicides | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15SS0460002 | DPT | 0-2 | 12-10 | 0850 | L | G | 5 | 3 | 1 | 1 | | | | Fill | 0 | CLAY |
| 46 | 15SB0460206 | " | 2-6 | " | 0855 | " | " | 5 | 3 | 1 | 1 | | | | " | 5 | CLAY |
| | 15SB0460610 | " | 6-10 | " | 0900 | " | " | 5 | 3 | 1 | 1 | | | | " | 0 | CLAY |
| | 15SB0461020 | " | 10-20 | " | 0915 | " | " | 5 | 3 | 1 | 1 | | | | " | 0 | CLAY |
| | 15SS0450002 | " | 0-2 | " | 1000 | " | " | 5 | 3 | 1 | 1 | | | | Fill | 0 | CLAY |
| 45 | 15SB0450206 | " | 2-6 | " | 1005 | " | " | 5 | 3 | 1 | 1 | | | | Fill | 0 | CLAY |
| | 15SB0450610 | " | 6-10 | " | 1010 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | CLAY |
| | 15SB0451012 | " | 10-12 | " | 1015 | " | " | 5 | 3 | 1 | 1 | | | | — | 0 | WEATH SHALE |
| | 15SS0190002 | " | 0-2 | " | 1235 | " | " | 5 | 3 | 1 | 1 | | | | Fill | 0 | CLAY |
| | 15SB0190206 | " | 2-6 | " | 1240 | " | " | 5 | 3 | 1 | 1 | | | | Fill | 0 | SANDY CLAY |
| | 15SS0230002 | " | 0-2 | " | 1250 | " | " | 5 | 3 | 1 | 1 | | | | Fill | 0 | CLAY/ROCK FRAGS |
| | 15SB0230206 | " | 2-6 | " | 1255 | " | " | 13 | 9 | 2 | 2 | | | | 8 | 1.5 | SANDY ? (Poss. Fill) SILTY CLAY ODOR |
| | FD12100401 | " | 2-6 | " | 0000 | " | " | 5 | 3 | 1 | 1 | | | | | | DUP OF 15SB0230206 |
| | | | | | | | | | | | | | | | | | |

REMARKS: See Figure 3-2
○ - MS/MSD
▭ - DUP

LABORATORY: Laucks Testing Laboratories

COC No.: 0145
0147

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[] SURFACE SOIL [] SEDIMENT
[] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): SJConti

SAMPLER (S): JG/SJC

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern B & O

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volitiles 8260B | SVOCs w/PAHs | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS043000 2 | DPT | 0-2 | 12-10 | 1045 | L | G | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY |
| 15SB043020 6 | " | 2-5 | " | 1050 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | WEATH SANDSTONE |
| 15SS042000 2 | " | 0-2 | " | 1100 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY, TR SAND, ROOTS |
| 15SB042020 6 | " | 2-6 | " | 1105 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | SANDY CLAY/WEATH S.ST. |
| 15SS044000 2 | " | 0-2 | " | 1115 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY |
| 15SB044020 6 | " | 2-6 | " | 1120 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | SANDY CLAY/WEATH S.ST. |

REMARKS: See Figure 3-2

LABORATORY: Laucks Testing Laboratories

COC No.: 0146

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[X] SURFACE SOIL [] SEDIMENT
[X] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): S Conte

SAMPLER (S): JG.

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern G & H

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volitiles 8260B | SVOCs w/PAHs, PCBs, Pesticides & Herbicides | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS0300002 | HA | 0-2 | 12-14 | 0915 | L | G | 5 | 3 | 1 | 1 | | | | 3 | 0 | CLAYEY SILT |
| 15SB0300206 | " | 2-3 | " | 0920 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | SILTY CLAY |
| 15SS0330002 | " | 0-2 | " | 0950 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | SILTY CLAY / ROCK FRAGS |
| 15SS0360002 | " | 0-2 | " | 1000 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | CLAYEY SAND |
| 15SS0340002 | " | 0-2 | " | 1015 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | " " |
| 15SS0410002 | " | 0-2 | " | 1050 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | SANDY CLAY. |
| 15SS0380002 | " | 0-2 | " | 1145 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | " " |

REMARKS: See Figure 3-2

LABORATORY: Laucks Testing Laboratories

COC No.: 3651

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[X] SURFACE SOIL [] SEDIMENT
[X] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): SJConti

SAMPLER (S): SJC/JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern F

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: SVOCs w/PAHs | | | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS0250002 | DPT | 0-2 | 12-11 | 1010 | L | G | 1 | 1 | | | | | | FILL | 0 | CLAYEY SAND |
| 15SB0250206 | " | 2-5 | " | 1015 | " | " | 1 | 1 | | | | | | FILL/9 | 0 | CLAYEY SAND - S.S FRAG. |
| 15SS0240002 | " | 0-2 | " | 1020 | " | " | 1 | 1 | | | | | | FILL | 0 | CLAY |
| 15SB0240206 | " | 2-5 | " | 1025 | " | " | 1 | 1 | | | | | | — | 0 | WEATH SANDSTONE |
| 15SS0260002 | " | 0-2 | " | 1030 | " | " | 1 | 1 | | | | | | 3 | 0 | SILT |
| 15SB0260206 | " | 2-3.5 | " | 1035 | " | " | 1 | 1 | | | | | | — | 0 | WEATH SANDSTONE |
| 15SS0280002 | " | 0-2 | " | 1040 | " | " | 1 | 1 | | | | | | — | 0 | ASPHALT/WEATH SANDSTONE |
| 15SB0280206 | " | 2-4 | " | 1045 | " | " | 2 | 2 | | | | | | — | 0 | WEATHERED SANDSTONE |
| FD12110402 | " | 2-4 | " | 0000 | " | " | 1 | 1 | | | | | | — | 0 | DUP OF 15SB0280206 |
| 15SS0270002 | " | 0-2 | " | 1100 | " | " | 1 | 1 | | | | | | — | 0 | WEATH SHALY SANDSTONE |
| 15SB0270206 | " | 2-3 | " | 1105 | " | " | 1 | 1 | | | | | | 9 | 0 | " " " |

REMARKS: See Figure 3-2
○ - MS/MSD
△ DUP02

LABORATORY:
Laucks Testing Laboratories

COC No.: 3646 & 3647

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[X] SURFACE SOIL [] SEDIMENT
[X] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): SJ Conti
SAMPLER (S): SJC/JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern D

| | SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Pesticides & Herbicides | ANALYSES: TAL Metals plus Sn | | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 15SS0170002 | DPT | 0-2 | 12-11 | 0855 | L | G | 2 | 1 | 1 | | | | | FILL | 0 | CLAY |
| | 15SB0170206 | " | 2-6 | " | 0900 | " | " | 2 | 1 | 1 | | | | | 9 | 0 | CLAYEY SAND |
| 16 | 15SS0160002 | " | 0-2 | " | 0905 | " | " | 2 | 1 | 1 | | | | | FILL | 0 | CLAY |
| | 15SB0160206 | " | 2-6 | " | 0910 | " | " | 2 | 1 | 1 | | | | | 8/9 | 0 | CLAYEY SAND |
| 15 | 15SS0150002 | " | 0-2 | " | 0915 | " | " | 2 | 1 | 1 | | | | | FILL | 0 | CLAY |
| | 15SB0150206 | " | 2-6 | " | 0920 | " | " | 2 | 1 | 1 | | | | | " | 0 | CLAYEY SAND/ROCK FRAG |
| 18 | 15SS0180002 | " | 0-2 | " | 0925 | " | " | 2 | 1 | 1 | | | | | FILL | 0 | CLAY |
| | 15SB0180206 | " | 2-6 | " | 0930 | " | " | 2 | 1 | 1 | | | | | " | 0 | SILTY SAND - ROCK FRAGS |
| 14 | 15SS0140002 | " | 0-2 | " | 0935 | " | " | 2 | 1 | 1 | | | | | FILL | 0 | CLAY |
| | 15SB0140206 | " | 2-6 | " | 0940 | " | " | 4 | 2 | 2 | | | | | " | 0 | SILTY SAND - ROCK FRAGS |
| | FD12110401 | " | 2-6 | " | 0000 | " | " | 2 | 1 | 1 | | | | | — | — | DUP OF 15SB0140206 |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

REMARKS: See Figure 3-2
○ MS/MSD
□ DUP

LABORATORY: Laucks Testing Laboratories

COC No.: 3646

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[] SURFACE SOIL [] SEDIMENT
[] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): SJConti

SAMPLER (S): SJC/JG

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern E, U & W

| | SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volatiles 8260B | SVOCs w/PAHs, PCBs, Pesticides & Herbicides | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 15SS0200002 | DPT | 0-2 | 12-10 | 1315 | L | G | 5 | 3 | 1 | 1 | | | | FILL | 0 | SANDY CLAY |
| | 15SB0200206 | " | 2-6 | " | 1320 | " | " | 5 | 3 | 1 | 1 | | | | 9 | 0 | CLAYEY SAND |
| 22 | 15SS0220002 | " | 0-2 | " | 1330 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY |
| | 15SB0220206 | " | 2-6 | " | 1335 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | CLAYEY SAND / SANDY CLAY |
| 21 | 15SS0210002 | " | 0-2 | " | 1340 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAY, SAND |
| | 15SB0210206 | " | 2-6 | " | 1345 | " | " | 5 | 3 | 1 | 1 | | | | FILL | 0 | CLAYEY SAND (? FILL) |
| | | | | | | | | | | | | | | | | | |
| 40 | 15SS0400002 | " | 0-2 | " | 1445 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | CLAYEY SAND |
| | 15SB0400206 | " | 2-6 | " | 1450 | " | " | 5 | 3 | 1 | 1 | | | | 9 | 0 | SILTY SAND - TR ROCK |
| | 15SS0390002 | " | 0-2 | " | 1510 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | CLAYEY SAND |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

REMARKS: See Figure 3-2

LABORATORY: Laucks Testing Laboratories

COC No.: 0147

# MULTIPLE SAMPLE LOG SHEET



Tetra Tech NUS, Inc.

[X] SURFACE SOIL [] SEDIMENT
[X] SUBSURFACE SOIL [] LAGOON / POND
[] OTHER _____

SIGNATURE(S): S. Conti

SAMPLER (S): JG.

PROJECT NAME: NSWC CRANE
PROTECT NUMBER: N1245

LOCATION: SWMU 15 - Area of Concern E, U & W

| SAMPLE No. | SAMPLE METHOD | DEPTH (Ft.) | DATE 2004 | TIME | CONCENTRATION (L)LOW (H)HIGH | (G) GRAB (C) COMPOSITE | TOTAL No. OF CONTAINERS | ANALYSES: Volatiles 8260B | SVOCs w/PAHs, PCBs, Pesticides & Herbicides | TAL Metals plus Sn | | | | SOIL GROUP # | PID READING | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15SS0620002 | HA | 0-2 | 12-14 | 1330 | L | G | 13 | 9 | 2 | 2 | | | | 3 | 0 | SILTY SANDY CLAY |
| 15SB0620206 | " | 2-3.5 | " | 1340 | " | " | 5 | 3 | 1 | 1 | | | | 8 | 0 | SILTY CLAY |
| FD12140201 | " | 0-2 | " | 0000 | " | " | 5 | 3 | 1 | 1 | | | | — | — | DUP OF 15SS0620002 |
| 15SS0490002 | " | 0-2 | " | 1430 | " | " | 5 | 3 | 1 | 1 | | | | 3 | 0 | CLAYEY SAND |

REMARKS: See Figure 3-2 ○ MS/MSD □ DUP

LABORATORY: Laucks Testing Laboratories

COC No.: 3651

# APPENDIX C.2
# SEDIMENT SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 001 0006
Sample Location: 15SW/SD 001
Sampled By: CD / TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/11/05<br>Time: 1040<br>Method: Dis Trowel<br>Monitor Reading (ppm): | 0-6" | BRN | MED SAND WELL sorted tr. CLAY SAT |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD ✓

Duplicate ID No.: —

**Signature(s):**

[signature]

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

**Sample Number:** 155D001 0006 **Date:** 1/11/05 **Time:** 1040 **Sampler:** CD / TR

**Photograph Number/Direction:** 1095 X Upstream ____ Downstream ____ East ____ West NNW 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) Possibly Other (Insects, frogs, etc.): likely

**Water Width (ft):** 5'-12' **Water Depth (ft):** 0.2 **Estimated Flow/Velocity:** ft/sec .22 x 5'

**Channel Width (ft):** 15'-21' **Channel Depth (ft):** 2.5-10' ~~4"~~

**Signs of flooding (circle all that apply)** (Yes) No Water marks on trees (Water-borne debris piles) Other: under cut trees

**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) Sewage Petroleum Chemical Anaerobic

**Water Surface Oils:** (None) Droplets Sheen

**Turbidity:** (Clear) Slightly Turbid Turbid Opaque

**Other Comments/Observations:** Debris - Plastic, Transite, scrap metal / etc Asphalt, wood

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 002 0006
Sample Location: 15SW/SD 002
Sampled By: CD / TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/11/05<br>Time: 1000<br>Method: Dig trowel<br>Monitor Reading (ppm): – | 0-6" | BRN | MED Sand & Silt & Clay Rich Mat. Sat |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: —

Signature(s):

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

| | | | | | |
|---|---|---|---|---|---|
| **Sample Number:** 15SD002 0006 | **Date:** 1/11/05 | **Time:** 1000 | **Sampler:** ED/TR | | |
| **Photograph Number/Direction:** 1094 X Upstream | Downstream | East | West | NAAK 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) | Possibly | Other (insects, frogs, etc.): | likely | | |
| **Water Width (ft):** 6-10' | **Water Depth (ft):** .2-.4 | **Estimated Flow/Velocity:** | 1 sec/ft .25'x6' | | |
| **Channel Width (ft):** 8-14' | **Channel Depth (ft):** 4' + | | | | |
| **Signs of flooding (circle all that apply)** (Yes) | No | Water marks on trees | (Water-borne debris piles) | Other: Debri | |
| **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:** Asphalt, scrap metal

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD D05 0006
Sample Location: 15SW/SD 005
Sampled By: CD / TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/11/05<br>Time: 1525<br>Method: Dig Trowel<br>Monitor Reading (ppm): – | 0-6" | Orange Brn | Fine - Coarse Sand Tr. Some Silt & ~~some~~ Clay Sat |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| YES | 15FD011105 02 |

**Signature(s):**

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

| | | | | |
|---|---|---|---|---|
| **Sample Number:** 15SD005 0005 | **Date:** 1/11/05 | **Time:** 1525 | **Sampler:** CD/TR | |
| **Photograph Number/Direction:** X Upstream & X Downstream | ~~North~~ East (TR) | Upstream 1101 North West | Downstream 1103 ~~X~~ South ~~East~~ (TR) STET | North |
| **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.): Likely | | | |
| **Water Width (ft):** 4 | **Water Depth (ft):** 3" | **Estimated Flow/Velocity:** 12 gpm | | |
| **Channel Width (ft):** 6 | **Channel Depth (ft):** 4-5 | | | |
| **Signs of flooding (circle all that apply)** (Yes) | No | Water marks on trees | (Water-borne debris piles) | Other: stream washed out to Bedrock |
| **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) plastic | 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:** Asphalt/Tar

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 006 0006
Sample Location: 15SW/SD 006
Sampled By: CD/TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/11/0<br>Time: 1555<br>Method: Dis Trowel<br>Monitor Reading (ppm): | 0-6" | BRN | FINE - MED SAND<br>Some Silt & Clay<br>Tr. Coarse Sand Sat |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No (TR) | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | ~~Yes/No~~ (TR) | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

**Sample Number:** 1550006 0006 **Date:** 1/11/05 **Time:** 1555 **Sampler:** CD/TK

**Photograph Number/Direction:** 1103 X Upstream ___ Downstream ___ East ___ West X 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) Trace | **Stream channelized:** (Yes) No

**Water flowing:** (Yes) No Not present

**Organisms Present:** Fish (in) Possible Other (insects, frogs, etc.): Likely

**Water Width (ft):** 3-5' | **Water Depth (ft):** 6-2" | **Estimated Flow/Velocity:**

**Channel Width (ft):** 5-8' | **Channel Depth (ft):** 1-2' | → Except @ spillway/culvert

**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) @ culvert

**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) Plastic | 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:** _____

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 009 0006
Sample Location: 15SW/SD 009
Sampled By: CD/TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/12/0<br>Time: 0910<br>Method: Dig Trowel<br>Monitor Reading (ppm): – | 0-6" | Dark Brn - Dark Grey | Fine - Coarse Sand Abundant Organics |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD –

Duplicate ID No.: –

Signature(s): [signature]

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

**Sample Number:** 1550 009 0006 **Date:** 1/12/04 **Time:** 0910 **Sampler:** CD/TK

**Photograph Number/Direction:** 1104 X Upstream ____ Downstream ____ East North 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) N/O Other (insects, frogs, etc.): possibly

**Water Width (ft):** 1-3 **Water Depth (ft):** 0.05-0.25 **Estimated Flow/Velocity:** 8-12 gpm (meas)

**Channel Width (ft):** 1-12' **Channel Depth (ft):** 0.5-2

**Signs of flooding (circle all that apply)** Yes No Water marks on trees Water-borne debris piles Other: Matted Grass

**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:** _____

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 013 0006
Sample Location: 15SW/SD 013
Sampled By: CD/TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 7/11/05<br>Time: 1415<br>Method: DIS TROWEL<br>Monitor Reading (ppm): | 0-6" | BRN | MED - FINE SAND & CLAY<br>Abundant org. mat.<br>WET - SAT |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: —

Signature(s): Ty Moal

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

| | | | | | | |
|---|---|---|---|---|---|---|
| Sample Number: | 15SW013 0006 | Date: | 1/11/05 | Time: | 1415 | Sampler: CD/TK |
| Photograph Number/Direction: | 1099 X Upstream | Downstream | East | NW West | North | South |
| Predominant Surrounding Land Use: | Wooded | Open Field | Other | | | |
| Canopy Cover: | Open | Partly Open | Shaded | | | |
| Dicharge Pipe Present: | Yes | No | up stream | | | |
| Aquatic Vegetation Present: | Yes | No | | Stream channelized: | Yes | No |
| Water flowing: | Yes | No | Not present | | | |
| Organisms Present: | Fish (in) | NO | Other (insects, frogs, etc.): | | | |
| Water Width (ft): | 0.5 | Water Depth (ft): | 0.05 | Estimated Flow/Velocity: | 0.3 gpm | |
| Channel Width (ft): | 2'-7' | Channel Depth (ft): | 0-3' | | | |
| Signs of flooding (circle all that apply) | Yes | No | Water marks on trees | Water-borne debris piles | Other: matted grass | |
| 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: Debris - bricks, concrete, Asphalt, paper etc
concrete block

VERY STEEP grade

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 014 0006
Sample Location: 15SW/SD 014
Sampled By: CD/TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/11/05<br>Time: 1425<br>Method: Dis. Trowel<br>Monitor Reading (ppm): | 0-6" | ORANGISH BRN | MED SAND - GRAVEL TR. CLAY SAT |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| ✓ | — |

**Signature(s):**

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

| | | | | | |
|---|---|---|---|---|---|
| Sample Number: | 1550014 0006 | Date: 1/11/05 | Time: 1425 | Sampler: CO/TK | |
| Photograph Number/Direction: | 1100 X Upstream | ___ Downstream | ___ East | ___ West | NNE 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) | Possibly | Other (insects, frogs, etc.): | Likely | |
| Water Width (ft): | 2-4 | Water Depth (ft): | 0.05-0.3 | Estimated Flow/Velocity: | 0.1 x 2 ft/sec |
| Channel Width (ft): | 4-8' | Channel Depth (ft): | 1-8' | | |
| 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: ~~Concrete~~ TK Above

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 015 0006
Sample Location: 15SW/SD 015
Sampled By: CD / TK
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/11/05<br>Time: 1320<br>Method: Dig Trowel<br>Monitor Reading (ppm): | 0-6" | BRN | FINE - MED SAND & SILT TRACE CLAY & COARSE SAND SAT |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

Signature(s):

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

| | | | | | |
|---|---|---|---|---|---|
| **Sample Number:** 15 SW D015 0006 | **Date:** 6/11/05 | **Time:** 1320 | **Sampler:** CD / TK | | |
| **Photograph Number/Direction:** X Upstream | Downstream | X 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) Possibly | Other (insects, frogs, etc.): Likely | | | | |
| **Water Width (ft):** 1½ - 9' | **Water Depth (ft):** 0-0.5 ~~0.55~~ | **Estimated Flow/Velocity:** MEAS. 30 gal | | | |
| **Channel Width (ft):** 12 - 18' | **Channel Depth (ft):** 2-10' | | | | |
| **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:** DEBRIS - transite, glass, scrap metal, plastic etc

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 016 0006
Sample Location: 15SW/SD 016
Sampled By: CD/TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/11/05<br>Time: 11/5<br>Method: Dig Trowel<br>Monitor Reading (ppm): – | 0-6" | Yellow Brn | Coarse Sand Sat |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | ~~Yes/No~~ | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | ~~Yes/No~~ TR | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

Signature(s):

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

| | | | | | |
|---|---|---|---|---|---|
| Sample Number: 153D016 0006 | Date: 1/11/05 | Time: 1115 | Sampler: CD/TR | | |
| Photograph Number/Direction: 1096 X Upstream | Downstream | East | W/S 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) Possible | Other (insects, frogs, etc.): Likely | | | | |
| Water Width (ft): 3-5 | Water Depth (ft): 0.0-0.5 | Estimated Flow/Velocity: 2 SEC/ft 0.2' x 3 | | | |
| Channel Width (ft): 10-15' | Channel Depth (ft): 3-5 | | | | |
| Signs of flooding (circle all that apply) Yes | No | Water marks on trees | Water-borne debris piles | Other: Debris | |
| 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 TN | Slightly Turbid | Turbid | Opaque | | |

Other Comments/Observations: Debris - Plastic tar/ Asphalt

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 017 0006
Sample Location: 15SW/SD 017
Sampled By: CD/TR
C.O.C. No.: 3665

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/11/05<br>Time: 1225<br>Method: DS Trowel<br>Monitor Reading (ppm): – | 0-6" | Orangish Brn | MED-Coarse Sand tr. Clay SAT |

**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 8260B | (3) Encore sampler | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

Signature(s):

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

**Sample Number:** 155D017 0006 **Date:** 1/11/05 **Time:** 1225 **Sampler:** CD / TK

Photograph Number/Direction: (74) ~~1097~~ 1097 X Upstream ____ Downstream ____ East X 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):** 2' - 4' **Water Depth (ft):** 0.1-0.3 **Estimated Flow/Velocity:** ft/sec .1 x 2'

**Channel Width (ft):** 6'-14' **Channel Depth (ft):** 3'-6'

**Signs of flooding (circle all that apply)** (Yes) No Water marks on trees (Water-borne debris piles) Other: undercut trees

**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) | Sewage | Petroleum | Chemical | Anaerobic |
| **Water Surface Oils:** | (None) | Droplets | Sheen | | |
| **Turbidity:** | (Clear) | Slightly Turbid | Turbid | Opaque | |

**Other Comments/Observations:** _____

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD018 0006
Sample Location: 15SW/SD 018
Sampled By: CD/TR
C.O.C. No.: 3662

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/9/05<br>Time: 1605<br>Method: Dis Trowel<br>Monitor Reading (ppm): | 0-6" | Brn | Silty clay sat. some organic mat. |

**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 8260B | 4oz ~~(3) Encore sampler~~ Jar | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

SEE PHOTO FOR SKI & SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: —

Signature(s):

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

| | | | | | |
|---|---|---|---|---|---|
| **Sample Number:** 1093 155W/SD018 | **Date:** 1/9/05 | **Time:** 1605 | **Sampler:** CD/TMC | | |
| **Photograph Number/Direction:** X Upstream | Downstream | NorthEast | 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.): Likely | | | | |
| **Water Width (ft):** 1-2' | **Water Depth (ft):** 1-4" | **Estimated Flow/Velocity:** | | | |
| **Channel Width (ft):** 3-5 | **Channel Depth (ft):** 1-3 | | | | |
| **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) | Trace | |
| **(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:** _____

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD019 0006
Sample Location: 15SW/SD
Sampled By: CD/TK
C.O.C. No.: 3662

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/9/05<br>Time: 1545<br>Method: DIS TROWEL<br>Monitor Reading (ppm): – | 0-6" | BRN | Organic Rich Clay<br>Abundant Roots<br>Tr. Sand & Gravel 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 |
|---|---|---|---|
| Volatiles 8260B | 4oz ~~(3) Encore sampler~~ Jar | Yes | |
| SVOCs w/ PAHs, PCBs, Pesticides & Herbicides | (1) 4oz Jar | Yes | |
| TAL Metals plus Tin | (1) 4oz Jar | Yes/No | |
| TAL Metals plus Sn & Cyanide | (1) 4oz Jar | Yes/No | |

**OBSERVATIONS / NOTES:**

PHOTO # 1092

~~Flow 1ft/sec 0.13 x 2'~~ (TK)

SEE SUPPLEMENTAL SHEET

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: —

**Signature(s):**

Tg Rogal

# SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
## NSWC CRANE, INDIANA

**Sample Number:** 15SW/SD 019 **Date:** 1/9/05 **Time:** 1545 **Sampler:** JG/CD/TK

**Photograph Number/Direction:** 1092 X Upstream ____ Downstream X East ____ West ____ North ____ South

**Predominant Surrounding Land Use:** Wooded (Open Field) Other

**Canopy Cover:** Open Partly Open Shaded

**Dicharge Pipe Present:** Yes No @ culvert

**Aquatic Vegetation Present:** (Yes) No Lush | **Stream channelized:** (Yes) No

**Water flowing:** (Yes) No Not present

**Organisms Present:** Fish (in) Likely Other (insects, frogs, etc.): Likely

**Water Width (ft):** 1 - 4' | **Water Depth (ft):** 1" - 4" | **Estimated Flow/Velocity:** 1ft/sec 0.13' x 2'

**Channel Width (ft):** | **Channel Depth (ft):**

**Signs of flooding (circle all that apply)** (Yes) No Water marks on trees Water-borne debris piles Other: MATTED GRASS

**Deep Pools Present (>2 feet):** Yes (No) If yes (approximate size)

**Sediment Substrate:** Bedrock Rip Rap 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:** Grassy AREA & lush, Downstream of 2' dia Culvert.

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 020 0006
Sample Location: 15SW/SD 020
Sampled By: T. ROJAHN
C.O.C. No.: 3257 & 3258

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 6/07/05<br>Time: 1215<br>Method: S.S. BOWL<br>Monitor Reading (ppm): — | 0-6" | BRN | MED-COURSE SAND & GRAVEL TRACE SILT, SOME PEBBLES (SAT.) |

**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 |
|---|---|---|---|
| 10-Day Hyalella azteca sediment toxicity | (1) Gallon HDPE Bucket | Yes | ESI |
| PAHs | (1) 4oz Jar | Yes | LAUCKS |
| TAL Metals plus TOC | (1) 4oz Jar | Yes | ↓ |
| Grain Size | (1) 8oz Jar | Yes | |

**OBSERVATIONS / NOTES:**

FORMER 15SW/SD 002
PHOTO 4 1660 UPSTREAM

**MAP:**

See Figures 3-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tony Rojahn

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 021 0006
Sample Location: 15SW/SD 021
Sampled By: T. ROJAHN
C.O.C. No.: 3257 & 3258

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 6/7/05<br>Time: 1305<br>Method: SS BOWL<br>Monitor Reading (ppm): — | 0-6" | MED. BRN | COARSE SAND & GRAVEL, TRACE SILT, SOME PEBBLES (SAT.) |

**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 |
|---|---|---|---|
| 10-Day Hyalella azteca sediment toxicity | (1) Gallon HDPE Bucket | Yes | ESI |
| PAHs | (1) 4oz Jar | Yes | LAULKS |
| TAL Metals plus TOC | (1) 4oz Jar | Yes | ↓ |
| Grain Size | (1) 8oz Jar | Yes | |

**OBSERVATIONS / NOTES:**

PHOTO # 1661 UPSTREAM

**MAP:**

See Figures 3-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Tony Rojahn

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 022 0006
Sample Location: 15SW/SD 022
Sampled By: T. ROJAHN
C.O.C. No.: 3257 & 3258

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 6/7/05<br>Time: 1340<br>Method: SS BOWL<br>Monitor Reading (ppm): — | 0-6" | MED. BRN | FINE SAND & SILT, TRACE COARSE SAND (SAT.) |

**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 |
|---|---|---|---|
| 10-Day Hyalella azteca sediment toxicity | (1) Gallon HDPE Bucket | Yes | ESI |
| PAHs | (1) 4oz Jar | Yes | LAUCKS |
| TAL Metals plus TOC | (1) 4oz Jar | Yes | ↓ |
| Grain Size | (1) 8oz Jar | Yes | |

**OBSERVATIONS / NOTES:**

FORMER 15SW/SD 001
PHOTO #1662 UPSTREAM

**MAP:**

See Figures 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, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 023 0006
Sample Location: 15SW/SD 023
Sampled By: C. Doolan
C.O.C. No.: 3257 & 3258

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 6/07/05<br>Time: 1430<br>Method: SS Bowl<br>Monitor Reading (ppm): — | 0-6" | MED. to DARK BRN | Coarse sand, gravel & pebbles, some med-fine sand, trace silt (SAT.) |

**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 |
|---|---|---|---|
| 10-Day Hyalella azteca sediment toxicity | (1) Gallon HDPE Bucket | Yes | ESI |
| PAHs | (1) 4oz Jar | Yes | Laucks |
| TAL Metals plus TOC | (1) 4oz Jar | Yes | ↓ |
| Grain Size | (1) 8oz Jar | Yes | ↓ |

**OBSERVATIONS / NOTES:**

FORMER 15SW/SD016
PHOTO # 1658

**MAP:**

See Figures 3-2

**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, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 026 0006
Sample Location: 15SW/SD 026
Sampled By: T. ROSAHN
C.O.C. No.: 3257 & 3258

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 6/07/05<br>Time: 1435<br>Method: S.S. Bowl<br>Monitor Reading (ppm): – | 0-6" | MED - DARK BRN | MED - COARSE SAND, t. gravel, t. silt, SOME ORGANIC MAT. (SAT.) |

**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 |
|---|---|---|---|
| 10-Day Hyalella azteca sediment toxicity | (1) Gallon HDPE Bucket | Yes | ESI |
| PAHs | (1) 4oz Jar | Yes | LAUCKS |
| TAL Metals plus TOC | (1) 4oz Jar | Yes | ↓ |
| Grain Size | (1) 8oz Jar | Yes | |

**OBSERVATIONS / NOTES:**

FORMER 15 SW/SD 014
PHOTO # 1656

**MAP:**

See Figures 3-2

**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: —

**Signature(s):**

Terry Rosahn

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 0250006
Sample Location: 15SW/SD 025
Sampled By: C. Doolan
C.O.C. No.: 3257 & 3258

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 6/07/05<br>Time: 1500<br>Method: S.S. Bowl<br>Monitor Reading (ppm): – | 0-6" | BRN | COARSE SAND, GRAVEL & pebbles, SOME F-MED. SAND, + Silt (SAT.) |

**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 |
|---|---|---|---|
| 10-Day Hyalella azteca sediment toxicity | (1) Gallon HDPE Bucket | Yes | ESI |
| PAHs | (1) 4oz Jar | Yes | LAUCKS |
| TAL Metals plus TOC | (1) 4oz Jar | Yes | ↓ |
| Grain Size | (1) 8oz Jar | Yes | |

**OBSERVATIONS / NOTES:**

FORMER 15 SW/SD 015
PHOTO # 165T UPSTREAM

**MAP:**

See Figures 3-2

**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, SWMU 15
Project No.: N1245, CTO 0331

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 15SD 024 0006
Sample Location: 15SW/SD 024
Sampled By: T. ROSAHN
C.O.C. No.: 3257 & 3258

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 6/07/05<br>Time: 1510<br>Method: S.S. Bowl<br>Monitor Reading (ppm): — | 0-6" | MED BRN - Grey BRN | Fine SAND & silt, t. MED & COARSE SAND, (SAT.) |

**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 |
|---|---|---|---|
| 10-Day Hyalella azteca sediment toxicity | (1) Gallon HDPE Bucket | Yes | ESI |
| PAHs | (1) 4oz Jar | Yes | LAUCKS |
| TAL Metals plus TOC | (1) 4oz Jar | Yes | |
| Grain Size | (1) 8oz Jar | Yes | ↓ |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Directly Below Soil Boring location 1558033.
PHOTO # 1659

**MAP:**

See Figures 3-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

# APPENDIX C.3
# SURFACE WATER SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

Sample ID No.: 15SW001 01
Sample Location: 15SW/SD 001
Sampled By: JG/TK
C.O.C. No.: 3660

[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: 1/11/05 | | | | | | | | |
| Time: 1035 | | | | | | | | |
| Depth: SURFACE | CLEAR | 7.86 | 0.579 | 9.76 | 45 | 11.50 | 78.7 | — |
| Method: DIRECT | | | | | | | | |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[ ] No[ ] 15SW 001 01 -F

PHOTO# 1095
1 ft/sec
.22' x 5' x 1 x 449 =
FLOW = 494 gpm

## MAP:

See Figure 3-2

## Circle if Applicable:

MS/MSD — Duplicate ID No.: —

## Signature(s):

Tey [illegible]

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 15SW00201
Sample Location: 15SW/SD 002
Sampled By: JG/TK
C.O.C. No.: 3660

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: 1/11/05 | | | | | | | | |
| Time: 0945 | | | | | | | | |
| Depth: SURFAC | Sl. Cloudy | 7.25 | 0.484 | 9.36 | 90 | 7.33 | +81 | — |
| Method: Direct | | | | | | | | |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[ ] No[ ] 15SW 00201 -F

1 SEC/FT 0.25' x 6'

PHOTO # 1098 NAVI

FLOW: 674 gpm

## MAP:

See Figure 3-2

## 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, SWMU 15
Project No.: N1245 CTO 0331

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: catch basin/storm drain
[] QA Sample Type:

Sample ID No.: 15ST00401
Sample Location: 15SW/SD 004
Sampled By: CO
C.O.C. No.: 3666

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: 1/12/05<br>Time: 1120<br>Depth: surface<br>Method: transfer container 4oz jar | clear | 7.76 | 0.720 | 12.21 | 5.3 | 10.76 | 53.1 | — |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

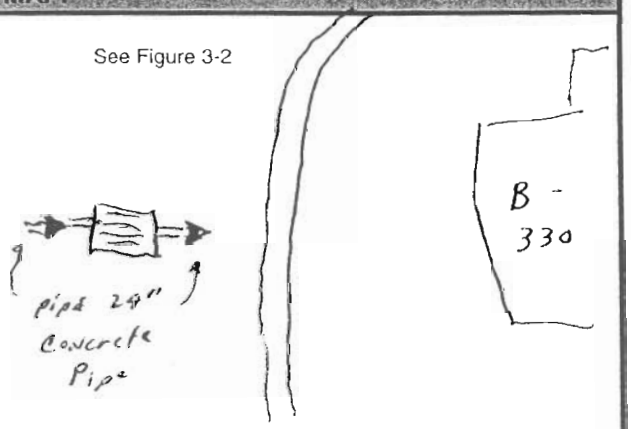
## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[ ] No[ ] 15ST00401-F

photo # 1106
Standing North of catch basin
0.5" of water

## MAP:

See Figure 3-2




**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: —

Signature(s): [illegible]

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Culvert
[] QA Sample Type:

Sample ID No.: 15S W 00501
Sample Location: 15SW/SD 005
Sampled By: JG / TK
C.O.C. No.: 3664

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: 1/11/05 | | | | | | | | |
| Time: 1520 | | | | | | | | |
| Depth: SURFACE | Clear | 7.64 | 1.082 | 11.41 | 9.1 | 9.53 | +24.3 | — |
| Method: Direct | | | | | | | | |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[ ] No[ ] 15SW 00501 -F

PHOTO 1101 NW
UPSTREAM

PHOTO 1102
DOWNSTREAM ~~ATE~~ SE

MEAS. FLOW: 12 gal / min

## MAP:

See Figure 3-2

## Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

## Signature(s):

Ty [illegible]

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 15SW 00601
Sample Location: 15SW/SD 006
Sampled By: JG / TR
C.O.C. No.: 3664

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: 1/11/04<br>Time: 1550<br>Depth: SURFACE<br>Method: DIRECT | Clear | 7.75 | 1.028 | 10.97 | 13 | 10.47 | 70.4 | — |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[ ] No[ ] 15SW 00601 -F

PHOTO 1103 N

20 - 30 ppm

## MAP:

See Figure 3-2

## Circle if Applicable:

| MS/MSD | Duplicate ID No.: |
|---|---|
| YES | 15FD01110501 |

Signature(s):

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

Sample ID No.: 15S W 00901
Sample Location: 15SW/SD 009
Sampled By: JG / TK
C.O.C. No.: 3664

[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: 1/12/10<br>Time: 0905<br>Depth: SURFACE<br>Method: Direct | CLEAR | 7.03 | 0.522 | 10.48 | 8.3 | 10.14 | -6.8 | — |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | ~~(2)~~ 1 L Glass Amber | Yes |
| Pesticides | 4°C | ~~(2)~~ 1 L Glass Amber | Yes/No |
| Herbicides | 4°C | ~~(2)~~ 1 L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW 00901-F

FLOW: 8-12 gpm (MEAS.)

PHOTO # 1104 NW

## MAP:

See Figure 3-2

## Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[] Stream
[] Spring
[] Pond
[] Lake
[✓] Other: catch basin/stormdrain
[] QA Sample Type:

Sample ID No.: 15S T010 01
Sample Location: 15SW/SD 010
Sampled By: CD
C.O.C. No.: 3664

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: 1/12/05<br>Time: 0955<br>Depth: Surface<br>Method: peristaltic | clear | 7.84 | 0.237 | 12.94 | 35 | 10.38 | 32.7 | — |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | 1 ~~(2)~~ L Glass Amber | Yes |
| PCBs | 4°C | 1 ~~(2)~~ L Glass Amber | Yes |
| Pesticides | 4°C | 1 ~~(2)~~ L Glass Amber | Yes/No |
| Herbicides | 4°C | 1 ~~(2)~~ L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW 01001 -F

PHOTO 1105

1" to 1.5" water depth

## MAP:

See Figure 3-2

**Circle if Applicable:**

MS/MSD — Duplicate ID No.: —

**Signature(s):** Colin Dolan

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other:
[] QA Sample Type: storm drain

Sample ID No.: 15ST01101
Sample Location: 15SW/SD011
Sampled By: Goerdt
C.O.C. No.: 3666

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: 1-12-05 | | | | | | | | |
| Time: 1035 | | | | | | | | |
| Depth: SURFACE | | | | | | | | |
| Method: peristaltic | clear | 7.61 | .946 | 13.33 | 12 | 9.66 | 115.5 | — |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | 1 (~~2~~) L Glass Amber | Yes |
| PCBs | 4°C | 1 (~~2~~) L Glass Amber | Yes |
| Pesticides | 4°C | 1 (~~2~~) L Glass Amber | Yes/No |
| Herbicides | 4°C | 1 (~~2~~) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SWT01101-F

Storm drain depth ~6'
Water depth ~4"

PHOTO II
1107
Standing
West
side

Stagnant Water.
No inflow or outflow
@ time of sampling.

## MAP:

See Figure 3-2

**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, SWMU 15
Project No.: N1245 CTO 0331

Sample ID No.: 15SW01301
Sample Location: 15SW/SD 01301
Sampled By: JG/TK
C.O.C. No.: 3660

[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: 1/11/05 | | | | | | | | |
| Time: 1410 | | | | | | | | |
| Depth: SURFACE | LT TAN | 7.70 | 0.783 | 9.64 | 370 | 10.39 | -0.1 | — |
| Method: Direct | | | | | | | | |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW 01301 -F

PHOTO 1099 NNW

MEAS = 0.3gal/min

## MAP:

See Figure 3-2

**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: —

**Signature(s):**

Ty Ryan

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 15S W01401
Sample Location: 15SW/SD 014
Sampled By: JG / TR
C.O.C. No.: 3664

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: 1/11/04<br>Time: 1420<br>Depth: SURFACE<br>Method: Direct | CLEAR | 7.77 | .478 | 9.88 | 39 | 11.00 | ← | 55.3 |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW 01401 -F

PHOTO # 1100 NNE
ft/sec 0.1' x 2'
FLOW = 90 gpm

## MAP:

See Figure 3-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

Sample ID No.: 15S W 01501
Sample Location: 15SW/SD 015
Sampled By: JG / TK
C.O.C. No.: 3660

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

## SAMPLING DATA:

| Date: 1/11/05 | Color (Visual) | pH (S. U.) | S.C. (mS/cm) | Temp. (°C) | Turbidity (NTU) | DO (mg/L) | ORP (mV) | Other NA |
|---|---|---|---|---|---|---|---|---|
| Time: 1315 | | | | | | | | |
| Depth: SURFACE | clear | 7.93 | .518 | 9.89 | 19 | 11.33 | 3.4 | – |
| Method: DIRECT | | | | | | | | |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW 01501 -F

PHOTO # 1098

MEAS. 309 ml

## MAP:

See Figure 3-2

**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: —

**Signature(s):**

Ty Nagel

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 15SW01601
Sample Location: 15SW/SD 016
Sampled By: JG/TK
C.O.C. No.: 3660

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: 7/11/05 | | | | | | | | |
| Time: 1110 | | | | | | | | |
| Depth: SURFACE | Lt TAN | 7.86 | .771 | 10.27 | 140 | 11.08 | 72.3 | — |
| Method: Direct | | | | | | | | |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW 01601 -F

PHOTO 1096 WSW
2 sec/ft 0.2' x 3'

Flow = 135 gpm

## MAP:

See Figure 3-2

## Circle if Applicable:

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

Signature(s):

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 15SW01701
Sample Location: 15SW/SD 017
Sampled By: JG / TK
C.O.C. No.: 3660

Type of Sample:
[X] Low Concentration
[] High Concentration

## SAMPLING DATA:

| Date: 1/11/05 Time: 1220 Depth: Surface Method: Direct | Color (Visual) | ~~pH~~ TEMP (S. U.) | S.C. (mS/cm) | ~~Temp.~~ (°C) P.H | Turbidity (NTU) | DO (mg/L) | ORP (mV) | Other NA |
|---|---|---|---|---|---|---|---|---|
| | Clear | 10.87 | 0.947 | 7.74 | 60 | 10.57 | 4.4 | – |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| Total Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW01701-F

PHOTO 1097 W

15ft/sec 0.1' x 2'

## MAP:

See Figure 3-2

## Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Tay [illegible]

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 15SW01801
Sample Location: 15SW/SD
Sampled By: JG / TL
C.O.C. No.: 3657 & 3658

Type of Sample:
[X] Low Concentration
[] High Concentration

* MALFUNCTION

## SAMPLING DATA:

| | Color (Visual) | pH (S. U.) | S.C. (mS/cm) | Temp. (°C) | Turbidity (NTU) | DO (mg/L) | ORP (mV) | Other NA |
|---|---|---|---|---|---|---|---|---|
| Date: 1/9/05<br>Time: 1600<br>Depth: SURFACE<br>Method: Direct | SL Cloudy | 7.57<br>~~6.73~~ (2) | 0.512 | 6.73 | 70 | * | 27 | — |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | 1 (2) L Glass Amber | Yes |
| PCBs | 4°C | 1 (2) L Glass Amber | Yes |
| Pesticides | 4°C | 1 (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | 1 (2) L Glass Amber | Yes/No |
| Total Metals + TIN | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals + TIN | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW01801-F

PHOTO # 1093
1 ft/sec 0.02' x 1'
Culvert downstream
FLOW:
9pm

## MAP:

See Figure 3-2

**Circle if Applicable:**

MS/MSD — Duplicate ID No.: —

**Signature(s):**

Tetra Tech NUS, Inc.

# SURFACE WATER SAMPLE LOG SHEET



Project Site Name: NSWC CRANE, SWMU 15
Project No.: N1245 CTO 0331

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 15SW01901
Sample Location: 15SW/SD 079
Sampled By: JG / TK
C.O.C. No.: 3657

Type of Sample:
[X] Low Concentration
[] High Concentration

* Malfunction

## SAMPLING DATA:

| | Color (Visual) | pH (S. U.) | S.C. (mS/cm) | Temp. (°C) | Turbidity (NTU) | DO (mg/L) | ORP (mV) | Other NA |
|---|---|---|---|---|---|---|---|---|
| Date: 1-9-05 | | | | | | | | |
| Time: 1540 | | | | | | | | |
| Depth: SURFACE | CLEAR | 7.82 | 0.375 | 7.37 | 25 | * | -15.7 | — |
| Method: Direct | | | | | | | | |

## SAMPLE COLLECTION INFORMATION:

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | 1 ~~(2)~~ L Glass Amber | Yes |
| PCBs | 4°C | 1 ~~(2)~~ L Glass Amber | Yes |
| Pesticides | 4°C | 1 ~~(2)~~ L Glass Amber | Yes/No |
| Herbicides | 4°C | 1 ~~(2)~~ L Glass Amber | Yes/No |
| Total Metals + TIM | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals + TIM | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| | | | |
| | | | |
| | | | |

## OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[ ] 15SW 01901 -F

Photo # 1092
Flow 1 ft/sec 0.13'x2'
117 gpm

## MAP:

See Figure 3-2

**Circle if Applicable:**

MS/MSD — Duplicate ID No.: —

**Signature(s):**

Troy Rozal

# APPENDIX C.4
# GROUNDWATER SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

# GROUNDWATER SAMPLE LOG SHEET



Project Site Name: NSWC Crane, SWMU 15
Project No.: N1245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temporary Well
[] QA Sample Type:

Sample ID No.: 15GWTW 001
Sample Location: 15TW 001/SB002
Sampled By: T. ROHAN
C.O.C. No.: 3656
Type of Sample:
[X] Low Concentration
[] High Concentration

**SAMPLING DATA:**

| | Color Visual | NA | pH Standard | S.C. mS/cm | Temp. °C | Turbidity NTU | DO mg/l | ORP mV |
|---|---|---|---|---|---|---|---|---|
| Date: 1/08/05 Time: 1300 Method: SAME | CLEAR | – | 7.45 | 0.413 | 6.53 | 9.8 | 11.51 | -79.4 |

**PURGE DATA:**

| | Volume | Time | pH | S.C. | Temp. (C) | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Date: 1/08/05 | | | | | | | | |
| Method: Peristaltic | | | | | | | | |
| Monitor Reading (ppm): – | | | | | | | | |
| Well Casing Diameter & Material | | | | | | | | |
| Type: 1" Ø PVC | | SEE | LOW | FLOW | PURGE | DATA | SHEET | |
| Total Well Depth (TD): 7.04 | | | | | | | | |
| Static Water Level (WL): 2.9 | | | | | | | | |
| One Casing Volume(gal/L): 2.6 | | | | | | | | |
| Start Purge (hrs): 1200 | | | | | | | | |
| End Purge (hrs): 1300 | | | | | | | | |
| Total Purge Time (min): 60 | | | | | | | | |
| Total Vol. Purged (gal/L): 4.3 | | | | | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| Total Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes/No |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | 1 (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Filtered Sample Collected Yes[ ] No[ ] 15GWTW_____-F

Converted Boring 15SB 002

4.14' x 0.163 = 0.7 gal OR 2.6 L

Stick up = 1.44

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

Signature(s): Terry Rohan

Tetra Tech NUS, Inc.

# LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: TG ~~7440~~ 1245

WELL ID.: 15TW001
DATE: 1/08/05

| 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 (Color. etc) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1200 | 2.90 | 0 | – | – | – | – | – | – | – | START PURGE |
| 1210 | 4.74 | 1300 | 130 | 7.50 | 0.427 | 200 | 6.32 | 7.38 | -10.3 | SL. Cloudy |
| 1220 | 6.20 | 1900 | 60 | 7.40 | 0.454 | 190 | 8.94 | 7.02 | -78.9 | " " |
| 1230 | 6.20 | 2500 | 60 | 7.40 | 0.429 | 50 | 10.50 | 6.75 | -76.6 | CLEAR |
| 1240 | 6.20 | 3100 | 60 | 7.41 | 0.422 | 20 | 10.96 | 6.94 | -78.4 | " |
| 1250 | 6.20 | 3700 | 60 | 7.45 | 0.417 | 14 | 11.26 | 6.96 | -79.7 | " |
| 1300 | 6.20 | 4300 | 60 | 7.45 | 0.413 | 9.8 | 11.51 | 6.93 | -79.4 | " Start Sampling |

Water Quality Meter (SN) 01D0956 AA
Control Box type (SN) 419
Turbidity Meter (SN) 4536-3303

Pump Intake 6.9'

SIGNATURE(S): Ty Lopez

Tetra Tech NUS, Inc.

# GROUNDWATER SAMPLE LOG SHEET



Project Site Name: NSWC Crane, SWMU 15
Project No.: N1245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temporary Well
[] QA Sample Type:

Sample ID No.: 15GWTW 002
Sample Location: 15TW 002/SB006
Sampled By: T. ROJAHN
C.O.C. No.: 3656
Type of Sample:
[X] Low Concentration
[] High Concentration

**SAMPLING DATA:**

| | Color | NA | pH | S.C. | Temp. | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Date: 1/08/05 | Visual | | Standard | mS/cm | °C | NTU | mg/l | mV |
| Time: 0950 | | | | | | | | |
| Method: SAME | CLEAR | – | 7.56 | 0.438 | 7.35 | 13 | 8.52 | 46.0 |

**PURGE DATA:**

| Date: 1/08/05 | Volume | Time | pH | S.C. | Temp. (C) | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Method: PERISTALTIC | | | | | | | | |
| Monitor Reading (ppm): – | | | | | | | | |
| Well Casing Diameter & Material | | | | | | | | |
| Type: 1" Ø PVC | | | SEE | LOW | FLOW | PURGE | SHEET | |
| Total Well Depth (TD): 7.85 | | | | | | | | |
| Static Water Level (WL): 3.95 | | | | | | | | |
| One Casing Volume(gal/L): 2.4 | | | | | | | | |
| Start Purge (hrs): 0840 | | | | | | | | |
| End Purge (hrs): 0950 | | | | | | | | |
| Total Purge Time (min): 70 | | | | | | | | |
| Total Vol. Purged (gal/L): 7.4 | | | | | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| Total Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes/No |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | 1 ~~(2)~~ L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Filtered Sample Collected Yes[X] No[ ] 15GWTW 002 -F

3.9' x .163 = 0.6 gal or 2.4 L

Converted Boring 15SB 006

stick up = 1.52'

**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: (Tt) ~~7448~~ 1245

WELL ID.: 15TW002
DATE: 1/08/05

| 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 (Color, etc) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0840 | 3.95 | 0 | – | – | – | – | – | – | – | START PURGE |
| 0850 | 4.30 | 2000 | 200 | 7.26 | 0.449 | 1000 | 3.99 | 8.65 | +68.6 | LT. BRN |
| 0900 | 4.20 | 2900 | 90 | 7.38 | 0.438 | 85 | 7.68 | 8.12 | 66.1 | V. SL. Cloudy |
| 0910 | 4.20 | 3800 | 90 | 7.47 | 0.434 | 32 | 9.85 | 7.60 | 61.1 | CLEAR |
| 0920 | 4.20 | 4700 | 90 | 7.54 | 0.434 | 20 | 9.21 | 7.41 | 57.6 | CLEAR |
| 0930 | 4.20 | 5600 | 90 | 7.56 | 0.435 | 12 | 9.13 | 7.19 | 56.0 | CLEAR |
| 0940 | 4.24 | 6500 | 90 | 7.58 | 0.439 | 20 | 8.45 | 7.70 | 49.3 | CLEAR |
| 0950 | 4.26 | 7400 | 90 | 7.56 | 0.438 | 13 | 8.52 | 7.35 | 46.0 | CLEAR |
| 0950 | – | – | – | – | – | – | – | – | – | START SAMPLING |

Water Quality Meter (SN) 01D0956AA
Control Box type (SN) 419
Turbidity Meter (SN) 4536-3303

Pump Intake 7.7'

SIGNATURE(S): Terry Rogers

Tetra Tech NUS, Inc.

# GROUNDWATER SAMPLE LOG SHEET



Project Site Name: NSWC Crane, SWMU 15
Project No.: N1245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temporary Well
[] QA Sample Type:

Sample ID No.: 15GWTW 003
Sample Location: 15TW 003/5800 9
Sampled By: Gorski
C.O.C. No.: 3656
Type of Sample:
[X] Low Concentration
[] High Concentration

**SAMPLING DATA:**

| Date: 1-8-05 | Color | NA | pH | S.C. | Temp. | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Time: 1525 | Visual | | Standard | mS/cm | °C | NTU | mg/l | mV |
| Method: peristaltic | Clear | – | 6.13 | 1.258 | 9.51 | 33 | 0.31 | -65.3 |

**PURGE DATA:**

| Date: 1-8-05 | Volume | Time | pH | S.C. | Temp. (C) | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Method: peristaltic | | | | | | | | |
| Monitor Reading (ppm): – | | | | | | | | |
| Well Casing Diameter & Material | | | | | | | | |
| Type: 1" pvc | | | | | | | | |
| Total Well Depth (TD): 9.83 | | | | | | | | |
| Static Water Level (WL): 2.22 | | | | | | | | |
| One Casing Volume(gal/L): 4.6 | | | | | | | | |
| Start Purge (hrs): 1415 | | | | | | | | |
| End Purge (hrs): 1520 | | | | | | | | |
| Total Purge Time (min): 65 | | | | | | | | |
| Total Vol. Purged (gal/L): 14.6 | | | | | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| Total Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes/No |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Filtered Sample Collected Yes[X] No[ ] 15GWTW 003 -F

Converted Boring 15SB 009

9.83
2.22
7.61 (.163) = 1.24 gal
= 4.6 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: 1245

WELL ID.: 15TW503
DATE: 1-8-05

| 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 (Color. etc) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1415 | 2.22 | - | - | - | - | - | - | - | - | start purge |
| 1425 | 2.63 | 2.25 | 225 | 6.17 | 1.247 | - | 0.41 | 9.36 | -57.5 | - |
| 1435 | 3.02 | 4.50 | 225 | 6.16 | 1.248 | 385 | 0.48 | 9.29 | -58.6 | cloudy |
| 1445 | 3.03 | 6.75 | 225 | 6.14 | 1.252 | 180 | 0.37 | 9.38 | -61.0 | sl. cloudy |
| 1455 | 3.09 | 9.00 | 225 | 6.13 | 1.253 | 97 | 0.35 | 9.41 | -62.4 | " |
| 1505 | 3.17 | 11.25 | 225 | 6.13 | 1.256 | 60 | 0.32 | 9.45 | -63.7 | " |
| 1515 | 3.19 | 13.5 | 225 | 6.12 | 1.257 | 41 | 0.34 | 9.47 | -65.0 | " |
| 1520 | 3.20 | 14.6 | 225 | 6.13 | 1.258 | 33 | 0.31 | 9.51 | -65.3 | stop purge |

Water Quality Meter (SN) 99K1014 ACF
Control Box type (SN) NA
Turbidity Meter (SN) 4175 1503

Pump Intake 9.5'

3 wv = 13.8 L

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

# GROUNDWATER SAMPLE LOG SHEET



Project Site Name: NSWC Crane, SWMU 15
Project No.: N1245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temporary Well
[] QA Sample Type:

Sample ID No.: 15GWTW 004
Sample Location: 15TW 004/SB031 (TR)
Sampled By: Gerdt
C.O.C. No.: 3656
Type of Sample:
[X] Low Concentration
[] High Concentration

taken just prior to metals collection

**SAMPLING DATA:**

| | Color | NA | pH | S.C. | Temp. | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Date: 1-8-05 | Visual | | Standard | mS/cm | °C | NTU | mg/l | mV |
| Time: 0904* See below | | | | | | | | |
| Method: peristaltic | light tan | — | 6.92 | .167 | 10.76 | 650 | 6.62 | 118.7 |

**PURGE DATA:**

| Date: 1-8-05 | Volume | Time | pH | S.C. | Temp. (C) | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Method: peristaltic | | | | | | | | |
| Monitor Reading (ppm): — | | | | | | | | |
| Well Casing Diameter & Material | | | | | | | | |
| Type: 1" PVC | | | | | | | | |
| Total Well Depth (TD): 14.9 | | | | | | | | |
| Static Water Level (WL): 9.73 | | | | | | | | |
| One Casing Volume(gal/L): 3.12 | | | | | | | | |
| Start Purge (hrs): 0825 | | | | | | | | |
| End Purge (hrs): 0835 | | | | | | | | |
| Total Purge Time (min): 10 | | | | | | | | |
| Total Vol. Purged (gal/L): 2.0 | | | | | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | | Collection Order | Preservative | * | Container Requirements | Collected |
|---|---|---|---|---|---|---|
| Volatiles 8260B | Full | 5 | 4°C/HCl | 1250 | (3) 40ml Vials | Yes |
| Total Metals plus Tin | Full | 1 | 4°C/$HNO_3$ | 0904 | (1) L HDPE | Yes |
| Dissolved Metals plus Tin | Full | 2 | 4°C/$HNO_3$ | 1005 | (1) L HDPE | Yes/No |
| SVOCs | Full | 3 | 4°C | 1047 | 1 (2) L Glass Amber | Yes |
| PAHs | Full | 4 | 4°C | 1130 | 1 (2) L Glass Amber | Yes |
| PCBs | 500 ml | 6 | 4°C | 1220 | 1 (2) L Glass Amber | Yes |
| Pesticides | 500 ml | 7 | 4°C | 1320 | 1 (2) L Glass Amber | Yes No |
| Herbicides | 500 ml | 8 | 4°C | 1355 | 1 (2) L Glass Amber | Yes No |

Minimal sample collected.

**OBSERVATIONS / NOTES:**

Filtered Sample Collected Yes[X] No[ ] 15GWTW 004 -F

Converted Boring 15SB 031

14.90
9.73
5.17 (.163) = .84 gal
= 3.12 L

Well dried out continually while sampling. Allowed time for recharge between samples.

**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:** 1245

**WELL ID.:** 15TW004
**DATE:** 1-8-05

| 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 (Color. etc) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0825 | 9.73 | ~~2.0~~ gs | ~~200~~ gs | — | — | — | — | — | — | Start purge |
| 0835 | Dry | 2.0 | 200 | 6.92 | .167 | >1000 | 6.62 | 10.76 | 118.7 | Brn - Dry |

Water Quality Meter (SN) 99K1014AG
Control Box type (SN) NA
Turbidity Meter (SN) 4175 1503

Pump Intake 14' 5"

**SIGNATURE(S):** [signature]

Tetra Tech NUS, Inc.

# GROUNDWATER SAMPLE LOG SHEET



Project Site Name: NSWC Crane, SWMU 15
Project No.: N1245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temporary Well
[] QA Sample Type:

Sample ID No.: 15GWTW 005
Sample Location: 15TW 005 / SB035
Sampled By: JG / CD
C.O.C. No.: 3652
Type of Sample:
[X] Low Concentration
[] High Concentration

**SAMPLING DATA:**

| Date: 1-5-05 | Color | NA | pH | S.C. | Temp. | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Time: 1320 | Visual | | Standard | mS/cm | °C | NTU | mg/l | mV |
| Method: Peristaltic | Brn | | 8.21 | 1.181 | 7.86 | >1000 | 10.59 | 32.2 |

**PURGE DATA:**

| Date: 1-5-05 | Volume | Time | pH | S.C. | Temp. (C) | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Method: Peristaltic | | | | | | | | |
| Monitor Reading (ppm): — | | | | | | | | |
| Well Casing Diameter & Material | | | | | | | | |
| Type: 1" PVC | | | | | | | | |
| Total Well Depth (TD): 9.02 | | | | | | | | |
| Static Water Level (WL): 4.15 | | | | | | | | |
| One Casing Volume(gal/L): 2.9 | | | | | | | | |
| Start Purge (hrs): 1215 | | | | | | | | |
| End Purge (hrs): 1315 | | | | | | | | |
| Total Purge Time (min): 60 | | | | | | | | |
| Total Vol. Purged (gal/L): 8.8 | | | | | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| Total Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes/No |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Filtered Sample Collected Yes[X] No[ ] 15GWTW 005 -F

PVC riser = 4.2' above ground surface

Converted Boring 15SB 035

Heavy rains w/ standing water around hole. Diverted runoff by channeling water away.

9.02
4.15
4.87(.163) = 0.79 gal
= 2.9 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: 1245

WELL ID.: 15TW005
DATE: 1-5-05

| 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 (Color. etc) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1215 | 4.15 | – | – | – | – | – | – | – | – | Start purge |
| 1225 | 4.19 | 1.6 | 160 | 8.13 | 1.213 | 755 | 10.63 | 8.73 | 35.6 | Brown |
| 1235 | 4.19 | 3.2 | 160 | 8.15 | 1.202 | >1000 | 10.48 | 8.76 | 32.6 | " |
| 1245 | 4.15 | 5.1 | 190 | 8.20 | 1.210 | 410 | 10.64 | 8.76 | 34.4 | " |
| 1255 | 4.18 | 6.6 | 150 | 8.14 | 1.210 | 974 | 10.56 | 8.78 | 34.8 | " |
| 1305 | 4.17 | 7.8 | 120 | 8.23 | 1.196 | 845 | 10.58 | 8.24 | 36.9 | " |
| 1315 | 4.17 | 8.8 | 100 | 8.21 | 1.181 | >1000 | 10.59 | 7.86 | 32.2 | end purge |

Water Quality Meter (SN) 01D0956AA
Control Box type (SN) NA
Turbidity Meter (SN) 4175-1503

Pump Intake 1" off bottom ≈8.9'

SIGNATURE(S): [illegible]
Eli Dooley

Tetra Tech NUS, Inc.

# GROUNDWATER SAMPLE LOG SHEET



Project Site Name: NSWC Crane, SWMU 15
Project No.: N1245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temporary Well
[] QA Sample Type:

Sample ID No.: 15GWTW 006
Sample Location: 15TW 006 / SB 046
Sampled By: Goerdt
C.O.C. No.: 3655
Type of Sample:
[X] Low Concentration
[] High Concentration

**SAMPLING DATA:**

| Date: 1-7-05 | Color | NA | pH | S.C. | Temp. | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Time: 1115 | Visual | | Standard | mS/cm | °C | NTU | mg/l | mV |
| Method: peristaltic | clear | | 6.55 | .844 | 13.21 | 2.0 | 0.38 | -120.3 |

**PURGE DATA:**

| Date: 1-7-05 | Volume | Time | pH | S.C. | Temp. (C) | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Method: peristaltic | | | | | | | | |
| Monitor Reading (ppm): — | | | | | | | | |
| Well Casing Diameter & Material | | | | | | | | |
| Type: 1" PVC | | | | | | | | |
| Total Well Depth (TD): 21.45 | | | | | | | | |
| Static Water Level (WL): 13.88 | | | | | | | | |
| One Casing Volume(gal/L): 4.6 | | | | | | | | |
| Start Purge (hrs): 0950 | | | | | | | | |
| End Purge (hrs): 1110 | | | | | | | | |
| Total Purge Time (min): 80 | | | | | | | | |
| Total Vol. Purged (gal/L): 14.9 | | | | | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | ~~(2)~~ (3) 40ml Vials | Yes |
| Total Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes/No |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes/No |
| Herbicides | 4°C | (2) L Glass Amber | Yes/No |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Filtered Sample Collected Yes[ ] No[X] 15GWTW_____-F

Converted Boring 15SB 046

21.45
13.88
7.57 (.163) = 1.23 gal
= 4.57 L

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| Yes | 15FD01070501 |

Signature(s): [signature]

Tetra Tech NUS, Inc.

# LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 1245

WELL ID.: 15TW006
DATE: 1-7-05

| 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 (Color. etc) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0950 | 13.88 | – | – | – | – | – | – | – | – | Start purge. |
| 1000 | 14.48 | 2.2 | 220 | 6.51 | .812 | – | 1.82 | 12.93 | 106.4 | Initial color was |
| 1010 | 14.61 | 3.1 | 190 | 6.56 | .846 | 650 | 0.59 | 13.56 | -122.9 | muddy tan gray. |
| 1020 | 14.55 | 5.9 | 180 | 6.58 | .845 | 65 | 0.51 | 13.55 | -122.8 | cloudy |
| 1030 | 14.61 | 7.7 | 180 | 6.57 | .846 | 200 | 0.42 | 13.41 | -124.2 | " |
| 1040 | 14.62 | 9.5 | 180 | 6.57 | .842 | 70 | 0.41 | 13.23 | -124.2 | sl. cloudy |
| 1050 | 14.64 | 11.3 | 180 | 6.56 | .843 | 58 | 0.38 | 13.24 | -123.4 | " |
| 1100 | 14.66 | 13.1 | 180 | 6.56 | .845 | 4.5 | 0.39 | 13.28 | -123.2 | " |
| 1110 | 14.65 | 14.9 | 180 | 6.55 | .844 | 2.0 | 0.38 | 13.21 | -120.3 | Stop purge |

Water Quality Meter (SN) 99K 1014 AG
Control Box type (SN) NA
Turbidity Meter (SN) 4536 3303

Pump Intake 21'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

# GROUNDWATER SAMPLE LOG SHEET



Project Site Name: NSWC Crane, SWMU 15
Project No.: N1245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temporary Well
[] QA Sample Type:

Sample ID No.: 15GWTW007
Sample Location: 15TW007 / 580 48
Sampled By: Dodian
C.O.C. No.: 3655
Type of Sample:
[X] Low Concentration
[] High Concentration

**SAMPLING DATA:**

| Date: 1/7/05 | Color | NA | pH | S.C. | Temp. | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Time: 1500 | Visual | | Standard | mS/cm | °C | NTU | mg/l | mV |
| Method: Peristaltic | tan | | 6.81 | 0.695 | 11.09 | 550 | 0.61 | -103.2 |

**PURGE DATA:**

| Date: 1/7/05 | Volume | Time | pH | S.C. | Temp. (C) | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Method: Peristaltic | | | | | | | | |
| Monitor Reading (ppm): | | | | | | | | |
| Well Casing Diameter & Material | | | | | | | | |
| Type: 1" PVC | | | | | | | | |
| Total Well Depth (TD): 14.53 | | | | | | | | |
| Static Water Level (WL): 10.28 | | | | | | | | |
| One Casing Volume(gal/L): 2.7 | | | | | | | | |
| Start Purge (hrs): 1340 | | | | | | | | |
| End Purge (hrs): 1450 | | | | | | | | |
| Total Purge Time (min): 70 | | | | | | | | |
| Total Vol. Purged (gal/L): 10.300 | | | | | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| Total Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes No |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes No |
| Herbicides | 4°C | (2) L Glass Amber | Yes No |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Filtered Sample Collected Yes[X] No[ ] 15GWTW 007 -F

Converted Boring 15SB 048

14.53
- 10.28
4.25 (.163) = 0.69 gal
= 2.7 L

**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: 1245

WELL ID.: 15TW007
DATE: 1/7/05

| 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 (Color. etc) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1340 | 10.28 | 0 | — | — | — | — | — | — | — | Start Purge |
| 1350 | 11.06 | 1300 | 120 | 6.93 | 0.515 | >1000 | 0.57 | 10.73 | -80.6 | |
| 1400 | 10.73 | 2.700 | 140 | 6.83 | 0.643 | >1000 | 0.95 | 10.57 | -99.2 | |
| 1410 | 10.53 | 4.100 | 140 | 6.79 | 0.705 | 900 | 0.86 | 10.84 | -106.0 | |
| 1420 | 10.70 | 5.500 | 140 | 6.81 | 0.691 | >1000 | 0.68 | 11.02 | -110.5 | |
| 1430 | 10.71 | 7.100 | 160 | 6.80 | 0.733 | >1000 | 0.50 | 11.02 | -113.5 | |
| 1440 | 10.28 | 8.700 | 160 | 6.80 | 0.678 | >1000 | 0.72 | 11.06 | -98.2 | |
| 1450 | 10.41 | 10.300 | 160 | 6.81 | 0.695 | 550 | 0.61 | 11.09 | -103.2 | |

Water Quality Meter (SN) 0100956 AA
Control Box type (SN) 419
Turbidity Meter (SN) 4.75 - 1503

Pump Intake 14.35

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

# GROUNDWATER SAMPLE LOG SHEET



Project Site Name: NSWC Crane, SWMU 15
Project No.: N1245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temporary Well
[] QA Sample Type:

Sample ID No.: 15GWTW 008
Sample Location: 15TW 008/SB062
Sampled By: Dodian
C.O.C. No.: 3655
Type of Sample:
[X] Low Concentration
[] High Concentration

**SAMPLING DATA:**

| | Color Visual | NA | pH Standard | S.C. mS/cm | Temp. °C | Turbidity NTU | DO mg/l | ORP mV |
|---|---|---|---|---|---|---|---|---|
| Date: 1/7/05 | | | | | | | | |
| Time: 1006 | | | | | | | | |
| Method: Peristaltic | tan | — | 6.50 | 0.618 | 5.75 | 290 | 1.42 | 72.1 |

**PURGE DATA:**

| Date: 1/7/05 | Volume | Time | pH | S.C. | Temp. (C) | Turbidity | DO | ORP |
|---|---|---|---|---|---|---|---|---|
| Method: Peristaltic | | | | | | | | |
| Monitor Reading (ppm): — | | | | | | | | |
| Well Casing Diameter & Material | | | | | | | | |
| Type: 1" PVC | | | | | | | | |
| Total Well Depth (TD): 5.32 | | | | | | | | |
| Static Water Level (WL): 3.19 | | | | | | | | |
| One Casing Volume(gal/L): ~~0.35~~ | 1.3 | | | | | | | |
| Start Purge (hrs): 940 | | | | | | | | |
| End Purge (hrs): 1000 | | | | | | | | |
| Total Purge Time (min): 20 | | | | | | | | |
| Total Vol. Purged (gal/L): ~~0.1.390~~ | | | | | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Preservative | Container Requirements | Collected |
|---|---|---|---|
| Volatiles 8260B | 4°C/HCl | (3) 40ml Vials | Yes |
| Total Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes |
| Dissolved Metals plus Tin | 4°C/$HNO_3$ | (1) L HDPE | Yes/No |
| SVOCs | 4°C | (2) L Glass Amber | Yes |
| PAHs | 4°C | (2) L Glass Amber | Yes |
| PCBs | 4°C | (2) L Glass Amber | Yes |
| Pesticides | 4°C | (2) L Glass Amber | Yes No |
| Herbicides | 4°C | (2) L Glass Amber | Yes No |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Filtered Sample Collected Yes[✓] No[ ] 15GWTW 008 -F

Converted Boring 15SB 062

5.32
-3.19
2.13 x (.163) = 0.35 gal
= 1.3 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: 1245

WELL ID.: 15TW008
DATE: 1/7/05

| 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 (Color. etc) |
|---|---|---|---|---|---|---|---|---|---|---|
| 945 | 3.19 | 0 | — | — | — | — | — | — | — | Start Purge |
| 950 | 3.37 | 1.250 | 100 | 6.53 | 0.608 | 700 | 0.88 | 5.62 | 109.3 | |
| 1000 | 3.40 | ~~2.850~~ | 140 | 6.50 | 0.618 | 290 | 1.42 | 5.75 | 72.1 | stop purge |

Water Quality Meter (SN) 0100956 AA
Control Box type (SN) ~~4.17~~ NA
Turbidity Meter (SN) 4175-1503

Pump Intake 5'

SIGNATURE(S): [illegible]

# APPENDIX C.5
# CHAIN OF CUSTODY RECORDS

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 0138 PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 0331 | NSWC CRANE | RALPH BASINSKI | (412) 921-8308 | LAUCKS / ANN HO |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| | | T. ROJAHN | (412) 921-8857 | 940 SOUTH HARNEY STREET |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB # 8447 8135 6336 | | SEATTLE WA 98108 |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
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 | SVOCS, PAHS & PCBS | SVOCS w/ PAHS | TAL METALS & SN | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | P | G | G | | | | | | |
| PRESERVATIVE USED | | | | | | | | | 4°C | 4°C | 4°C | | | | | | |
| 12/08 | 0800 | TB12080401 | QC | - | - | QC | G | 2 | 2 | | | | | | | | TRIP BLANK GLASS w/HCl |
| 12/08 | 1000 | 1555120002 | 155B 012 | 0 | 2 | SO | G | 4 | 3 | 1 | | | | | | | |
| 12/08 | 1010 | 155B120206 | ↓ | 2 | 6 | SO | G | 4 | 3 | *1 | | | | | | | |
| 12/08 | 1020 | 1555013 0002 | 155B 013 | 0 | 2 | SO | G | 4 | 3 | 1 | | | | | | | |
| 12/08 | 1030 | 155B0130206 | ↓ | 2 | 6 | SO | G | 4 | 3 | *1 | | | | | | | |
| 12/08 | 1035 | 155B0110002 (TR) | 155B 011 | 0 | 2 | SO | G | 4 | 3 | 1 | | | | | | | |
| 12/08 | 1040 | 155B0110206 | ↓ | 2 | 6 | SO | G | 4 | 3 | *1 | | | | | | | |
| 12/08 | 1120 | 1555090002 | 155B 009 | 0 | 2 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1125 | 155B0090206 | ↓ | 2 | 6 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1130 | 155B0090610 | ↓ | 6 | 10 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1240 | 1555010 0002 | 155B 010 | 0 | 2 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1245 | 155B0100206 | ↓ | 2 | 6 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1250 | 155B0100610 | ↓ | 6 | 10 | SO | G | 5 | 3 | | 1 | 1 | | | | | |

| | DATE | TIME | | DATE | TIME |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY | 12/08/04 | 1800 | 1. RECEIVED BY FED EX. | 12/08/04 | 1800 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * = EXTRACT & HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0141 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 0331 | NSWC CRANE | RALPH BASINSKI | (412) 921-8308 | LAUCKS / ANH HO |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| | | T. ROJAHN | (412) 921-8857 | 940 SOUTH HARNEY ST |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB# 8447 8135 6336 | | SEATTLE, WA 98108 |

STANDARD TAT ☒ EXCEPT SEE COMMENTS
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P P G 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 | VOLATILES 8260B | SVOCS w/ PAHS | TAL METALS & SN | SVOCS, PAHS & HERBICIDES | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/08 | 1255 | 1555008 0002 | 155B 008 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/08 | 1300 | 155B008 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/08 | 1305 | 155B008 0610 | ↓ | 6 | 10 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/08 | 1335 | 1555 007 0002 | 155B 007 | 0 | 2 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1340 | 155B 0070206 | ↓ | 2 | 6 | SO | G | 5 | 3 | | ** 1 | * 1 | | | | | |
| 12/08 | 1400 | 1555 002 0002 | 155B 002 | 0 | 2 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1405 | 155B0020206 | ↓ | 2 | 6 | SO | G | 5 | 3 | | ** 1 | * 1 | | | | | |
| 12/08 | 1430 | 1555 006 0002 | 155B 006 | 0 | 2 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1435 | 155B0060206 | ↓ | 2 | 6 | SO | G | 13 | 9 | – | ** 2 | * 2 | | | | | DO MS/MSD |
| 12/08 | 1520 | 1555 005 0002 | 155B 005 | 0 | 2 | SO | G | 5 | 3 | | 1 | 1 | | | | | |
| 12/08 | 1525 | 155B0050206 | ↓ | 2 | 6 | SO | G | 5 | 3 | | ** 1 | * 1 | | | | | |
| 12/08 | 0000 | FD12080401 | QC | – | – | SO | G | 5 | 3 | | ** 1 | * 1 | | | | | FROM 155B0060206 |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Taylor | DATE 12/8/04 | TIME 1800 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 12/8/04 | TIME 1800 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (LAB COPY) PINK (FILE COPY)

4/02R
FOR. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0143 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| N1245 CTO 0331 | NSWC CRANE | RALPH BASINSKI | (412) 921-8308 | LAUCKS / ANN HO |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| | | T. ROJAHN | (412) 921-8857 | 940 SOUTH HARNEY STREET |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB # 8447 8135 6325 | | SEATTLE WA 98108 |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
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 SW846 8260B | SVOCS W/PAHS, PCBS | HERBICIDE & PESTICIDE | TAL METALS & SN | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | P | G | G | | | | | | |
| PRESERVATIVE USED | | | | | | | | | 4°C | 4°C | 4°C | | | | | | |
| 12/09 | 0730 | 15TB12090401 | QC | - | - | QC | G | 2 | 2 | 1 | 1 | | | | | | TRIP BLANK GLASS W/HCl |
| 12/09 | 1025 | 15SS0290002 | 15SB 029 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 1030 | 15SB0290206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1050 | 15SS0310002 | 15SB 031 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 1055 | 15SB0310206 | | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1100 | 15SB0310610 | | 6 | 10 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1105 | 15SB0311014 | ↓ | 10 | 14 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1130 | 15SS0320002 | 15SB 032 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 1135 | 15SB0320206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1150 | 15SS0350002 | 15SB 035 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 1155 | 15SB0350206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1205 | 15SS0370002 | 15SB 037 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 1210 | 15SB0370206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Terry Agnew | DATE 12/09/04 | TIME 1830 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 12/09/04 | TIME 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 0144 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 0331 | NSWC CRANE | RALPH BASINSKI | (412) 921-8308 | LAUCKS / ANH HO |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| | | T. ROJANN | (412) 921-8857 | 940 SOUTH HARNEY ST. |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB# 8447 8135 6325 | | SEATTLE, WA 98108 |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P G
PRESERVATIVE USED: 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 | SVOCS w/ PAHS & HERBICIDE | TAL METALS & SN | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/09 | 0910 | 1555001 0002 | 155B 001 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 0915 | 1558001 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 0935 | 1555003 0002 | 155B 003 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 0940 | 1558003 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 0955 | 1556004 0002 | 155B 004 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 1000 | 1558004 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1520 | 1555048 0002 | 155B 048 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 1525 | 1558048 0206 | | 2 | 6 | SO | G | 13 | 9 | 2 | 2 | | | | | | PO MS/MSD |
| 12/09 | 1530 | 1558048 0610 | | 6 | 10 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1550 | 1558048 1015 | ↓ | 10 | 15 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/09 | 1610 | 1555047 0002 | 155B 047 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/09 | 0000 | FD120904 01 | QC | – | – | SO | G | 5 | 3 | 1 | 1 | | | | | | DUP FROM 1558048 0206 |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Terry Rogal | DATE 12/9/04 | TIME 1830 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 12/9/04 | TIME 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (COPY) PINK (FILE COPY)

FORM: TtNUS-001 4/02R

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0145 | PAGE 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT NO: CTO N1245 0331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASINSKI | PHONE NUMBER: (412) 921-8308 |
| LABORATORY NAME AND CONTACT: LAUCKS / ANN HO | SAMPLERS (SIGNATURE): [signature] | FIELD OPERATIONS LEADER: T. ROJAHN | PHONE NUMBER: (412) 921-8857 |
| ADDRESS: 940 SOUTH HARNEY ST. | CARRIER/WAYBILL NUMBER: FED. EX. AB # 8447 8135 6439 | CITY, STATE: SEATTLE, WA 98108 | |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P G 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 | SVOCS W/PAHS, PCBS PESTICIDES & HERBICIDE | TAL METALS + SN | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/10 | 0800 | 15TB12100401 | QC | - | - | QC | G | 2 | 2 | | | | | | | | TRIP BLANK GLASS W/HCL |
| 12/10 | 0850 | 15SS0460002 | 15SB 046 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 0855 | 15SB0460206 | | 2 | 6 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 0900 | 15SB0460610 | | 6 | 10 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/10 | 0915 | 15SB0461020 | | 10 | 20 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/10 | 1000 | 15SS0450002 | 15SB 045 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1005 | 15SB0450206 | | 2 | 6 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1010 | 15SB0450610 | | 6 | 10 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/10 | 1015 | 15SB0451012 | | 10 | 12 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/10 | 1235 | 15SS0190002 | 15SB 019 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1240 | 15SB0190206 | | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/10 | 1250 | 15SS0230002 (TE) | 15SB 023 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1255 | 15SB0230206 | | 2 | 6 | SO | G | 13 | 9 | *2 | **2 | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY: [signature] | DATE: 12/10/04 | TIME: 1830 | 1. RECEIVED BY: FEDERAL EXPRESS | DATE: 12/10/04 | TIME: 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS: * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0146 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 0331 | NSWC CRANE | RALPH BASINSKI | (412) 921-8308 | LAUCKS / ANH HO |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| | | T. ROJAHN | (412) 921-8857 | 940 SOUTH HARNEY STREET |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB# 8447 8135 6439 | | SEATTLE, WA 98108 |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G 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 8260B | SVOCS W/PAHS | TAL METALS + SN | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/10 | 1045 | 155S0430002 | 155B 043 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1050 | 155B0430206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/10 | 1100 | 155S042 0002 | 155B 042 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1105 | 155B042 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |
| 12/10 | 1115 | 155S044 0002 | 155B 044 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1120 | 155B044 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | * 1 | ** 1 | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Tony Rojahn | DATE 12/10/04 | TIME 1830 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 12/10/04 | TIME 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (COPY) PINK (FILE COPY)

4/02R FOR. TINUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0147 | PAGE 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT NO: CTO N1245 0331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASINSKI | PHONE NUMBER: (412) 921-8308 |
| LABORATORY NAME AND CONTACT: LAUCKS / ANN HO | SAMPLERS (SIGNATURE): [signature] S. Conti | FIELD OPERATIONS LEADER: T. ROSAHN | PHONE NUMBER: (412) 921-8857 |
| ADDRESS: 940 SOUTH HARNEY ST. | CARRIER/WAYBILL NUMBER: FED EX AB# 8447 8135 6439 | CITY, STATE: SEATTLE, WA 98108 | |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P, G, 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 | VOLATILES SW 846 8260B | SVOC W/ PAHS/PCBS PESTICIDE & HERBICIDE | TAL METALS + SN | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/10 | 1315 | 1555020 0002 | 1558 020 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1320 | 1558020 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | *1 | **1 | | | | | | |
| 12/10 | 1330 | 1555022 0002 | 1558 022 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1335 | 1558022 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | *1 | **1 | | | | | | |
| 12/10 | 1340 | 1555021 0002 ~~1558~~ | 1558 021 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1345 | 1558021 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | *1 | **1 | | | | | | |
| 12/10 | 1445 | 1555040 0002 | 1558 040 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 1450 | 1558040 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | *1 | **1 | | | | | | |
| 12/10 | 1510 | 1555039 0002 | 1558 039 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/10 | 0000 | FD12100401 | QC | – | – | SO | G | 5 | 3 | *1 | **1 | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY [signature] | DATE 12/10/04 | TIME 1830 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 12/10/04 | TIME 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 3645 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 331 | NSWC CRANE | RALPH BASINSKI | (412) 921-8308 | LAUCKS / ANH HO |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| Terry Rogal, D Conta | | T. ROJAHN | (412) 921-8857 | 940 SOUTH HARNEY ST |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB # 8447 8135 6450 | | 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 | SVOCS, PAHS, PCBS | HERBICIDES & PESTICIDES | TAL METALS + SN | NITROAROMATICS & NITRAMINES | PERCHLORATES | TOC | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | G | P | G | P | G | | | | |
| PRESERVATIVE USED | | | | | | | | | 4°C/HCl | 4°C | 4°C/HNO3 | 4°C | 4°C | 4°C/H3PO4 | | | | |
| 12/11 | 0800 | TB12110401 | QC | - | - | QC | G | 2 | 2 | | | | | | | | | |
| 12/11 | 0740 | ~~TS~~ RB12110401 | QC | - | - | QC | G | 9 | 3 | 5 | 1 | - | - | - | | | | DRIVE SHOE |
| 12/12 | 0830 | RB12120401 | QC | - | - | QC | G | 13 | 3 | 5 | 1 | 1 | 1 | 2 | | | | DISPOSABLE SLEEVE |
| 12/12 | 0930 | RB12120402 | QC | - | - | QC | G | 11 | 3 | 5 | 1 | 1 | 1 | - | | | | DISPOSABLE TROWEL |
| 12/12 | 1030 | ~~SB~~ RB12120403 | QC | - | - | QC | G | 2 | - | - | - | 1 | 1 | - | | | | DRIVE SHOE |
| 12/12 | 1230 | SB12120401 | QC | - | - | QC | G | 11 | 3 | 5 | 1 | 1 | 1 | - | | | | DI $H_2O$ |
| 12/12 | 1650 | SB12120402 | QC | - | - | QC | G | 11 | 3 | 5 | 1 | 1 | 1 | - | | | | DPT Rig TANK |

| | DATE | TIME | | DATE | TIME |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Terry Rogal | 12/13/04 | 1830 | 1. RECEIVED BY FEDERAL EXPRESS | 12/13/04 | 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 (LAB COPY) PINK (FILE COPY)

4/02R FOR TtNUS-001

TETRA TECH NUS, INC.

# CHAIN OF CUSTODY

NUMBER 3646



| | | | |
|---|---|---|---|
| PROJECT NO: CTO N1245 0331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASINSKI | PHONE NUMBER: (412) 921-8308 |
| | | FIELD OPERATIONS LEADER: T. ROJAHN | PHONE NUMBER: (412) 921-8857 |
| | | CARRIER/WAYBILL NUMBER: FED. EX. AB # 8447 8135 6450 | |

LABORATORY NAME AND CONTACT: LAUCKS / ANH HO

ADDRESS: 940 SOUTH HARNEY ST.

CITY, STATE: SEATTLE, WA 98108

SAMPLERS (SIGNATURE)

STANDARD TAT ☒ EXCEPT FOR COMMENTS

RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G

PRESERVATIVE USED: 4°C 4°C 4°C

TYPE OF ANALYSIS

| 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 | PESTICIDES & HERBICIDES | TAL METALS & SN | SVOCS w/PAHS | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/11 | 0855 | 155S0170002 | 155B 017 | 0 | 2 | SO | G | 2 | 1 | 1 | | | | | | | |
| 12/11 | 0900 | 155B0170206 | ↓ | 2 | 6 | SO | G | 2 | *1 | **1 | | | | | | | |
| 12/11 | 0905 | 155S0160002 | 155B 016 | 0 | 2 | SO | G | 2 | 1 | 1 | | | | | | | |
| 12/11 | 0910 | 155B0160206 | ↓ | 2 | 6 | SO | G | 2 | *1 | **1 | | | | | | | |
| 12/11 | 0915 | 155B0150002 (TR) | 155B 015 | 0 | 2 | SO | G | 2 | 1 | 1 | | | | | | | |
| 12/11 | 0920 | 155B0150206 | ↓ | 2 | 6 | SO | G | 2 | *1 | **1 | | | | | | | |
| 12/11 | 0925 | 155S0180002 | 155B 018 | 0 | 2 | SO | G | 2 | 1 | 1 | | | | | | | |
| 12/11 | 0930 | 155B0180206 | ↓ | 2 | 6 | SO | G | 2 | *1 | **1 | | | | | | | |
| 12/11 | 0935 | 155S0140002 | 155B 014 | 0 | 2 | SO | G | 2 | 1 | 1 | | | | | | | |
| 12/11 | 0940 | 155B0140206 | ↓ | 2 | 6 | SO | G | 4 | *2 | **2 | | | | | | | MS/MSD |
| 12/11 | 0000 | FD12110401 | QC | – | – | SO | G | 2 | *1 | **1 | | | | | | | DUP OF 155B0140206 |
| 12/11 | 1010 | 155S0250002 | 155B 025 | 0 | 2 | SO | G | 1 | – | – | 1 | | | | | | |
| 12/11 | 1015 | 155B0250206 | ↓ | 2 | 6 | SO | G | 1 | – | – | *1 | | | | | | |

| | | | |
|---|---|---|---|
| 1. RELINQUISHED BY [signature] | DATE 12-13-04 | TIME 1830 | 1. RECEIVED BY FEDERAL EXPRESS — DATE 12-13-04 — TIME 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY — DATE — TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY — DATE — TIME |

COMMENTS * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R

FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3647 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 0331 | NSWC CRANE | RALPH BASINSKI | (412) 921-8308 | LAUCKS / ANH HO |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| | | T. ROJAHN | (412) 921-8857 | 940 SOUTH HARNEY ST |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB# 844781356450 | | SEATTLE, WA 98108 |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4oC

| 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: SVOCS w/ PAHS | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/11 | 1020 | 15SS0240002 | 15SB 024 | 0 | 2 | SO | G | 1 | 1 | | | | | | | | |
| 12/11 | 1025 | 15SB0240208 (FR) | ↓ | 2 | 6 | SO | G | 1 | * 1 | | | | | | | | |
| 12/11 | 1030 | 15SS0260002 | 15SB 026 | 0 | 2 | SO | G | 1 | 1 | | | | | | | | |
| 12/11 | 1035 | 15SB0260206 | ↓ | 2 | 6 | SO | G | 1 | * 1 | | | | | | | | |
| 12/11 | 1040 | 15SS0280002 | 15SB 028 | 0 | 2 | SO | G | 1 | 1 | | | | | | | | |
| 12/11 | 1045 | 15SB0280206 | ↓ | 2 | 6 | SO | G | 2 | * 2 | | | | | | | | DO MS/MSD |
| 12/11 | 1100 | 15SS0270002 | 15SB 027 | 0 | 2 | SO | G | 1 | 1 | | | | | | | | |
| 12/11 | 1105 | 15SB0270206 | ↓ | 2 | 6 | SO | G | 1 | * 1 | | | | | | | | |
| 12/11 | 0000 | FD12110402 | QC | - | - | SO | G | 1 | * 1 | | | | | | | | DUP OF 15SB0280206 |

| 1. RELINQUISHED BY | DATE | TIME | 1. RECEIVED BY | DATE | TIME |
|---|---|---|---|---|---|
| Terry Rojahn | 12-13-04 | 1830 | FEDERAL EXPRESS | 12-13-04 | 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| | | | | | |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |
| | | | | | |

COMMENTS * EXTRACT & HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (COPY) PINK (FILE COPY)

FORM 4/02R TINUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3648 | PAGE 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT NO: CTO N1245 0331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASINSKI | PHONE NUMBER: (412) 921-8308 |
| LABORATORY NAME AND CONTACT: LAUCKS / ANN HO | SAMPLERS (SIGNATURE): S. Conti | FIELD OPERATIONS LEADER: TERRY ROJAHN | PHONE NUMBER: (412) 921-8857 |
| ADDRESS: 940 SOUTH HARNEY St. | CARRIER/WAYBILL NUMBER: FED. EX. AB# 8447 8135 6450 | 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 | SVOCS w/ PAHS | Energetics - Nitroaromatics Nitramines & Perchlorates | TAL METALS + SN | SVOCS w/ PAHS & PCBS | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | G | G | G | G | | | | | |
| PRESERVATIVE USED | | | | | | | | | 4°C | 4°C | 4°C | 4°C | 4°C | | | | | |
| 12/11 | 1305 | 0855001 0002 | 085B 001 | 0 | 2 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | | |
| 12/11 | 1330 | 085S002 0002 (FR) | 085B 002 | 0 | 2 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | | |
| 12/11 | 1350 | 0855003 0002 | 085B 003 | 0 | 2 | SO | G | 5 | 3 | – | – | 1 | 1 | | | | | |
| 12/11 | 1405 | 0855005 0002 | 085B 005 | 0 | 2 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | | |
| 12/11 | 1410 | 085B005 0206 | ↓ | 2 | 6 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | | |
| 12/11 | 1430 | 0855004 0002 | 085B 004 | 0 | 2 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | | |
| 12/11 | 1435 | 085B004 0206 | ↓ | 2 | 6 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | | |
| 12/12 | 0905 | 0855006 0002 | 085B 006 | 0 | 2 | SO | G | 6 | 3 | – | 1 | 1 | 1 | | | | | |
| 12/12 | 0910 | 085B006 0206 | ↓ | 2 | 6 | SO | G | 6 | 3 | – | 1 | 1 | 1 | | | | | |
| 12/12 | 0915 | 085B006 0610 | ↓ | 6 | 10 | SO | G | 6 | 3 | – | 1 | 1 | 1 | | | | | |
| 12/12 | 0925 | 085S009 0002 (FR) | 085B 009 | 0 | 2 | SO | G | 6 | 3 | – | 1 | 1 | 1 | | | | | |
| 12/12 | 0930 | 085B009 0206 | ↓ | 2 | 6 | SO | G | 6 | 3 | – | 1 | 1 | 1 | | | | | |
| 12/12 | 0935 | 085B009 0610 | ↓ | 6 | 10 | SO | G | 15 | 9 | – | 2 | 2 | 2 | | | | | DO MS/MSD |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY: Terry Rojahn | DATE: 12/13/04 | TIME: 1830 | 1. RECEIVED BY: FEDERAL EXPRESS | DATE: 12-13-04 | 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 3649 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 0331 | 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 # 8447 8135 6450 | | SEATTLE, WA 98108 |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
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 | SVOCs w/ PAHs & PCBs | Energetics-Nitroaromatics, Nitramines & Perchlorates | TAL Metals & SN | SVOCs w/ PAHs, PCBs Pesticides & Herbicides | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CONTAINER TYPE PLASTIC (P) or GLASS (G) | G | G | G | G | G | | | | |
| | | | | | | | | PRESERVATIVE USED | 4°C | 4°C | 4°C | 4°C | 4°C | | | | |
| 12/12 | 1020 | 08SS008 0002 | 08SB 008 | 0 | 2 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | |
| 12/12 | 1025 | 08SB008 0206 | ↓ | 2 | 6 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | |
| 12/12 | 1030 | 08SB008 0610 | ↓ | 6 | 10 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | |
| 12/12 | 1045 | 08SS007 0002 | 08SB 007 | 0 | 2 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | |
| 12/12 | 1050 | 08SB007 0206 | ↓ | 2 | 6 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | |
| 12/12 | 1055 | 08SB007 0610 | ↓ | 6 | 10 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | |
| 12/12 | 1100 | 08SB007 1013 | ↓ | 10 | 13 | SO | G | 6 | 3 | 1 | 1 | 1 | | | | | |
| 12/12 | 1135 | 08SB010 0002 (TR) | 08SB 010 | 0 | 2 | SO | G | 5 | 3 | – | – | 1 | 1 | | | | |
| 12/12 | 1140 | 08SB010 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | – | – | 1 | 1 | | | | |
| 12/12 | 1145 | 08SB010 0610 | ↓ | 6 | 10 | SO | G | 5 | 3 | – | – | ** 1 | * 1 | | | | |
| 12/12 | 1200 | 08SB010 1013 | ↓ | 10 | 13 | SO | G | 5 | 3 | – | – | ** 1 | * 1 | | | | |
| 12/12 | 1355 | 08SS011 0002 | 08SB 011 | 0 | 2 | SO | G | 5 | 3 | – | – | 1 | 1 | | | | |
| 12/12 | 1400 | 08SB011 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | – | – | 1 | 1 | | | | |

| | DATE | TIME | | DATE | TIME |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Terry Rojahn | 12-13-04 | 1830 | 1. RECEIVED BY FEDERAL EXPRESS | 12-13-04 | 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * HOLD & EXTRACT ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (COPY) PINK (FILE COPY)

FORM TtNUS-001 4/02R

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3650 | PAGE 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT NO: CTO N1245 0331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASINSKI | PHONE NUMBER: (412) 921-8308 |
| LABORATORY NAME AND CONTACT: LAUCKS / ANH HO | SAMPLERS (SIGNATURE) | FIELD OPERATIONS LEADER: T. ROJAHN | PHONE NUMBER: (412) 921-8857 |
| ADDRESS: 940 SOUTH HARNEY ST. | CARRIER/WAYBILL NUMBER: FED. EX. AB# 8447813564 50 | CITY, STATE: SEATTLE, WA 98108 | |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
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 | SVOCS w/ PAHs, PCBs | PESTICIDES & HERBICIDES | TAL METALS & SN | CEC, PH & TOC | SVOCs w/ PAHs & PCBs | Energetics - Nitroaromatics Nitramines & Perchlorates | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | P | G | G | G | G | G | | | | |
| PRESERVATIVE USED | | | | | | | | | 4°C | 4°C | 4°C | 4°C | 4°C | 4°C | | | | |
| 12/12 | 1410 | 0855012 0002 | 0858 012 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | | |
| 12/12 | 1415 | 0858012 0206 | ↓ | 2 | 6 | SO | G | 13 | 9 | 2 | 2 | | | | | | | DO MS/MSD |
| 12/12 | 1420 | 0858012 0610 | ↓ | 6 | 10 | SO | G | 5 | 3 | *1 | **1 | | | | | | | |
| 12/12 | 1430 | 0858012 1018 | ↓ | 10 | 18 | SO | G | 5 | 3 | *1 | **1 | | | | | | | |
| 12/12 | 1450 | 0855013 0002 | 0858 013 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | | |
| 12/12 | 1455 | 0858013 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | 1 | 1 | | | | | | | |
| 12/12 | 1500 | 0858013 0610 | ↓ | 6 | 10 | SO | G | 5 | 3 | *1 | **1 | | | | | | | |
| 12/12 | 1505 | 0858013 1013 | ↓ | 10 | 13 | SO | G | 5 | 3 | *1 | **1 | | | | | | | |
| 12/12 | 1525 | 0855014 0002 | 0858 014 | 0 | 2 | SO | G | 1 | - | - | - | 1 | | | | | | DO MS/MSD ON CEC ONLY |
| 12/12 | 0000 | FD12120401 | QC | - | - | SO | G | 6 | 3 | - | 1 | - | 1 | 1 | | | | DUP FROM 0858009 0610 |
| 12/12 | 0000 | FD12120402 | QC | - | - | SO | G | 5 | 3 | 1 | 1 | | | | | | | DUP FROM 0858012 0206 |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY: Terry Rojahn | DATE: 12-13-04 | TIME: 1830 | 1. RECEIVED BY: FEDERAL EXPRESS | DATE: 12-13-04 | TIME: 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS: * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3651 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 331 | 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# 8447 8135 5682 | | SEATTLE, WA 98108 |

STANDARD TAT ☒ EXCEPT FOR COMMENTS
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P, G, 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 | VOLATILES SW 846 8260B | SVOCS W/PAHS PCBS PESTICIDES & HERBICIDES | TAL METALS & SN | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/14 | 0800 | TB12140401 | QC | – | – | QC | G | 2 | 2 | | | | | | | | TRIP BLANK, GLASS W/HCL |
| 12/14 | 0915 | 1555030 0002 | 155B 030 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/14 | 0920 | 1558030 0206 | 155B 030 | 2 | 6 | SO | G | 5 | 3 | *1 | **1 | | | | | | |
| 12/14 | 0950 | 1555033 0002 | 155B 033 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/14 | 1000 | 1555036 0002 | 155B 036 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/14 | 1015 | 1555034 0002 | 155B 034 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/14 | 1050 | 1555041 0002 | 155B 041 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/14 | 1145 | 1555038 0002 | 155B 038 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/14 | 1330 | 1555062 0002 | 155B 062 | 0 | 2 | SO | G | 13 | 9 | 2 | 2 | | | | | | DO MS/MSD |
| 12/14 | 1340 | 1555062 0206 | ↓ | 2 | 6 | SO | G | 5 | 3 | *1 | ** | | | | | | |
| 12/14 | 1430 | 1555049 0002 | 155B 049 | 0 | 2 | SO | G | 5 | 3 | 1 | 1 | | | | | | |
| 12/14 | 0000 | FD12140201 | QC | – | – | SO | G | 5 | 3 | 1 | 1 | | | | | | DUP OF 1555062 0002 |
| | | | | | | ~~SO~~ TC | | | | | | | | | | | |

| 1. RELINQUISHED BY | DATE | TIME | 1. RECEIVED BY | DATE | TIME |
|---|---|---|---|---|---|
| Terry Rojahn | 12-14-04 | 1830 | FEDERAL EXPRESS | 12-14-04 | 1830 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| | | | | | |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |
| | | | | | |

COMMENTS: * EXTRACT & HOLD ** HOLD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (LAB COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3652 | PAGE 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT NO: CTO N1245 331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASINKI | PHONE NUMBER: 412 921-8308 |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER: TERRY ROJAHN | PHONE NUMBER: 412 921-8857 |
| | | CARRIER/WAYBILL NUMBER: FED. EX. AB# 8447 8135 5627 | |

LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE
ADDRESS: 940 SOUTH HARNEY STREET
CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 | TOTAL METALS PLUS TIN | DIS. METALS PLUS TIN | SVOCS & PAHS | PCBS | HERBICIDES & PESTICIDES | NITROAROMATICS & NITRAMINES | PERCHLORATES | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | P | P | G | G | G | G | P | |
| PRESERVATIVE USED | | | | | | | | | 4°C/HCl | 4°C/HNO3 | 4°C/HNO3 | 4°C | 4°C | 4°C | 4°C | 4°C | |
| 01/05 | 0800 | TB01050501 | QC | - | - | QC | G | 2 | 2 | | | | | | | | TRIP BLANK |
| 01/05 | 1320 | 15GWTW005 | 15TW 005 | - | - | GW | G | 14 | 3 | 1 | - | 4 | 2 | 4 | | | |
| 01/05 | 1320 | 15GWTW005-F | ↓ | - | - | GW | G | 1 | - | - | 1 | - | - | - | | | |
| 01/06 | 1025 | 08GWTW003 | 08TW 003 | - | - | GW | G | 17 | 3 | 1 | - | 4 | - | - | 6 | 3 | MS/MSD ON ENERGENTICS |
| ~~01/06~~ | ~~1025~~ | ~~08GWTW003-F~~ | ~~↓~~ | ~~-~~ | ~~-~~ | ~~GW~~ | ~~G~~ | ~~1~~ | ~~-~~ | ~~-~~ | ~~1~~ | ~~-~~ | | | | | TR |
| 01/06 | 1315 | 08GWTW002 | 08TW 002 | - | - | GW | G | 8 | 3 | 1 | - | 2 | - | - | 1 | 1 | MIN. VOL. |
| 01/06 | 1315 | 08GWTW002-F | ↓ | - | - | GW | G | 1 | - | - | 1 | - | - | - | - | - | |
| 01/06 ~~0000~~ TR | 0000 | 08FD01060501 | QC | - | - | GW | G | 3 | - | - | - | - | - | - | 2 | 1 | |
| ~~000~~ TR | | | | | | | | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY | DATE 1/06/05 | TIME 1830 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 1/06/05 | 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 3653 | PAGE 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT NO: CTO N1245 331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASINSKI | PHONE NUMBER: 412 921-8308 |
| LABORATORY NAME AND CONTACT: EC LABS / JAC PADGETT | SAMPLERS (SIGNATURE): Terry Rojahn | FIELD OPERATIONS LEADER: TERRY ROJAHN | PHONE NUMBER: 412 921-8857 |
| ADDRESS: 11422 N. US HIGHWAY 41 | CARRIER/WAYBILL NUMBER: PICK UP BY EC LABS | CITY, STATE: FARMERSBURG, IN | |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P
PRESERVATIVE USED: 4°C*

| DATE YEAR 2005 | 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: Fecal Coliform Method 9222D | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/07 | 0705 | 08GWTW004 | 8TW 004 | — | - | GW | G | 1 | 1 | |
| 1/07 | 0715 | 08GWTW003 | 8TW 003 | — | — | GW | G | 1 | 1 | |
| 1/07 | 0735 | 08GWTW002 | 8TW 002 | — | — | GW | G | 1 | 1 | |
| 1/07 | 0745 | 08GWTW001 | 8TW 001 | — | — | GW | G | 1 | 1 | |
| 1/07 | 0000 | 08FD010705 01 | QC | — | — | GW | G | 1 | 1 | FROM 08GWTW002 |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY: Terry Rojahn | DATE: 1-07-05 | TIME: 0922 | 1. RECEIVED BY | DATE | TIME |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY: (MR. COPLAND) | DATE: 1/7 | TIME: 0900 |

COMMENTS: * Sodium thiosulfate

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

FORM 4/02R TINUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3655 | PAGE 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT NO: CTO N1245 331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASINSKI | PHONE NUMBER: (412) 921-8308 |
| LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE | SAMPLERS (SIGNATURE): [signature] [signature] FOR J. GOERDT | FIELD OPERATIONS LEADER: TERRY ROJAHN | PHONE NUMBER: (412) 921-8857 |
| ADDRESS: 940 SOUTH HARNEY ST. | CARRIER/WAYBILL NUMBER: FED. EX. AB # 8447 8135 5638 | CITY, STATE: SEATTLE, WA 98108 | |

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 | NITROAROMATICS & NITRAMINES | PERCHLORATES | TOTAL METALS + TIN | DIS. METALS + TIN | SVOCS + PAHS | PCBS | HERBICIDES & PESTICIDES | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | G | P | P | P | G | G | G | |
| PRESERVATIVE USED | | | | | | | | | 4°C/HCl | 4°C | 4°C | 4°C/HNO3 | 4°C/HNO3 | 4°C | 4°C | 4°C | |
| 1/06 | 1230 | TB01060501 | QC | - | - | QC | G | 2 | 2 | - | - | - | - | - | - | - | |
| 1/06 | 1440 | 08GWTW001 | 8TW 001 | - | - | GW | G | 8 | 3 | 1 | 1 | 1 | - | 2 | - | - | MIN. VOL. |
| 1/06 | 1440 | 08GWTW001-F | ↓ | - | - | GW | G | 1 | - | - | - | - | 1 | MS/MSD ENDRIN | | | |
| 1/06 | 1612 | 08GWTW004 | 8TW 004 | - | - | GW | G | 8 | 3 | 1 | 1 | 1 | - | 2 | - | - | MIN. VOL. |
| 1/06 | 1612 | 08GWTW004-F | ↓ | - | - | GW | G | 1 | - | - | - | - | 1 | - | - | - | |
| 1/07 | 1006 | 15GWTW008 | 15TW 008 | - | - | GW | G | 14 | 3 | - | - | 1 | - | 4 | 2 | 4 | |
| 1/07 | 1006 | 15GWTW008-F | ↓ | - | - | GW | G | 1 | - | - | - | - | 1 | - | - | - | |
| 1/07 | 1115 | 15GWTW006 | 15TW 006 | - | - | GW | G | 32 | 9 | - | - | 3 | - | 8 | 4 | 8 | DO MS/MSD |
| TR ~~1/07~~ | | ~~15GWTW006-F~~ | | | | | | | | | | | | | | | |
| 1/07 | 1500 | 15GWTW007 | 15TW 007 | - | - | GW | G | 14 | 3 | - | - | 1 | - | 4 | 2 | 4 | |
| 1/07 | 1500 | 15GWTW007-F | ↓ | - | - | GW | G | 1 | - | - | - | - | 1 | - | - | - | |
| 1/07 | 0000 | 15FD01070501 | QC | - | - | GW | G | 14 | 3 | - | - | 1 | - | 4 | 2 | 4 | FROM 15GWTW006 |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY [signature] | DATE 1/07/05 | TIME 1900 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 1/07/05 | 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 3656 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| N1245 331 CTO | 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 6358 | | SEATTLE, WA 98108 |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 | Total Metals + Tin | Dis Metals + Tin | SVOCs + PAHs | PCBs | Herbicides & Pesticides | Nitroaromatics & Nitramines | Perchlorates | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | P | P | G | G | G | G | P | |
| PRESERVATIVE USED | | | | | | | | | 4°C | 4°C/HCl | 4°C/HNO3 | 4°C | 4°C | 4°C | 4°C | 4°C | |
| 1/08 | 0730 | TB01080501 | QC | - | - | QC | G | 2 | 2 | | | | | | | | TRIP BLANK |
| 1/08 | 0904 | 15GWTW004 | 15TW 004 | - | - | GW | G | 9 | 3 | 1 | - | 2 | 1 | 2 | | | MIN. VOL |
| 1/08 | 0904 | 15GWTW004-F | ↓ | - | - | GW | G | 1 | - | - | 1 | - | - | - | | | |
| 1/08 | 0950 | 15GWTW002 | 15TW 002 | - | - | GW | G | 9 | 3 | 1 | - | 4 | 1 | - | | | |
| 1/08 | 0950 | 15GWTW002-F | ↓ | - | - | GW | G | 1 | - | - | 1 | - | - | - | | | |
| 1/08 | 1300 | 15GWTW001 | 15TW 001 | - | - | GW | G | 9 | 3 | 1 | - | 4 | 1 | - | | | |
| 1/08 | 1525 | 15GWTW003 | 15TW 003 | - | - | GW | G | 10 | 3 | 1 | - | 4 | 2 | - | | | |
| 1/08 | 1525 | 15GWTW003-F | ↓ | - | - | GW | G | 1 | - | - | 1 | - | - | - | | | |
| 1/08 | 1630 | RB01080501 | QC | - | - | QC | G | 11 | 3 | 1 | - | 2 | 1 | 2 | 1 | 1 | TUBING RINSATE |
| 1/09 | 0855 | 08SW00901 | 8SW 009 | - | - | SW | G | 10 | 3 | *1 | - | 3 | 1 | - | 1 | 1 | |
| 1/09 | 0855 | 08SW00901-F | ↓ | - | - | SW | G | 1 | - | - | *1 | - | - | - | - | - | |
| 1/09 | 0955 | 08SW00701 | 8SW 007 | - | - | SW | G | 30 | 9 | *3 | - | 9 | 3 | - | 3 | 3 | DO MS/MSD |
| 1/09 | 0955 | 08SW00701-F | ↓ | - | - | SW | G | 3 | - | - | *3 | - | - | - | - | - | DO MS/MSD |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Terry Rojahn | DATE 1/10/05 | TIME 1900 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 1/10/05 | TIME 1900 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * TAL METALS ONLY

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (COPY) PINK (FILE COPY)

4/02R FOR TINUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3657 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 331 | NSWIC 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 6358 | | SEATTLE WA 98108 |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 | TAL METALS (Total) | TAL METALS (DISSOLVED) | SVOCS & PAHS | PCBS | NITROAROMATICS & NITRAMINES | PERCHLORATES | PESTICIDES & HERBICIDES | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | P | P | G | G | G | G | | |
| PRESERVATIVE USED | | | | | | | | | 4°C/HCl | 4°C/HNO3 | 4°C/HNO3 | 4°C | 4°C | 4°C | 4°C | | |
| 1/09 | 1138 | 08SW00801 | 8SW 008 | – | – | SW | G | 10 | 3 | 1 | – | 3 | 1 | 1 | 1 | | |
| 1/09 | 1138 | 08SW00801-F | ↓ | – | – | SW | G | 1 | – | – | 1 | – | – | – | – | | |
| 1/09 | 1340 | 08SW00601 | 8SW 006 | – | – | SW | G | 10 | 3 | 1 | – | 3 | 1 | 1 | 1 | | |
| 1/09 | 1340 | 08SW00601-F | 8SW 006 | – | – | SW | G | 1 | – | – | 1 | – | – | – | – | | |
| 1/09 | 1415 | 08SW00301 | 8SW 003 | – | – | SW | G | 9 | 3 | 1 | – | 3 | – | 1 | 1 | | |
| 1/09 | 1415 | 08SW00301-F | ↓ | – | – | SW | G | 1 | – | – | 1 | – | – | – | – | | |
| 1/09 | 1450 | 08SW00101 | 8SW 001 | – | – | SW | G | 9 | 3 | 1 | – | 3 | – | 1 | 1 | | |
| 1/09 | 1450 | 08SW00101-F | ↓ | – | – | SW | G | 1 | – | – | 1 | – | – | – | – | | |
| 1/09 | 0000 | 08FD01090501 | QC | – | – | SW | G | 10 | 3 | 1 | – | 3 | 1 | 1 | 1 | | FROM 08SW00701 |
| 1/09 | 0000 | 08FD01090501-F | QC | – | – | SW | G | 1 | – | – | 1 | – | – | – | – | | ↓ |
| 1/09 | 1540 | 15SW01901 | 15SW 019 | – | – | SW | G | 10 | 3 | *1 | – | 3 | 1 | ~~X~~ (TA) | X (TA) | 2 | |
| 1/09 | 1540 | 15SW01901-F | 15SW 019 | – | – | SW | G | 1 | – | – | *1 | – | – | – | – | – | |
| 1/09 | 1600 | 15SW01801 | 15SW 018 | – | – | SW | G | 10 | 3 | *1 | – | 3 | 1 | – | – | 2 | |

| 1. RELINQUISHED BY | DATE | TIME | 1. RECEIVED BY | DATE | TIME |
|---|---|---|---|---|---|
| Terry Rojahn | 1/10/05 | 1900 | FEDERAL EXPRESS | 1/10/05 | 1900 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| | | | | | |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |
| | | | | | |

COMMENTS * = PLUS TAN

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3658 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| N1245 CTO 331 | NSWC CRANE | RALPH BASINSKI | (412) 921-8308 | LAUCKS / HUGH PRENTICE |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| | | TERRY ROJAHN | (412) 921-8857 | 940 S. HARNEY ST |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB # 8447 8135 6358 | | SEATTLE WA 98108 |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 | SVOCS & PAHS | PCBS | PESTICIDES & HERBICIDES | Total Metals + Tin | Dis Metals + Tin | Nitroaromatics & Nitramines | Perchlorates | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | G | G | G | P | P | G | P | |
| PRESERVATIVE USED | | | | | | | | | 4°C/HCl | 4°C | 4°C | 4°C | 4°C/HNO3 | 4°C/HNO3 | 4°C | 4°C | |
| 1/09 | 1600 | 15SW01801-F | 15SW 018 | - | - | SW | G | 1 | - | - | - | - | - | 1 | | | |
| 1/10 | 1000 | 08SW00502 | 8SW 005 | - | - | SW | G | 10 | 3 | 4 | - | - | *1 | - | 1 | 1 | DEEP |
| 1/10 | 1020 | 08SW00501 | ↓ | - | - | SW | G | 10 | 3 | 4 | - | - | *1 | - | 1 | 1 | SHALLOW |
| 1/10 | 1000 | 08SW00502-F | | - | - | SW | G | 1 | - | - | - | - | - | *1 | - | - | DEEP |
| 1/10 | 1020 | 08SW00501-F | ↓ | - | - | SW | G | 1 | - | - | - | - | - | *1 | - | - | SHALLOW |
| 1/10 | 1045 | 08SW00402 | 8SW 004 | - | - | SW | G | 10 | 3 | 4 | - | - | *1 | - | 1 | 1 | DEEP |
| 1/10 | 1045 | 08SW00402-F | | - | - | SW | G | 1 | ~~3~~ | - | - | - | - | *1 | - | - | DEEP |
| 1/10 | 1115 | 08SW00401 | | - | - | SW | G | 10 | 3 | 4 | - | - | *1 | - | 1 | 1 | SHALLOW |
| 1/10 | 1115 | 08SW00401-F | ↓ | - | - | SW | G | 1 | ~~3~~ | - | - | - | - | *1 | - | - | SHALLOW |

| 1. RELINQUISHED BY | DATE | TIME | 1. RECEIVED BY | DATE | TIME |
|---|---|---|---|---|---|
| [signature] | 1/10/05 | 1900 | FEDERAL EXPRESS | 1/10/05 | 1900 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY | DATE | TIME |
| | | | | | |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |
| | | | | | |

COMMENTS * TAL METALS ONLY

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (COPY) PINK (FILE COPY)

4/02R
FORM: TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3660 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| N1245 CTO 331 | NSWC CRANE | RALPH BASWSKI | (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 6369 | | SEATTLE, WA 98108 |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 | SVOCS & PAHS SW 8260 | PCBs | HERBICIDES & PESTICIDES | TOTAL METALS + SW | DIS METALS + SW | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | G | G | G | P | P | | | |
| PRESERVATIVE USED | | | | | | | | | 4°C/HCl | 4°C | 4°C | 4°C/HNO3 | 4°C/HNO3 | | | | |
| 1/11 | 0700 | TB01110501 | QC | – | – | QC | G | 2 | 2 | | | | | | | | |
| 1/11 | 0945 | 15SW00201 | 15SW 002 | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | |
| 1/11 | 0945 | 15SW00201-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |
| 1/11 | 1035 | 15SW00101 | 15SW 001 | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | |
| 1/11 | 1035 | 15SW00101-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |
| 1/11 | 1110 | * 15SW01601 | 15SW 016 | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | |
| 1/11 | 1110 | * 15SW01601-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |
| 1/11 | 1220 | 15SW01701 | 15SW 017 | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | |
| 1/11 | 1220 | 15SW01701-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |
| 1/11 | 1315 | 15SW01501 | 15SW 015 | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | |
| 1/11 | 1315 | 15SW01501-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |
| 1/11 | 1410 | 15SW01301 | 15SW 013 | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | |
| 1/11 | 1410 | 15SW01301-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |

| | DATE | TIME | | DATE | TIME |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY | 1/12/05 | 1900 | 1. RECEIVED BY FEDERAL EXPRESS | 1/12/05 | 1900 |
| 2. RELINQUISHED BY | | | 2. RECEIVED BY | | |
| 3. RELINQUISHED BY | | | 3. RECEIVED BY | | |

COMMENTS * LABELS SHOULD READ 15SW016 not 15ST016 for this COC

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 3662 x 54 | 57 PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 331 | 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 S. HARNEY ST |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX AB # 8447 8135 6358 | | 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

PRESERVATIVE USED: 4°C 4°C 4°C 4°C 4°C 4°C

TYPE OF ANALYSIS

| DATE YEAR 2005 | TIME | SAMPLE ID | LOCATION ID | TOP DEPTH (FT) INCHES | BOTTOM DEPTH (FT) INCHES | MATRIX (GW, SO, SW, SD, QC, ETC.) | COLLECTION METHOD GRAB (G) COMP (C) | No. OF CONTAINERS | VOLATILES SW 846 8260 | SVOCS, PAHS & PCBS | NITROAROMATICS & PERCHLORATE & NITRAMINES | SVOCS & PAHS | SVOC, PAHS, PCBS HERBICIDES & PESTICIDES | TAL METALS PLUS TIN | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/09 | 0905 | 08SD009 0006 | 8SD 009 | 0 | 6 | SD | G | 3 | 1 | 1 | 1 | | | | | | |
| 1/09 | 1008 | 08SD007 0006 | 8SD 007 | 0 | 6 | SD | G | 6 | 2 | 2 | 2 | | | | | | DO MS/MSD |
| 1/09 | 1145 | 08SD008 0006 | 8SD 008 | 0 | 6 | SD | G | 3 | 1 | 1 | 1 | | | | | | |
| 1/09 | 1350 | 08SD006 0006 | 8SD 006 | 0 | 6 | SD | G | 3 | 1 | 1 | 1 | | | | | | |
| 1/09 | 1420 | 08SD003 0006 | 8SD 003 | 0 | 6 | SD | G | 3 | 1 | – | 1 | 1 | | | | | |
| 1/09 | 1450 | 08SD002 0006 | 8SD 002 | 0 | 6 | SD | G | 3 | 1 | – | 1 | 1 | | | | | |
| 1/09 | 1510 | 08SD001 0006 | 8SD 001 | 0 | 6 | SD | G | 3 | 1 | – | 1 | 1 | | | | | |
| 1/09 | 0000 | 08FD010905 02 | QC | 0 | 6 | SD | G | 3 | 1 | 1 | 1 | | | | | | FROM 08SD007 0006 |
| 1/09 | 1540 | 15SD019 0006 | 15SD 019 | 0 | 6 | SD | G | 3 | 1 | – | – | – | 1 | 1 | | | |
| 1/09 | 1605 | 15SD018 0006 | 15SD 018 | 0 | 6 | SD | G | 3 | 1 | – | – | – | 1 | 1 | | | |
| 1/10 | 1145 | 08SD004 0012 | 8SD 004 | 0 | 12 | SD | G | 3 | 1 | – | 1 | 1 | | | | | |
| 1/10 | 1200 | 08SD004 1224 | ↓ | 12 | 24 | SD | G | 3 | 1 | – | 1 | 1 | | | | | |
| 1/10 | 1220 | 08SD005 0012 | 8SD 005 | 0 | 12 | SD | G | 3 | 1 | – | 1 | 1 | | | | | |
| 1/10 | 1235 | 08SD005 1224 | | 12 | 24 | SD | G | 3 | 1 | – | 1 | 1 | | | | | |

| | DATE | TIME | | DATE | TIME |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Terry Rojahn | 1/10/05 | 1900 | 1. RECEIVED BY FEDERAL EXPRESS | 1/10/05 | 1900 |
| 2. RELINQUISHED BY | | | 2. RECEIVED BY | | |
| 3. RELINQUISHED BY | | | 3. RECEIVED BY | | |

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (LAB COPY) PINK (FILE COPY)

4/02R
FORM TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3664 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 331 | RALPH BASINSKI | 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 6369 | | SEATTLE WA 98108 |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 8260 B | SVOCS & PAHS SW 8260 B | PCBS | HERBICIDES & PESTICIDES | TOTAL METALS + SN | DIS. METALS + SN | Nitroaromatics & Nitramines | PERCHLORATE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | G | G | G | P | P | G | P | |
| PRESERVATIVE USED | | | | | | | | | 4°C/HCL | 4°C/ | 4°C | 4°C | 4°C/HNO3 | 4°C/HNO3 | 4°C | 4°C | |
| 1/11 | 1420 | 15SW01401 | 15SW 014 | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | |
| 1/11 | 1420 | 15SW01401-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |
| 1/11 | 1520 | 15SW00501 | 15SW 005 | – | – | SW | G | 9 | 3 | 4 | 1 | – | 1 | – | | | |
| 1/11 | 1520 | 15SW00501-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |
| 1/11 | 1550 | 15SW00601 | 15SW 006 | – | – | SW | G | (TB) ~~25~~ 27 | 9 | ~~4~~ 6 | 3 | 6 | 3 | – | | | DO MS/MSD |
| 1/11 | 1550 | 15SW00601-F | ↓ | – | – | SW | G | 3 | – | – | – | – | – | 3 | | | DO MS/MSD |
| 1/11 | 0000 | 15FD01110501 | 15SW QC | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | FROM 15SW006 |
| 1/11 | 0000 | 15FD01110501-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | ↓ |
| 1/11 | 1700 | 08RB01110501 | QC | – | – | QC | G | 7 | 3 | ~~4~~ 12 (TB) | – | – | – | – | 1 | 1 | (TB) WILDCO SLEEVE |
| 1/12 | 0905 | 15SW00901 | 15SW 009 | – | – | SW | G | 11 | 3 | 4 | 1 | 2 | 1 | – | | | |
| 1/12 | 0905 | 15SW00901-F | ↓ | – | – | SW | G | 1 | – | – | – | – | – | 1 | | | |
| 1/12 | 0955 | 15ST01001 | 15SW 010 | – | – | ~~SW~~ ST (TB) | G | 10 | 3 | 3 | 1 | 2 | 1 | | | | |
| 1/12 | 0955 | 15ST01001-F | ↓ | – | – | ~~SW~~ ST (TB) | G | 1 | – | – | – | – | – | 1 | | | |

| | DATE | TIME | | DATE | TIME |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY | 1/12/05 | 1900 | 1. RECEIVED BY FEDERAL EXPRESS | 1/12/05 | 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 3665 PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 331 | 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 6369 | | SEATTLE WA 98108 |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 8260 | SVOCS, PAHS, PCBS SW 8260 | HERBICIDES & PESTICIDES | TAL METALS PLUS TIN & CYANIDE | TAL METALS PLUS TIN | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | G | G | G | | | | | |
| PRESERVATIVE USED | | | | | | | | | 4°C | 4°C | 4°C | 4°C | | | | | |
| 1/11 | 1000 | 15SD002 0006 | 15SD 002 | 0 | 0.5 | SD | G | 3 | 1 | 1 | 1 | | | | | | |
| 1/11 | 1040 | 15SD001 0006 | 15SD 001 | 0 | 0.5 | SD | G | 3 | 1 | 1 | 1 | | | | | | |
| 1/11 | 1115 | 15SD016 0006 | 15SD 016 | 0 | 0.5 | SD | G | 3 | 1 | 1 | – | 1 | | | | | |
| 1/11 | 1225 | 15SD017 0006 | 15SD 017 | 0 | 0.5 | SD | G | 3 | 1 | 1 | – | 1 | | | | | |
| 1/11 | 1320 | 15SD015 0006 | 15SD 015 | 0 | 0.5 | SD | G | 3 | 1 | 1 | – | 1 | | | | | |
| 1/11 | 1415 | 15SD013 0006 | 15SD 013 | 0 | 0.5 | SD | G | 3 | 1 | 1 | – | 1 | | | | | |
| 1/11 | 1425 | 15SD014 0006 | 15SD 014 | 0 | 0.5 | SD | G | 3 | 1 | 1 | – | 1 | | | | | |
| 1/11 | 1525 | 15SD005 0006 | 15SD 005 | 0 | 0.5 | SD | G | 6 | 2 | 2 | 2 | | | | | | DO MS/MSD |
| 1/11 | 0000 | 15FD0111050Z | QC | 0 | 0.5 | SD | G | 3 | 1 | 1 | 1 | | | | | | DUP OF 15SD005 0006 |
| 1/11 | 1555 | 15SD006 0006 | 15SD 006 | 0 | 0.5 | SD | G | 3 | 1 | 1 | – | 1 | | | | | |
| 1/12 | 0910 | 15SD009 0006 | 15SD 009 | 0 | 0.5 | SD | G | 3 | 1 | 1 | – | 1 | | | | | |

| | DATE | TIME | | DATE | TIME |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY Terry Rojahn | 1/12/05 | 1900 | 1. RECEIVED BY FEDERAL EXPRESS | 1/12/05 | 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 3666 | PAGE 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT NO: N1245 CTO 331 | FACILITY: NSWC CRANE | PROJECT MANAGER: RALPH BASWSKI | 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 6369 | CITY, STATE: SEATTLE WA 98108 | |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

| DATE YEAR 2005 | 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 | SVOCS & PAHS | PCBs | HERBICIDES & PESTICIDES | TOTAL METALS + SD | DIS. METALS + SD | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTAINER TYPE PLASTIC (P) or GLASS (G) | | | | | | | | | G | G | G | G | G | G | | | |
| PRESERVATIVE USED | | | | | | | | | 4°C | HCl 4°C | 4°C | 4°C | 4°C | HNO3 4°C | HNO3 | | |
| 1/12 | 1035 | 15ST01101 | 15SW 011 | – | – | ST | G | 10 | 3 | 3 | 1 | 2 | 1 | – | | | |
| 1/12 | 1035 | 15ST01101-F | ↓ | – | – | ST | G | 1 | – | – | – | – | – | 1 | | | |
| 1/12 | 1120 | 15ST00401 | 15SW 004 | – | – | ST | G | 10 | 3 | 3 | 1 | 2 | 1 | – | | | |
| 1/12 | 1120 | 15ST00401-F | ↓ | – | – | ST | G | 1 | – | – | – | – | – | 1 | | | |
| ~~1/12~~ TR | | | | | | ~~ST~~ | TR | | | | | | | | | | |
| ~~1/12~~ TR | | | | | | ~~ST~~ | TR | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY | DATE 1/12/05 | TIME 1900 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 1/12/05 | 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 3694

PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO N1245 331 | 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. EXAB# 8447 8135 3695 | | 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: PESTICIDE/PCBS

| DATE YEAR 2005 | 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 | PESTICIDE/PCBS | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/14 | 1420 | 1555047000Z | 1558 047 | 0 | 2 | SO | G | 1 | 1 | | | | | | | | |
| 2/14 | 1430 | 1555048000Z | 1558 048 | 0 | 2 | SO | G | 1 | 1 | | | | | | | | |
| 2/14 | 1448 | 1558048 0206 | ↓ | 2 | 6 | SO | G | 1 | 1 | | | | | | | | |

| | DATE | TIME | | DATE | TIME |
|---|---|---|---|---|---|
| 1. RELINQUISHED BY | 2/16/05 | 1830 | 1. RECEIVED BY FEDERAL EXPRESS | 2/16/05 | 1830 |
| 2. RELINQUISHED BY | | | 2. RECEIVED BY | | |
| 3. RELINQUISHED BY | | | 3. RECEIVED BY | | |

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (COPY) PINK (FILE COPY)

4/02R
FORM: TTNUS-001

# APPENDIX C.6
# EQUIPMENT CALIBRATION LOGS

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: NSWC CRANE PROJECT NO.: N1245

| Date of Calibration | Instrument Name and Model | Instrument I.D. Number | Person Performing Calibration | Instrument Settings | | Instrument Readings | | Calibration Standard (Lot Number) | Remarks/ Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Pre-Calibration | Post-Calibration | Pre-Calibration | Post-Calibration | | |
| 12-8-04 | PID PHOTOVAC | ED HE 322 | SJC | — | — | 95.8 | 100 PPM | 00250-03 EXP 2-17-05 | |
| 12-9-04 | " | " | SJC | — | — | 98 | 100 PPM | " | |
| 12-10-04 | " | " | SJC | — | — | 95 | " | " | |
| 12-11-04 | " | " | SJC | — | — | 92 | " | " | |
| 12-12-04 | " | " | SJC | — | — | 95 | 100 PPM | " | |
| 12-13-04 | " | " | " | — | — | 95 | 100 " | " | |
| 12-14-04 | " | " | " | — | — | 94 | 100 " | " | |
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FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: SWMUs 08/15 12/13/16

PROJECT NO.: 1245 6878 / 7448

| Date of Calibration | Instrument Name and Model | Instrument I.D. Number | Person Performing Calibration | Instrument Settings | | Instrument Readings | | Calibration Standard (Lot Number) | Remarks/ Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Pre-Calibration | Post-Calibration | Pre-Calibration | Post-Calibration | | |
| 1-5-05 | LaMotte | 4175-1503 | JD | 0 | — | 9.96 | 10.0 | NA | ok |
| 1-6-05 | " | | JD | 0 | — | 9.99 | 10.0 | | ok |
| 1-7-05 | " | | JD | 0 | — | 10.00 | 10.0 | | ok |
| 1-8-05 | " | | JD | 0 | — | 10.0 | 10.0 | | ok |
| 1-9-05 | " | | CO | 0.05 | 0 | 10.0 | 10.0 | | ok |
| 1-10-05 | " | | CO | 0 | — | 10.0 | — | | ok |
| 1-11-05 | " | | CO | 0 | 0 | 10.0 | 10.0 | | ok |
| 1-12-05 | " | | CO | 0 | 0 | 9.87 | 10.0 | | ok |
| 1-22-05 | " | | CO | 0 | — | 10.0 | — | | ok |
| 1-23-05 | " | | TR | 0 | 0 | 10.0 | — | | ok |
| 1-25-05 | " | | CO | 0.0 | — | 10.0 | — | | ok |
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FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: SWMU 08/15 12/13/16

PROJECT NO.: 1245 6878/7448

| Date of Calibration | Instrument Name and Model | Instrument I.D. Number | Person Performing Calibration | Instrument Settings | | Instrument Readings | | Calibration Standard (Lot Number) | Remarks/ Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Pre-Calibration | Post-Calibration | Pre-Calibration | Post-Calibration | | |
| 1-5-05 | Lamotte | 4536-3303 | JD | 0 | – | 9.98 | 10.0 | | ok |
| 1-6-05 | " | | JD | 0 | – | 10.0 | – | | ok |
| 1-7-05 | " | | JD | 0 | – | 10.0 | – | | " |
| 1-8-05 | " | | JD | 0 | – | 10.0 | – | | ok |
| 1-12-05 | " | | CD | 0 | – | 10.0 | – | | OK |
| 1-22-05 | " | | CD | 0 | – | 10.0 | – | | OK |
| 1-23-05 | " | | JK | 0 | 0 | 10.0 | – | | OK |
| 1-25-05 | " | | CD | 0.0 | – | 10.0 | – | | OK |
| | | | | | | | | | |
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Turbidity Meter
LaMotte
0355-4197

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: NSWC CRANE

PROJECT NO.: 7448/6878

| Date of Calibration | Instrument Name and Model | Instrument I.D. Number | Person Performing Calibration | Instrument Settings | | Instrument Readings | | Calibration Standard (Lot Number) | Remarks/ Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Pre-Calibration | Post-Calibration | Pre-Calibration | Post-Calibration | | |
| 2-2-05 | 2020 | 0355-4197 | TR | 0.0 | 0.0 | 0.0 | 0.0 | Provided by Vendor | ok |
| 2-3-05 | | | [illegible] | 0 | 0 | 11 | 9.9 | | ok |
| 2-5-05 | | | [illegible] | 0 | 0 | 9.2 | 10 | | |
| 2-6-05 | | | LD | 0 | 0 | 10 | 10 | | ok |
| 2-7-05 | | | TR | 0 | 0 | 10 | 10 | | ok |
| | | | | | | | | | |
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FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: SWMU 13/16 RQ4 12 Rd 2

PROJECT NO.: 7448 / 0878

| Date of Calibration | Instrument Name and Model | Instrument I.D. Number | Person Performing Calibration | Instrument Settings | | Instrument Readings | | Calibration Standard (Lot Number) | Remarks/ Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Pre-Calibration | Post-Calibration | Pre-Calibration | Post-Calibration | | |
| 2-1-05 | Lamotte | 4536-3303 | QD | 0 | 0 | 10 | 10 | NA | |
| 2-2-05 | | | QD | 0 | 0 | 10 | 10 | | |
| 2-3-05 | | | QD | 0 | 0 | 10 | 10 | | |
| 2-4-05 | | | QD | 0 | 0 | 11 | 10 | | |
| 2-5-05 | | | QD | 0 | 0 | 10 | 10 | | |
| 2-6-05 | | | CD | 0 | 0 | 10 | 10 | | OK |
| 2-7-05 | | | TR | 0 | 0 | 10 | 10 | | |
| 2-8-05 | | | QD | 0 | 0 | 9.8 | 10 | | |
| 2-15-05 | | | CD | 0 | 0 | 9.9 | 10 | | OK |
| 2-16-05 | | | CD | 0 | 0 | 10 | 10 | | OK |
| 2-17-05 | | | CD | 0 | 0 | 9.5 | 10 | | ok |
| 2-18-05 | | | CD | 0 | 0 | 10 | 10 | | ok |
| 2-19-05 | | | CD | 0 | 0 | 10 | 10 | | ok |
| 2-20-05 | | | CD | 0 | 0 | 10 | 10 | | ok |
| 2-21-05 | | | CD | 0 | 0 | 10.31 | 10 | | ok |
| 2-22-05 | | | CD | 0 | 0 | 10.64 | 10 | | ok |

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: SWMU 13/16 RQ4 12 Rd 2

PROJECT NO.: 7448 6878

| Date of Calibration | Instrument Name and Model | Instrument I.D. Number | Person Performing Calibration | Instrument Settings | | Instrument Readings | | Calibration Standard (Lot Number) | Remarks/ Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Pre-Calibration | Post-Calibration | Pre-Calibration | Post-Calibration | | |
| 2-1-05 | Lamotte | 4175-1503 | QD | 0 | 0 | 10 | 10 | NA | |
| 2-2-05 | | | QD | 0 | 0 | 10 | 10 | | |
| 2-3-05 | | | QD | 0 | 0 | 9.97 | 10 | | |
| 2-4-05 | | | CD | 0 | 0 | 10.12 | 10 | | |
| 2-5-05 | | | QD | 0.7 | 0 | 9.98 | 10 | | |
| 2-6-05 | | | CD | 0 | 0 | 9.90 | 10 | | ok |
| 2-7-05 | | | TR | 0 | 0 | 10 | 10 | | ok |
| 2-15-05 | | | CD | 0 | 0 | 9.27 | 10 | | replaced battery |
| 2-16-05 | | | CD | 0 | 0 | 10.54 | 10 | | ok |
| 2-17-05 | | | CD | 0 | 0 | 9.41 | 10 | | ok |
| 2-18-05 | | | CD | 0 | 0 | 9.95 | 10 | | ok |
| 2-19-05 | | | CD | 0 | 0 | 10.26 | 10 | | ok |
| 2-20-05 | | | CD | 0 | 0 | 10 | 10 | | ok |
| 2-21-05 | | | CD | 0 | 0 | 10.07 | 10 | | ok |
| 2-21-05 | | | CD | 0 | 0 | 10.56 | 10 | | ok |
| | | | | | | | | | |

Tetra Tech NUS, Inc.

# DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 08 &15 12/13/16

PROJECT No.: N1245, CTO 0331 6878/7498

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01D0956 A2

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/5/05 | JG CD | 6.99 | 4.05 | 1015 | 9.87 | 250.5 17.61 | 7.00 | 4.00 | 1000 | 9.50 | 237.4 17.33 | 7.0 4110 8/23/05 4.0 4098 8/18/05 | |
| 1/6/05 | JG CD | 7.06 | 3.92 | 1069 | 9.22 | 219.3 17.61 | 6.99 | 4.00 | 1001 | 9.10 | 237.6 17.69 | SPC 4387 1/21/05 ORP 03X0667 | 10/05 |
| 1/7/05 | CD | 7.01 | 4.21 | 1009 | 10.04 | 238.1 16.55 | 7.00 | 4.00 | 1000 | 9.61 | 238.0 16.68 | " | |
| 1/8/05 | CD | 7.10 | 3.79 | 996 | 9.74 | 250.2 15.07 | 7.00 | 4.00 | 1000 | 9.97 | 234.6 15.30 | " | |
| 1/9/05 | CD | 7.01 | 3.99 | 1094 | 9.54 | 233.8 15.47 | 7.00 | 4.00 | 1000 | 9.63 | 238.5 15.55 | " | |
| 1/11/05 | CD | 7.01 | 4.00 | 1005 | 7.64 | 227.6 17.28 | 7.00 | 4.00 | 1001 | 9.11 | 236.8 17.43 | " | |
| 1/12/05 | TR | 7.06 | 3.90 | 990 | 9.15 | 246 19.25 | 7.00 | 4.00 | 1000 | 9.07 | 237.4 19.32 | " | |
| 1/22/05 | CD | 7.04 | 3.96 | 1014 | 8.40 | 227.3 14.53 | 7.00 | 4.00 | 1000 | 8.60 | 238.2 14.62 | " | replaced DO membrane |
| 1/23/05 | CD | 7.00 | 4.03 | 998 | 10.53 | 242.2 10.63 | 7.00 | 4.00 | 1000 | 9.62 | 236.7 10.57 | " | |
| 1/25/05 | CD | 7.00 | 3.99 | 1101 | 10.96 | 227.9 15.31 | 7.00 | 4.00 | 1000 | 8.88 | 238.2 16.62 | " | |
| | | | | | | | SWMU 13/16 R24 | | | | | | |
| 2/1/05 | CD | 6.98 | 4.01 | 910 | 10.40 | 240.6 17.93 | 7.00 | 4.00 | 1000 | 8.79 | 237.5 17.57 | SPC 4599 7/27/05 | |
| 2/2/05 | JG | 7.06 | 3.97 | 8.65 | 1136 | 233.8 18.05 | 7.00 | 4.00 | 1000 | 9.42 | 237.5 18.12 | " | |
| 2/3/05 | JG | 6.86 | 4.00 | 1100 | 9.86 ~~1109~~ | 241.6 18.23 | 7.00 | 4.00 | 1000 | 9.45 | 237.6 18.10 | " | |
| 2/5/05 | CD | 7.10 | 3.99 | 1109 | 4.77 | 235.6 16.24 | 7.00 | 4.00 | 1000 | 9.12 | 237.2 16.30 | " | replaced DO membrane |
| 2/6/05 | CD | 7.03 | 4.00 | 1036 | 9.12 | 238.6 17.10 | 7.00 | 4.00 | 1000 | 8.77 | 237.5 17.04 | " | |
| 2/7/05 | JG | 6.98 | 4.02 | 952 | 9.60 | 241.2 18.70 | 7.00 | 4.00 | 1000 | 8.92 | 238.6 18.60 | | |
| 2/8/05 | JG | 6.58 | 4.03 | 1016 | 9.61 | 242.3 19.87 | 7.00 | 4.00 | 1000 | 9.15 | 237.5 19.87 | | |

Tetra Tech NUS, Inc.

# DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

INSTRUMENT NAME/MODEL: YSI

SITE NAME: SWMUs 08 &15 12/13/16

MANUFACTURER: YSI

PROJECT No.: N1245, CTO 0331 6878 & 7448

SERIAL NUMBER: 99K1014 AG

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/5/05 | JG CD | 7.09 | 3.84 | 994 | 8.96 | 238.7 17.48 | 7.00 | 4.00 | 1000 | 9.40 | 239.8 17.51 | 7.00 4110 8/23/05 4.00 4098 8/18/05 | |
| 1/6/05 | JG CD | 7.03 | 3.89 | 536 | 8.63 | 268.7 18.38 | 7.00 | 4.01 | 1000 | 9.13 | 239.6 18.01 | SPC 4387 1/21/05 ORP 03K0667 10/05 | |
| 1/7/05 | JG | 6.98 | 3.88 | 890 | 9.49 | 214.5 15.38 | 7.00 | 4.00 | 1000 | 9.66 | 240.0 15.63 | " | |
| 1/8/05 | JG | 6.92 | 3.90 | 826 | 9.24 | 220.7 14.37 | 7.00 | 4.00 | 1000 | 9.81 | 239.9 14.16 | " | |
| 1/10/05 | CD | 7.02 | 3.87 | 529 | 9.59 | 225.5 16.17 | 7.00 | 4.00 | 1000 | 9.71 | 251.6 16.44 | " | |
| 1/12/05 | CD | 7.06 | 3.89 | 1039 | 9.57 | 214.1 17.94 | 7.00 | 4.00 | 1000 | 9.26 | 253.1 17.89 | " | |
| 1/22/05 | CD | 6.99 | 3.89 | 1068 | 7.55 | 253.1 18.25 | 7.00 | 4.00 | 1000 | 8.43 | 235.1 18.34 | " | replaced DO membrane |
| 1/23/05 | CD | 7.04 | 3.82 | 1065 | 9.12 | 217.3 11.75 | 7.00 | 4.00 | 1000 | 9.91 | 252.5 11.75 | " | |
| 1/25/05 | CD | 7.08 | 3.84 | 1130 | 8.90 | 211.5 17.93 | 7.00 | 4.00 | 1000 | 8.85 | 252.9 17.92 | " | |
| | | | | SWMU | | | 13/16 | | RA | 4 | | | |
| 2/1/05 | JG | 7.02 | 3.88 | 978 | 14.73 | 210.1 18.40 | 7.00 | 4.00 | 1010 | 9.27 | 240.2 18.40 | SPC 4599 7/27/05 | |
| 2/2/05 | JG | 7.04 | 3.95 | 947 | 15.62 | 18.56 208.8 | 7.00 | 4.00 | 1000 | 9.35 | 18.48 252.9 | | |
| 2/3/05 | JG | 6.96 | 3.95 | 1155 | 12.01 | 18.14 221.7 | 7.00 | 4.00 | 1000 | 9.41 | 18.37 250.7 | | |
| 2/4/05 | JG | 7.04 | 3.94 | 952 | 13.65 | 18.39 209.3 | 7.00 | 4.00 | 1000 | 9.37 | 18.32 237.4 | | |
| 2/5/05 | JG | 7.00 | 3.92 | 945 | 12.95 | 18.53 208.6 | 7.00 | 4.00 | 1000 | 9.04 | 19.09 252.8 | | |
| 2/6/05 | JG | 7.11 | 3.88 | 1151 | 12.52 | 19.74 208.3 | 7.00 | 4.00 | 1000 | 8.99 | 19.66 252.9 | | |
| 2/7/05 | JG | 6.98 | 3.92 | 1173 | 10.05 | 208.2 19.77 | 7.00 | 4.00 | 1000 | 8.97 | 19.84 252.8 | | |
| 2/8/05 | JG | 6.97 | 4.07 | 1154 | 9.02 | 211.2 19.70 | 7.00 | 4.00 | 1000 | 9.12 | 19.70 252.9 | | |

Tetra Tech NUS, Inc.

# DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs ~~08 & 15~~ 13/16

PROJECT No.: N~~1245~~ 7448, CTO ~~0331~~ 357/6878 CTO 343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 02A 0~~257~~ 527 AF

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/2/05 | JG | 6.97 | 3.94 | 1095 | 10.26 | 251.6 17.28 | 7.00 | 4.00 | 1000 | 9.25 | 237.5 17.27 | 7.0 4110 8/23/05 4.0 4098 8/18/05 | |
| 2/3/05 | JG | 6.87 | [illegible] | 888 | [illegible] | 234.7 ~~21.74~~ 19.2 | 7.00 | 4.00 | 1000 | 9.52 | 237.4 18.02 | SPC ~~4067~~ 4596 7/27/05 ORP 0231 0667 | 10/05 |
| 2/5/05 | JG | 3.38 | 7.54 | 1.53 | 9.39 | 11.11 24.16 | 7.00 | 7.00 | 1000 | 8.84 | 237.5 19.17 | " | |
| 2/6/05 | CO | — | — | 1014 | 6.91 | 236.5 17.01 | — | — | 1000 | 8.87 | 237.6 17.17 | " | broken pH probe, replaced DO membrane |
| 2/7/05 | JG | — | — | 1007 | 9.15 | 20.26 237.5 | — | — | 1000 | 9.12 | 20.29 237.5 | " | " |
| 2/8/05 | JG | — | — | 10~~06~~ 05 | 9.42 | 18.50 236.5 | | | 1000 | 9.10 | 18.25 237.4 | " | |

Tetra Tech NUS, Inc.

# DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

INSTRUMENT NAME/MODEL: YSI

SITE NAME: SWMUs 08 &15 & 12

MANUFACTURER: YSI

PROJECT No.: N1245, CTO 0331 6878

SERIAL NUMBER: 01D0956 AA

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/05 | CD | 7.03 | 3.99 | 1024 | 10.32 | 242.2 16.04 | 7.00 | 4.00 | 1000 | 9.47 | 237.7 16.08 | 4.0 4098 8/18/05<br>7.0 4594 7/28/06 | |
| 2/16/05 | CD | 6.97 | 4.03 | 1007 | 10.22 | 238.9 12.97 | 7.00 | 4.00 | 1000 | 9.75 | 236.4 13.03 | SPC 4599 7/27/05<br>CRP 03150667 | |
| 2/17/05 | CD | 7.00 | 3.96 | 1015 | 9.38 | ~~216.1~~ ~~(2) 11.10~~ | 7.00 | 4.00 | 1000 | 9.48 | ~~252.5~~ ~~(2) 13.93~~ | " | |
| | | | | | | 237.7 ↑ 14.10 | | | | | 237.2 ↑ 14.43 | | |
| 2/18/05 | CD | 7.00 | 4.01 | 997 | 9.43 | 234.9 12.36 | 7.00 | 4.00 | 1000 | 9.77 | 237.3 12.36 | " | |
| 2/19/05 | CD | 6.99 | 3.97 | 1007 | 9.45 | 241.3 10.57 | 7.00 | 4.00 | 1000 | 9.90 | 237.3 10.57 | " | |
| 2/20/05 | CD | 7.00 | 4.04 | 1030 | 7.69 | 231.2 14.17 | 7.00 | 4.00 | 1000 | 9.56 | 237.5 14.17 | " | |
| 2/21/05 | CD | 7.03 | 3.99 | 1002 | 7.43 | 236.1 16.67 | 7.00 | 4.00 | 1000 | 9.41 | 237.5 16.62 | " | |
| 2/22/05 | CD | 7.03 | 4.01 | 1014 | 14.86 | 233.2 13.47 | 7.00 | 4.00 | 1000 | 9.55 | 237.5 13.74 | " | |
| 3/2/05 | JG | 7.02 | 4.18 | 1029 | 4.24 | 233.7 14.77 | 7.00 | 4.00 | 1000 | 9.75 | 237.5 14.72 | " | |
| 3/3/05 | JG | 6.98 | 3.99 | 974 | 8.80 | 230.3 14.26 | 7.00 | 4.00 | 1000 | 9.38 | 237.5 14.20 | " | |
| 3/4/05 | JG | 7.02 | 4.24 | 1065 | 5.78 | 234.5 17.62 | 7.00 | 4.00 | 1002 | 9.74 | 237.5 17.74 | " | |
| 3/5/05 | JG | 7.25 | 3.78 | 974 | 11.74 | 234.6 16.31 | 7.00 | 4.00 | 1001 | 9.23 | 237.5 16.00 | " | |
| 3/6/05 | JG | 6.97 | 3.94 | 995 | 9.25 | 235.7 16.73 | 7.00 | 4.00 | 1000 | 9.54 | 237.5 16.30 | " | |
| 3/7/05 | JG | 7.03 | 4.03 | 998 | 6.38 | 237.4 17.14 | 7.00 | 4.00 | 1001 | 9.15 | 237.5 17.10 | | |
| | | | | | | | | | | | | | |

Tetra Tech NUS, Inc.

# DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 08 &15 812

PROJECT No.: N1245, CTO 0331 & 6878

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99K1014 AG

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/05 | CD | 7.10 | 3.84 | 1185 | 5.61 | 210.5 16.27 | 7.00 | 4.00 | 1000 | 9.31 | 252.9 16.37 | 4.0 4098 8/18/05 7.0 4594 7/28/06 | replaced DO membrane |
| 2/16/05 | CD | 7.07 | 3.83 | 1199 | 8.50 | 211.4 13.91 | 7.00 | 4.00 | 1000 | 9.53 | 252.9 13.73 | SPC 4599 7/27/05 ORP 03K0667 | |
| 2/17/05 | CD | 7.00 | 3.95 | 1212 | 7.51 | 210.1 14.10 | 7.00 | 4.00 | 1000 | 9.35 | 252.9 13.93 | " | |
| 2/18/05 | CD | 7.09 | 3.89 | 1209 | 7.92 | 210.6 13.35 | 7.00 | 4.00 | 1000 | 9.49 | 252.9 13.29 | " | |
| 2/19/05 | CD | 7.06 | 3.90 | 1196 | 7.94 | 210.6 11.94 | 7.00 | 4.00 | 1000 | 9.63 | 252.9 11.32 | " | |
| 2/20/05 | CD | 6.98 | 3.93 | 1241 | 7.92 | 206.3 15.82 | 7.01 | 4.00 | 999 | 7.89 | 252.9 15.91 | " | |
| 2/21/05 | CD | 7.01 | 3.99 | 1262 | 8.21 | 203.2 16.39 | 7.00 | 4.00 | 1000 | 9.27 | 252.9 16.40 | " | |
| 2/22/05 | CD | 6.98 | 3.96 | 1268 | 8.88 | 202.2 14.46 | 7.00 | 4.00 | 1000 | 9.47 | 252.9 14.07 | " | |
| 3/2/05 | JG | 6.75 | 4.06 | 1305 | 10.54 | 201.3 16.95 | 7.00 | 4.00 | 1000 | 9.70 | 252.9 16.78 | " | |
| 3/3/05 | JG | 6.92 | 4.04 | 926 | 10.39 | 198.8 14.26 | 7.00 | 4.00 | 1000 | 9.33 | 252.9 14.71 | | |
| 3/4/05 | JG | 6.94 | 4.04 | 1397 | 8.83 | 197.2 16.70 | 7.00 | 4.00 | 1000 | 9.33 | 252.9 16.50 | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

# APPENDIX D
# MISCELLANEOUS FIELD DOCUMENTATION

# APPENDIX D.1
# SITE LOGBOOK

1360

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| SWMUS 18, 19, 20 & OGTSL | 42-53 |
| SWMUS 8 & 15 | 54-57 |


©SCIENTIFIC BINDERY PRODUCTIONS, 60 EAST 13TH STREET, CHICAGO, ILLINOIS 60605

**TITLE**

**PROJECT NO.** 1245

**BOOK NO.** 1380



MON. 12-06-04

Work continued from Page

TRAVEL DAY - D. WESTERHOFF & T. ROJAHN

PURCHASE SUPPLIES @ LOWES & SAM'S CLUB

5

END

10

15

20

25

30

35

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

**SIGNATURE** T. Rojal

**DATE** 12-6-04

**DISCLOSED TO AND UNDERSTOOD BY** **DATE** **WITNESS** **DATE**

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4668

| | |
|---|---|
| REQUESTED BY: Tetra Tech / Terry Rogers 812-421-5957 | DATE: 11/10/04 |
| WORK REQUEST ON E/S NO. | Hwy 555 B-3330 B-2693 |
| WORK WILL BE PERFORMED BY: Tetra Tech NUS Inc. | DATE (Start - on or about): 12/3/04 |

WORK DESCRIPTION
Soil borings to obtain surface and subsurface samples, located approx. 8 feet east of Highway 555, south west of Building 3330, north east - west of Building 2693. Marked with stakes with pink ribbon or white paint. Locations are solid circles on attached drawing.

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed (RCPI) 11/17/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

| UTILITY | PRESENT | MARKED | NOT LOCATED | REMARKS |
|---|---|---|---|---|
| COMPRESSED AIR (RCP1) | N/A | | | KG 12-2-04 |
| HIGH VOLTAGE ELECTRICAL | yes | yes | see note * | S.D. 11-23-04 |
| FIRE ALARM (RCP1) | N/A | N/A | | SEG 11-18-04 |
| GROUNDING (RCP1) | N/A | | | KG 12-2-04 |
| 16 NATURAL GAS See Below | YES | YES | | DFH 11 |
| SECURITY ALARM (RCP2) | N/A | | | MA 11-20 |
| SEWER | yes | yes | | 12-1-04 MW |
| STEAM 3330 | N/A | | | 11-18-04 GCE |
| TELEPHONE Faxed 11/17/04 | N/A | | | LP 11-29-04 |
| WATER | yes | yes | | 12-1-04 MWAP |
| SECOND ELECTRICAL (RCP1) | YES | YES | | 11-[illegible]-04 KG |
| GENERAL DYNAMICS/NMCI Faxed 11/17/04 | N/A | | | 11-18-04 |

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

0412071305, 0412071310, 0412071312
0411146569, 0411146572, 0411146582 Exp 11/9 12/27

* Marked at 12-13-04

| | |
|---|---|
| PERMIT HOLDER SIGNATURE: Terry Rogers | DATE: 12/07/04 |
| DIGGING PERMIT APPROVED BY: [illegible] | DATE: 12/7/04 |

DISTRIBUTION:
ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1380



TUES 12-07-04

Work continued from Page

OVERCAST & PERIODS OF RAIN 40's

0700 HRS - ARRIVE @ B-3245
WORK ON CTO 160

1230 HRS - ARRIVE @ PUBLIC WORKS
• DONNA Z. EXTENDED GAS TICKETS @
1255 HRS - SWMU's 8 & 15; FINISH @ PUBLIC WORKS
SEE DIG PERMITS ON PAGES 2, 4 & 5.

WORK ON CTO 160 REMAINDER OF DAY

1630 HRS - H&S TRAINING
• ORGANIZE EQ.
• PUT PIDS ON CHARGE
• OPEN CONTAINER BOXES & COOLERS
1720 HRS → NO 4oz JARS
CALL LAB to check on container shipment
1745 HRS - LEFT SITE FOR WAL MART

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 12-07-04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

# DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4669

| | |
|---|---|
| REQUESTED BY: Tom Pick / Tony Rogers 812-3857 | DATE: 11/29/04 |
| WORK REQUEST ON E/S NO. | Bldg 106 Area |
| WORK WILL BE PERFORMED BY: Tetratech NUS, Inc. | DATE (Start - on or about): 12/3/04 |

WORK DESCRIPTION: Soil borings to obtain surface & subsurface samples. Locations are: North, East, & South of Building 106. Locations are marked with stakes with pink ribbon or white paint, & are solid circles on attached drawing.

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed CROP 2 11/19/04

## UNDERGROUND UTILITIES LOCATED IN WORK SITE

| UTILITY | PRESENT | MARKED | NOT LOCATED | REMARKS |
|---|---|---|---|---|
| COMPRESSED AIR CROP 2 | N/A | | | RI 11-23-04 |
| HIGH VOLTAGE ELECTRICAL | N/A | | | S.P. 11-23-04 |
| FIRE ALARM CROP 2 | Yes | Yes | | MA 11-22-04 |
| GROUNDING CROP 2 | N/A | | | 11-22-04 |
| L2 NATURAL GAS ~~Exp 12/19~~ ~~0411190560~~ | YES | YES | | 11-22-04 DEH |
| SECURITY ALARM CROP 2 | NA | | | 11-20 MA |
| SEWER | Yes | Yes | | 12-1-04 M. Wagoner |
| STEAM | Yes | Hot Pink Lines + Flags | | 11-19-04 GCD |
| TELEPHONE Faxed 11/18/04 | N/A | | | 11-29-04 |
| WATER | Yes | Yes | | 12-1-04 M Wagoner |
| SECOND ELECTRICAL CROP 2 | N/A | | | 11-22-04 |
| GENERAL DYNAMICS/NMCI Faxed 11/19/04 | N/A | No | Not in Area | 11-29-04 |

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

* Exp 12/27 0412071315

| | |
|---|---|
| PERMIT HOLDER SIGNATURE: Tony Rogers | DATE: 12/07/04 |
| DIGGING PERMIT APPROVED BY: [illegible] | DATE: 12/7/04 |

DISTRIBUTION:

ORIGINAL - Code 09Z5 File

**DIGGING PERMIT**
**NSWC CRANE 11000/3 (REV. 8/02)**

4557

| REQUESTED BY | DATE |
|---|---|
| Tetra Tech, Terry Rogalu 412-921-5057 | 11/17/04 |
| WORK REQUEST ON E/S NO. | E side H-45, S of B-3281 & N of B-45 |
| WORK WILL BE PERFORMED BY | DATE (Start - on or about) |
| Tetra Tech NUS Inc. | 12/13/04 |

WORK DESCRIPTION

Soil borings to obtain surface + subsurface soil samples. Locations are marked with wooden stakes with pink ribbon. Locations are annotated by solid circles on attached drawing

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed CROP2 11/17/04 **UNDERGROUND UTILITIES LOCATED IN WORK SITE**

| UTILITY | PRESENT | MARKED | NOT LOCATED | REMARKS |
|---|---|---|---|---|
| COMPRESSED AIR CROP2 | N/A | | | DN 11-18-04 |
| HIGH VOLTAGE ELECTRICAL | NA | | | S.P. 11-23-04 |
| FIRE ALARM CROP2 | NA | | | MH 11-20 |
| GROUNDING CROP2 | N/A | | | 11-18-04 BL |
| NATURAL GAS | N/A | | | 11/17/04 dm |
| SECURITY ALARM CROP2 | NA | | | MH 11-20 |
| SEWER | N/A | | | 12-1-04 M Wagoner |
| STEAM | N/A | | | 11-19-04 JCD |
| TELEPHONE Faxed 11/17/04 | N/A | | | YP 12-6-04 |
| WATER | N/A | | | 12-1-04 M Wagoner |
| SECOND ELECTRICAL CROP2 | N/A | | | 11-18-04 BL |
| GENERAL DYNAMICS/NMCI Faxed 11/17/04 | NA | | | 11-18-04 |

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

| PERMIT HOLDER SIGNATURE | DATE |
|---|---|
| Terry Rogalu | 12/07/04 |
| DIGGING PERMIT APPROVED BY | DATE |
| Donna L. Zellman | 12/7/04 |

**DISTRIBUTION:**

**ORIGINAL - Code 09Z5 File**
**YELLOW - Supv. At work site**

SAMPLE SUMMARY FOR 12-08-04:

Soil Borings Completed Include

15SB 002, 005→013

SAMPLES SHIP VIA AB #8447 8135 6336

ON COCs 0138 & 0141

FINISHED Layout OF AOC-VI

DPT - S. Cont. J. Goerdt & J. McFall
other - T. Rojahn D. Westerhuff

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1380



WED 12-08-04

Work continued from Page

WEATHER OVERCAST 40°s Periods of rain

0700 - Arrive @ B 3245
- Assist DPT Crew to PREP. FOR Soil SAMPLING
- Got H&S PAPERWORK FROM DPT CREW (SC & JG)
- Organize Garage - EQ & SAMPLE Containers
  MAKE Room For delivery 3 PALLETS

0900 Hrs - Arrive @ SWMU 15 AOC-W
- Lay out REMAINING 9 Soil Boring Locations

1118 Hrs - Finish Lay out @ AOC-W

1125 Hrs - CHECK IN w/ DPT CREW

1145 Hrs - LUNCH & PURCHASE ICE

1220 Hrs - ARRIVE @ B-3245
- Pick up supplies For SWMU 7
- Drop OFF ICE - PURCHASED @ Gas Station

1300 Hrs - Check @ DEMO. RANGE - Range ACTIVE NEED to check back @ 6154

1315 Hrs - Stopped & PICKED up Soil Sampling Log Sheets FROM DPT CREW

1326 Hrs - ARRIVE @ B-3245 - Start COCs For SWMU 15

1410 Hrs - RECEIVE ok to ACCESS OPR (SWMU 7) FROM DEMO RANGE

1545 Hrs - DEMO RANGE WORKS locking up Gates - HAVE to LEAVE OPR

1600 Hrs - ARRIVE @ B 3245
- PREP. SAMPLES FROM SWMU 15 FOR SHIPMENT
- Complete COCs 0138 & 0141

1705 Hrs - LEFT B-3245 FOR FED. EX

1740 Hrs - DROP OFF SAMPLES @ FED. EX
AB# 8447 8135 6336

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

**SIGNATURE** Ted Goerdt

**DATE** 12-8-04

**DISCLOSED TO AND UNDERSTOOD BY** **DATE** **WITNESS** **DATE**

CREWS - DPT
S. Cont
J. Goerdt
Jay McFall (EFS)

VEG CLEARENCE
D. Westerhoff
T. RoJAHN

DPT Summary 12/09/04:
Completed Soil Borings = 10
1558001, 003, 004, 029, 031, 032, 035, 037
047 & 048

TEMP. Wells Completed to date - 6

CLEAR VEG ACCESS @ SWMU 15 AOC-W for DPT Boring locations.

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1380



THURS 12-09-04

Work continued from Page

WEATHER - OVERCAST / RAIN @ times 40°s

0700 Hrs - ARRIVE @ B-3245
FAX SAMPLE COCs to OFFICE & LAB

0745 Hrs - PREP. to sample soils @ SWMU 7

0815 Hrs - CHECK IN @ DEMO RANGE to ACCESS OPR
Range active today - cannot work on OPR

0825 Hrs - RETURN to B-3245, to work on N1245
- Check in w / T. Brent - suggest rental companies in Bloomington to rent chain saw to clear access for DPT @ SWMU 15 (AOC W)

0845 Hrs - LEAVE B-3245 FOR Master Rental in Bloomington

0930 Hrs - RENT chainsaw, chaps & brush cutter @ Master Rental

0955 Hrs - ARRIVE @ Lowes - D.H. purchased rain gear & flagging to mark access trail @ AOC W for DPT Rig.

1115 Hrs - ARRIVE @ B-3245; drop off all EQ @ OFFICE & Prep to clear veg @ AOC - W

1140 Hrs - LUNCH

1210 Hrs - Check in w/ DPT CREW - Rig stuck in Valley @ SWMU 15

1230 Hrs - ARRIVE @ AOC - W start veg clearing

1445 Hrs - Finish Clearing @ SWMU 15 AOC - W

1600 Hrs - CHECK BACK w/ DPT CREW; got sample log sheets - Rig being toed out

1625 Hrs - ARRIVE @ B-3245
- COC PREP., Airbill PREP. etc FOR SHIPMENT to LAUCKS

1635 Hrs - S.C. & J.G. ARRIVE @ B-3245
- PREP SAMPLES FOR shipment on COCs 0143 & 0144 VIA FED.EX. AB# 8447 8135 6325

1800 Hrs - Drop off samples @ FED.EX. (JG & TF.)
(D.H. RETURNED Chain saw & brush cutter to Master Rental EARLIER).

IFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tony Rogel

DATE 12-9-04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREWS - SEE PAGE 8

SOIL BORINGS COMPLETED ON 12/10/04: 12
15SB019, 020, 021, 022, 023, 039, 040
042 → 046

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1380



FRI 12-10-04

Work continued from Page

WEATHER - Overcast w/Periods of Rain 40°s

0700 Hrs - Arrive @ B 3245

FAX COCs to OFFICE & LAB; discuss DPT Sampling w/S.C.

0755 Hrs - Start working on SWMU 7

1540 Hrs - PAPERWORK & SHIPMENT PREP

Prepare COCs 0145 - 0147

SHIPMENT PREPARED ON FED EX AB# 844781356439

1700 Hrs - LEFT B 3245 FOR FED EX

1735 Hrs - Drop off samples @ FEDEX

1803 Hrs - FAX LAUCKS COPY OF COCs @ Hotel

END

NTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

**SIGNATURE** Ty Lloyd

**DATE** 12-10-04

**DISCLOSED TO AND UNDERSTOOD BY** **DATE** **WITNESS** **DATE**

CREWS · SEE PAGE 8

Soil Borings Completed 12/11/04:

15SB014 - 018 & 024 - 028

+

08SB001 - 005

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1380



SAT 12-11-04

Work continued from Page

WEATHER - OVERCAST w/ Periods of Lt. Rain 40°F

0725 Hrs - Show S. Cont. SWMU 8 & boring locations

0805 Hrs - Return to B-3245

Work @ SWMU 7 Remainder of Day

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 12-11-04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

CREIAS - SEE PAGE 8

SOIL BORINGS COMPLETED
0858006 - 014

Collect (3) Rinsate blanks & (2) SOURCE WATER blanks -

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1330



SWH 12/12/04

Work continued from Page

WEATHER - Partly Cloudy Temp 40°s WINDY

0700 HRS - ARRIVE @ B-3245

PAPERWORK - ~~PREPARE~~ Collect SAMPLES ON COC #3645

3 Rinsate Blanks

PREPARE COFC & Labels FOR SOUCE WATER blanks

1200 HRS - LUNCH

1230 HRS - 1600 HRS - WORK ON SWMU 7

1600 HRS - Label & PROCESS SB12120401

Collect SB12120402 @

1700 HRS - LEFT B3245 FOR HOTEL

END

ENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

**SIGNATURE** Ted Rosal

**DATE** 12-12-04

**DISCLOSED TO AND UNDERSTOOD BY** **DATE** **WITNESS** **DATE**

CREWS SAME AS ON PAGE 8

Soil Borings Completed:

15SB050 - 061 ALL CLEAN / No samples collected or TUBS installed for sampling

SHIPPED SAMPLES ON COCS 3645 - 3650 VIA FED EX AB# 8447 0135 6950

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1380



MON 12/13/04

Work continued from Page

WEATHER - Mostly Cloudy Snow Dusting 30°S

0700 Hrs - Arrive @ B 3245

- FAX OFFICE COCs 0145-0147
- PREPARE COCs 3646 - 3650 FOR this dates shipment
- CHECK IN W/R. BASINKI - discuss project status, bring up problem of Routine Samples FOR Extract & Hold that were selected as DUPS & MS/MSDs Also, discussed problem w/E. Sedlmyer
- CHECK IN W/R. Clark Regardin SWMU 7 & start COCs FOR TUGS. SHIPMENT
- FAX COCs to OFFICE 3646-3650 FOR T. Johnston ED. Sedlmyer to address Extract & Hold problem

1200 Hrs - LUNCH

1230 Hrs - Return to B 3245

- PICK UP ICE @ BASE Gas Station
- PACKAGE SAMPLES ON COCs - 3645-3650 FOR SHIPMENT this date
- CHECK ON drilling crew @ AOC W SWMU 15 AFTER talking to R. BASINSKI - Follow QAPP Regarding - NO SAMPLES IF CORES are clean, likewise NO TEMP. WELLS will be installed if AREA/BORINGS ARE clean.
- Con't Log in of SWMU 7 Soil SAMPLES

1700 Hrs - LEAVE B 3245 FOR FED. EX.

1730 Hrs - Drop off Samples on FED. EX. AB# 8497 8135 6950 Also COCs 3645 - 3650.

END

ITIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

**SIGNATURE** Troy Royal

**DATE** 12-13-04

**DISCLOSED TO AND UNDERSTOOD BY** **DATE** **WITNESS** **DATE**

B 100 P ©

CREWS - SAME AS ON PAGE 8
JAY McFALL to DEMOB

Soil Borings Completed - 8 HAND AUGERED
1558030, 033, 034, 038, 039, 041, 049
& 062

SHIP SAMPLES ON COC 3651 VIA FED. EX.
AB # 8447 8135 5682

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1380



TUES 12/14/04

Work continued from Page

0715 Hrs - Arrive @ B-3245
FAX COCs 3645-3650 to office & LAB

0800 Hrs - Survey crew arrived
Furnish maps of swmus 8 & 15 and show
Boring locations on the ground

0930 Hrs - Return to B-3245
Work on swmu 7

1530 Hrs - Prep samples ~~out~~ & COC # 3651 for shipping
via Fed Ex. AB # 8447 8135 5682

1630 Hrs - FAX COC # 3651 to LAB & office

1645 Hrs - Leave Bldg 3245 for Fed Ex

1715 Hrs - Drop off samples @ Fed Ex.

END

IENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rogers

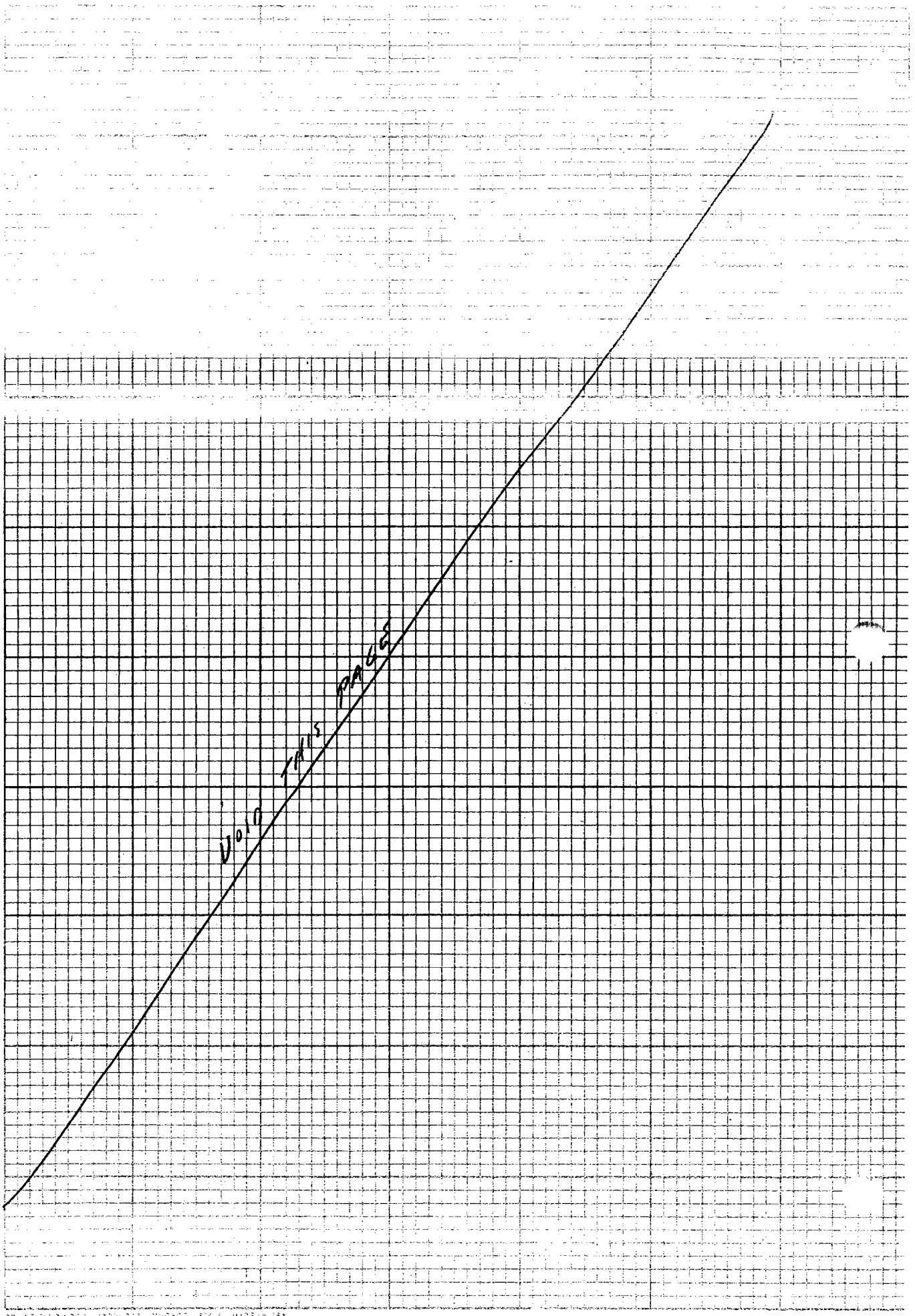
DATE 12/14/04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE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WED 12/15/04

Work continued from Page

0700 Hrs - Arrive @ B-3245

Meas. staff gauges & surface water flow @

SWMUs 16 & 12.

See Notebooks 1374 & 1376

1100 Hrs - travel to Airport (T. Rojahn & D. Westerhoff)

END

IENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty Rogal

DATE 12/15/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

TRAVEL DAY 01/04/05

**TITLE** NSWC CRANE

**PROJECT NO.** 1245

**BOOK NO.** 1380



TUES 01/04/05

Work continued from Page

0630 HRS - ARRIVE @ PITT Airport

1330 HRS - ARRIVE @ B-3245

- CHECK IN W. T. Breat
- CALL ED SEDLMYER REGARDING FECAL Coliform LAB
  - LAB : EC LABS, FARMERSBURG, IN
    Contact : JAC PADGETT
- Contact LAB - set up bottle drop OFF FOR WED.
- INVENTORY supplies

1500 HRS - LEAVE B 3245 FOR Sam's Club

1610 HRS - CHECK out @ Sam's w/ supplies FOR sampling.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 1/04/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREW : S. Conti - slug tests
C. Doolan
J. Goerdt } SAMPLERS
T. Rojahn

SAMPLE SUMMARY 01/05/05 :
TEMP WELL - 15GWTW005 Sampled

| Soil Boring No. | AOC | Temporary Well No. | Sample No. | Priority of Sample Aliquot Collection | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SWMU 15 | | | | High Priority ← | | | | | |
| 15SB002 | A | 15TW001 | 15GWTW001 | VOCs | SVOCs | PAHs | PCBs | metals | diss. |
| 15SB006 | A | 15TW002 | 15GWTW002 | VOCs | SVOCs | PAHs | PCBs | metals | diss. |
| 15SB009 | B | 15TW003 | 15GWTW003 | VOCs | SVOCs | PAHs | metals | diss. metals | P |
| 15SB031 | G | 15TW004 | 15GWTW004 | metals | diss. metals | SVOCs | PAHs | VOCs | P |
| 15SB035 | G | 15TW005 | 15GWTW005 | metals | diss. metals | SVOCs | PAHs | VOCs | P |
| 15SB046 | U | 15TW006 | 15GWTW006 | metals | diss. metals | SVOCs | PAHs | VOCs | P |
| 15SB048 | U | 15TW007 | 15GWTW007 | metals | diss. metals | SVOCs | PAHs | VOCs | P |
| 15SB061 | W | **do not collect sample** | | | | | | | |
| 15SB062 | U | 15TW008 | 15GWTW008 | metals | diss. metals | SVOCs | PAHs | VOCs | P |
| SWMU 08 | | | | | | | | | |
| 08SB006 | ✓ | 08TW001 | 08GWTW001 | Explosives | Perchlorate | metals | diss. metals | VOCs | SV |
| 08SB007 | ✓ | 08TW002 | 08GWTW002 | Explosives | Perchlorate | metals | diss. metals | VOCs | SV |
| 08SB010 | ✓ | 08TW003 | 08GWTW003 | Explosives | Perchlorate | metals | diss. metals | VOCs | SV |
| 08SB013 | ✓ | 08TW004 | 08GWTW004 | Explosives | Perchlorate | metals | diss. metals | VOCs | SV |

VOCs = volatile organic compounds (method 8260B) - need full vials (i.e., no headspace)
SVOCs = semivolatile organic compounds (except PAHs) -- need full bottle
PAHs = polycyclic aromatic hydrocarbons -- need full bottle
metals = TAL metals plus tin -- need minimum of 250 mL; fill bottle if possible
diss. metals = dissolved TAL metals plus tin (i.e., filtered) - need minimum of 250 mL; fill bottle if possible
PCBs = polychlorinated byphenyls - need minimum of 500 mL; fill bottle if possible
pest. = pesticides - need minimum of 500 mL; fill bottle if possible
herb. = herbicides - need minimum of 500 mL; fill bottle if possible
fecal colif = fecal coliform - need full bottle

Expl - (2) amb
Perch - (1) clear
metals - (1) pl
VOCs - (3) 40
SVOCs - (2) am
PAHs -
Fecal -
PCBs - (2) A
pest/Herb - (1)

Note: Sample aliquots for VOCs method 8015B are **not** to be collected
Field parameters (pH, ORP, DO, SC, and temperature) should be measured for every temporary well
Follow SOP CTO331-05 for sampling procedures

CREW: S. Conti - slug tests
C. Doolan
J. Goerdt } SAMPLERS
T. Rojahn

SAMPLE SUMMARY 01/05/05:
TEMP WELL - 15GWTW005 Sampled @ 1320 Hrs

| ary o. | Sample No. | Priority of Sample Aliquot Collection | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | High Priority ← | | | | | → Low Priority | | |
| 01 | 15GWTW001 | VOCs | SVOCs | PAHs | PCBs | metals | diss. metals | | |
| 02 | 15GWTW002 | VOCs | SVOCs | PAHs | PCBs | metals | diss. metals | | |
| 03 | 15GWTW003 | VOCs | SVOCs | PAHs | metals | diss. metals | PCBs | | |
| 04 | 15GWTW004 | metals | diss. metals | SVOCs | PAHs | VOCs | PCBs | pest. | herb. |
| 05 | 15GWTW005 | metals | diss. metals | SVOCs | PAHs | VOCs | PCBs | pest. | herb. |
| 06 | 15GWTW006 | metals | diss. metals | SVOCs | PAHs | VOCs | PCBs | pest. | herb. |
| 07 | 15GWTW007 | metals | diss. metals | SVOCs | PAHs | VOCs | PCBs | pest. | herb. |
| **ɔt collect sample** | | | | | | | | | |
| 08 | 15GWTW008 | metals | diss. metals | SVOCs | PAHs | VOCs | PCBs | pest. | herb. |
| | | | | | | | | | |
| 01 | 08GWTW001 | Explosives | Perchlorate | metals | diss. metals | VOCs | SVOCs | PAHs | fecal colif. |
| 02 | 08GWTW002 | Explosives | Perchlorate | metals | diss. metals | VOCs | SVOCs | PAHs | fecal colif. |
| 03 | 08GWTW003 | Explosives | Perchlorate | metals | diss. metals | VOCs | SVOCs | PAHs | fecal colif. |
| 04 | 08GWTW004 | Explosives | Perchlorate | metals | diss. metals | VOCs | SVOCs | PAHs | fecal colif. |

(method 8260B) - need full vials (i.e., no headspace)
ɔunds (except PAHs) -- need full bottle
bons -- need full bottle
minimum of 250 mL; fill bottle if possible
plus tin (i.e., filtered) - need minimum of 250 mL; fill bottle if possible
ɔeed minimum of 500 mL; fill bottle if possible
500 mL; fill bottle if possible
f 500 mL; fill bottle if possible
bottle

ɔod 8015B are **not** to be collected
, and temperature) should be measured for every temporary well
ɪ p' 'ures

Expl - (2) amber 1000 ml
Perch - (1) clean plastic 500 ml
metals - (1) plastic w/ $HNO_3$ 1000 ml
VOCs - (3) 40 ml
SVOCs - (2) amber 1000 ml
PAHs -
Fecal -
PCBs - (2) Amber 1000 ml
pest/herb - (2) Amber 1000 ml

WED 01/05/05

Work continued from Page WEATHER - 30°s & rainy

0705 Hrs - Arrive @ site
- Assist & Train C. Doolan w/ Prep for sampling temporary wells @ SWMU 15
- Select wells for sampling, Collect Trip Blank
- Discuss need for boat for SWMU 8 Pond w/ T. Brent etc.
- Begin Paperwork; Received Container from EC Labs

1015 Hrs - Arrive @ SWMU 15
J.G. - set up @ sample location 15TW003
C.D. & T.R. - setup @ 15TW005 - setup tent to block rain from well and samplers

1100 Hrs - Check on J.G. - Geotech Pump not working
Break for lunch

1120 Hrs - Lunch

1150 Hrs - Returned to B-3245 to work on ~~post~~ geotech pump - J.G. ~~went~~ with C.D. to help train CD & sample 15TW005
- Check pump w/ AC plug - started to smoke
- Called U.S. Env. for pump replacement for tomorrow's sampling; order more Cal. Sol. for YSI
- Checked in w/ office - Discussed problem due to weather & malfuctioning Geotech Pump
- Conference call w/ J. Schubert & R. Basinski Need to check out wells W of Mine Fin A
- Order 4 Nitrogen Cylinders

1400 Hrs - Check in on JG & C.D. @ 15TW005
Need to over purge wells due to recent rain fall

1420 Hrs - Check wells west of SWMU 12 for J. Schubert - wells (5) - 7/3, 7/4 & 7/5 are marked assume 7/1 & 2 are unmarked wells only well next to road has a protecting case & 7/4 is damaged

1500 Hrs - Return to B-3245
Paperwork & Prep. Geotech Pump for shipment

1615 Hrs - Leave B-3245 for FED EX

1645 Hrs - Drop off shipment @ FEDEX. AB# 8447 8135 6347

Work continued to Page

DIETZGEN PAPER PRODUCTION CHICAGO 10385 MADE IN USA

SIGNATURE [signature] DATE 1/05/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREW SAME AS ON P. 24

SLUGE TESTS @ 12MWT01, 03, 06 & 08

SAMPLING SUMMARY 01/06/05 !

SAMPLED TEMP. WELLS @ SWMU 8 -

08TW001 → 004

THURS. 1/06/05

Work continued from Page

WEATHER - OVERCAST & 30°s

0710Hrs - ARRIVE @ BLDG # 3245
- Assign WELLS FOR SAMPLING
- Assist in PREP FOR TEMP. WELL SAMPLING
- Obtain VEHICLE PASSES
- ORGANIZE PAPERWORK
- H&S FOR C. Doolan

0850Hrs - T. Brent & T.R. PICKED UP JON BOAT @ PW

0920Hrs - RETURN to B 3245 & SECURE Boat to FENCE POST
- SET UP PICKUP FOR Coli. SAMPLES @ BLDG 118 @0900 Hrs on FRI.
- RECEIVE FED. EX. SHIPMENT - SWMU 16 EQ. & Peristaltic Pump REPLACEMENT

1020 Hrs - ARRIVE @ SWMU 8

1047 Hrs - Start Purge 08TW002

1204 Hrs - END Purge "

1210 Hrs - LUNCH BREAK / Collected T801060501 @ 1230 Hrs

1305 Hrs - RETURN to SWMU 08
- Assist & Train C. Doolan w/ the sampling of 08TW002 & Purging of 08TW004

1530 Hrs - LEFT SWMU 8 to locate BLDG #118 - location to MEET EC LABS Pick up PERSON ~~for~~ THE SCH. for tomorrow

1635 Hrs - RETURN to B-3245
- CALL EC LABS - JAC Padgett to confirm meeting place (BLDG seemed unlikely) - JAC checked w/ Pickup PERSON - MEETING PLACE should be @ B 3260
- PREP. PAPERWORK and PACKAGE SAMPLES on COFC # 3652

1745 Hrs - LEFT B-3245 FOR FED. EX

1815 Hrs - DROP OFF SAMPLES ON FED. EX. AB # 8447 8135 5627

END



SIGNATURE Terry Rozak DATE 1/06/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREW - SAME AS ON P. 24

SAMPLE SUMMARY 01/07/05 :

- ALL WELLS @ SWMU 08 SAMPLED this date for FECAL coliform - ECLAB PICKED UP @ BLDG 3260 @ 0922 Hr. Pick up Person was Mr. Copland Jac Padgett was POC @ ECLABS FARMERSBURG, IN

**Environmental Certification Labs, Inc.**
P.O. Box 569 • Farmersburg, IN 47850-0569
(812) 696-5076 • 1-800-458-3489
Fax: (812) 696-2596

- Additional TEMP WELLS SAMPLED includes 15TW006, 007 & 008

SLUGE TEST SUMMARY :

TESTED Monitoring WELLS 16MWT03, 05, 18 & 19
No tests conducted @ 16MWT16 - Due to small water column.

FRI. 1/07/05

Work continued from Page

WEATHER - COLD 30°s & mostly Cloudy

0630 Hrs - ARRIVE @ B-3245

PREP. to Collect FECAL Coliform SAMPLES @ SWMU 8

| SAMPLE ID # | SAMPLE TIME |
|---|---|
| 08GWTW004 | 0705 |
| 08GWTW003 | 0715 |
| 08GWTW002 | 0735 |
| 08GWTW001 | 0745 |
| 08FD010705 01 | 0000 FROM 08TW 002 |

0810 Hrs - RETURN to B-3245

PREP. Coliform samples FOR EC LAB PICK UP

0922 Hrs - EC LABS (Mr Copland) PICK GO UP SAMPLES @ B-3260

0930 Hrs - RETURNED to B 3245

- FAX COCs 3653 & 3652 to OFFICE &
  COC 3652 to LAUCKS Testing LAB
- PAPERWORK & const. Storm SEWER SAMPLER
- PREP to BACKFILL TEMP WELLS
- ORGANIZE OFFICE / CLEAN

1210 Hrs - LUNCH

1245 Hrs - ARRIVE @ SWMU 8 to BACKFILL TEMP. WELLS - will MEAS. stick ups prior to WELL ABANDONMENT

TW 001 - 2.60' 10' WELL TW003 — 20' WELL

TW 002 - 2.98' 20' WELL TW 004 1.12' 20' WELL

1330 Hrs - Finish WELL ABANDONMENT @ SWMU 8

1338 Hrs - ARRIVE @ SWMU 15

ABANDONED TEMP WELL @ 15SB061 &

15TW1005 - 4.18' stick up. 10' WELL

CHECK IN ON Jim & Colin

1457 Hrs - ARRIVE @ B-3245

- PAPERWORK & PACKAGE SAMPLES FOR SHIPMENT ON COC # 3655

1650 Hrs - LEAVE B-3245 FOR FED. EX.

1735 Hrs - Drop OFF SAMPLES @ FED. EX. (AB # 8447 8135 5639)

1806 Hrs - FAX COC # 3655 to LAUCKS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty Bgl DATE 1/07/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAT. 1-08-05

Work continued from Page

WEATHER: Cold 30's & OVERCAST

0705 HRS - ARRIVE @ B-3245
- PREP VEHICLE FOR GW SAMPLING
- COLLECT TB01080501 @ 0730 HRS

0820 HRS - ARRIVE @ 15TW002
START PURGE = 0840 VOL. PURGED = 7.4L
END PURGE = 0950 SAMPLE TIME = 0950 HRS

1145 HRS - ARRIVE @ 15TW001
START PURGE - 1200 VOL. PURGED = 4.3L
END PURGE - 1300 SAMPLE TIME = 1300 HRS

1455 HRS - FINISH CLEAN UP @ 15TW001

1515 HRS - ARRIVE @ B 3245
- PICK UP BACK FILL MATERIAL (Bentonite CHIPS)
- Drop off samples

1527 HRS - RETURN to SWMU 15 to ABANDON TEMP. WELLS

| WELL ID | Stick up | |
|---|---|---|
| 15TW001 | 1.44' | |
| 002 | 1.52 | |
| 003 | 1.00' | 10' WELL |
| 004 | 1.48' | ~~20~~ 15' WELL (TC) |
| 005 | 4.19' | 10' WELL (ABANDONED 1/07) |
| 006 | 1.35' | ~21.5' WELL |
| 007 | 0.10' | ~~20~~ 15' WELL (TC) |
| 008 | 2.60' | ~~ABANDONED BY C.D.~~ (TC) |

1616 HRS - RETURN to B-3245

1630 HRS - Collect Rinsate Blank of tubing RB01080501
NERL Lot # 1009064 EX. DATE 10/05

1710 HRS - LEFT B 3245 FOR Hotel

1745 HRS - Drop off J. Goerdt @ Hotel
- DRIVE to K-MART to purchase life preservers for SWMU 8 POND - No luck - J.G. check checked 2 stores last night with NO luck (seasonal item)

1830 HRS - RETURN to Hotel

END



SIGNATURE Tony Rogal DATE 1/08/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREW SAME AS P. 29

SLUGE Testing @ 16 MWT 20 & 12 MWT 10, 13, & 21
Also FINISHED TEST @ 16 MWT 18

SAMPLING SUMMARY 01/08/05:

- Collected SAMPLES @ 15TW 001 → 004
- ABANDONED the Following TEMP WELLS
  15TW 001 - 004 & 006 → 007 (005 Abandoned on
  ALL WELLS (TEMP.) HAVE been ABANDONED

CREW SAME AS P. 24

SLUGE TESTING PERFORMED THIS DATA ON
12MWT 15, 17, 36, 25 & 28

SAMPLE SUMMARY 1/9/05 :

Completed the following SEDIMENT & SURFACE WATER locations :

085W001, 003, 006 → 009
155W018 & 019
085D001 → 003, 006 → 009, 155D018 & 019

SUN 1-09-05

Work continued from Page

WEATHER - Mild 40's, Partly Cloudy

0710 HRS - ARRIVE @ B-3245

- PREP. FOR SURFACE WATER & SEDI. SAMPLING

0830 HRS - ARRIVE @ SINNIU & CONFIRM CONFLUENCE OF SITE NO NAME STREAM w/ RTE 45

| SW SAMPLE ID | TIME | SD SAMPLE ID | TIME |
|---|---|---|---|
| 08SW00901 | 0855 | 08SD0090006 | 0905 |
| 08SW00701 (DUPE MS/MSD) | 0955 | 08SD0070006 | 1008 |
| 08SW00801 | 1138 | 08SD0080006 | 1145 |
| 08SW00601 | 1340 | 08SD0060006 | 1350 |
| 08SW00301 | 1415 | 08SD0030006 | 1420 |
| 08SW00201 (DRY) | NA | 08SD0020006 | 1450 |
| 08SW00101 | 1450 | 08SD0010006 | 1510 |
| 15SW01901 | 1540 | 15SD0190006 | 1540 |
| 15SW01801 | 1600 | 15SD0180006 | 1605 |

1630 Hrs - RETURN to B3245

- SECURE SAMPLE IN FRIG OR ICED IN COOLERS
- PROCESS 15SW/SD019 & 018 (LABEL & BAG)

1700 Hrs - LEFT B-3245 FOR ~~PM~~ EQ. NEED to SAMPLE POND @ SWMU DB

1805 Hrs - CHECK OUT @ MENARDS

1826 Hrs - " " @ LOWE'S

END



SIGNATURE Terry Rogal

DATE 1-09-05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

B 100 P ©

CREW SAME AS P 24

SAMPLE SUMMARY 1/10/05:

SAMPLE 08SW/SD 004 & 005 @ 106 POND
SEE P. 35 & sample log sheets for details

SURGE TEST MONITORING WELLS 12MW1T 38, 45, 46 & 4

TASK MUD - BASED ON FIELD OBSERVATION & CONVERSATION W/ R. BASINSKI, INSTEAD OF 3 SAMPLE DEPTHS (0-6", 6"-12" & 12-18 2 ~~SAMPLE~~ DEPTHS (0-12" & 12-24") WERE SAMPLED.

MON 1-10-05

Work continued from Page WEATHER - Mostly Cloudy TEMP ~40°s

0705 HRS - ARRIVE @ B3245
PREP to SAMPLE POND @ SITE 8

0905 HRS - ARRIVE @ POND SWMU 8
- UNLOAD EQ & JON BOAT (delivered by T. BRENT

1000 HRS - START SAMPLING SURFACE WATER AFTER Rigging JON BOAT W/ stabilization ROPES FROM FRONT & BACK of JON BOAT to SHORE - Also MARK sampling locations W/ 1" Screened PVC - USED AS location MARKER & to SAMPLE SW NEAR the bottom of pond ~4.5'

| SAMPLE ID | TIME | Comments |
|---|---|---|
| 08SW00502 | 1000 | Deep Sample |
| 08SW00501 | 1020 | Shallow " |
| 08SW00402 | 1045 | Deep Sample |
| 08SW00401 | 1115 | SHALLOW " |
| 08SD004 0012 | 1145 | 0-12" |
| 08SD004 1224 | 1200 | 12"-24" |
| 08SD005 0012 | 1220 | 0-12" |
| 08SD005 1224 | 1235 | 12"-24" |

1250 HRS - LUNCH

1330 HRS - Return to SWMU 8 - DECON BOAT & CLEAN UP

1420 HRS - TR Return to B-3245
JG STAYED @ SWMU 8 to ASSIST T. Brent W/ Returning Jon Boat
CD - ASSISTING S. Conti this AFTERNOON W/ SLUGGE TESTING

1420 HRS - ~~Start~~ TR SAMPLE PROCESSING (PACKAGE SAMPLES & PAPERWORK FOR SHIPMENT OF SAMPLES ON COCs # 3656, 3657, 3658 & 3662 via FEDEX AB# 8447 8135 6358

1722 HRS - LEAVE B-3245 FOR FED.EX.

1808 HRS - Drop off SAMPLES @ FED.EX.
- unload / SHIP 11 coolers

END



SIGNATURE DATE 1/10/05
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREW SAME AS ON P. 24

SLUGE TEST SUMMARY 01-11-05:

Tested 12MWT 23 33 & 29

SAMPLE SUMMARY 01-11-05:

Collected SURFACE WATER SAMPLES @ and SED SAMPLE
@ 15SW/SD001, 002, 005, 006, and 013-017

TUES 1-11-05

Work continued from Page

WEATHER - Mostly Cloudy Rain High in 50°

0655 Hrs - Arrive @ B-3245 Collect TB01110501 @ 0700 Hrs

- Prep. to sample surface water & sediment @ 15
- Fax COCs to office (from 1/07 & 1/10) &
- Lab (1/10 only, 1/07 was faxed on 1/07).
- Purchase ice @ Base Gas Station
- ~~Purchase of ice @~~

0930 Hrs - Arrive @ SWMU 15

| SW SAMPLE ID | TIME | SD SAMPLE ID | TIME | |
|---|---|---|---|---|
| 15SW00201 | 0945 | 15SD0020006 | 1000 | |
| 15SW00101 | 1035 | 15SD0010006 | 1040 | |
| 15SW01601 | 1110 | 15SD0160006 | 1115 | |
| 15SW01701 | 1220 | 15SD0170006 | 1225 | |
| 15SW01501 | 1315 | 15SD0150006 | 1320 | |
| 15SW01301 | 1410 | 15SD0130006 | 1415 | |
| 15SW01401 | 1420 | 15SD0140006 | 1425 | |
| 15SW00501 | 1520 | 15SD0050006 | 1525 | DUP & MS/MSD |
| DUP & MS/MSD 15SW00601 | 1550 | 15SD0060006 | 1555 | |

1610 Hrs - Arrive @ B 3245

- Process samples from 15SW/SD 006
- Collect Rinsate Blank on Wilco sieve used to collect SED. samples @ SWMU 8 Pond 08RB01110508 @ 1700 Hrs
- Clean up

1800 Hrs - Leave site for Motel

C.D. to purchase bubble wrap @ Office Depot

T.R. paperwork in evening

END



SIGNATURE

DATE 1/11/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREWS SAME AS ON P. 24

SAMPLE SUMMARY 01-12-05:
Collect 4 SW SAMPLES 15SW009 & 15ST010, 011 &
Collect 1 SED. SAMPLE 15SD009
REMAINDER OF DAY PACKAGE SAMPLE & VENDOR
EQ. FOR SHIPMENT TO LAB & U.S. ENV.
RESPECTIVELY.
5. Cont. demob slug test EQ AS WELL

Returned on 1-12-05
U.S. ENVIRONMENTAL EQUIPMENT

| | | |
|---|---|---|
| 2 | mini troll | |
| 1 | PDA | 26043 (~~51670830~~) |
| 2 | water levels | 26104 |
| 1 | PID | ED JF 315 |
| 2 | power pacs | 90<br>122 |
| 2 | peristaltics | 401<br>419 |
| 1 | Kemmerer | US 02 |
| 1 | Wildco | 105 |
| 1 | tire meter | 0918-4298 |
| 1 | LAP TOP | |

WED 1/12/05

Work continued from Page

WEATHER Mostly Cloudy TEMP IN 50°S & 60°S

0650 HRS - ARRIVE @ SITE
- PAPERWORK
- PREP. to Collect Sediment & SURFACE WATER @ SWMU 15

0905 Hrs - Collect SURFACE WATER @ 15SW00901
0910 HRS - " SEDIMENT @ 15SD009
0930 Hrs - Catch basin @ location SW/SD007 couldn't be located

0955 Hrs - SAMPLED a newly constructed Catch basin/storm SEWER @ SW/SD010 - 15ST01001

0915 Hr - THE ONLY MANHOLE in the AREA OF SW/SD012 WAS A SANITARY SEWER

1035 Hrs - SAMPLED 15ST01101 Also A newly constructed Catch basin/storm sewer

1120 Hrs - SAMPLED 15ST004

| Locations NOT SAMPLED | COMMENTS |
|---|---|
| 15SW/SD 007 | missing |
| 15SW/SD 012 | impact by NEW const. IN THE AREA IS A (SANITARY SEWER) |
| 15SW/SD 008 | impacted by NEW const. |
| 15SW/SD 003 | missing (AREA SOMEWHAT FLOODED) |

1215 HRS - 1245 HRS - LUNCH

1250 HRS - RETURN to B 3245
- PAPERWORK & PACKAGING SAMPLES on CoPCs 3660, 3664, 3665 & 3666
- CHECK in w/ OFFICE Ed. SEDLMYER & R. BASINSKI
- FAX COCs to OFFICE & LAB (H. PRENTICE)
- UNLOAD VEHICEL
- ORGANIZE & begin OFFICE CLEAN UP
- SEE P. 38 → PACKAGE EQ to RETURN to US. ENU ON AB# 8447 8135 5649

1620 HRS - LEAVE B-3245 FOR FED. EX

1655 HRS - DROP OFF EQ & SAMPLES (ON AB# 8447 8135 6369)

1720 HRS - WASH RENTAL SUV

1730 HRS - FINISH WASHING RENTAL

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE T. Nagel DATE 1-12-05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

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SCIENTIFIC BINDERS PRODUCTS CHICAGO 60639 MADE IN USA

THUL. 1/13/05

Work continued from Page

0700 Hrs - Arrive @ B-3295
- Organize paperwork
- Prep to return to Pittsburgh
- Sweep & mop floors

1000 Hrs - Leave for airport
- Remainder of day - travel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty [illegible] DATE 1/13/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Logbook pages 42 - 53 are associated with SWMUs 18, 19, 20 and OGTSL.

SAMPLE SUMMARY 2-14-05:

Sampled soil @ 15550470002,
15550480002 & 15580480206.

TRAVEL DAY!

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

MON. 2/14/05

Work continued from Page

TRAVEL DAY

1330 Hrs - ARRIVE @ B-3245

- PREP. to collect soil samples @ SWMU 15

1420 Hrs - Collect 15550470002 FOR PEST./PCBs @ SWMU 15

1430 Hrs - Collect 15550480002 " " " " " "

1448 Hrs - Collect 15580480206 " " " " " "

SAMPLES ON COC #3694

1500 Hrs - RETURN to B-3245

- PROCESS SAMPLES @ FM AND PACK IN FRIG.
- DECON AUGER bucket bits

1545 Hrs - LEAVE B-3245 FOR BEDFORD.

END

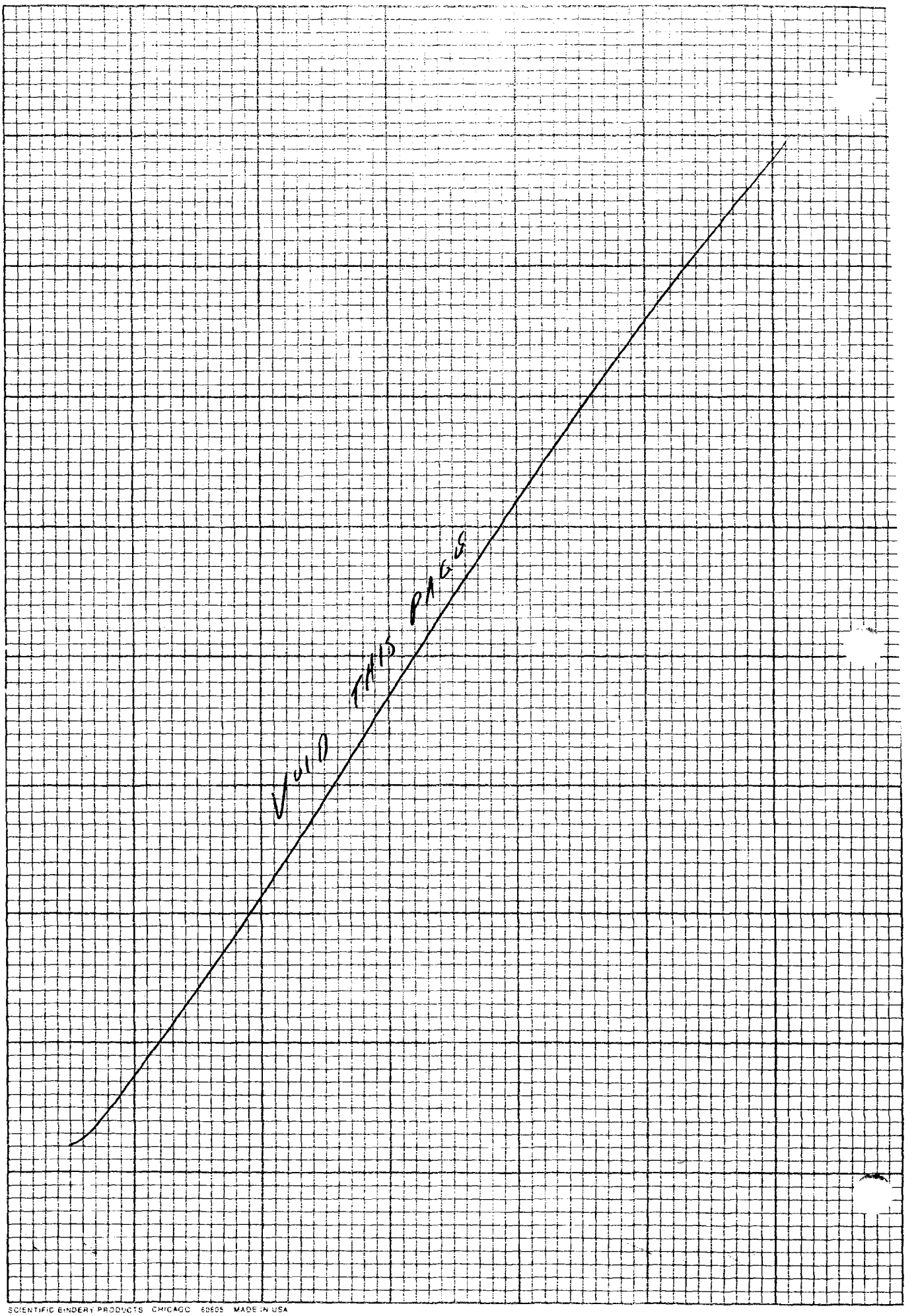
NTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 2-14-05

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE




SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 1245

BOOK NO. 1380



WED 2-16-05

Work continued from Page

SHIPPED SAMPLES Collected on 2-14-05 (SEE P 55.)
VIA FED.EX. AB II 8447 8135 7990

END

SC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 2-16-05

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

# APPENDIX D.2
# SITE NOTEBOOK

NSWC
CRANE

8 & 15

2586

LOGBOOK

START : 12-7-04

## TABLE OF CONTENTS

| Subject | Page |
|---|---|
| | |

**TITLE** NSWC CRANE
TUES DEC 7 2004

**PROJECT NO.** N1245
**BOOK** 2586

Work continued from Page

AT SITE SJC

AM: CLOUDY W/ RAIN
PM: " " "

AM: READ OVER QAP, ETC

PM: TRAVEL DAY TO NSWC SITE
MOB DAY FOR EFS.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

**SIGNATURE** SJ Conte **DATE** 12/7/04

**WITNESS** **DATE**

**TITLE** NSWC CRANE **PROJECT NO.** N1245

WED DEC 8 2004 **BOOK** 2586

Work continued from Page

AT SITE: SJC/JG

JM - EFS

AM: SUNNY COLD

PM: " COLD HI 40° F

0630 AT SITE - LOAD VAN CALIB PID
H&S BRIEFING, SIGN SHEETS FILL
OUT MED DATA FORM

0800 DISCUSS WORK SCEDULE FOR TODAY

0850 DPT RIG STARTS TO MOB TO SITE 15
CANNOT USE TRAILER, DUE TO BROKEN
WHEEL ON TRAILER

0930 ARRIVES (DPT) AT SITE 15.

1020 AOC B SB013 6'
SB012 6'
SB011 6'

AOC C SB008 9'
SB009 TEMP WELL 9.5
SB010 9.5

1315 DONE AT AOC C.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConti DATE 12/8/04

WITNESS DATE



**TITLE** NSWC CRANE **PROJECT NO** N1245

WED (CONT) **BOOK** 586

Work continued from Page

1330 MOVE TO AOC A.

SB007 6'

SB002 6' TEMP WELL - 6'

DUP MS/MSD ON 0206 SB006 6' TEMP WELL - 6'

SB005 6'

1530 AT SB005 FINISHING UP SAMPLE
COLLECTION.

1600 LEAVE FOR FIELD OFFICE.

1610 ARR FIELD OFF - BEGIN TO PREP
SAMPLES TAKEN TODAY.

1700 LOAD BOTTLES INTO COOLERS ADD
ICE AND STRAP.

1800 LV SITE.

QUANT TODAY EFS

1 DAILY RENTAL DPT

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConti DATE 12/8/04

WITNESS DATE

**TITLE** NSWC CRANE **PROJECT NO.** N1245

THUR DEC 9 2004 **BOOK** 2586

Work continued from Page

AT SITE: SJC/JG JM

AM: CLOUDY, COLD – LT RAIN ≈ 1115

PM: CLOUDY, COLD – RAIN STOPS ≈ 1400

0630 AT SITE – NOTES, CALIBRATE PID. GO OVER DARS

0730 MAKE UP ENCORE SETS

0800 EFS ARRIVES – WAITS FOR MECHANIC TO FIX TRAILER (WHEEL BROKE OFF)

0900 MOVE TO

| | | | | |
|---|---|---|---|---|
| AOCA | 15SB001 | – | 6' | |
| | 15SB003 | – | 6' | |
| | 15SB004 | – | 6' | |
| AOCG | 15SB029 | – | 5' | |
| | 15SB031 | – | 14' | TEMP WELL |
| | 15SB032 | – | 3' | |
| | 15SB035 | – | 6' | TEMP WELL |
| | 15SB037 | – | 4' | |
| | 15SB048 | – | 15' | TEMP WELL |
| | 15SB047 | – | 2' | |

1215 DPT RIG STUCK – WENT TO LUNCH AFTER LUNCH TALKED TO TOM B HE WAS ABLE TO CALL ROAD MAINT

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE [signature] DATE 12/9/04

WITNESS DATE



**TITLE** NSWC CRANE **PROJECT NO.** N1245

THURS (CONT) 2004 **BOOK** 2586

Work continued from Page

AND THEY WERE ABLE TO WINCH OUT THE DPT.

1500 DPT RIG WAS WINCHED OUT AND MOVED TO 15SB048.

1630 DONE AT 15SB047 GO TO FIELD OFFICE.

1700 BEGIN TO PREPARE SAMPLES FOR SHIPMENT

1800 LV SITE. [1 DAY FOR DPT]

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE [signature] DATE 12/9/04

WITNESS DATE

**TITLE** NSWC CRANE **PROJECT NO.** N1245

FR. DEC 10 2004 **BOOK** 2586

Work continued from Page AT SITE: SJC/JG.

AM: CLOUDY, COOL - RAIN BECOMES PARTLY CLOUDY

PM: PARTLY TO CLOUDY - COOL LT RAIN.

0630 AT SITE CALIB PID - FINISH NOTES

0730 PREPARE ENCORE SETS

0830 GO TO SITE 15 - SET UP ON 046

| | | | |
|---|---|---|---|
| AOC U | 15SB046 | 20.5' | SET TEMP WELL 10-20 |
| | 15SB045 | 14' | |
| AOC O | 15SB043 | 5' | |
| | 15SB042 | 6' | |
| | 15SB044 | 4.5' | |
| AOC E | 15SB019 | 6' | |
| | 15SB023 | 6' | DUP AT 0206 + MS/MSD |
| | 15SB020 | 6' | |
| | 15SB022 | 6' | |
| | 15SB021 | 6' | |
| AOC H | 15SB040 | 6' | |
| | 15SB039 | 3' | |

1630 AT FIELD OFFICE - PREPARE SAMPLES

1800 LV SITE. (1 DAY DPT)



SIGNATURE SJ Conta DATE 12/10/04

WITNESS DATE



**TITLE** NSWC CRANE **PROJECT NO.** N1245

SAT DEC 11 2004 **BOOK** 2586

Work continued from Page AT SITE: SJC/JG JM

AM: CLOUDY COLD RAIN - RAIN STOPS ≈ 0900

PM: " "

0630 AT SITE CALIB PID - FINISH NOTES GET ENCORES READY

0730 SJC/TR GO TO SITE 8 TO CHECK OUT SITE.

0800 BACK AT OFFICE. JAY HOOKS UP TO TRAILER. GO TO SITE 15.

0835 MOVES DPT RIG TO 15SB0

| | | |
|---|---|---|
| | 15SB017 | 6' |
| | 15SB016 | 6' |
| | 15SB015 | 6' |
| | 15SB018 | 6' |
| 0945 | 15SB014 | 6'' |
| | 15SB025 | 5' |
| | 15SB024 | 5' |
| | 15SB026 | 3.5' |
| 1050 | 15SB028 | 4' |
| | 15SB027 | |



SIGNATURE SJ Conta DATE 12/11/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N1245

SAT (CONT) - 2004 BOOK 2586

Work continued from Page

1200 CLEAN UP AT SITE 15 - PATCH BORING WITH COLD PATCH. LOAD DPT ON TRAILER

1250 AT SITE 08 SET UP AT 08SB001

1305 08SB001 2.5'
08SB002 3'
08SB003 3'
08SB005 4'
1500 08SB004 6'

1545 AT SITE OFFICE - PLACE SAMPLES IN FRIDGE - WRITE UP NOTES, PAPERWORK - CHECK OVER QA SHEET BEGIN COC'S - FILL OUT DARS.

1810 LV SITE - WORK ON LOGS IN ROOM
47 BORINGS DONE SO FAR
9 LEFT AT SITE 8 (12/12)
12 " AT " 15 12/13/12/14/12/15
7 CANT DO W/ DPT
75 TOTAL

[1 DAY DPT]

4 DAY + 1 MOB

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 12/11/04.

WITNESS DATE



TITLE NSWC CRANE PROJECT NO. N1245

SUN DEC 12 2004 BOOK 2586

Work continued from Page

AT SITE: SJC/JG JM-EFS

AM: CLOUDY, COLD, WINDY
PM: PTLY CLDY, COLD, WINDY

0630 AT SITE: CALIB PID - PREPARE ENCORE SAMPLES - LOAD VANS - JARS, COOLERS ICE

0730 FINISH LOADING VANS - PREPARE TO GO TO SITE 8.

0830 AT SITE 8

08SB006 8' TEMP WELL (3'-8')
0910 MS/MSD + DUP → 08SB009 8.5
08SB008 10'
08SB007 17' TEMP WELL (7'-17')
1130 08SB010 17.5 TEMP WELL (7'-17')

1230 TOOK SAMPLE OF EFS'S SOURCE WATER USED FOR DECON - TOOK SAMPLES AND PAPER WORK TO FIELD OFFICE.

1300 ARRIVE FIELD OFFICE - DROP OFF SAMPLES - GET MORE SUPPLIES.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 12/12/04

WITNESS DATE

**TITLE** N' C CRANE **PROJECT NO.** N1245

SUN (CONT) 2004 **BOOK** 2586

Work continued from Page

| | | | |
|---|---|---|---|
| 1330 | 085B011 | 6' | |
| | 085B012 | 19' | MS/MSD 0206 DUP 02 |
| 1515 | 085B013 | 19 | SET TEMP WELL 9-19 |
| | 085B014 | 2-4 | |

1545 CLEAN UP LOAD UP DPT - GO TO SITE 15 LOOK OVER LOCATIONS

1630 RETURN TO FIELD OFFICE. PUT SAMPLES IN FRIDGE.

1800 LU SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE S J Conti DATE 12-12-04

WITNESS DATE



**TITLE** NSWC CRANE **PROJECT NO** N1245

MON DEC 13 2004 **BOOK** : 86

Work continued from Page AT SITE: SJC/JG (THUS) JM - EFS

AM: CLOUDY, COLD WINDY.

PM: " " "

0630 AT SITE: CALIB PID, PAPERWORK, DARS GET ENCORES READY, JARS, COOLERS, ICE LOAD VAN - PREPARE TO GO TO SITE 15 WOODED AREA

0730 LOOK OVER QUP FOR AOC W.

0800 EFS ARRIVES - PREPARE TO GO TO AOC W.

| | | | |
|---|---|---|---|
| 0900 | 15SB053 | 6' | |
| | 15SB057 | 9.5' | |
| | 15SB061 | 6' | SET TEMP WELL 1-6 |
| 1020 | 15SB060 | 6' | |
| | 15SB059 | 6' | |
| 1320 | 15SB058 | 6' | |
| | 15SB54 | 6' | |
| | 15SB50 | 6' | |
| | 15SB51 | 6' | |
| 1430 | 15SB52 | 6' | |

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE S J Conti DATE 12/13/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N1245

MON (CONT) 2004 BOOK 2586

Work continued from Page

15SB056 6'

1630 15SB055 6'

1635 JAY HOOKS UP TRAILER AND LOADS DPT ON TRAILER - TAKES IT TO FIELD OFFICE.

1730 AT FIELD OFFICE - PREP SAMPLES AND SHIP.

1810 LU SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conte DATE 12/14/04

WITNESS DATE



TITLE NSWC CRANE PROJECT NO. N1245

TUE DEC 14 2004 BOOK 2586

Work continued from Page AT SITE: SJC/JG TENUS

AM: CLEAR V. COLD

PM: PARTLY CLDY COLD

0630 AT SITE - WRITE UP NOTES AND COMPLETE DARS

0730 PREPARE FOR HAND AUGER AT SITE 15

0800 GO OVER DARS W/ JAY McFACK

0830 LOAD HAND AUGER EQUIP

0915 TAKE HAND AUGER 15SB030 (3')

" " " 15SB033 (2')

" " " 15SB036 (2')

" " " 15SB039 (2')

1050 " " " 15SB041 (2')

" " " 15SB038 (2')

1330 ± " " (TEMP WELL) 5SB062 (3.5)

1430 " " 15SB049 (2')

1510 DONE AT SITE 15 GO TO FIELD OFF.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 12/14/04

WITNESS DATE

# APPENDIX E
# SURVEY DATA

| SWMU 15 SURVEY LOCATIONS- DECEMBER, 2004 - FEBRUARY, 2005 | | | | | |
|---|---|---|---|---|---|
| DATA COMPILED BY: BLEDSOE, TAPP, & RIGGERT, INC | | | | | |
| Location | Northing (feet) | Easting (feet) | Ground Surface Elevation (feet amsl) | Top of Casing Elevation (feet amsl) | Top of PVC Elevation (feet amsl) |
| **SOIL BORING** | | | | | |
| 15SB001 | 1317540.18 | 3027499.46 | 774.47 | N/A | N/A |
| 15SB002 | 1317491.74 | 3027519.72 | 758.07 | N/A | N/A |
| 15SB003 | 1317436.15 | 3027448.70 | 771.96 | N/A | N/A |
| 15SB004 | 1317415.58 | 3027453.79 | 771.78 | N/A | N/A |
| 15SB005 | 1317396.14 | 3027441.39 | 770.88 | N/A | N/A |
| 15SB006 | 1317451.19 | 3027512.32 | 755.64 | N/A | N/A |
| 15SB007 | 1317535.27 | 3027547.74 | 756.79 | N/A | N/A |
| 15SB008 | 1317409.14 | 3027657.93 | 750.74 | N/A | N/A |
| 15SB009 | 1317429.64 | 3027643.80 | 752.08 | N/A | N/A |
| 15SB010 | 1317423.52 | 3027658.63 | 751.60 | N/A | N/A |
| 15SB011 | 1317477.26 | 3027705.27 | 752.57 | N/A | N/A |
| 15SB012 | 1317469.30 | 3027688.79 | 752.06 | N/A | N/A |
| 15SB013 | 1317484.68 | 3027689.89 | 752.74 | N/A | N/A |
| 15SB014 | 1317440.49 | 3027795.65 | 755.25 | N/A | N/A |
| 15SB015 | 1317457.13 | 3027808.01 | 755.43 | N/A | N/A |
| 15SB016 | 1317453.79 | 3027825.35 | 754.92 | N/A | N/A |
| 15SB017 | 1317471.80 | 3027818.88 | 755.47 | N/A | N/A |
| 15SB018 | 1317461.01 | 3027790.74 | 755.90 | N/A | N/A |
| 15SB019 | 1317534.96 | 3027897.66 | 756.32 | N/A | N/A |
| 15SB020 | 1317533.94 | 3027922.43 | 756.28 | N/A | N/A |
| 15SB021 | 1317546.46 | 3027929.06 | 756.89 | N/A | N/A |
| 15SB022 | 1317529.74 | 3027938.42 | 756.06 | N/A | N/A |
| 15SB023 | 1317516.66 | 3027910.61 | 755.44 | N/A | N/A |
| 15SB024 | 1317653.93 | 3028044.16 | 761.65 | N/A | N/A |
| 15SB025 | 1317576.53 | 3028048.33 | 758.09 | N/A | N/A |
| 15SB026 | 1317621.98 | 3028107.74 | 759.90 | N/A | N/A |
| 15SB027 | 1317675.79 | 3028163.20 | 761.69 | N/A | N/A |
| 15SB028 | 1317609.72 | 3028181.92 | 759.83 | N/A | N/A |
| 15SB029 | 1317396.04 | 3027915.59 | 752.55 | N/A | N/A |
| 15SB030 | 1317342.05 | 3027981.73 | 737.67 | N/A | N/A |
| 15SB031 | 1317470.44 | 3028187.10 | 756.32 | N/A | N/A |
| 15SB032 | 1317384.55 | 3028284.73 | 726.55 | N/A | N/A |
| 15SB033 | 1317304.94 | 3028049.40 | 721.38 | N/A | N/A |
| 15SB034 | 1317394.99 | 3028124.68 | 735.45 | N/A | N/A |
| 15SB035 | 1317331.38 | 3028308.96 | 708.40 | N/A | N/A |
| 15SB036 | 1317244.35 | 3027989.43 | 724.71 | N/A | N/A |
| 15SB037 | 1317333.77 | 3028253.46 | 711.60 | N/A | N/A |
| 15SB038 | 1317324.93 | 3028156.82 | 716.67 | N/A | N/A |
| 15SB039 | 1317214.19 | 3028092.34 | 733.47 | N/A | N/A |
| 15SB040 | 1317232.65 | 3028224.14 | 735.97 | N/A | N/A |
| 15SB041 | 1317252.25 | 3028369.99 | 714.23 | N/A | N/A |
| 15SB042 | 1317616.11 | 3027975.50 | 760.37 | N/A | N/A |
| 15SB043 | 1317625.51 | 3027991.56 | 760.92 | N/A | N/A |
| 15SB044 | 1317637.58 | 3027975.38 | 761.92 | N/A | N/A |
| 15SB045 | 1317930.58 | 3028450.96 | 775.92 | N/A | N/A |
| 15SB046 | 1317772.54 | 3028437.38 | 763.18 | N/A | N/A |

| | | | | | |
|---|---|---|---|---|---|
| 15SB047 | 1317696.97 | 3028512.29 | 755.52 | N/A | N/A |
| 15SB048 | 1317628.25 | 3028420.25 | 755.69 | N/A | N/A |
| 15SB049 | 1317552.98 | 3028586.35 | 716.23 | N/A | N/A |
| 15SB050 | 1316531.97 | 3027280.90 | 761.62 | N/A | N/A |
| 15SB051 | 1316483.42 | 3027408.75 | 762.92 | N/A | N/A |
| 15SB052 | 1316445.63 | 3027548.22 | 765.09 | N/A | N/A |
| 15SB053 | 1316399.95 | 3027690.50 | 768.22 | N/A | N/A |
| 15SB054 | 1316432.96 | 3027216.47 | 759.20 | N/A | N/A |
| 15SB055 | 1316440.19 | 3027384.97 | 761.03 | N/A | N/A |
| 15SB056 | 1316374.35 | 3027512.69 | 762.88 | N/A | N/A |
| 15SB057 | 1316333.55 | 3027646.17 | 767.19 | N/A | N/A |
| 15SB058 | 1316291.46 | 3027173.59 | 753.82 | N/A | N/A |
| 15SB059 | 1316272.27 | 3027370.65 | 756.56 | N/A | N/A |
| 15SB060 | 1316275.24 | 3027478.32 | 760.88 | N/A | N/A |
| 15SB061 | 1316269.81 | 3027606.24 | 765.62 | N/A | N/A |
| 15SB062 | 1317725.72 | 3028627.22 | 737.26 | N/A | N/A |
| | | | | | |
| **SURFACE WATER/SEDIMENT** | | | | | |
| 15SW/SD001 | 1317194.18 | 3028517.22 | 689.77 | N/A | N/A |
| 15SW/SD002 | 1316736.70 | 3028691.68 | 674.64 | N/A | N/A |
| 15SW/SD003 | **NOT SAMPLED** | | | | |
| 15SW/SD004 | 1317744.65 | 3027660.25 | 761.78 | N/A | N/A |
| 15SW/SD005 | 1317254.38 | 3027741.85 | 734.36 | N/A | N/A |
| 15SW/SD006 | 1317348.00 | 3027874.56 | 737.80 | N/A | N/A |
| 15SW/SD007 | **NOT SAMPLED** | | | | |
| 15SW/SD008 | **NOT SAMPLED** | | | | |
| 15SW/SD009 | 1317346.42 | 3027637.35 | 743.99 | N/A | N/A |
| 15SW/SD010 | 1317479.24 | 3027885.11 | 753.85 | N/A | N/A |
| 15SW/SD011 | 1317758.27 | 3027774.91 | 778.30 | N/A | N/A |
| 15SW/SD012 | **NOT SAMPLED** | | | | |
| 15SW/SD013 | 1317575.09 | 3028590.17 | 717.33 | N/A | N/A |
| 15SW/SD014 | 1317588.39 | 3028659.23 | 714.00 | N/A | N/A |
| 15SW/SD015 | 1317396.16 | 3028463.19 | 698.90 | N/A | N/A |
| 15SW/SD016 | 1317327.69 | 3028375.19 | 697.53 | N/A | N/A |
| 15SW/SD017 | 1317335.07 | 3028127.27 | 713.56 | N/A | N/A |
| 15SW/SD018 | 1316162.81 | 3027112.05 | 744.44 | N/A | N/A |
| 15SW/SD019 | 1316050.96 | 3026910.36 | 736.14 | N/A | N/A |
| | | | | | |
| SB= Soil Boring SW = Surface Water SG = Staff Guage | | | | | |
| MW = Monitoring Well SD = Sediment SP = Seep | | | | | |

# APPENDIX F

# HEALTH AND SAFETY FORMS

OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

## TOXIC AND HAZARDOUS SUBSTANCES – HCP WRITTEN OPINION

**NAME:** Josh Dean **DATE:** 9-17-04

**Examiner to select A or B**

A. ✓ **I have detected no medical conditions** that would place this individual at an increased risk of material health impairment from exposure to asbestos.

B. ____ **I have detected medical conditions** that would place this individual at an increased risk of material health impairment from exposure to asbestos.

**Examiner to select all that apply:**

C. ____ Restrictions are placed on this individual for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

D. ✓ The above named individual has been provided a copy of this Licensed Health Care Professional's written opinion, and of any medical conditions resulting from asbestos exposure that require further explanation or treatment.

E. ____ This individual has been informed of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure.

B.C. Russell

T.E. Lieser, MD; P.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

# Certificate of Completion

This is to certify that

**Joshua Dean**

has successfully completed the
OSHA 29 CFR 1910.120 -- Hazardous Waste
Operations and Emergency Response
8 Hour Annual Refresher Training Course
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

28 Dec 2004

2095-04
Certificate Identification Number

Level B
Personal Protective Equipment Level

Steven L. Curtis PE, CSP, CHMM
Trainer

# Certificate

## OF

# Completion

*This is to certify that*

## Josh Dean

*Has successfully completed the*

MSHA30 CFR Part 46.8
8-Hour Annual Refresher Training
Given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

**December 28, 2004**

1228040005
Certificatee Identification Number

Henry M. Butcher, REM, CEA

# 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

# ARGONNE NATIONAL LABORATORY

RECOGNIZES

Jeffrey P. Schubert

ON THE COMPLETION OF THE COURSES OF STUDY
PRESCRIBED BY 29 CFR 1910.120 AND DOE ORDER 5480.11

## HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE (40 HOURS) AND GENERAL EMPLOYEE RADIATION SAFETY

COMPLETED ON THIS DATE January 12, 1990

ISSUED AND ATTESTED BY

Robert A. Wymer
MANAGER
ENVIRONMENT, SAFETY & HEALTH

Dean R. Larsen
COURSE MANAGER

# WORK STATUS REPORT

Employer Copy

**TYPE OF EXAMINATION:** Baseline Examination **UPDATE**

| | | | |
|---|---|---|---|
| **EMPLOYEE:** | Doolan, Colin | **COMPANY:** | TT/NUS |
| **SSN:** | XXX-XX-8351 | **POSITION:** | Earth Scientist |
| **DATE OF EXAM:** | 12/02/2004 | **LOCATION:** | TT/NUS-Pittsburgh |
| **EXPIRATION DATE:** | 12/02/2006 | **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:** ***Status changed to Biennial.***

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: 12/07/04

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

# TETRA TECH NUS

## CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

**Colin A. Doolan**

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

December 23, 2004

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: | Rojahn, Terry | COMPANY: | TT/NUS |
| SSN: | XXX-XX-8670 | POSITION: | Environmental Sampling |
| DATE OF EXAM: | 11/05/2004 | LOCATION: | TT/NUS-Pittsburgh |
| EXPIRATION DATE: | 11/05/2006 | 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: 11/10/04

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

## Basinski, Ralph

**From:** Soltis, Matthew

**Sent:** Tuesday, August 31, 2004 3:18 PM

**To:** Basinski, Ralph

**Cc:** Rojahn, Terry; Diano, Linda

**Subject:** Training Certificate

Ralph:

As I mentioned earlier, one of the action items from my recent H&S audit at NSWC Crane was to follow up on the matter of an 8-hour training certificate for Management/Supervisor H&S training for our FOL on this field effort (Terry Rojahn). This was the only mandatory training element that I could not find documentation for during my audit.

In checking our corporate training database, I have confirmed that Terry did satisfactorily complete this training with us on March 31, 1988. We do not maintain copies of every training certificate that we issue. Please have Terry use this message as interim confirmation of his satisfying this training requirement. The next time that we prepare training certificates, Linda Diano will prepare a replacement certificate for Terry and provide it to him for his records/use.

If there are any questions, let me know.

Matt

Matthew M. Soltis, CIH, CSP.
Corporate Health and Safety Manager
**Tetra Tech** NUS, Inc.
Foster Plaza 7, 661 Andersen Drive
Pittsburgh, PA 15220-2745
Telephone: (412) 921-8912
FAX: (412) 921-4040
soltism@ttnus.com
http://www.ttnus.com
http://www.tetratech.com

NOTICE OF CONFIDENTIALITY

*This e-mail message and its attachments (if any) are intended solely for the use of the addressees hereof. In addition, this message and the attachments (if any) may contain information that is confidential, privileged and exempt from disclosure under applicable law. If you are not the intended recipient of this message, you are prohibited from reading, disclosing, reproducing, distributing, disseminating or otherwise using this transmission. Delivery of this message to any person other than the intended recipient is not intended to waive any right or privilege. If you have received this message in error, please promptly notify the sender by reply e-mail and immediately delete this message from your system.*

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

February 25, 2005

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

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, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-5-5-042

May 27, 2005

Project Numbers N1245, N7448, 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, 0343, 0357, and 0376

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to add personnel conducting the field activities at the NAS Dallas site from May 31 through June 8, 2005. Mr. Colin Doolan has been added to the field crew performing this work. All other information in our letter dated April 29, 2005 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.



In addition, Roger Clark will also visit Tetra Tech NUS, Inc. work sites at NWSC Crane during this period. However, he will be not participating in any intrusive activities (e.g., drilling, sampling, etc.) and will be restricted from approaching work areas while any intrusive activities are performed.

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.
Mr. Terry Rojahn, TtNUS, Inc.
Mr. Roger Clark, TtNUS, Inc.
File copy CTO 0331, 0343, 0357, 0376

**TETRA TECH** NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-04-5-067

April 29, 2005

Project Nos. 1245, 7448, 6878, 00042

Mr. William Gates (Code ES31)
Commander, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29119-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Nos. 0331, 0343, 0357, 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. (TtNUS) 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 May 2, 2005 through June 8, 2005. The individuals that will perform these tasks are employees of TtNUS. In performing these activities, the field team will adhere to the following Health and Safety Plans (HASPs):

- HASP for RCRA Facility Investigation at Building 106 Pond (SWMU 8) and Roads and Grounds Area (SWMU 15), dated November 2004, prepared under CTO 0331.
- HASP for Cast High Explosives Fill and B-146 Incinerator, dated August 2004, prepared under CTO 0343.
- HASP for Mine Fill A (SWMU 12), Revision 1, dated August 2004, prepared under CTO 0357.
- HASP for Risk Assessment and Corrective Measures Study (SWMU 9), dated February 2005, prepared under CTO 0376.

The following individuals will participate in the planned activities described above:

Jim Goerdt
Terry Rojahn
John Wright
Jeff Schubert

## 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 | |
|---|---|---|---|---|---|---|---|
| 1245 | Jay McFall<br>Jay McFall | 12/7/04 | 2/19/04 | N/A | N/A | 7/30/04 | |
| SWMU 9 | DON WOSTOLHOFF<br>[illegible] | " | 1/93 | 8/04 | 8/04 | 2/12/03 | |
| | TERRY ROHAHN<br>[illegible] | " | 10/85 | 1/04 | 1/04 | 11/10/04 | ALSO SWMU 9 |
| 1245<br>6875<br>7448 | [illegible]<br>[illegible] | 12/8/04 | 12/91 | 10/04 | NA | 11/7/04 | |
| | Stan Conti<br>S Conti | 12/8/04 | 8/83 | 5/04 | 8/84 | 12/6/04 | |
| | Colin Doolan<br>Colin Doolan | 11/6/05 | 5/99 | 12/04 | NA | 12/04 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |

# MEDICAL APPROVAL FORM

**For Employees of Environmental Field Services, Inc.**

Participant Name: Jay McFall Date & Time of Examination: July 30, 2004

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, T Perri, have examined Jay McFall

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):

   (N)

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 : TR

Address: 5604 W. 74th
Indpls

Phone Number: 317 290 1551

Compliance Environmental Resources, Inc.
7002 Graham Road
Suite 202
Indianapolis, IN 46220
317-863-0008

# Jay McFall

Has completed the 40 Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) course in compliance with 29 CFR 1910.120 (e). He will have met the criteria for certification upon completion of 24 hours of supervised training.

Christopher A. Kinsey, CHMM, CET
Instructor
Completion Date: 02/19/04

# WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

| | | | |
|---|---|---|---|
| EMPLOYEE: | Rojahn, Terry | COMPANY: | TT/NUS |
| SSN: | XXX-XX-8670 | POSITION: | Environmental Sampling |
| DATE OF EXAM: | 11/05/2004 | LOCATION: | TT/NUS-Pittsburgh |
| EXPIRATION DATE: | 11/05/2006 | 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: 11/10/04

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

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

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

February 25, 2005

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

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

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 J. Conti

Office Location: PIT

| 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: 12-6-04

***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

Stan Contl

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. Lilly
Manager
Training Services

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. Lafley
Manager, Training Resources

JKL:lld

# 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

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 AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 22, 2004

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

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

# WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Baseline Examination **UPDATE**

| | | | |
|---|---|---|---|
| EMPLOYEE: | Doolan, Colin | COMPANY: | TT/NUS |
| SSN: | XXX-XX-8351 | POSITION: | Earth Scientist |
| DATE OF EXAM: | 12/02/2004 | LOCATION: | TT/NUS-Pittsburgh |
| EXPIRATION DATE: | 12/02/2006 | 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:** ***Status changed to Biennial.***

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: 12/07/04

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

TETRA TECH NUS

*CERTIFICATE OF TRAINING*

THIS CERTIFIES THAT

**Colin A. Doolan**

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

December 23, 2004

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

**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.**
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, an[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. 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.**
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

# APPENDIX G

# ANALYTICAL DATA

APPEND :LE G-1
RESULTS FOR CHEMICALS ANALY... IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,1,1-TRICHLOROETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,1,2,2-TETRACHLOROETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,1,2-TRICHLOROETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,1-DICHLOROETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,1-DICHLOROETHENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,2,3-TRICHLOROPROPANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,2-DIBROMO-3-CHLOROPROPANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,2-DIBROMOETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,2-DICHLOROETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 1,2-DICHLOROPROPANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 2-BUTANONE | 2 J 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>3 J 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>2 J 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>2 J 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| 2-HEXANONE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 3-CHLOROPROPENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| 4-METHYL-2-PENTANONE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| ACETONE | 14 U 15SS0010002<br>4 BU 15SB0010206 | 14 U 15SS0020002<br>23 BU 15SB0020206 | 6 U 15SS0030002<br>7 BU 15SB0030206 | 5 U 15SS0040002<br>22 BU 15SB0040206 | 13 U 15SS0050002<br>16 BU 15SB0050206 | 27 U 15SS0060002<br>15 BU 15SB0060206-D |
| ACETONITRILE | 33.8 UR 15SS0010002<br>36.4 UR 15SB0010206 | 46 UR 15SS0020002<br>37.5 UR 15SB0020206 | 45.8 UR 15SS0030002<br>39.3 UR 15SB0030206 | 42 UR 15SS0040002<br>40.5 UR 15SB0040206 | 59.4 UR 15SS0050002<br>39.8 UR 15SB0050206 | 41.8 UR 15SS0060002<br>45.5 UR 15SB0060206-D |
| ACROLEIN | 0.846 UR 15SS0010002<br>0.91 UR 15SB0010206 | 1.15 UR 15SS0020002<br>0.938 UR 15SB0020206 | 1.14 UR 15SS0030002<br>0.982 UR 15SB0030206 | 1.05 UR 15SS0040002<br>1.01 UR 15SB0040206 | 1.48 UR 15SS0050002<br>0.995 UR 15SB0050206 | 1.04 UR 15SS0060002<br>1.14 UR 15SB0060206-D |
| ACRYLONITRILE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| BENZENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| BROMODICHLOROMETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| BROMOFORM | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| BROMOMETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CARBON DISULFIDE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |

APPENDIX G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CHLOROBENZENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CHLORODIBROMOMETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CHLOROETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CHLOROFORM | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CHLOROMETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CHLOROPRENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CIS-1,2-DICHLOROETHENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| CIS-1,3-DICHLOROPROPENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| DIBROMOMETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| DICHLORODIFLUOROMETHANE | 0.846 UR 15SS0010002<br>0.91 UR 15SB0010206 | 1.15 UJ 15SS0020002<br>0.938 U 15SB0020206 | 1.14 UR 15SS0030002<br>0.982 UR 15SB0030206 | 1.05 UR 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 UJ 15SS0060002<br>1.14 U 15SB0060206-D |
| ETHYL METHACRYLATE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| ETHYLBENZENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| ISOBUTANOL | 33.8 UR 15SS0010002<br>36.4 UR 15SB0010206 | 46 UR 15SS0020002<br>37.5 UR 15SB0020206 | 45.8 UR 15SS0030002<br>39.3 UR 15SB0030206 | 42 UR 15SS0040002<br>40.5 UR 15SB0040206 | 59.4 UR 15SS0050002<br>39.8 UR 15SB0050206 | 41.8 UR 15SS0060002<br>45.5 UR 15SB0060206-D |
| METHACRYLONITRILE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| METHYL IODIDE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| METHYL METHACRYLATE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| METHYL TERT-BUTYL ETHER | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| METHYLENE CHLORIDE | 5 J 15SS0010002<br>7 J 15SB0010206 | 6 J 15SS0020002<br>2 J 15SB0020206 | 10 J 15SS0030002<br>18 J 15SB0030206 | 7 J 15SS0040002<br>11 J 15SB0040206 | 4 J 15SS0050002<br>1 J 15SB0050206 | 4 J 15SS0060002<br>3 J 15SB0060206-D |
| PROPIONITRILE | 33.8 UR 15SS0010002<br>36.4 UR 15SB0010206 | 46 UR 15SS0020002<br>37.5 UR 15SB0020206 | 45.8 UR 15SS0030002<br>39.3 UR 15SB0030206 | 42 UR 15SS0040002<br>40.5 UR 15SB0040206 | 59.4 UR 15SS0050002<br>39.8 UR 15SB0050206 | 41.8 UR 15SS0060002<br>45.5 UR 15SB0060206-D |
| STYRENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| TETRACHLOROETHENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| TOLUENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| TOTAL XYLENES | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| TRANS-1,2-DICHLOROETHENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| TRANS-1,3-DICHLOROPROPENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| TRANS-1,4-DICHLORO-2-BUTENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| TRICHLOROETHENE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| TRICHLOROFLUOROMETHANE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>2 J 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| VINYL ACETATE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| VINYL CHLORIDE | 0.846 U 15SS0010002<br>0.91 U 15SB0010206 | 1.15 U 15SS0020002<br>0.938 U 15SB0020206 | 1.14 U 15SS0030002<br>0.982 U 15SB0030206 | 1.05 U 15SS0040002<br>1.01 U 15SB0040206 | 1.48 U 15SS0050002<br>0.995 U 15SB0050206 | 1.04 U 15SS0060002<br>1.14 U 15SB0060206-D |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 1,2,4-TRICHLOROBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 1,2-DICHLOROBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 1,3-DICHLOROBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 1,4-DICHLOROBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 1,4-DIOXANE | 113 U 15SS0010002 | 134 U 15SS0020002 | 440 U 15SS0030002 | 107 U 15SS0040002 | 450 U 15SS0050002 | 111 U 15SS0060002<br>118 U 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| 1,4-NAPHTHOQUINONE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 1,4-PHENYLENEDIAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 1-NAPHTHYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 UJ 15SB0060206-D |
| 2,3,4,6-TETRACHLOROPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2,4,5-TRICHLOROPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2,4,6-TRICHLOROPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2,4-DICHLOROPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2,4-DIMETHYLPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2,4-DINITROPHENOL | 75.5 UJ 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2,6-DICHLOROPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2-ACETYLAMINOFLUORENE | 75.5 U 15SS0010002 | 89.6 UJ 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 UJ 15SS0060002<br>79.4 U 15SB0060206-D |
| 2-CHLORONAPHTHALENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2-CHLOROPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2-METHYLNAPHTHALENE | 21 J 15SS0010002<br>3.85 U 15SB0010206 | 94 J 15SS0020002<br>47 15SB0020206 | 100 15SS0030002<br>4.05 U 15SB0030206 | 14.1 U 15SS0040002<br>3.98 U 15SB0040206 | 111 U 15SS0050002<br>3.96 U 15SB0050206 | 170 15SS0060002<br>15 J 15SB0060206-D |
| 2-METHYLPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |

APPEND 3LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| 2-NAPHTHYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2-NITROANILINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2-NITROPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 2-PICOLINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 3&4-METHYLPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 3,3'-DICHLOROBENZIDINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 3,3'-DIMETHYLBENZIDINE | 75.5 U 15SS0010002 | 89.6 UJ 15SS0020002 | 295 UJ 15SS0030002 | 71.7 UJ 15SS0040002 | 301 UJ 15SS0050002 | 74.4 UJ 15SS0060002<br>79.4 UJ 15SB0060206-D |
| 3-METHYLCHOLANTHRENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 3-NITROANILINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 4,6-DINITRO-2-METHYLPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 4-AMINOBIPHENYL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 4-BROMOPHENYL PHENYL ETHER | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 4-CHLORO-3-METHYLPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 4-CHLOROANILINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 4-CHLOROPHENYL PHENYL ETHER | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 4-NITROANILINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| 4-NITROPHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 4-NITROQUINOLINE-1-OXIDE | 75.5 UR 15SS0010002 | 89.6 UR 15SS0020002 | 295 UR 15SS0030002 | 71.7 UR 15SS0040002 | 301 UR 15SS0050002 | 74.4 UR 15SS0060002<br>79.4 UR 15SB0060206-D |
| 5-NITRO-O-TOLUIDINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| A,A-DIMETHYLPHENETHYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| ACENAPHTHENE | 230 15SS0010002<br>3.85 U 15SB0010206 | 9 J 15SS0020002<br>110 15SB0020206 | 410 15SS0030002<br>4.05 U 15SB0030206 | 14.1 U 15SS0040002<br>3.98 U 15SB0040206 | 111 U 15SS0050002<br>3.96 U 15SB0050206 | 27.5 U 15SS0060002<br>5 J 15SB0060206-D |
| ACENAPHTHYLENE | 220 15SS0010002<br>3.85 U 15SB0010206 | 40 J 15SS0020002<br>3.97 U 15SB0020206 | 1200 15SS0030002<br>4.05 U 15SB0030206 | 14.1 U 15SS0040002<br>3.98 U 15SB0040206 | 150 J 15SS0050002<br>3.96 U 15SB0050206 | 27.5 U 15SS0060002<br>3.91 U 15SB0060206-D |
| ACETOPHENONE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| ANILINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| ANTHRACENE | 750 15SS0010002<br>3.85 U 15SB0010206 | 75 J 15SS0020002<br>120 15SB0020206 | 1200 15SS0030002<br>4.05 J 15SB0030206 | 16 J 15SS0040002<br>5 J 15SB0040206 | 150 J 15SS0050002<br>3.96 U 15SB0050206 | 78 15SS0060002<br>14 J 15SB0060206-D |
| ARAMITE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| BENZO(A)ANTHRACENE | 1200 J 15SS0010002<br>3.85 UJ 15SB0010206 | 770 J 15SS0020002<br>100 J 15SB0020206 | 4600 J 15SS0030002<br>15 J 15SB0030206 | 14.1 UJ 15SS0040002<br>3.98 UJ 15SB0040206 | 460 15SS0050002<br>3.96 UJ 15SB0050206 | 92 J 15SS0060002<br>45 J 15SB0060206-D |
| BENZO(A)PYRENE | 1300 15SS0010002<br>3.85 U 15SB0010206 | 1100 J 15SS0020002<br>57 15SB0020206 | 10000 15SS0030002<br>12 15SB0030206 | 130 15SS0040002<br>3.98 U 15SB0040206 | 730 15SS0050002<br>3.96 U 15SB0050206 | 27.5 U 15SS0060002<br>45 J 15SB0060206-D |
| BENZO(B)FLUORANTHENE | 1500 15SS0010002<br>3.85 U 15SB0010206 | 2100 J 15SS0020002<br>80 15SB0020206 | 12000 15SS0030002<br>11 15SB0030206 | 14.1 U 15SS0040002<br>3.98 U 15SB0040206 | 620 15SS0050002<br>3.96 U 15SB0050206 | 27.5 U 15SS0060002<br>110 J 15SB0060206-D |
| BENZO(G,H,I)PERYLENE | 2700 15SS0010002<br>3.85 U 15SB0010206 | 850 J 15SS0020002<br>19 15SB0020206 | 13000 15SS0030002<br>6 J 15SB0030206 | 1900 15SS0040002<br>3.98 U 15SB0040206 | 4700 15SS0050002<br>3.96 U 15SB0050206 | 27.5 U 15SS0060002<br>44 J 15SB0060206-D |
| BENZO(K)FLUORANTHENE | 750 15SS0010002<br>3.85 U 15SB0010206 | 2200 J 15SS0020002<br>55 15SB0020206 | 6900 15SS0030002<br>16 15SB0030206 | 14.1 U 15SS0040002<br>3.98 U 15SB0040206 | 270 15SS0050002<br>3.96 U 15SB0050206 | 27.5 U 15SS0060002<br>45 J 15SB0060206-D |

APPEND 3LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| BENZYL ALCOHOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| BIS(2-CHLOROETHOXY)METHANE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| BIS(2-CHLOROETHYL)ETHER | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| BIS(2-ETHYLHEXYL)PHTHALATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| BUTYL BENZYL PHTHALATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| CHLOROBENZILATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| CHRYSENE | 1300 J 15SS0010002<br>3.85 U 15SB0010206 | 890 J 15SS0020002<br>90 15SB0020206 | 9500 J 15SS0030002<br>15 15SB0030206 | 14.1 UJ 15SS0040002<br>3.98 U 15SB0040206 | 450 15SS0050002<br>3.96 U 15SB0050206 | 92 J 15SS0060002<br>71 J 15SB0060206-D |
| DI-N-BUTYL PHTHALATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| DI-N-OCTYL PHTHALATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| DIALLATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| DIBENZO(A,H)ANTHRACENE | 540 15SS0010002<br>3.85 U 15SB0010206 | 250 J 15SS0020002<br>7 J 15SB0020206 | 3200 15SS0030002<br>4.05 U 15SB0030206 | 14.1 U 15SS0040002<br>3.98 U 15SB0040206 | 111 U 15SS0050002<br>3.96 U 15SB0050206 | 27.5 U 15SS0060002<br>12 J 15SB0060206-D |
| DIBENZOFURAN | 140 J 15SS0010002 | 89.6 U 15SS0020002 | 460 J 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| DIETHYL PHTHALATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| DIMETHYL PHTHALATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| DIPHENYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| ETHYL METHANE SULFONATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| FLUORANTHENE | 3100 15SS0010002<br>3.85 U 15SB0010206 | 640 J 15SS0020002<br>370 15SB0020206 | 6000 15SS0030002<br>48 15SB0030206 | 23 J 15SS0040002<br>3.98 U 15SB0040206 | 330 15SS0050002<br>14 15SB0050206 | 110 15SS0060002<br>90 J 15SB0060206-D |
| FLUORENE | 330 15SS0010002<br>3.85 U 15SB0010206 | 10 J 15SS0020002<br>120 15SB0020206 | 170 15SS0030002<br>4.05 U 15SB0030206 | 14.1 U 15SS0040002<br>3.98 U 15SB0040206 | 111 U 15SS0050002<br>4 J 15SB0050206 | 27.5 U 15SS0060002<br>5 J 15SB0060206-D |
| HEXACHLOROBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 UJ 15SB0060206-D |
| HEXACHLOROBUTADIENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| HEXACHLOROCYCLOPENTADIENE | 75.5 UJ 15SS0010002 | 89.6 UJ 15SS0020002 | 295 UJ 15SS0030002 | 71.7 UJ 15SS0040002 | 301 UJ 15SS0050002 | 74.4 UJ 15SS0060002<br>79.4 UJ 15SB0060206-D |
| HEXACHLOROETHANE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| HEXACHLOROPROPENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| INDENO(1,2,3-CD)PYRENE | 1900 15SS0010002<br>3.85 U 15SB0010206 | 770 J 15SS0020002<br>20 15SB0020206 | 11000 15SS0030002<br>6 J 15SB0030206 | 250 15SS0040002<br>3.98 U 15SB0040206 | 1200 15SS0050002<br>3.96 U 15SB0050206 | 27.5 U 15SS0060002<br>38 J 15SB0060206-D |
| ISODRIN | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| ISOPHORONE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| ISOSAFROLE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| KEPONE | 75.5 UJ 15SS0010002 | 89.6 UR 15SS0020002 | 295 UR 15SS0030002 | 71.7 UR 15SS0040002 | 301 UR 15SS0050002 | 74.4 UR 15SS0060002<br>79.4 UJ 15SB0060206-D |
| METHAPYRILENE | 75.5 UJ 15SS0010002 | 89.6 UJ 15SS0020002 | 295 UJ 15SS0030002 | 71.7 UJ 15SS0040002 | 301 UJ 15SS0050002 | 74.4 UJ 15SS0060002<br>79.4 UJ 15SB0060206-D |
| METHYL METHANE SULFONATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| N-NITROSO-DI-N-BUTYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| N-NITROSO-DI-N-PROPYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 UJ 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| N-NITROSODIETHYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| N-NITROSODIMETHYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 UJ 15SB0060206-D |
| N-NITROSODIPHENYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| N-NITROSOMETHYLETHYLAMINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| N-NITROSOMORPHOLINE | 75.5 UJ 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 UJ 15SB0060206-D |
| N-NITROSOPIPERIDINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 UJ 15SB0060206-D |
| N-NITROSOPYRROLIDINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| NAPHTHALENE | 40 15SS0010002<br>3.85 U 15SB0010206 | 65 J 15SS0020002<br>42 15SB0020206 | 230 15SS0030002<br>4.05 U 15SB0030206 | 14.1 U 15SS0040002<br>3.98 U 15SB0040206 | 111 U 15SS0050002<br>3.96 U 15SB0050206 | 89 15SS0060002<br>13 J 15SB0060206-D |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| O-TOLUIDINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| P-(DIMETHYLAMINO)AZOBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| PENTACHLOROBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| PENTACHLOROETHANE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| PENTACHLORONITROBENZENE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| PHENACETIN | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| PHENANTHRENE | 2800 15SS0010002<br>3.85 U 15SB0010206 | 170 J 15SS0020002<br>510 15SB0020206 | 1300 15SS0030002<br>18 15SB0030206 | 33 15SS0040002<br>3.98 U 15SB0040206 | 120 J 15SS0050002<br>10 15SB0050206 | 520 15SS0060002<br>79 J 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| PHENOL | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| PRONAMIDE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 UJ 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| PYRENE | 3900 J 15SS0010002<br>3.85 U 15SB0010206 | 790 J 15SS0020002<br>390 15SB0020206 | 14000 J 15SS0030002<br>61 15SB0030206 | 97 J 15SS0040002<br>12 15SB0040206 | 1000 15SS0050002<br>12 15SB0050206 | 190 J 15SS0060002<br>110 J 15SB0060206-D |
| PYRIDINE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| SAFROLE | 75.5 U 15SS0010002 | 89.6 U 15SS0020002 | 295 U 15SS0030002 | 71.7 U 15SS0040002 | 301 U 15SS0050002 | 74.4 U 15SS0060002<br>79.4 U 15SB0060206-D |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | | | | | | |
| 4,4'-DDE | | | | | | |
| 4,4'-DDT | | | | | | |
| ALDRIN | | | | | | |
| ALPHA-BHC | | | | | | |
| ALPHA-CHLORDANE | | | | | | |
| AROCLOR-1016 | | | | | | |
| AROCLOR-1221 | | | | | | |
| AROCLOR-1232 | | | | | | |
| AROCLOR-1242 | | | | | | |
| AROCLOR-1248 | | | | | | |
| AROCLOR-1254 | | | | | | |
| AROCLOR-1260 | | | | | | |
| BETA-BHC | | | | | | |
| DELTA-BHC | | | | | | |
| DIELDRIN | | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| ENDOSULFAN I | | | | | | |
| ENDOSULFAN II | | | | | | |
| ENDOSULFAN SULFATE | | | | | | |
| ENDRIN ALDEHYDE | | | | | | |
| ENDRIN KETONE | | | | | | |
| ENDRIN | | | | | | |
| GAMMA-BHC (LINDANE) | | | | | | |
| GAMMA-CHLORDANE | | | | | | |
| HEPTACHLOR EPOXIDE | | | | | | |
| HEPTACHLOR | | | | | | |
| METHOXYCHLOR | | | | | | |
| TOXAPHENE | | | | | | |
| **Herbicides (ug/kg)** | | | | | | |
| 2,4,5-T | 1.52 U 15SS0010002 | 1.8 U 15SS0020002 | 1.48 U 15SS0030002 | 1.45 U 15SS0040002 | 11.4 U 15SS0050002 | 1.5 U 15SS0060002<br>1.6 UJ 15SB0060206-D |
| 2,4,5-TP (SILVEX) | 1.52 U 15SS0010002 | 1.8 U 15SS0020002 | 1.48 U 15SS0030002 | 1.45 U 15SS0040002 | 11.4 U 15SS0050002 | 1.5 U 15SS0060002<br>1.6 UJ 15SB0060206-D |
| 2,4-D | 1.52 U 15SS0010002 | 1.8 U 15SS0020002 | 1.48 U 15SS0030002 | 1.45 U 15SS0040002 | 11.4 U 15SS0050002 | 1.5 U 15SS0060002<br>1.6 UJ 15SB0060206-D |
| DINOSEB | 1.52 U 15SS0010002 | 1.8 U 15SS0020002 | 1.48 U 15SS0030002 | 1.45 U 15SS0040002 | 11.4 U 15SS0050002 | 1.5 U 15SS0060002<br>1.6 UJ 15SB0060206-D |
| HEXACHLOROPHENE | 0.958 U 15SS0010002 | 1.14 U 15SS0020002 | 0.935 U 15SS0030002 | 0.91 U 15SS0040002 | 7.17 U 15SS0050002 | 0.944 U 15SS0060002<br>1.01 UJ 15SB0060206-D |
| PENTACHLOROPHENOL | 0.507 U 15SS0010002 | 0.602 U 15SS0020002 | 0.495 U 15SS0030002 | 0.482 U 15SS0040002 | 3.8 U 15SS0050002 | 0.5 U 15SS0060002<br>0.533 UJ 15SB0060206-D |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | 15600 J 15SS0010002 | 19900 J 15SS0020002 | 6140 J 15SS0030002 | 1890 J 15SS0040002 | 1700 J 15SS0050002 | 8230 J 15SS0060002<br>14300 J 15SB0060206-D |
| ANTIMONY | 0.36 U 15SS0010002 | 1.2 U 15SS0020002 | 0.54 U 15SS0030002 | 0.11 U 15SS0040002 | 0.12 U 15SS0050002 | 2.7 J 15SS0060002<br>0.68 J 15SB0060206-D |
| ARSENIC | 3.7 J 15SS0010002 | 8.4 J 15SS0020002 | 20.6 J 15SS0030002 | 0.79 J 15SS0040002 | 0.98 J 15SS0050002 | 7.8 J 15SS0060002<br>5.6 J 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| BARIUM | 42.8 J 15SS0010002 | 122 J 15SS0020002 | 50.5 J 15SS0030002 | 16 J 15SS0040002 | 16.4 J 15SS0050002 | 72.1 J 15SS0060002<br>194 J 15SB0060206-D |
| BERYLLIUM | 0.38 J 15SS0010002 | 2 J 15SS0020002 | 0.44 J 15SS0030002 | 0.1 U 15SS0040002 | 0.1 U 15SS0050002 | 0.87 J 15SS0060002<br>0.98 J 15SB0060206-D |
| CADMIUM | 0.26 U 15SS0010002 | 6.9 J 15SS0020002 | 0.59 J 15SS0030002 | 0.43 J 15SS0040002 | 0.52 J 15SS0050002 | 1.1 J 15SS0060002<br>0.71 J 15SB0060206-D |
| CALCIUM | 46900 J 15SS0010002 | 37300 J 15SS0020002 | 230000 J 15SS0030002 | 327000 J 15SS0040002 | 381000 J 15SS0050002 | 92100 J 15SS0060002<br>18500 J 15SB0060206-D |
| CHROMIUM | 24.2 J 15SS0010002 | 25 J 15SS0020002 | 13.1 J 15SS0030002 | 7.2 J 15SS0040002 | 6 J 15SS0050002 | 15.8 J 15SS0060002<br>24.3 J 15SB0060206-D |
| COBALT | 1.6 J 15SS0010002 | 6.8 J 15SS0020002 | 2.5 J 15SS0030002 | 0.59 J 15SS0040002 | 0.67 J 15SS0050002 | 4.9 J 15SS0060002<br>9.9 J 15SB0060206-D |
| COPPER | 6.2 J 15SS0010002 | 15.4 J 15SS0020002 | 10 J 15SS0030002 | 1.4 J 15SS0040002 | 1.9 J 15SS0050002 | 20.1 J 15SS0060002<br>13.1 J 15SB0060206-D |
| IRON | 14500 J 15SS0010002 | 43300 J 15SS0020002 | 12500 J 15SS0030002 | 1870 J 15SS0040002 | 2200 J 15SS0050002 | 23200 J 15SS0060002<br>24800 J 15SB0060206-D |
| LEAD | 6.6 J 15SS0010002 | 15 J 15SS0020002 | 27.6 J 15SS0030002 | 1.7 J 15SS0040002 | 4 J 15SS0050002 | 29.8 J 15SS0060002<br>20.7 J 15SB0060206-D |
| MAGNESIUM | 2160 J 15SS0010002 | 2440 J 15SS0020002 | 42700 J 15SS0030002 | 6770 J 15SS0040002 | 12000 J 15SS0050002 | 3390 J 15SS0060002<br>2770 J 15SB0060206-D |
| MANGANESE | 28.6 J 15SS0010002 | 414 J 15SS0020002 | 156 J 15SS0030002 | 69.7 J 15SS0040002 | 69.2 J 15SS0050002 | 215 J 15SS0060002<br>502 J 15SB0060206-D |
| MERCURY | 0.014 J 15SS0010002 | 0.045 J 15SS0020002 | 0.017 J 15SS0030002 | 0.006 U 15SS0040002 | 0.006 U 15SS0050002 | 0.031 J 15SS0060002 |
| NICKEL | 7.2 J 15SS0010002 | 17.6 J 15SS0020002 | 11.6 J 15SS0030002 | 4.2 J 15SS0040002 | 5 J 15SS0050002 | 14.7 J 15SS0060002<br>25.2 J 15SB0060206-D |
| POTASSIUM | 1260 J 15SS0010002 | 1470 J 15SS0020002 | 912 J 15SS0030002 | 583 J 15SS0040002 | 419 J 15SS0050002 | 806 J 15SS0060002<br>2080 J 15SB0060206-D |
| SELENIUM | 0.18 U 15SS0010002 | 0.54 J 15SS0020002 | 0.99 J 15SS0030002 | 0.06 U 15SS0040002 | 0.06 U 15SS0050002 | 0.41 J 15SS0060002<br>0.4 J 15SB0060206-D |
| SILVER | 0.042 U 15SS0010002 | 0.07 U 15SS0020002 | 0.35 U 15SS0030002 | 0.041 U 15SS0040002 | 0.16 U 15SS0050002 | 0.09 U 15SS0060002<br>0.08 U 15SB0060206-D |

APPENDI LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB001<br>12/9/2004 | 15SB002<br>12/8/2004 | 15SB003<br>12/9/2004 | 15SB004<br>12/9/2004 | 15SB005<br>12/8/2004 | 15SB006<br>12/8/2004 |
|---|---|---|---|---|---|---|
| SODIUM | 59.8 U 15SS0010002 | 150 J 15SS0020002 | 269 J 15SS0030002 | 95.2 J 15SS0040002 | 111 J 15SS0050002 | 116 J 15SS0060002<br>105 J 15SB0060206-D |
| THALLIUM | 0.19 U 15SS0010002 | 0.49 U 15SS0020002 | 0.24 U 15SS0030002 | 0.39 U 15SS0040002 | 0.06 U 15SS0050002 | 0.23 U 15SS0060002<br>0.21 U 15SB0060206-D |
| TIN | 0.8 U 15SS0010002 | 0.45 U 15SS0020002 | 0.62 U 15SS0030002 | 0.28 U 15SS0040002 | 0.26 U 15SS0050002 | 2.2 J 15SS0060002<br>0.61 U 15SB0060206-D |
| VANADIUM | 21.7 J 15SS0010002 | 40 J 15SS0020002 | 20.2 J 15SS0030002 | 5.3 J 15SS0040002 | 5.7 J 15SS0050002 | 19.7 J 15SS0060002<br>23.5 J 15SB0060206-D |
| ZINC | 20.6 J 15SS0010002 | 626 15SS0020002 | 51.8 J 15SS0030002 | 22.6 J 15SS0040002 | 33.5 J 15SS0050002 | 111 15SS0060002<br>80.7 J 15SB0060206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,1,1-TRICHLOROETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,1,2,2-TETRACHLOROETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,1,2-TRICHLOROETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,1-DICHLOROETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,1-DICHLOROETHENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,2,3-TRICHLOROPROPANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,2-DIBROMO-3-CHLOROPROPANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,2-DIBROMOETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,2-DICHLOROETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 1,2-DICHLOROPROPANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 2-BUTANONE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>8 J 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>10 J 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>13 J 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 22 15SS0120002<br>1.02 U 15SB0120206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| 2-HEXANONE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 3-CHLOROPROPENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| 4-METHYL-2-PENTANONE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| ACETONE | 11 U 15SS0070002<br>6 BU 15SB0070206 | 0.8 UJ 15SS0080002<br>35 U 15SB0080206<br>11 U 15SB0080610 | 6 U 15SS0090002<br>42 U 15SB0090206<br>7 U 15SB0090610 | 5 U 15SS0100002<br>67 J 15SB0100206<br>14 U 15SB0100610 | 6 U 15SS0110002<br>12 BU 15SB0110206 | 73 J 15SS0120002<br>11 BU 15SB0120206 |
| ACETONITRILE | 41.6 UR 15SS0070002<br>35.6 UR 15SB0070206 | 32 UR 15SS0080002<br>42.3 UR 15SB0080206<br>40 UR 15SB0080610 | 52.5 UR 15SS0090002<br>45.4 UR 15SB0090206<br>37.5 UR 15SB0090610 | 51.5 UR 15SS0100002<br>59.1 UR 15SB0100206<br>39.9 UR 15SB0100610 | 38.8 UR 15SS0110002<br>40.8 UR 15SB0110206 | 42.5 UR 15SS0120002<br>40.6 UR 15SB0120206 |
| ACROLEIN | 1.04 UR 15SS0070002<br>0.891 UR 15SB0070206 | 0.8 UR 15SS0080002<br>1.06 UR 15SB0080206<br>1 UR 15SB0080610 | 1.31 UR 15SS0090002<br>1.13 UR 15SB0090206<br>0.936 UR 15SB0090610 | 1.29 UR 15SS0100002<br>1.48 UR 15SB0100206<br>0.998 UR 15SB0100610 | 0.97 UR 15SS0110002<br>1.02 UR 15SB0110206 | 1.06 UR 15SS0120002<br>1.02 UR 15SB0120206 |
| ACRYLONITRILE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| BENZENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| BROMODICHLOROMETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| BROMOFORM | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| BROMOMETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CARBON DISULFIDE | 1.04 U 15SS0070002<br>1 J 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CHLOROBENZENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CHLORODIBROMOMETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CHLOROETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CHLOROFORM | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CHLOROMETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CHLOROPRENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CIS-1,2-DICHLOROETHENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| CIS-1,3-DICHLOROPROPENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| DIBROMOMETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| DICHLORODIFLUOROMETHANE | 1.04 UJ 15SS0070002<br>0.891 U 15SB0070206 | 0.8 UJ 15SS0080002<br>1.06 U 15SB0080206<br>1 UJ 15SB0080610 | 1.31 U 15SS0090002<br>1.13 UJ 15SB0090206<br>0.936 UJ 15SB0090610 | 1.29 UJ 15SS0100002<br>1.48 U 15SB0100206<br>0.998 UR 15SB0100610 | 0.97 U 15SS0110002<br>1.02 UJ 15SB0110206 | 1.06 UJ 15SS0120002<br>1.02 UJ 15SB0120206 |
| ETHYL METHACRYLATE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| ETHYLBENZENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| ISOBUTANOL | 41.6 UR 15SS0070002<br>35.6 UR 15SB0070206 | 32 UR 15SS0080002<br>42.3 UR 15SB0080206<br>40 UR 15SB0080610 | 52.5 UR 15SS0090002<br>45.4 UR 15SB0090206<br>37.5 UR 15SB0090610 | 51.5 UR 15SS0100002<br>59.1 UR 15SB0100206<br>39.9 UR 15SB0100610 | 38.8 UR 15SS0110002<br>40.8 UR 15SB0110206 | 42.5 UR 15SS0120002<br>40.6 UR 15SB0120206 |
| METHACRYLONITRILE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| METHYL IODIDE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| METHYL METHACRYLATE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| METHYL TERT-BUTYL ETHER | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| METHYLENE CHLORIDE | 4 J 15SS0070002<br>0.891 U 15SB0070206 | 3 J 15SS0080002<br>6 J 15SB0080206<br>5 J 15SB0080610 | 8 J 15SS0090002<br>5 J 15SB0090206<br>4 J 15SB0090610 | 3 J 15SS0100002<br>7 J 15SB0100206<br>10 J 15SB0100610 | 1 J 15SS0110002<br>1.35 J 15SB0110206 | 1.06 UJ 15SS0120002<br>1.02 U 15SB0120206 |
| PROPIONITRILE | 41.6 UR 15SS0070002<br>35.6 UR 15SB0070206 | 32 UR 15SS0080002<br>42.3 UR 15SB0080206<br>40 UR 15SB0080610 | 52.5 UR 15SS0090002<br>45.4 UR 15SB0090206<br>37.5 UR 15SB0090610 | 51.5 UR 15SS0100002<br>59.1 UR 15SB0100206<br>39.9 UR 15SB0100610 | 38.8 UR 15SS0110002<br>40.8 UR 15SB0110206 | 42.5 UR 15SS0120002<br>40.6 UR 15SB0120206 |
| STYRENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| TETRACHLOROETHENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| TOLUENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| TOTAL XYLENES | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 J 15SS0120002<br>1.02 U 15SB0120206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| TRANS-1,2-DICHLOROETHENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| TRANS-1,3-DICHLOROPROPENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| TRANS-1,4-DICHLORO-2-BUTENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| TRICHLOROETHENE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| TRICHLOROFLUOROMETHANE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| VINYL ACETATE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| VINYL CHLORIDE | 1.04 U 15SS0070002<br>0.891 U 15SB0070206 | 0.8 U 15SS0080002<br>1.06 U 15SB0080206<br>1 U 15SB0080610 | 1.31 U 15SS0090002<br>1.13 U 15SB0090206<br>0.936 U 15SB0090610 | 1.29 U 15SS0100002<br>1.48 U 15SB0100206<br>0.998 U 15SB0100610 | 0.97 U 15SS0110002<br>1.02 U 15SB0110206 | 1.06 U 15SS0120002<br>1.02 U 15SB0120206 |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 1,2,4-TRICHLOROBENZENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 1,2-DICHLOROBENZENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 1,3-DICHLOROBENZENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 1,4-DICHLOROBENZENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 1,4-DIOXANE | 125 U 15SS0070002 | 113 U 15SS0080002<br>123 U 15SB0080206<br>121 U 15SB0080610 | 108 U 15SS0090002<br>130 U 15SB0090206<br>120 U 15SB0090610 | 236 U 15SS0100002<br>130 U 15SB0100206<br>122 U 15SB0100610 | 115 U 15SS0110002 | 122 U 15SS0120002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| 1,4-NAPHTHOQUINONE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 1,4-PHENYLENEDIAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 1-NAPHTHYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2,3,4,6-TETRACHLOROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2,4,5-TRICHLOROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2,4,6-TRICHLOROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2,4-DICHLOROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2,4-DIMETHYLPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2,4-DINITROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2,6-DICHLOROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2-ACETYLAMINOFLUORENE | 83.9 U 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 UJ 15SB0080206<br>80.8 UJ 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 UJ 15SB0090206<br>80.4 UJ 15SB0090610 | 158 UJ 15SS0100002<br>86.9 UJ 15SB0100206<br>81.5 UJ 15SB0100610 | 77.4 UJ 15SS0110002 | 81.8 UJ 15SS0120002 |
| 2-CHLORONAPHTHALENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2-CHLOROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2-METHYLNAPHTHALENE | 590 J 15SS0070002<br>27 15SB0070206 | 31 J 15SS0080002<br>4.05 UJ 15SB0080206<br>3.98 UJ 15SB0080610 | 14.2 UJ 15SS0090002<br>4.3 UJ 15SB0090206<br>3.96 UJ 15SB0090610 | 15.6 UJ 15SS0100002<br>4.28 UJ 15SB0100206<br>4.01 UJ 15SB0100610 | 7 J 15SS0110002 | 4.03 UJ 15SS0120002 |
| 2-METHYLPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| 2-NAPHTHYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2-NITROANILINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2-NITROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 2-PICOLINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 3&4-METHYLPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 3,3'-DICHLOROBENZIDINE | 83.9 U 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 UJ 15SS0100002<br>86.9 UR 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 3,3'-DIMETHYLBENZIDINE | 83.9 U 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 UJ 15SB0080206<br>80.8 UJ 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 UJ 15SB0090206<br>80.4 UJ 15SB0090610 | 158 UJ 15SS0100002<br>86.9 UJ 15SB0100206<br>81.5 UJ 15SB0100610 | 77.4 UJ 15SS0110002 | 81.8 UJ 15SS0120002 |
| 3-METHYLCHOLANTHRENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 3-NITROANILINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 4,6-DINITRO-2-METHYLPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 4-AMINOBIPHENYL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 4-BROMOPHENYL PHENYL ETHER | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 4-CHLORO-3-METHYLPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 4-CHLOROANILINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 4-CHLOROPHENYL PHENYL ETHER | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 4-NITROANILINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |

APPENI 3LE G-1
RESULTS FOR CHEMICALS ANAL . IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| 4-NITROPHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 4-NITROQUINOLINE-1-OXIDE | 83.9 UR 15SS0070002 | 75.5 UR 15SS0080002<br>82.3 UR 15SB0080206<br>80.8 UR 15SB0080610 | 72.1 UR 15SS0090002<br>87.4 UR 15SB0090206<br>80.4 UR 15SB0090610 | 158 UR 15SS0100002<br>86.9 UR 15SB0100206<br>81.5 UR 15SB0100610 | 77.4 UR 15SS0110002 | 81.8 UR 15SS0120002 |
| 5-NITRO-O-TOLUIDINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| A,A-DIMETHYLPHENETHYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| ACENAPHTHENE | 4.13 UJ 15SS0070002<br>3.87 U 15SB0070206 | 7.43 UJ 15SS0080002<br>4.05 UJ 15SB0080206<br>3.98 UJ 15SB0080610 | 14.2 UJ 15SS0090002<br>4.3 UJ 15SB0090206<br>3.96 UJ 15SB0090610 | 15.6 UJ 15SS0100002<br>4.28 UJ 15SB0100206<br>4.01 UJ 15SB0100610 | 3.81 UJ 15SS0110002 | 4.03 UJ 15SS0120002 |
| ACENAPHTHYLENE | 4.13 UJ 15SS0070002<br>3.87 U 15SB0070206 | 8 J 15SS0080002<br>4.05 UJ 15SB0080206<br>3.98 UJ 15SB0080610 | 23 J 15SS0090002<br>4.3 UJ 15SB0090206<br>3.96 UJ 15SB0090610 | 15.6 UJ 15SS0100002<br>4.28 UJ 15SB0100206<br>4.01 UJ 15SB0100610 | 4 J 15SS0110002 | 4.03 UJ 15SS0120002 |
| ACETOPHENONE | 160 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>130 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 100 U 15SS0120002 |
| ANILINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| ANTHRACENE | 24 15SS0070002<br>3.87 U 15SB0070206 | 10 J 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 17 J 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 15.6 U 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 3.81 U 15SS0110002 | 4.03 U 15SS0120002 |
| ARAMITE | 83.9 U 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 UJ 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| BENZO(A)ANTHRACENE | 27 15SS0070002<br>3.87 UJ 15SB0070206 | 47 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 20 J 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 15.6 U 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 18 15SS0110002 | 8 J 15SS0120002 |
| BENZO(A)PYRENE | 21 15SS0070002<br>3.87 U 15SB0070206 | 44 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 14.2 U 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 15.6 U 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 23 15SS0110002 | 4.03 U 15SS0120002 |
| BENZO(B)FLUORANTHENE | 4.13 U 15SS0070002<br>3.87 U 15SB0070206 | 60 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 14.2 U 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 15.6 U 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 24 15SS0110002 | 17 15SS0120002 |
| BENZO(G,H,I)PERYLENE | 4.13 U 15SS0070002<br>3.87 U 15SB0070206 | 85 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 14.2 U 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 15.6 U 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 30 15SS0110002 | 4.03 U 15SS0120002 |
| BENZO(K)FLUORANTHENE | 4.13 U 15SS0070002<br>3.87 U 15SB0070206 | 40 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 14.2 U 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 15.6 U 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 16 15SS0110002 | 11 15SS0120002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| BENZYL ALCOHOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| BIS(2-CHLOROETHOXY)METHANE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| BIS(2-CHLOROETHYL)ETHER | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| BIS(2-ETHYLHEXYL)PHTHALATE | 120 J 15SS0070002 | 79 J 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 UJ 15SS0090002<br>110 J 15SB0090206<br>80.4 U 15SB0090610 | 158 UJ 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 250 J 15SS0120002 |
| BUTYL BENZYL PHTHALATE | 83.9 U 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 UJ 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| CHLOROBENZILATE | 83.9 U 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 UJ 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| CHRYSENE | 36 15SS0070002<br>3.87 U 15SB0070206 | 58 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 23 J 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 42 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 21 15SS0110002 | 23 15SS0120002 |
| DI-N-BUTYL PHTHALATE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>100 J 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 91 J 15SS0120002 |
| DI-N-OCTYL PHTHALATE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| DIALLATE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| DIBENZO(A,H)ANTHRACENE | 4.13 U 15SS0070002<br>3.87 U 15SB0070206 | 7.43 U 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 14.2 U 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 15.6 U 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 3.81 U 15SS0110002 | 4.03 U 15SS0120002 |
| DIBENZOFURAN | 95 J 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| DIETHYL PHTHALATE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| DIMETHYL PHTHALATE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| DIPHENYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| ETHYL METHANE SULFONATE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |

APPEND ,LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| FLUORANTHENE | 41 15SS0070002<br>3.87 U 15SB0070206 | 54 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 26 J 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 20 J 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 21 15SS0110002 | 13 15SS0120002 |
| FLUORENE | 4.13 UJ 15SS0070002<br>3.87 U 15SB0070206 | 7.43 UJ 15SS0080002<br>4.05 UJ 15SB0080206<br>3.98 UJ 15SB0080610 | 14.2 UJ 15SS0090002<br>4.3 UJ 15SB0090206<br>3.96 UJ 15SB0090610 | 15.6 UJ 15SS0100002<br>4.28 UJ 15SB0100206<br>4.01 UJ 15SB0100610 | 3.81 UJ 15SS0110002 | 4.03 UJ 15SS0120002 |
| HEXACHLOROBENZENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| HEXACHLOROBUTADIENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| HEXACHLOROCYCLOPENTADIENE | 83.9 UJ 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 UJ 15SB0080206<br>80.8 UJ 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 UJ 15SB0090206<br>80.4 UJ 15SB0090610 | 158 UJ 15SS0100002<br>86.9 UR 15SB0100206<br>81.5 UJ 15SB0100610 | 77.4 UJ 15SS0110002 | 81.8 UJ 15SS0120002 |
| HEXACHLOROETHANE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| HEXACHLOROPROPENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| INDENO(1,2,3-CD)PYRENE | 4.13 U 15SS0070002<br>3.87 U 15SB0070206 | 50 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 14.2 U 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 15.6 U 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 23 15SS0110002 | 4.03 U 15SS0120002 |
| ISODRIN | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| ISOPHORONE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| ISOSAFROLE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>1300 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| KEPONE | 83.9 UJ 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 UJ 15SB0080206<br>80.8 UJ 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 UJ 15SB0090206<br>80.4 UJ 15SB0090610 | 158 UJ 15SS0100002<br>86.9 UJ 15SB0100206<br>81.5 UJ 15SB0100610 | 77.4 UJ 15SS0110002 | 81.8 UJ 15SS0120002 |
| METHAPYRILENE | 83.9 U 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 UJ 15SB0080206<br>80.8 UJ 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 UJ 15SB0090206<br>80.4 UJ 15SB0090610 | 158 UJ 15SS0100002<br>86.9 UJ 15SB0100206<br>81.5 UJ 15SB0100610 | 77.4 UJ 15SS0110002 | 81.8 UJ 15SS0120002 |
| METHYL METHANE SULFONATE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| N-NITROSO-DI-N-BUTYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| N-NITROSO-DI-N-PROPYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| N-NITROSODIETHYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| N-NITROSODIMETHYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| N-NITROSODIPHENYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| N-NITROSOMETHYLETHYLAMINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| N-NITROSOMORPHOLINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| N-NITROSOPIPERIDINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| N-NITROSOPYRROLIDINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| NAPHTHALENE | 280 J 15SS0070002<br>16 15SB0070206 | 13 J 15SS0080002<br>4.05 UJ 15SB0080206<br>3.98 UJ 15SB0080610 | 14.2 UJ 15SS0090002<br>4.3 UJ 15SB0090206<br>3.96 UJ 15SB0090610 | 15.6 UJ 15SS0100002<br>4.28 UJ 15SB0100206<br>4.01 UJ 15SB0100610 | 7 J 15SS0110002 | 4.03 UJ 15SS0120002 |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| O-TOLUIDINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| P-(DIMETHYLAMINO)AZOBENZENE | 83.9 U 15SS0070002 | 75.5 UJ 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 UJ 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 UJ 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| PENTACHLOROBENZENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| PENTACHLOROETHANE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| PENTACHLORONITROBENZENE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| PHENACETIN | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| PHENANTHRENE | 220 15SS0070002<br>11 15SB0070206 | 58 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 30 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 19 J 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 13 15SS0110002 | 4.03 U 15SS0120002 |

APPEND LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| PHENOL | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| PRONAMIDE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| PYRENE | 52 15SS0070002<br>3.87 U 15SB0070206 | 50 15SS0080002<br>4.05 U 15SB0080206<br>3.98 U 15SB0080610 | 29 15SS0090002<br>4.3 U 15SB0090206<br>3.96 U 15SB0090610 | 27 J 15SS0100002<br>4.28 U 15SB0100206<br>4.01 U 15SB0100610 | 24 15SS0110002 | 15 15SS0120002 |
| PYRIDINE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| SAFROLE | 83.9 U 15SS0070002 | 75.5 U 15SS0080002<br>82.3 U 15SB0080206<br>80.8 U 15SB0080610 | 72.1 U 15SS0090002<br>87.4 U 15SB0090206<br>80.4 U 15SB0090610 | 158 U 15SS0100002<br>86.9 U 15SB0100206<br>81.5 U 15SB0100610 | 77.4 U 15SS0110002 | 81.8 U 15SS0120002 |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | | | | | | |
| 4,4'-DDE | | | | | | |
| 4,4'-DDT | | | | | | |
| ALDRIN | | | | | | |
| ALPHA-BHC | | | | | | |
| ALPHA-CHLORDANE | | | | | | |
| AROCLOR-1016 | | | | | 10.4 U 15SS0110002 | 11 U 15SS0120002 |
| AROCLOR-1221 | | | | | 10.4 U 15SS0110002 | 11 U 15SS0120002 |
| AROCLOR-1232 | | | | | 10.4 U 15SS0110002 | 11 U 15SS0120002 |
| AROCLOR-1242 | | | | | 10.4 U 15SS0110002 | 11 U 15SS0120002 |
| AROCLOR-1248 | | | | | 10.4 U 15SS0110002 | 11 U 15SS0120002 |
| AROCLOR-1254 | | | | | 10.4 U 15SS0110002 | 11 U 15SS0120002 |
| AROCLOR-1260 | | | | | 10.4 U 15SS0110002 | 11 U 15SS0120002 |
| BETA-BHC | | | | | | |
| DELTA-BHC | | | | | | |
| DIELDRIN | | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| ENDOSULFAN I | | | | | | |
| ENDOSULFAN II | | | | | | |
| ENDOSULFAN SULFATE | | | | | | |
| ENDRIN ALDEHYDE | | | | | | |
| ENDRIN KETONE | | | | | | |
| ENDRIN | | | | | | |
| GAMMA-BHC (LINDANE) | | | | | | |
| GAMMA-CHLORDANE | | | | | | |
| HEPTACHLOR EPOXIDE | | | | | | |
| HEPTACHLOR | | | | | | |
| METHOXYCHLOR | | | | | | |
| TOXAPHENE | | | | | | |
| **Herbicides (ug/kg)** | | | | | | |
| 2,4,5-T | 1.69 U 15SS0070002 | | | | | |
| 2,4,5-TP (SILVEX) | 1.69 U 15SS0070002 | | | | | |
| 2,4-D | 1.69 U 15SS0070002 | | | | | |
| DINOSEB | 1.69 U 15SS0070002 | | | | | |
| HEXACHLOROPHENE | 1.06 U 15SS0070002 | | | | | |
| PENTACHLOROPHENOL | 0.563 U 15SS0070002 | | | | | |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | 15100 J 15SS0070002 | 13400 J 15SS0080002<br>19200 J 15SB0080206<br>25500 J 15SB0080610 | 2850 J 15SS0090002<br>20700 J 15SB0090206<br>20200 J 15SB0090610 | 3230 J 15SS0100002<br>23600 J 15SB0100206<br>18700 J 15SB0100610 | | |
| ANTIMONY | 1.5 J 15SS0070002 | 0.51 U 15SS0080002<br>0.31 U 15SB0080206<br>0.37 U 15SB0080610 | 0.59 U 15SS0090002<br>0.42 U 15SB0090206<br>0.39 U 15SB0090610 | 1.4 J 15SS0100002<br>0.58 U 15SB0100206<br>0.3 U 15SB0100610 | | |
| ARSENIC | 5.8 J 15SS0070002 | 9.1 J 15SS0080002<br>4.5 J 15SB0080206<br>8.1 J 15SB0080610 | 7.7 J 15SS0090002<br>6.4 J 15SB0090206<br>7.7 J 15SB0090610 | 5.9 J 15SS0100002<br>14.6 J 15SB0100206<br>8.4 J 15SB0100610 | | |

APPEND ,LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| BARIUM | 74.5 J 15SS0070002 | 72.5 J 15SS0080002 | 38.6 J 15SS0090002 | 35.8 J 15SS0100002 | | |
| | | 157 J 15SB0080206 | 141 J 15SB0090206 | 85.8 J 15SB0100206 | | |
| | | 59.4 J 15SB0080610 | 53.7 J 15SB0090610 | 157 J 15SB0100610 | | |
| BERYLLIUM | 1.1 J 15SS0070002 | 0.7 J 15SS0080002 | 0.17 U 15SS0090002 | 0.22 U 15SS0100002 | | |
| | | 0.84 J 15SB0080206 | 1 J 15SB0090206 | 1.1 J 15SB0100206 | | |
| | | 0.69 J 15SB0080610 | 0.64 J 15SB0090610 | 0.9 J 15SB0100610 | | |
| CADMIUM | 2.3 J 15SS0070002 | 0.51 J 15SS0080002 | 0.6 J 15SS0090002 | 0.89 J 15SS0100002 | | |
| | | 0.3 J 15SB0080206 | 0.54 J 15SB0090206 | 0.43 J 15SB0100206 | | |
| | | 0.34 J 15SB0080610 | 0.31 J 15SB0090610 | 0.44 J 15SB0100610 | | |
| CALCIUM | 3460 J 15SS0070002 | 50100 J 15SS0080002 | 345000 J 15SS0090002 | 341000 J 15SS0100002 | | |
| | | 1370 J 15SB0080206 | 1430 J 15SB0090206 | 1320 J 15SB0100206 | | |
| | | 301 U 15SB0080610 | 391 U 15SB0090610 | 726 J 15SB0100610 | | |
| CHROMIUM | 20.8 J 15SS0070002 | 23.7 J 15SS0080002 | 9 J 15SS0090002 | 10.1 J 15SS0100002 | | |
| | | 16.5 J 15SB0080206 | 17 J 15SB0090206 | 19.4 J 15SB0100206 | | |
| | | 27.6 J 15SB0080610 | 26.3 J 15SB0090610 | 23.1 J 15SB0100610 | | |
| COBALT | 7.4 J 15SS0070002 | 7.7 J 15SS0080002 | 1.6 J 15SS0090002 | 2.2 J 15SS0100002 | | |
| | | 13.7 J 15SB0080206 | 16.2 J 15SB0090206 | 54.2 J 15SB0100206 | | |
| | | 11.4 J 15SB0080610 | 5.4 J 15SB0090610 | 8 J 15SB0100610 | | |
| COPPER | 14.4 J 15SS0070002 | 12.4 J 15SS0080002 | 5.4 J 15SS0090002 | 6.1 J 15SS0100002 | | |
| | | 6.1 J 15SB0080206 | 7.7 J 15SB0090206 | 7.4 J 15SB0100206 | | |
| | | 11 J 15SB0080610 | 9.9 J 15SB0090610 | 11.1 J 15SB0100610 | | |
| IRON | 24300 J 15SS0070002 | 27200 J 15SS0080002 | 5010 J 15SS0090002 | 4900 J 15SS0100002 | | |
| | | 16500 J 15SB0080206 | 22500 J 15SB0090206 | 21600 J 15SB0100206 | | |
| | | 28300 J 15SB0080610 | 29400 J 15SB0090610 | 30800 J 15SB0100610 | | |
| LEAD | 15.5 J 15SS0070002 | 155 J 15SS0080002 | 20.3 J 15SS0090002 | 31.1 J 15SS0100002 | | |
| | | 13.5 J 15SB0080206 | 15.4 J 15SB0090206 | 11.7 J 15SB0100206 | | |
| | | 11.1 J 15SB0080610 | 10.3 J 15SB0090610 | 14.5 J 15SB0100610 | | |
| MAGNESIUM | 993 J 15SS0070002 | 2840 J 15SS0080002 | 19600 J 15SS0090002 | 18900 J 15SS0100002 | | |
| | | 1030 J 15SB0080206 | 1190 J 15SB0090206 | 1400 J 15SB0100206 | | |
| | | 1320 J 15SB0080610 | 1650 J 15SB0090610 | 1550 J 15SB0100610 | | |
| MANGANESE | 130 J 15SS0070002 | 321 J 15SS0080002 | 200 J 15SS0090002 | 192 J 15SS0100002 | | |
| | | 1400 J 15SB0080206 | 3570 J 15SB0090206 | 160 J 15SB0100206 | | |
| | | 397 J 15SB0080610 | 201 J 15SB0090610 | 399 J 15SB0100610 | | |
| MERCURY | 0.03 J 15SS0070002 | 0.051 J 15SS0080002 | 0.013 J 15SS0090002 | 0.13 15SS0100002 | | |
| | | 0.042 J 15SB0080206 | 0.049 J 15SB0090206 | 0.055 J 15SB0100206 | | |
| | | 0.025 J 15SB0080610 | 0.008 J 15SB0090610 | 0.008 J 15SB0100610 | | |
| NICKEL | 15.8 J 15SS0070002 | 19 J 15SS0080002 | 9.3 J 15SS0090002 | 10.6 J 15SS0100002 | | |
| | | 17.7 J 15SB0080206 | 20.9 J 15SB0090206 | 25.2 J 15SB0100206 | | |
| | | 13.3 J 15SB0080610 | 12.7 J 15SB0090610 | 12.2 J 15SB0100610 | | |
| POTASSIUM | 975 J 15SS0070002 | 1690 J 15SS0080002 | 783 J 15SS0090002 | 699 J 15SS0100002 | | |
| | | 1200 J 15SB0080206 | 1260 J 15SB0090206 | 1500 J 15SB0100206 | | |
| | | 1360 J 15SB0080610 | 1260 J 15SB0090610 | 1240 J 15SB0100610 | | |
| SELENIUM | 0.55 J 15SS0070002 | 0.41 J 15SS0080002 | 0.57 J 15SS0090002 | 0.28 U 15SS0100002 | | |
| | | 0.4 J 15SB0080206 | 0.51 J 15SB0090206 | 0.79 J 15SB0100206 | | |
| | | 0.39 J 15SB0080610 | 0.28 U 15SB0090610 | 0.34 J 15SB0100610 | | |
| SILVER | 0.06 U 15SS0070002 | 0.06 U 15SS0080002 | 0.05 U 15SS0090002 | 0.09 U 15SS0100002 | | |
| | | 0.06 U 15SB0080206 | 0.07 U 15SB0090206 | 0.08 U 15SB0100206 | | |
| | | 0.05 U 15SB0080610 | 0.06 U 15SB0090610 | 0.07 U 15SB0100610 | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB007<br>12/8/2004 | 15SB008<br>12/8/2004 | 15SB009<br>12/8/2004 | 15SB010<br>12/8/2004 | 15SB011<br>12/8/2004 | 15SB012<br>12/8/2004 |
|---|---|---|---|---|---|---|
| SODIUM | 170 J 15SS0070002 | 132 J 15SS0080002 | 182 J 15SS0090002 | 183 J 15SS0100002 | | |
| | | 112 J 15SB0080206 | 135 J 15SB0090206 | 118 J 15SB0100206 | | |
| | | 110 J 15SB0080610 | 88.6 J 15SB0090610 | 105 J 15SB0100610 | | |
| THALLIUM | 0.39 U 15SS0070002 | 0.17 U 15SS0080002 | 0.09 U 15SS0090002 | 0.08 U 15SS0100002 | | |
| | | 0.3 U 15SB0080206 | 0.32 U 15SB0090206 | 0.33 U 15SB0100206 | | |
| | | 0.3 U 15SB0080610 | 0.24 U 15SB0090610 | 0.23 U 15SB0100610 | | |
| TIN | 0.7 U 15SS0070002 | 0.89 U 15SS0080002 | 0.57 U 15SS0090002 | 1.2 U 15SS0100002 | | |
| | | 0.46 U 15SB0080206 | 0.54 U 15SB0090206 | 0.58 U 15SB0100206 | | |
| | | 0.51 U 15SB0080610 | 0.57 U 15SB0090610 | 0.53 U 15SB0100610 | | |
| VANADIUM | 32.6 J 15SS0070002 | 26.2 J 15SS0080002 | 14.6 J 15SS0090002 | 23.3 J 15SS0100002 | | |
| | | 30.1 J 15SB0080206 | 31.1 J 15SB0090206 | 34.8 J 15SB0100206 | | |
| | | 34.3 J 15SB0080610 | 34.5 J 15SB0090610 | 37.9 J 15SB0100610 | | |
| ZINC | 214 15SS0070002 | 60.6 15SS0080002 | 35.4 J 15SS0090002 | 42.9 J 15SS0100002 | | |
| | | 48.9 15SB0080206 | 46.4 15SB0090206 | 47.6 J 15SB0100206 | | |
| | | 40.7 J 15SB0080610 | 26.8 J 15SB0090610 | 34.4 J 15SB0100610 | | |

APPENDIX G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,1,1-TRICHLOROETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,1,2,2-TETRACHLOROETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,1,2-TRICHLOROETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,1-DICHLOROETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,1-DICHLOROETHENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,2,3-TRICHLOROPROPANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,2-DIBROMO-3-CHLOROPROPANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,2-DIBROMOETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,2-DICHLOROETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 1,2-DICHLOROPROPANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 2-BUTANONE | 8 J 15SS0130002<br>1.2 J 15SB0130206 | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| 2-HEXANONE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 3-CHLOROPROPENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| 4-METHYL-2-PENTANONE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| ACETONE | 22 U 15SS0130002<br>11 BU 15SB0130206 | | | | | |
| ACETONITRILE | 39.7 UR 15SS0130002<br>41 UR 15SB0130206 | | | | | |
| ACROLEIN | 0.992 UR 15SS0130002<br>1.02 UR 15SB0130206 | | | | | |
| ACRYLONITRILE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| BENZENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| BROMODICHLOROMETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| BROMOFORM | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| BROMOMETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CARBON DISULFIDE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |

APPENDIX G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CHLOROBENZENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CHLORODIBROMOMETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CHLOROETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CHLOROFORM | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CHLOROMETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CHLOROPRENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CIS-1,2-DICHLOROETHENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| CIS-1,3-DICHLOROPROPENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| DIBROMOMETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| DICHLORODIFLUOROMETHANE | 0.992 UJ 15SS0130002<br>1.02 UJ 15SB0130206 | | | | | |
| ETHYL METHACRYLATE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| ETHYLBENZENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| ISOBUTANOL | 39.7 UR 15SS0130002<br>41 UR 15SB0130206 | | | | | |
| METHACRYLONITRILE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| METHYL IODIDE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| METHYL METHACRYLATE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| METHYL TERT-BUTYL ETHER | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| METHYLENE CHLORIDE | 0.992 UJ 15SS0130002<br>2 J 15SB0130206 | | | | | |
| PROPIONITRILE | 39.7 UR 15SS0130002<br>41 UR 15SB0130206 | | | | | |
| STYRENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| TETRACHLOROETHENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| TOLUENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| TOTAL XYLENES | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| TRANS-1,2-DICHLOROETHENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| TRANS-1,3-DICHLOROPROPENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| TRANS-1,4-DICHLORO-2-BUTENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| TRICHLOROETHENE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| TRICHLOROFLUOROMETHANE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| VINYL ACETATE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| VINYL CHLORIDE | 0.992 U 15SS0130002<br>1.02 U 15SB0130206 | | | | | |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 79.1 U 15SS0130002 | | | | | |
| 1,2,4-TRICHLOROBENZENE | 79.1 U 15SS0130002 | | | | | |
| 1,2-DICHLOROBENZENE | 79.1 U 15SS0130002 | | | | | |
| 1,3-DICHLOROBENZENE | 79.1 U 15SS0130002 | | | | | |
| 1,4-DICHLOROBENZENE | 79.1 U 15SS0130002 | | | | | |
| 1,4-DIOXANE | 118 U 15SS0130002 | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| 1,4-NAPHTHOQUINONE | 79.1 U 15SS0130002 | | | | | |
| 1,4-PHENYLENEDIAMINE | 79.1 U 15SS0130002 | | | | | |
| 1-NAPHTHYLAMINE | 79.1 U 15SS0130002 | | | | | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 79.1 U 15SS0130002 | | | | | |
| 2,3,4,6-TETRACHLOROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2,4,5-TRICHLOROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2,4,6-TRICHLOROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2,4-DICHLOROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2,4-DIMETHYLPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2,4-DINITROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2,6-DICHLOROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2-ACETYLAMINOFLUORENE | 79.1 UJ 15SS0130002 | | | | | |
| 2-CHLORONAPHTHALENE | 79.1 U 15SS0130002 | | | | | |
| 2-CHLOROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2-METHYLNAPHTHALENE | 3.9 UJ 15SS0130002 | | | | | |
| 2-METHYLPHENOL | 79.1 U 15SS0130002 | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| 2-NAPHTHYLAMINE | 79.1 U 15SS0130002 | | | | | |
| 2-NITROANILINE | 79.1 U 15SS0130002 | | | | | |
| 2-NITROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 2-PICOLINE | 79.1 U 15SS0130002 | | | | | |
| 3&4-METHYLPHENOL | 79.1 U 15SS0130002 | | | | | |
| 3,3'-DICHLOROBENZIDINE | 79.1 U 15SS0130002 | | | | | |
| 3,3'-DIMETHYLBENZIDINE | 79.1 UJ 15SS0130002 | | | | | |
| 3-METHYLCHOLANTHRENE | 79.1 U 15SS0130002 | | | | | |
| 3-NITROANILINE | 79.1 U 15SS0130002 | | | | | |
| 4,6-DINITRO-2-METHYLPHENOL | 79.1 U 15SS0130002 | | | | | |
| 4-AMINOBIPHENYL | 79.1 U 15SS0130002 | | | | | |
| 4-BROMOPHENYL PHENYL ETHER | 79.1 U 15SS0130002 | | | | | |
| 4-CHLORO-3-METHYLPHENOL | 79.1 U 15SS0130002 | | | | | |
| 4-CHLOROANILINE | 79.1 U 15SS0130002 | | | | | |
| 4-CHLOROPHENYL PHENYL ETHER | 79.1 U 15SS0130002 | | | | | |
| 4-NITROANILINE | 79.1 U 15SS0130002 | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| 4-NITROPHENOL | 79.1 U 15SS0130002 | | | | | |
| 4-NITROQUINOLINE-1-OXIDE | 79.1 UR 15SS0130002 | | | | | |
| 5-NITRO-O-TOLUIDINE | 79.1 U 15SS0130002 | | | | | |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 79.1 U 15SS0130002 | | | | | |
| A,A-DIMETHYLPHENETHYLAMINE | 79.1 U 15SS0130002 | | | | | |
| ACENAPHTHENE | 3.9 UJ 15SS0130002 | | | | | |
| ACENAPHTHYLENE | 3.9 UJ 15SS0130002 | | | | | |
| ACETOPHENONE | 79.1 U 15SS0130002 | | | | | |
| ANILINE | 79.1 U 15SS0130002 | | | | | |
| ANTHRACENE | 3.9 U 15SS0130002 | | | | | |
| ARAMITE | 79.1 U 15SS0130002 | | | | | |
| BENZO(A)ANTHRACENE | 3.9 U 15SS0130002 | | | | | |
| BENZO(A)PYRENE | 3.9 U 15SS0130002 | | | | | |
| BENZO(B)FLUORANTHENE | 3.9 U 15SS0130002 | | | | | |
| BENZO(G,H,I)PERYLENE | 3.9 U 15SS0130002 | | | | | |
| BENZO(K)FLUORANTHENE | 3.9 U 15SS0130002 | | | | | |

APPENDI[illegible]E G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| BENZYL ALCOHOL | 79.1 U 15SS0130002 | | | | | |
| BIS(2-CHLOROETHOXY)METHANE | 79.1 U 15SS0130002 | | | | | |
| BIS(2-CHLOROETHYL)ETHER | 79.1 U 15SS0130002 | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 79.1 U 15SS0130002 | | | | | |
| BUTYL BENZYL PHTHALATE | 79.1 U 15SS0130002 | | | | | |
| CHLOROBENZILATE | 79.1 U 15SS0130002 | | | | | |
| CHRYSENE | 3.9 U 15SS0130002 | | | | | |
| DI-N-BUTYL PHTHALATE | 79.1 U 15SS0130002 | | | | | |
| DI-N-OCTYL PHTHALATE | 79.1 U 15SS0130002 | | | | | |
| DIALLATE | 79.1 U 15SS0130002 | | | | | |
| DIBENZO(A,H)ANTHRACENE | 3.9 U 15SS0130002 | | | | | |
| DIBENZOFURAN | 79.1 U 15SS0130002 | | | | | |
| DIETHYL PHTHALATE | 79.1 U 15SS0130002 | | | | | |
| DIMETHYL PHTHALATE | 79.1 U 15SS0130002 | | | | | |
| DIPHENYLAMINE | 79.1 U 15SS0130002 | | | | | |
| ETHYL METHANE SULFONATE | 79.1 U 15SS0130002 | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| FLUORANTHENE | 3.9 U 15SS0130002 | | | | | |
| FLUORENE | 3.9 UJ 15SS0130002 | | | | | |
| HEXACHLOROBENZENE | 79.1 U 15SS0130002 | | | | | |
| HEXACHLOROBUTADIENE | 79.1 U 15SS0130002 | | | | | |
| HEXACHLOROCYCLOPENTADIENE | 79.1 UJ 15SS0130002 | | | | | |
| HEXACHLOROETHANE | 79.1 U 15SS0130002 | | | | | |
| HEXACHLOROPROPENE | 79.1 U 15SS0130002 | | | | | |
| INDENO(1,2,3-CD)PYRENE | 3.9 U 15SS0130002 | | | | | |
| ISODRIN | 79.1 U 15SS0130002 | | | | | |
| ISOPHORONE | 79.1 U 15SS0130002 | | | | | |
| ISOSAFROLE | 79.1 U 15SS0130002 | | | | | |
| KEPONE | 79.1 UJ 15SS0130002 | | | | | |
| METHAPYRILENE | 79.1 UJ 15SS0130002 | | | | | |
| METHYL METHANE SULFONATE | 79.1 U 15SS0130002 | | | | | |
| N-NITROSO-DI-N-BUTYLAMINE | 79.1 U 15SS0130002 | | | | | |
| N-NITROSO-DI-N-PROPYLAMINE | 79.1 U 15SS0130002 | | | | | |

APPEND. LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| N-NITROSODIETHYLAMINE | 79.1 U 15SS0130002 | | | | | |
| N-NITROSODIMETHYLAMINE | 79.1 U 15SS0130002 | | | | | |
| N-NITROSODIPHENYLAMINE | 79.1 U 15SS0130002 | | | | | |
| N-NITROSOMETHYLETHYLAMINE | 79.1 U 15SS0130002 | | | | | |
| N-NITROSOMORPHOLINE | 79.1 U 15SS0130002 | | | | | |
| N-NITROSOPIPERIDINE | 79.1 U 15SS0130002 | | | | | |
| N-NITROSOPYRROLIDINE | 79.1 U 15SS0130002 | | | | | |
| NAPHTHALENE | 3.9 UJ 15SS0130002 | | | | | |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 79.1 U 15SS0130002 | | | | | |
| O-TOLUIDINE | 79.1 U 15SS0130002 | | | | | |
| P-(DIMETHYLAMINO)AZOBENZENE | 79.1 U 15SS0130002 | | | | | |
| PENTACHLOROBENZENE | 79.1 U 15SS0130002 | | | | | |
| PENTACHLOROETHANE | 79.1 U 15SS0130002 | | | | | |
| PENTACHLORONITROBENZENE | 79.1 U 15SS0130002 | | | | | |
| PHENACETIN | 79.1 U 15SS0130002 | | | | | |
| PHENANTHRENE | 3.9 U 15SS0130002 | | | | | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| PHENOL | 79.1 U 15SS0130002 | | | | | |
| PRONAMIDE | 79.1 U 15SS0130002 | | | | | |
| PYRENE | 3.9 U 15SS0130002 | | | | | |
| PYRIDINE | 79.1 U 15SS0130002 | | | | | |
| SAFROLE | 79.1 U 15SS0130002 | | | | | |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| 4,4'-DDE | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| 4,4'-DDT | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| ALDRIN | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| ALPHA-BHC | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| ALPHA-CHLORDANE | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| AROCLOR-1016 | 10.6 U 15SS0130002 | | | | | |
| AROCLOR-1221 | 10.6 U 15SS0130002 | | | | | |
| AROCLOR-1232 | 10.6 U 15SS0130002 | | | | | |
| AROCLOR-1242 | 10.6 U 15SS0130002 | | | | | |
| AROCLOR-1248 | 10.6 U 15SS0130002 | | | | | |
| AROCLOR-1254 | 10.6 U 15SS0130002 | | | | | |
| AROCLOR-1260 | 10.6 U 15SS0130002 | | | | | |
| BETA-BHC | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| DELTA-BHC | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| DIELDRIN | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |

APPENDI LE G-1
RESULTS FOR CHEMICALS ANALYZ IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| ENDOSULFAN I | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| ENDOSULFAN II | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| ENDOSULFAN SULFATE | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| ENDRIN ALDEHYDE | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| ENDRIN KETONE | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| ENDRIN | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| GAMMA-BHC (LINDANE) | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| GAMMA-CHLORDANE | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| HEPTACHLOR EPOXIDE | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| HEPTACHLOR | | 0.778 U 15SS0140002<br>0.734 U 15SB0140206-D | 0.77 U 15SS0150002 | 0.772 U 15SS0160002 | 0.773 U 15SS0170002 | 0.787 U 15SS0180002 |
| METHOXYCHLOR | | 7.78 U 15SS0140002<br>7.34 U 15SB0140206-D | 7.7 U 15SS0150002 | 7.72 U 15SS0160002 | 7.73 U 15SS0170002 | 7.87 U 15SS0180002 |
| TOXAPHENE | | 20.4 U 15SS0140002<br>19.2 U 15SB0140206-D | 20.1 U 15SS0150002 | 20.2 U 15SS0160002 | 20.2 U 15SS0170002 | 20.6 U 15SS0180002 |
| **Herbicides (ug/kg)** | | | | | | |
| 2,4,5-T | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| 2,4,5-TP (SILVEX) | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| 2,4-D | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| DINOSEB | | 1.62 U 15SS0140002<br>1.53 U 15SB0140206-D | 1.6 U 15SS0150002 | 1.6 U 15SS0160002 | 1.61 U 15SS0170002 | 1.63 U 15SS0180002 |
| HEXACHLOROPHENE | | 1.02 U 15SS0140002<br>0.96 U 15SB0140206-D | 1.01 U 15SS0150002 | 1.01 U 15SS0160002 | 1.01 U 15SS0170002 | 1.03 U 15SS0180002 |
| PENTACHLOROPHENOL | | 0.539 U 15SS0140002<br>0.508 U 15SB0140206-D | 0.533 U 15SS0150002 | 0.534 U 15SS0160002 | 0.535 U 15SS0170002 | 0.545 U 15SS0180002 |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | | 27800 J 15SS0140002<br>11000 J 15SB0140206-D | 26300 J 15SS0150002 | 22100 J 15SS0160002 | 22900 J 15SS0170002 | 24500 J 15SS0180002 |
| ANTIMONY | | 0.32 U 15SS0140002<br>0.86 J 15SB0140206-D | 0.36 U 15SS0150002 | 0.28 U 15SS0160002 | 0.3 U 15SS0170002 | 0.3 U 15SS0180002 |
| ARSENIC | | 8.3 J 15SS0140002<br>15.2 J 15SB0140206-D | 9.2 J 15SS0150002 | 7.8 J 15SS0160002 | 8.3 J 15SS0170002 | 8.6 J 15SS0180002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| BARIUM | | 254 J 15SS0140002<br>75.8 J 15SB0140206-D | 157 J 15SS0150002 | 84.7 J 15SS0160002 | 75.3 J 15SS0170002 | 94.3 J 15SS0180002 |
| BERYLLIUM | | 1.1 J 15SS0140002<br>1.4 J 15SB0140206-D | 0.76 J 15SS0150002 | 0.79 J 15SS0160002 | 0.86 J 15SS0170002 | 0.93 J 15SS0180002 |
| CADMIUM | | 0.16 U 15SS0140002<br>0.38 J 15SB0140206-D | 0.25 U 15SS0150002 | 0.21 U 15SS0160002 | 0.26 U 15SS0170002 | 0.34 U 15SS0180002 |
| CALCIUM | | 2980 J 15SS0140002<br>2860 J 15SB0140206-D | 3760 J 15SS0150002 | 1900 J 15SS0160002 | 8310 J 15SS0170002 | 119000 J 15SS0180002 |
| CHROMIUM | | 36.8 J 15SS0140002<br>36.8 J 15SB0140206-D | 30.2 J 15SS0150002 | 23.7 J 15SS0160002 | 28.6 J 15SS0170002 | 34 J 15SS0180002 |
| COBALT | | 3.4 J 15SS0140002<br>16 J 15SB0140206-D | 4.6 J 15SS0150002 | 10.5 J 15SS0160002 | 6.1 J 15SS0170002 | 4.8 J 15SS0180002 |
| COPPER | | 13.3 J 15SS0140002<br>11.3 J 15SB0140206-D | 12.9 J 15SS0150002 | 9.9 J 15SS0160002 | 13 J 15SS0170002 | 12.8 J 15SS0180002 |
| IRON | | 28000 J 15SS0140002<br>88500 J 15SB0140206-D | 27600 J 15SS0150002 | 23300 J 15SS0160002 | 32400 J 15SS0170002 | 37000 J 15SS0180002 |
| LEAD | | 13.5 J 15SS0140002<br>16.8 J 15SB0140206-D | 14.7 J 15SS0150002 | 14 J 15SS0160002 | 15.3 J 15SS0170002 | 16.6 J 15SS0180002 |
| MAGNESIUM | | 2530 J 15SS0140002<br>1240 J 15SB0140206-D | 2930 J 15SS0150002 | 1880 J 15SS0160002 | 3770 J 15SS0170002 | 2600 J 15SS0180002 |
| MANGANESE | | 50.1 J 15SS0140002<br>1210 J 15SB0140206-D | 168 J 15SS0150002 | 378 J 15SS0160002 | 233 J 15SS0170002 | 161 J 15SS0180002 |
| MERCURY | | 0.007 U 15SS0140002 | 0.025 J 15SS0150002 | 0.013 J 15SS0160002 | 0.02 J 15SS0170002 | 0.007 U 15SS0180002 |
| NICKEL | | 13.4 J 15SS0140002<br>31.2 J 15SB0140206-D | 13.5 J 15SS0150002 | 15.4 J 15SS0160002 | 16.6 J 15SS0170002 | 15.1 J 15SS0180002 |
| POTASSIUM | | 2190 J 15SS0140002<br>1250 J 15SB0140206-D | 2330 J 15SS0150002 | 2100 J 15SS0160002 | 1920 J 15SS0170002 | 2380 J 15SS0180002 |
| SELENIUM | | 0.32 U 15SS0140002<br>0.37 J 15SB0140206-D | 0.39 U 15SS0150002 | 0.25 U 15SS0160002 | 0.42 U 15SS0170002 | 0.5 U 15SS0180002 |
| SILVER | | 0.043 U 15SS0140002<br>0.043 U 15SB0140206-D | 0.049 U 15SS0150002 | 0.045 U 15SS0160002 | 0.05 U 15SS0170002 | 0.045 U 15SS0180002 |

APPEND. ɜLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB013<br>12/8/2004 | 15SB014<br>12/11/2004 | 15SB015<br>12/11/2004 | 15SB016<br>12/11/2004 | 15SB017<br>12/11/2004 | 15SB018<br>12/11/2004 |
|---|---|---|---|---|---|---|
| SODIUM | | 167 J 15SS0140002<br>74 J 15SB0140206-D | 308 J 15SS0150002 | 129 J 15SS0160002 | 185 J 15SS0170002 | 287 J 15SS0180002 |
| THALLIUM | | 0.32 U 15SS0140002<br>0.13 U 15SB0140206-D | 0.36 U 15SS0150002 | 0.3 U 15SS0160002 | 0.32 U 15SS0170002 | 0.32 U 15SS0180002 |
| TIN | | 0.52 J 15SS0140002<br>0.5 U 15SB0140206-D | 0.39 J 15SS0150002 | 0.34 J 15SS0160002 | 0.39 J 15SS0170002 | 0.52 J 15SS0180002 |
| VANADIUM | | 40.6 J 15SS0140002<br>33.2 J 15SB0140206-D | 43.8 J 15SS0150002 | 34.8 J 15SS0160002 | 36.7 J 15SS0170002 | 38.6 J 15SS0180002 |
| ZINC | | 24.8 J 15SS0140002<br>57.7 J 15SB0140206-D | 38.8 J 15SS0150002 | 34.5 J 15SS0160002 | 45.1 J 15SS0170002 | 34.6 J 15SS0180002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,1,1-TRICHLOROETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,1,2,2-TETRACHLOROETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,1,2-TRICHLOROETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,1-DICHLOROETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,1-DICHLOROETHENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,2,3-TRICHLOROPROPANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,2-DIBROMO-3-CHLOROPROPANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,2-DIBROMOETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,2-DICHLOROETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 1,2-DICHLOROPROPANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 2-BUTANONE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 4 J 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 6 J 15SS0220002<br>0.876 U 15SB0220206 | 4 J 15SS0230002<br>1 J 15SB0230206-D | |

APPENDIX LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| 2-HEXANONE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 3-CHLOROPROPENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| 4-METHYL-2-PENTANONE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| ACETONE | 26 J 15SS0190002<br>7 J 15SB0190206 | 38 J 15SS0200002<br>7 J 15SB0200206 | 7 U 15SS0210002<br>3 J 15SB0210206 | 30 J 15SS0220002<br>15 J 15SB0220206 | 25 J 15SS0230002<br>10 J 15SB0230206-D | |
| ACETONITRILE | 39.3 UR 15SS0190002<br>37.6 UR 15SB0190206 | 42.2 UR 15SS0200002<br>40.7 UR 15SB0200206 | 37.6 UR 15SS0210002<br>42 UR 15SB0210206 | 39 UR 15SS0220002<br>35 UR 15SB0220206 | 36.2 UR 15SS0230002<br>38 UR 15SB0230206-D | |
| ACROLEIN | 0.982 UR 15SS0190002<br>0.939 UR 15SB0190206 | 1.06 UR 15SS0200002<br>1.02 UR 15SB0200206 | 0.939 UR 15SS0210002<br>1.05 UR 15SB0210206 | 0.975 UR 15SS0220002<br>0.876 UR 15SB0220206 | 0.905 UR 15SS0230002<br>0.949 UR 15SB0230206-D | |
| ACRYLONITRILE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| BENZENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| BROMODICHLOROMETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| BROMOFORM | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| BROMOMETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CARBON DISULFIDE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CHLOROBENZENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CHLORODIBROMOMETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CHLOROETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CHLOROFORM | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CHLOROMETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CHLOROPRENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CIS-1,2-DICHLOROETHENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 5 15SS0220002<br>2 J 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| CIS-1,3-DICHLOROPROPENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| DIBROMOMETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| DICHLORODIFLUOROMETHANE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| ETHYL METHACRYLATE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |

APPENDI. _E G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| ETHYLBENZENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| ISOBUTANOL | 39.3 UR 15SS0190002<br>37.6 UR 15SB0190206 | 42.2 UR 15SS0200002<br>40.7 UR 15SB0200206 | 37.6 UR 15SS0210002<br>42 UR 15SB0210206 | 39 UR 15SS0220002<br>35 UR 15SB0220206 | 36.2 UR 15SS0230002<br>38 UR 15SB0230206-D | |
| METHACRYLONITRILE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| METHYL IODIDE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| METHYL METHACRYLATE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| METHYL TERT-BUTYL ETHER | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| METHYLENE CHLORIDE | 60 J 15SS0190002<br>24 J 15SB0190206 | 10 U 15SS0200002<br>18 J 15SB0200206 | 8 U 15SS0210002<br>1.05 UJ 15SB0210206 | 5 U 15SS0220002<br>3 J 15SB0220206 | 7 U 15SS0230002<br>0.949 UJ 15SB0230206-D | |
| PROPIONITRILE | 39.3 UR 15SS0190002<br>37.6 UR 15SB0190206 | 42.2 UR 15SS0200002<br>40.7 UR 15SB0200206 | 37.6 UR 15SS0210002<br>42 UR 15SB0210206 | 39 UR 15SS0220002<br>35 UR 15SB0220206 | 36.2 UR 15SS0230002<br>38 UR 15SB0230206-D | |
| STYRENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| TETRACHLOROETHENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| TOLUENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| TOTAL XYLENES | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| TRANS-1,2-DICHLOROETHENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| TRANS-1,3-DICHLOROPROPENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| TRANS-1,4-DICHLORO-2-BUTENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| TRICHLOROETHENE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| TRICHLOROFLUOROMETHANE | 2 J 15SS0190002<br>2 J 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| VINYL ACETATE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| VINYL CHLORIDE | 0.982 U 15SS0190002<br>0.939 U 15SB0190206 | 1.06 U 15SS0200002<br>1.02 U 15SB0200206 | 0.939 U 15SS0210002<br>1.05 U 15SB0210206 | 0.975 U 15SS0220002<br>0.876 U 15SB0220206 | 0.905 U 15SS0230002<br>0.949 U 15SB0230206-D | |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 1,2,4-TRICHLOROBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 1,2-DICHLOROBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 1,3-DICHLOROBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 1,4-DICHLOROBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 1,4-DIOXANE | 123 U 15SS0190002 | 121 U 15SS0200002 | 115 U 15SS0210002 | 119 U 15SS0220002 | 113 U 15SS0230002<br>122 U 15SB0230206-D | 121 U 15SS0240002 |

APPEND JLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| 1,4-NAPHTHOQUINONE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 1,4-PHENYLENEDIAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 1-NAPHTHYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 U 15SS0240002 |
| 2,3,4,6-TETRACHLOROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2,4,5-TRICHLOROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2,4,6-TRICHLOROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2,4-DICHLOROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2,4-DIMETHYLPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2,4-DINITROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2,6-DICHLOROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2-ACETYLAMINOFLUORENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2-CHLORONAPHTHALENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2-CHLOROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2-METHYLNAPHTHALENE | 34 15SS0190002 | 4 U 15SS0200002 | 3.78 U 15SS0210002 | 5 J 15SS0220002<br>5 J 15SB0220206 | 17 J 15SS0230002<br>4.01 U 15SB0230206-D | 3.98 U 15SS0240002 |
| 2-METHYLPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| 2-NAPHTHYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2-NITROANILINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2-NITROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 2-PICOLINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 3&4-METHYLPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 3,3'-DICHLOROBENZIDINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 3,3'-DIMETHYLBENZIDINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 U 15SS0240002 |
| 3-METHYLCHOLANTHRENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 3-NITROANILINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 4,6-DINITRO-2-METHYLPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 4-AMINOBIPHENYL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 4-BROMOPHENYL PHENYL ETHER | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 4-CHLORO-3-METHYLPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 4-CHLOROANILINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 4-CHLOROPHENYL PHENYL ETHER | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 4-NITROANILINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |

APPEND LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| 4-NITROPHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 4-NITROQUINOLINE-1-OXIDE | 82.2 UR 15SS0190002 | 81.3 UR 15SS0200002 | 76.7 UR 15SS0210002 | 79.7 UR 15SS0220002 | 75.8 UR 15SS0230002<br>81.5 UR 15SB0230206-D | 80.8 UR 15SS0240002 |
| 5-NITRO-O-TOLUIDINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| A,A-DIMETHYLPHENETHYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| ACENAPHTHENE | 9 15SS0190002 | 5 J 15SS0200002 | 5 J 15SS0210002 | 20 15SS0220002<br>8 15SB0220206 | 14.9 U 15SS0230002<br>26 15SB0230206-D | 3.98 U 15SS0240002 |
| ACENAPHTHYLENE | 4.05 U 15SS0190002 | 4 U 15SS0200002 | 3.78 U 15SS0210002 | 3.92 U 15SS0220002<br>3.8 U 15SB0220206 | 23 J 15SS0230002<br>4.01 U 15SB0230206-D | 3.98 U 15SS0240002 |
| ACETOPHENONE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| ANILINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| ANTHRACENE | 24 15SS0190002 | 12 15SS0200002 | 5 J 15SS0210002 | 40 15SS0220002<br>8 15SB0220206 | 30 J 15SS0230002<br>25 15SB0230206-D | 3.98 U 15SS0240002 |
| ARAMITE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| BENZO(A)ANTHRACENE | 29 15SS0190002 | 22 15SS0200002 | 7 J 15SS0210002 | 58 15SS0220002<br>12 15SB0220206 | 130 J 15SS0230002<br>78 15SB0230206-D | 3.98 U 15SS0240002 |
| BENZO(A)PYRENE | 24 15SS0190002 | 23 15SS0200002 | 8 15SS0210002 | 55 15SS0220002<br>13 15SB0220206 | 160 15SS0230002<br>130 15SB0230206-D | 3.98 U 15SS0240002 |
| BENZO(B)FLUORANTHENE | 15 15SS0190002 | 22 15SS0200002 | 3.78 U 15SS0210002 | 56 15SS0220002<br>11 15SB0220206 | 140 15SS0230002<br>180 15SB0230206-D | 3.98 U 15SS0240002 |
| BENZO(G,H,I)PERYLENE | 22 15SS0190002 | 34 15SS0200002 | 19 15SS0210002 | 71 15SS0220002<br>14 15SB0220206 | 210 15SS0230002<br>93 15SB0230206-D | 3.98 U 15SS0240002 |
| BENZO(K)FLUORANTHENE | 17 15SS0190002 | 14 15SS0200002 | 3.78 U 15SS0210002 | 27 15SS0220002<br>8 15SB0220206 | 100 15SS0230002<br>68 15SB0230206-D | 3.98 U 15SS0240002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| BENZYL ALCOHOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| BIS(2-CHLOROETHOXY)METHANE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| BIS(2-CHLOROETHYL)ETHER | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| BIS(2-ETHYLHEXYL)PHTHALATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>13000 J 15SB0230206-D | 80.8 U 15SS0240002 |
| BUTYL BENZYL PHTHALATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| CHLOROBENZILATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| CHRYSENE | 33 15SS0190002 | 25 15SS0200002 | 7 J 15SS0210002 | 68 15SS0220002<br>13 15SB0220206 | 170 J 15SS0230002<br>100 15SB0230206-D | 3.98 U 15SS0240002 |
| DI-N-BUTYL PHTHALATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| DI-N-OCTYL PHTHALATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| DIALLATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| DIBENZO(A,H)ANTHRACENE | 4.05 U 15SS0190002 | 4 U 15SS0200002 | 3.78 U 15SS0210002 | 3.92 U 15SS0220002<br>3.8 U 15SB0220206 | 14.9 U 15SS0230002<br>23 15SB0230206-D | 3.98 U 15SS0240002 |
| DIBENZOFURAN | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| DIETHYL PHTHALATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| DIMETHYL PHTHALATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| DIPHENYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| ETHYL METHANE SULFONATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |

APPENDI _E G-1
RESULTS FOR CHEMICALS ANALY_ _ IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| FLUORANTHENE | 41 15SS0190002 | 48 15SS0200002 | 12 15SS0210002 | 130 15SS0220002<br>26 15SB0220206 | 110 15SS0230002<br>180 15SB0230206-D | 4 J 15SS0240002 |
| FLUORENE | 8 J 15SS0190002 | 6 J 15SS0200002 | 3.78 U 15SS0210002 | 19 15SS0220002<br>7 J 15SB0220206 | 21 J 15SS0230002<br>20 15SB0230206-D | 3.98 U 15SS0240002 |
| HEXACHLOROBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 U 15SS0240002 |
| HEXACHLOROBUTADIENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| HEXACHLOROCYCLOPENTADIENE | 82.2 UJ 15SS0190002 | 81.3 UJ 15SS0200002 | 76.7 UJ 15SS0210002 | 79.7 UJ 15SS0220002 | 75.8 UJ 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 UJ 15SS0240002 |
| HEXACHLOROETHANE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| HEXACHLOROPROPENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| INDENO(1,2,3-CD)PYRENE | 14 15SS0190002 | 22 15SS0200002 | 3.78 U 15SS0210002 | 51 15SS0220002<br>8 15SB0220206 | 160 15SS0230002<br>74 15SB0230206-D | 3.98 U 15SS0240002 |
| ISODRIN | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| ISOPHORONE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 U 15SS0240002 |
| ISOSAFROLE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| KEPONE | 82.2 UR 15SS0190002 | 81.3 UR 15SS0200002 | 76.7 UR 15SS0210002 | 79.7 UR 15SS0220002 | 75.8 UR 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 UJ 15SS0240002 |
| METHAPYRILENE | 82.2 UJ 15SS0190002 | 81.3 UJ 15SS0200002 | 76.7 UJ 15SS0210002 | 79.7 UJ 15SS0220002 | 75.8 UJ 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 UJ 15SS0240002 |
| METHYL METHANE SULFONATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| N-NITROSO-DI-N-BUTYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| N-NITROSO-DI-N-PROPYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 U 15SS0240002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| N-NITROSODIETHYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| N-NITROSODIMETHYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 U 15SS0240002 |
| N-NITROSODIPHENYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| N-NITROSOMETHYLETHYLAMINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| N-NITROSOMORPHOLINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 U 15SS0240002 |
| N-NITROSOPIPERIDINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 UJ 15SB0230206-D | 80.8 U 15SS0240002 |
| N-NITROSOPYRROLIDINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| NAPHTHALENE | 15 15SS0190002 | 4 U 15SS0200002 | 4 J 15SS0210002 | 9 15SS0220002<br>15 15SB0220206 | 14.9 U 15SS0230002<br>4.01 U 15SB0230206-D | 3.98 U 15SS0240002 |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| O-TOLUIDINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| P-(DIMETHYLAMINO)AZOBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| PENTACHLOROBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| PENTACHLOROETHANE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| PENTACHLORONITROBENZENE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| PHENACETIN | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| PHENANTHRENE | 170 15SS0190002 | 69 15SS0200002 | 21 15SS0210002 | 190 15SS0220002<br>36 15SB0220206 | 92 15SS0230002<br>13 J 15SB0230206-D | 6 J 15SS0240002 |

APPEND .LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| PHENOL | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| PRONAMIDE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| PYRENE | 68 15SS0190002 | 73 15SS0200002 | 18 15SS0210002 | 190 15SS0220002<br>40 15SB0220206 | 210 J 15SS0230002<br>400 15SB0230206-D | 3.98 U 15SS0240002 |
| PYRIDINE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| SAFROLE | 82.2 U 15SS0190002 | 81.3 U 15SS0200002 | 76.7 U 15SS0210002 | 79.7 U 15SS0220002 | 75.8 U 15SS0230002<br>81.5 U 15SB0230206-D | 80.8 U 15SS0240002 |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 110 15SS0220002 | 38 15SS0230002<br>1.64 U 15SB0230206-D | |
| 4,4'-DDE | 2 J 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| 4,4'-DDT | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| ALDRIN | 0.798 U 15SS0190002 | 0.789 U 15SS0200002 | 0.745 U 15SS0210002 | 0.773 U 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| ALPHA-BHC | 0.798 U 15SS0190002 | 0.789 U 15SS0200002 | 0.745 U 15SS0210002 | 0.773 U 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| ALPHA-CHLORDANE | 0.798 U 15SS0190002 | 69 15SS0200002 | 0.745 U 15SS0210002 | 11 15SS0220002 | 1.6 J 15SS0230002<br>0.791 U 15SB0230206-D | |
| AROCLOR-1016 | 11 U 15SS0190002 | 10.9 U 15SS0200002 | 10.3 U 15SS0210002 | 10.7 U 15SS0220002<br>10.4 U 15SB0220206 | 10.2 U 15SS0230002<br>10.9 U 15SB0230206-D | |
| AROCLOR-1221 | 11 U 15SS0190002 | 10.9 U 15SS0200002 | 10.3 U 15SS0210002 | 10.7 U 15SS0220002<br>10.4 U 15SB0220206 | 10.2 U 15SS0230002<br>10.9 U 15SB0230206-D | |
| AROCLOR-1232 | 11 U 15SS0190002 | 10.9 U 15SS0200002 | 10.3 U 15SS0210002 | 10.7 U 15SS0220002<br>10.4 U 15SB0220206 | 10.2 U 15SS0230002<br>10.9 U 15SB0230206-D | |
| AROCLOR-1242 | 11 U 15SS0190002 | 10.9 U 15SS0200002 | 10.3 U 15SS0210002 | 10.7 U 15SS0220002<br>10.4 U 15SB0220206 | 10.2 U 15SS0230002<br>10.9 U 15SB0230206-D | |
| AROCLOR-1248 | 11 U 15SS0190002 | 10.9 U 15SS0200002 | 10.3 U 15SS0210002 | 10.7 U 15SS0220002<br>10.4 U 15SB0220206 | 10.2 U 15SS0230002<br>10.9 U 15SB0230206-D | |
| AROCLOR-1254 | 11 U 15SS0190002 | 10.9 U 15SS0200002 | 10.3 U 15SS0210002 | 10.7 U 15SS0220002<br>10.4 U 15SB0220206 | 10.2 U 15SS0230002<br>10.9 U 15SB0230206-D | |
| AROCLOR-1260 | 11 U 15SS0190002 | 10.9 U 15SS0200002 | 10.3 U 15SS0210002 | 190 15SS0220002<br>10.4 U 15SB0220206 | 1200 15SS0230002<br>10.9 U 15SB0230206-D | |
| BETA-BHC | 0.798 U 15SS0190002 | 0.789 U 15SS0200002 | 0.745 U 15SS0210002 | 0.773 U 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| DELTA-BHC | 0.798 U 15SS0190002 | 0.789 U 15SS0200002 | 0.745 U 15SS0210002 | 0.773 U 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| DIELDRIN | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| ENDOSULFAN I | 0.798 U 15SS0190002 | 0.789 U 15SS0200002 | 0.745 U 15SS0210002 | 0.773 U 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| ENDOSULFAN II | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| ENDOSULFAN SULFATE | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| ENDRIN ALDEHYDE | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| ENDRIN KETONE | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| ENDRIN | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| GAMMA-BHC (LINDANE) | 0.798 U 15SS0190002 | 0.789 U 15SS0200002 | 0.745 U 15SS0210002 | 0.773 U 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| GAMMA-CHLORDANE | 0.798 U 15SS0190002 | 75 15SS0200002 | 0.745 U 15SS0210002 | 12 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| HEPTACHLOR EPOXIDE | 0.798 U 15SS0190002 | 4.8 15SS0200002 | 0.745 U 15SS0210002 | 0.773 U 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| HEPTACHLOR | 0.798 U 15SS0190002 | 8.5 15SS0200002 | 0.745 U 15SS0210002 | 0.773 U 15SS0220002 | 0.735 U 15SS0230002<br>0.791 U 15SB0230206-D | |
| METHOXYCHLOR | 7.98 U 15SS0190002 | 7.89 U 15SS0200002 | 7.45 U 15SS0210002 | 7.73 U 15SS0220002 | 7.35 U 15SS0230002<br>7.91 U 15SB0230206-D | |
| TOXAPHENE | 20.9 U 15SS0190002 | 20.6 U 15SS0200002 | 19.5 U 15SS0210002 | 20.2 U 15SS0220002 | 19.2 U 15SS0230002<br>20.7 U 15SB0230206-D | |
| **Herbicides (ug/kg)** | | | | | | |
| 2,4,5-T | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| 2,4,5-TP (SILVEX) | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| 2,4-D | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| DINOSEB | 1.66 U 15SS0190002 | 1.64 U 15SS0200002 | 1.55 U 15SS0210002 | 1.61 U 15SS0220002 | 1.53 U 15SS0230002<br>1.64 U 15SB0230206-D | |
| HEXACHLOROPHENE | 1.04 U 15SS0190002 | 1.03 U 15SS0200002 | 0.974 U 15SS0210002 | 1.01 U 15SS0220002 | 0.962 U 15SS0230002<br>1.03 U 15SB0230206-D | |
| PENTACHLOROPHENOL | 0.552 U 15SS0190002 | 0.546 U 15SS0200002 | 0.515 U 15SS0210002 | 0.535 U 15SS0220002 | 0.509 U 15SS0230002<br>0.547 U 15SB0230206-D | |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | 13200 J 15SS0190002 | 29900 J 15SS0200002 | 16100 J 15SS0210002 | 19700 J 15SS0220002 | 20600 J 15SS0230002<br>26800 J 15SB0230206-D | |
| ANTIMONY | 0.44 U 15SS0190002 | 0.25 U 15SS0200002 | 0.15 U 15SS0210002 | 0.32 U 15SS0220002 | 0.46 U 15SS0230002<br>0.63 J 15SB0230206-D | |
| ARSENIC | 5.5 J 15SS0190002 | 7.3 J 15SS0200002 | 5.1 J 15SS0210002 | 8.3 J 15SS0220002 | 13.4 J 15SS0230002<br>9.6 J 15SB0230206-D | |

APPEND ɜLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| BARIUM | 72.5 J 15SS0190002 | 75.3 J 15SS0200002 | 61.4 J 15SS0210002 | 90.4 J 15SS0220002 | 80.6 J 15SS0230002<br>82.3 J 15SB0230206-D | |
| BERYLLIUM | 2.9 15SS0190002 | 0.58 15SS0200002 | 0.51 15SS0210002 | 0.65 15SS0220002 | 0.59 15SS0230002<br>0.71 J 15SB0230206-D | |
| CADMIUM | 0.41 J 15SS0190002 | 0.33 J 15SS0200002 | 0.18 J 15SS0210002 | 0.38 J 15SS0220002 | 0.38 J 15SS0230002<br>0.36 J 15SB0230206-D | |
| CALCIUM | 52100 J 15SS0190002 | 1660 J 15SS0200002 | 1430 J 15SS0210002 | 26800 J 15SS0220002 | 54300 J 15SS0230002<br>2550 J 15SB0230206-D | |
| CHROMIUM | 15.3 J 15SS0190002 | 27.8 J 15SS0200002 | 19.8 J 15SS0210002 | 23.8 J 15SS0220002 | 28.4 J 15SS0230002<br>24.4 J 15SB0230206-D | |
| COBALT | 6.2 J 15SS0190002 | 4.4 J 15SS0200002 | 3.5 J 15SS0210002 | 6.9 J 15SS0220002 | 5.4 J 15SS0230002<br>9.1 J 15SB0230206-D | |
| COPPER | 18.8 J 15SS0190002 | 18.2 J 15SS0200002 | 7.6 J 15SS0210002 | 12.4 J 15SS0220002 | 13.2 J 15SS0230002<br>16.8 J 15SB0230206-D | |
| IRON | 24700 J 15SS0190002 | 27100 J 15SS0200002 | 18200 J 15SS0210002 | 19100 J 15SS0220002 | 23100 J 15SS0230002<br>25100 J 15SB0230206-D | |
| LEAD | 9.2 J 15SS0190002 | 9.8 J 15SS0200002 | 6.6 J 15SS0210002 | 18.1 J 15SS0220002 | 15.8 J 15SS0230002<br>15.2 J 15SB0230206-D | |
| MAGNESIUM | 2800 J 15SS0190002 | 4450 J 15SS0200002 | 1550 J 15SS0210002 | 4660 J 15SS0220002 | 4610 J 15SS0230002<br>3070 J 15SB0230206-D | |
| MANGANESE | 222 15SS0190002 | 118 15SS0200002 | 86.1 15SS0210002 | 246 15SS0220002 | 189 15SS0230002<br>141 J 15SB0230206-D | |
| MERCURY | 0.017 J 15SS0190002 | 0.02 J 15SS0200002 | 0.007 U 15SS0210002 | 0.023 J 15SS0220002 | 0.027 J 15SS0230002 | |
| NICKEL | 16.1 J 15SS0190002 | 15.7 J 15SS0200002 | 9.5 J 15SS0210002 | 14.7 J 15SS0220002 | 14.5 J 15SS0230002<br>17.3 J 15SB0230206-D | |
| POTASSIUM | 1400 J 15SS0190002 | 2280 J 15SS0200002 | 1030 J 15SS0210002 | 1710 J 15SS0220002 | 1840 J 15SS0230002<br>2050 J 15SB0230206-D | |
| SELENIUM | 0.5 J 15SS0190002 | 0.27 J 15SS0200002 | 0.14 J 15SS0210002 | 0.29 J 15SS0220002 | 0.35 J 15SS0230002<br>0.41 J 15SB0230206-D | |
| SILVER | 0.053 U 15SS0190002 | 0.043 U 15SS0200002 | 0.046 U 15SS0210002 | 0.046 U 15SS0220002 | 0.048 U 15SS0230002<br>0.06 U 15SB0230206-D | |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB019<br>12/10/2004 | 15SB020<br>12/10/2004 | 15SB021<br>12/10/2004 | 15SB022<br>12/10/2004 | 15SB023<br>12/10/2004 | 15SB024<br>12/11/2004 |
|---|---|---|---|---|---|---|
| SODIUM | 1250 J 15SS0190002 | 150 J 15SS0200002 | 82.7 J 15SS0210002 | 216 J 15SS0220002 | 128 J 15SS0230002<br>99.8 J 15SB0230206-D | |
| THALLIUM | 0.23 U 15SS0190002 | 0.38 U 15SS0200002 | 0.19 U 15SS0210002 | 0.29 U 15SS0220002 | 0.28 U 15SS0230002<br>0.36 J 15SB0230206-D | |
| TIN | 0.81 U 15SS0190002 | 0.67 U 15SS0200002 | 0.44 U 15SS0210002 | 0.61 U 15SS0220002 | 0.8 U 15SS0230002<br>0.63 U 15SB0230206-D | |
| VANADIUM | 31.4 J 15SS0190002 | 43.7 J 15SS0200002 | 30 J 15SS0210002 | 35.7 J 15SS0220002 | 38.8 J 15SS0230002<br>47.8 J 15SB0230206-D | |
| ZINC | 46.9 J 15SS0190002 | 57.7 J 15SS0200002 | 20.1 J 15SS0210002 | 48.7 J 15SS0220002 | 46.8 J 15SS0230002<br>52.6 J 15SB0230206-D | |

APPEND LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,1,1-TRICHLOROETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,1,2,2-TETRACHLOROETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,1,2-TRICHLOROETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,1-DICHLOROETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,1-DICHLOROETHENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,2,3-TRICHLOROPROPANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,2-DIBROMO-3-CHLOROPROPANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,2-DIBROMOETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,2-DICHLOROETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 1,2-DICHLOROPROPANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 2-BUTANONE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| 2-HEXANONE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 3-CHLOROPROPENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| 4-METHYL-2-PENTANONE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| ACETONE | | | | | 5 U 15SS0290002<br>3 BU 15SB0290206 | 39 U 15SS0300002<br>34 J 15SB0300206 |
| ACETONITRILE | | | | | 32.2 UR 15SS0290002<br>41.5 UR 15SB0290206 | 47.5 UR 15SS0300002<br>47.7 UR 15SB0300206 |
| ACROLEIN | | | | | 0.806 UR 15SS0290002<br>1.04 UR 15SB0290206 | 1.19 UR 15SS0300002<br>1.19 UR 15SB0300206 |
| ACRYLONITRILE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| BENZENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| BROMODICHLOROMETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| BROMOFORM | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| BROMOMETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CARBON DISULFIDE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 UJ 15SS0300002<br>1.19 UJ 15SB0300206 |

APPEND LE G-1
RESULTS FOR CHEMICALS ANALY. IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CHLOROBENZENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CHLORODIBROMOMETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CHLOROETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CHLOROFORM | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CHLOROMETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CHLOROPRENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CIS-1,2-DICHLOROETHENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| CIS-1,3-DICHLOROPROPENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| DIBROMOMETHANE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| DICHLORODIFLUOROMETHANE | | | | | 0.806 U 15SS0290002<br>1.04 UR 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| ETHYL METHACRYLATE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| ETHYLBENZENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| ISOBUTANOL | | | | | 32.2 UR 15SS0290002<br>41.5 UR 15SB0290206 | 47.5 UR 15SS0300002<br>47.7 UR 15SB0300206 |
| METHACRYLONITRILE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| METHYL IODIDE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| METHYL METHACRYLATE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| METHYL TERT-BUTYL ETHER | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| METHYLENE CHLORIDE | | | | | 15 J 15SS0290002<br>15 J 15SB0290206 | 97 J 15SS0300002<br>6 J 15SB0300206 |
| PROPIONITRILE | | | | | 32.2 UR 15SS0290002<br>41.5 UR 15SB0290206 | 47.5 UR 15SS0300002<br>47.7 UR 15SB0300206 |
| STYRENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| TETRACHLOROETHENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| TOLUENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| TOTAL XYLENES | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |

APPENDI. .E G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| TRANS-1,2-DICHLOROETHENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| TRANS-1,3-DICHLOROPROPENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| TRANS-1,4-DICHLORO-2-BUTENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| TRICHLOROETHENE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| TRICHLOROFLUOROMETHANE | | | | | 1 J 15SS0290002<br>1.44 J 15SB0290206 | 3 J 15SS0300002<br>1.19 U 15SB0300206 |
| VINYL ACETATE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 UJ 15SS0300002<br>1.19 UJ 15SB0300206 |
| VINYL CHLORIDE | | | | | 0.806 U 15SS0290002<br>1.04 U 15SB0290206 | 1.19 U 15SS0300002<br>1.19 U 15SB0300206 |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 1,2,4-TRICHLOROBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 1,2-DICHLOROBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 1,3-DICHLOROBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 1,4-DICHLOROBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 1,4-DIOXANE | 119 U 15SS0250002 | 112 U 15SS0260002 | 113 U 15SS0270002 | 110 U 15SS0280002<br>109 U 15SB0280206-D | 115 U 15SS0290002 | 124 U 15SS0300002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| 1,4-NAPHTHOQUINONE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 1,4-PHENYLENEDIAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 1-NAPHTHYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2,3,4,6-TETRACHLOROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2,4,5-TRICHLOROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2,4,6-TRICHLOROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2,4-DICHLOROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2,4-DIMETHYLPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2,4-DINITROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 UJ 15SS0290002 | 82.8 U 15SS0300002 |
| 2,6-DICHLOROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2-ACETYLAMINOFLUORENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2-CHLORONAPHTHALENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2-CHLOROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2-METHYLNAPHTHALENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>4 J 15SB0280206-D | 3.8 U 15SS0290002 | 4.08 U 15SS0300002 |
| 2-METHYLPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |

APPEND. ,LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| 2-NAPHTHYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2-NITROANILINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2-NITROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 2-PICOLINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 3&4-METHYLPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 3,3'-DICHLOROBENZIDINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 3,3'-DIMETHYLBENZIDINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 UJ 15SS0300002 |
| 3-METHYLCHOLANTHRENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 3-NITROANILINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 4,6-DINITRO-2-METHYLPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 4-AMINOBIPHENYL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 4-BROMOPHENYL PHENYL ETHER | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 4-CHLORO-3-METHYLPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 4-CHLOROANILINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 4-CHLOROPHENYL PHENYL ETHER | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 4-NITROANILINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| 4-NITROPHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 4-NITROQUINOLINE-1-OXIDE | 80 UR 15SS0250002 | 75.4 UR 15SS0260002 | 75.5 UR 15SS0270002 | 73.8 UR 15SS0280002<br>72.9 UR 15SB0280206-D | 77.1 UR 15SS0290002 | 82.8 UR 15SS0300002 |
| 5-NITRO-O-TOLUIDINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| A,A-DIMETHYLPHENETHYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| ACENAPHTHENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>11 J 15SB0280206-D | 3.8 U 15SS0290002 | 4.08 U 15SS0300002 |
| ACENAPHTHYLENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>3.59 U 15SB0280206-D | 3.8 U 15SS0290002 | 4.08 U 15SS0300002 |
| ACETOPHENONE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| ANILINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| ANTHRACENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>16 J 15SB0280206-D | 3.8 U 15SS0290002 | 4.08 U 15SS0300002 |
| ARAMITE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| BENZO(A)ANTHRACENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>22 J 15SB0280206-D | 15 15SS0290002 | 4.08 U 15SS0300002 |
| BENZO(A)PYRENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>29 J 15SB0280206-D | 13 J 15SS0290002 | 4.08 U 15SS0300002 |
| BENZO(B)FLUORANTHENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>29 J 15SB0280206-D | 13 J 15SS0290002 | 4.08 U 15SS0300002 |
| BENZO(G,H,I)PERYLENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>39 J 15SB0280206-D | 16 J 15SS0290002 | 4.08 U 15SS0300002 |
| BENZO(K)FLUORANTHENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>14 J 15SB0280206-D | 10 J 15SS0290002 | 4.08 U 15SS0300002 |

APPEND ;LE G-1
RESULTS FOR CHEMICALS ANALY..J IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| BENZYL ALCOHOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| BIS(2-CHLOROETHOXY)METHANE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| BIS(2-CHLOROETHYL)ETHER | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| BIS(2-ETHYLHEXYL)PHTHALATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 93 J 15SS0290002 | 760 15SS0300002 |
| BUTYL BENZYL PHTHALATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| CHLOROBENZILATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| CHRYSENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>29 J 15SB0280206-D | 11 15SS0290002 | 4.08 U 15SS0300002 |
| DI-N-BUTYL PHTHALATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 120 J 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| DI-N-OCTYL PHTHALATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 920 J 15SS0300002 |
| DIALLATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| DIBENZO(A,H)ANTHRACENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>3.59 UJ 15SB0280206-D | 3.8 UJ 15SS0290002 | 4.08 U 15SS0300002 |
| DIBENZOFURAN | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| DIETHYL PHTHALATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| DIMETHYL PHTHALATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| DIPHENYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| ETHYL METHANE SULFONATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| FLUORANTHENE | 5 J 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 10 15SS0280002<br>58 J 15SB0280206-D | 21 15SS0290002 | 4.08 U 15SS0300002 |
| FLUORENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>12 15SB0280206-D | 3.8 U 15SS0290002 | 4.08 U 15SS0300002 |
| HEXACHLOROBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| HEXACHLOROBUTADIENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| HEXACHLOROCYCLOPENTADIENE | 80 UJ 15SS0250002 | 75.4 UJ 15SS0260002 | 75.5 UJ 15SS0270002 | 73.8 UJ 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 UJ 15SS0290002 | 82.8 UJ 15SS0300002 |
| HEXACHLOROETHANE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| HEXACHLOROPROPENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| INDENO(1,2,3-CD)PYRENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>28 J 15SB0280206-D | 11 J 15SS0290002 | 4.08 U 15SS0300002 |
| ISODRIN | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| ISOPHORONE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| ISOSAFROLE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| KEPONE | 80 UJ 15SS0250002 | 75.4 UJ 15SS0260002 | 75.5 UJ 15SS0270002 | 73.8 UJ 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 UJ 15SS0290002 | 82.8 UJ 15SS0300002 |
| METHAPYRILENE | 80 UJ 15SS0250002 | 75.4 UJ 15SS0260002 | 75.5 UJ 15SS0270002 | 73.8 UJ 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 UJ 15SS0290002 | 82.8 UJ 15SS0300002 |
| METHYL METHANE SULFONATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| N-NITROSO-DI-N-BUTYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| N-NITROSO-DI-N-PROPYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |

APPENDIX G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| N-NITROSODIETHYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| N-NITROSODIMETHYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| N-NITROSODIPHENYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| N-NITROSOMETHYLETHYLAMINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| N-NITROSOMORPHOLINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 UJ 15SS0290002 | 82.8 U 15SS0300002 |
| N-NITROSOPIPERIDINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 UJ 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| N-NITROSOPYRROLIDINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| NAPHTHALENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 3.63 U 15SS0280002<br>9 J 15SB0280206-D | 3.8 U 15SS0290002 | 4.08 U 15SS0300002 |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| O-TOLUIDINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| P-(DIMETHYLAMINO)AZOBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| PENTACHLOROBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| PENTACHLOROETHANE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| PENTACHLORONITROBENZENE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| PHENACETIN | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| PHENANTHRENE | 5 J 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 9 15SS0280002<br>88 J 15SB0280206-D | 12 15SS0290002 | 4.08 U 15SS0300002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| PHENOL | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| PRONAMIDE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| PYRENE | 3.94 U 15SS0250002 | 3.71 U 15SS0260002 | 3.72 U 15SS0270002 | 7 J 15SS0280002<br>78 J 15SB0280206-D | 32 15SS0290002 | 4.08 U 15SS0300002 |
| PYRIDINE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| SAFROLE | 80 U 15SS0250002 | 75.4 U 15SS0260002 | 75.5 U 15SS0270002 | 73.8 U 15SS0280002<br>72.9 U 15SB0280206-D | 77.1 U 15SS0290002 | 82.8 U 15SS0300002 |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| 4,4'-DDE | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| 4,4'-DDT | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| ALDRIN | | | | | 0.748 U 15SS0290002 | 0.803 U 15SS0300002 |
| ALPHA-BHC | | | | | 0.748 U 15SS0290002 | 0.803 U 15SS0300002 |
| ALPHA-CHLORDANE | | | | | 3.7 15SS0290002 | 0.803 U 15SS0300002 |
| AROCLOR-1016 | | | | | 10.4 U 15SS0290002 | 11.1 U 15SS0300002 |
| AROCLOR-1221 | | | | | 10.4 U 15SS0290002 | 11.1 U 15SS0300002 |
| AROCLOR-1232 | | | | | 10.4 U 15SS0290002 | 11.1 U 15SS0300002 |
| AROCLOR-1242 | | | | | 10.4 U 15SS0290002 | 11.1 U 15SS0300002 |
| AROCLOR-1248 | | | | | 10.4 U 15SS0290002 | 11.1 U 15SS0300002 |
| AROCLOR-1254 | | | | | 10.4 U 15SS0290002 | 11.1 U 15SS0300002 |
| AROCLOR-1260 | | | | | 10.4 U 15SS0290002 | 11.1 U 15SS0300002 |
| BETA-BHC | | | | | 0.748 U 15SS0290002 | 0.803 U 15SS0300002 |
| DELTA-BHC | | | | | 0.748 U 15SS0290002 | 0.803 U 15SS0300002 |
| DIELDRIN | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |

APPENI 3LE G-1
RESULTS FOR CHEMICALS ANAL ) IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| ENDOSULFAN I | | | | | 0.748 U 15SS0290002 | 0.803 U 15SS0300002 |
| ENDOSULFAN II | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| ENDOSULFAN SULFATE | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| ENDRIN ALDEHYDE | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| ENDRIN KETONE | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| ENDRIN | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| GAMMA-BHC (LINDANE) | | | | | 0.748 U 15SS0290002 | 0.803 U 15SS0300002 |
| GAMMA-CHLORDANE | | | | | 3.6 15SS0290002 | 0.803 U 15SS0300002 |
| HEPTACHLOR EPOXIDE | | | | | 0.748 U 15SS0290002 | 0.803 U 15SS0300002 |
| HEPTACHLOR | | | | | 0.748 U 15SS0290002 | 0.803 U 15SS0300002 |
| METHOXYCHLOR | | | | | 7.48 U 15SS0290002 | 8.03 U 15SS0300002 |
| TOXAPHENE | | | | | 19.6 U 15SS0290002 | 21 U 15SS0300002 |
| **Herbicides (ug/kg)** | | | | | | |
| 2,4,5-T | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| 2,4,5-TP (SILVEX) | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| 2,4-D | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| DINOSEB | | | | | 1.55 U 15SS0290002 | 1.67 U 15SS0300002 |
| HEXACHLOROPHENE | | | | | 0.978 U 15SS0290002 | 1.05 U 15SS0300002 |
| PENTACHLOROPHENOL | | | | | 0.518 U 15SS0290002 | 0.556 U 15SS0300002 |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | | | | | 17500 J 15SS0290002 | 21200 J 15SS0300002 |
| ANTIMONY | | | | | 0.05 U 15SS0290002 | 0.21 U 15SS0300002 |
| ARSENIC | | | | | 6.6 J 15SS0290002 | 13.7 J 15SS0300002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| BARIUM | | | | | 61.5 J 15SS0290002 | 93 J 15SS0300002 |
| BERYLLIUM | | | | | 0.52 15SS0290002 | 0.73 15SS0300002 |
| CADMIUM | | | | | 0.27 J 15SS0290002 | 0.3 J 15SS0300002 |
| CALCIUM | | | | | 21200 J 15SS0290002 | 1190 J 15SS0300002 |
| CHROMIUM | | | | | 20.6 J 15SS0290002 | 39.9 J 15SS0300002 |
| COBALT | | | | | 4.8 J 15SS0290002 | 14 J 15SS0300002 |
| COPPER | | | | | 9.8 J 15SS0290002 | 8.7 J 15SS0300002 |
| IRON | | | | | 18500 J 15SS0290002 | 31800 J 15SS0300002 |
| LEAD | | | | | 13.5 J 15SS0290002 | 20.5 J 15SS0300002 |
| MAGNESIUM | | | | | 2720 J 15SS0290002 | 1770 J 15SS0300002 |
| MANGANESE | | | | | 196 J 15SS0290002 | 406 J 15SS0300002 |
| MERCURY | | | | | 0.013 J 15SS0290002 | 0.043 J 15SS0300002 |
| NICKEL | | | | | 12.3 J 15SS0290002 | 15.2 J 15SS0300002 |
| POTASSIUM | | | | | 1380 J 15SS0290002 | 1430 J 15SS0300002 |
| SELENIUM | | | | | 0.28 J 15SS0290002 | 0.81 15SS0300002 |
| SILVER | | | | | 0.049 U 15SS0290002 | 0.049 U 15SS0300002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB025<br>12/11/2004 | 15SB026<br>12/11/2004 | 15SB027<br>12/11/2004 | 15SB028<br>12/11/2004 | 15SB029<br>12/9/2004 | 15SB030<br>12/14/2004 |
|---|---|---|---|---|---|---|
| SODIUM | | | | | 62.7 U 15SS0290002 | 69.8 U 15SS0300002 |
| THALLIUM | | | | | 0.23 J 15SS0290002 | 0.36 J 15SS0300002 |
| TIN | | | | | 0.28 U 15SS0290002 | 0.36 U 15SS0300002 |
| VANADIUM | | | | | 28 15SS0290002 | 46.6 15SS0300002 |
| ZINC | | | | | 32 J 15SS0290002 | 38.3 J 15SS0300002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| **Volatile Organics (ug/kg)** | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,1,1-TRICHLOROETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,1,2,2-TETRACHLOROETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,1,2-TRICHLOROETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,1-DICHLOROETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,1-DICHLOROETHENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,2,3-TRICHLOROPROPANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,2-DIBROMO-3-CHLOROPROPANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,2-DIBROMOETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,2-DICHLOROETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 1,2-DICHLOROPROPANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 2-BUTANONE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>7 J 15SB0310610<br>12 J 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>1 J 15SB0350206 | 3 J 15SS0360002 |

APPENDI. _E G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| 2-HEXANONE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 3-CHLOROPROPENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| 4-METHYL-2-PENTANONE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| ACETONE | 25 U 15SS0310002<br>13 BU 15SB0310206<br>28 BU 15SB0310610<br>72 BJ 15SB0311014 | 10 U 15SS0320002<br>5 BU 15SB0320206 | 9 U 15SS0330002 | 9 U 15SS0340002 | 10 U 15SS0350002<br>19 BU 15SB0350206 | 19 U 15SS0360002 |
| ACETONITRILE | 40.4 UR 15SS0310002<br>42.8 UR 15SB0310206<br>42.3 UR 15SB0310610<br>44.7 UR 15SB0311014 | 41.8 UR 15SS0320002<br>40.5 UR 15SB0320206 | 43.3 UR 15SS0330002 | 36.6 UR 15SS0340002 | 49 UR 15SS0350002<br>31.8 UR 15SB0350206 | 48.8 UR 15SS0360002 |
| ACROLEIN | 1.01 UR 15SS0310002<br>1.07 UR 15SB0310206<br>1.06 UR 15SB0310610<br>1.12 UR 15SB0311014 | 1.04 UR 15SS0320002<br>1.01 UR 15SB0320206 | 1.08 UR 15SS0330002 | 0.914 UR 15SS0340002 | 1.22 UR 15SS0350002<br>0.796 UR 15SB0350206 | 1.22 UR 15SS0360002 |
| ACRYLONITRILE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| BENZENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| BROMODICHLOROMETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| BROMOFORM | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| BROMOMETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CARBON DISULFIDE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 UJ 15SS0330002 | 0.914 UJ 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 UJ 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CHLOROBENZENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CHLORODIBROMOMETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CHLOROETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CHLOROFORM | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CHLOROMETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CHLOROPRENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CIS-1,2-DICHLOROETHENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| CIS-1,3-DICHLOROPROPENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| DIBROMOMETHANE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| DICHLORODIFLUOROMETHANE | 1.01 UJ 15SS0310002<br>1.07 UR 15SB0310206<br>1.06 UR 15SB0310610<br>1.12 UR 15SB0311014 | 1.04 U 15SS0320002<br>1.01 UR 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 UR 15SB0350206 | 1.22 U 15SS0360002 |
| ETHYL METHACRYLATE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| ETHYLBENZENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| ISOBUTANOL | 40.4 UR 15SS0310002<br>42.8 UR 15SB0310206<br>42.3 UR 15SB0310610<br>44.7 UR 15SB0311014 | 41.8 UR 15SS0320002<br>40.5 UR 15SB0320206 | 43.3 UR 15SS0330002 | 36.6 UR 15SS0340002 | 49 UR 15SS0350002<br>31.8 UR 15SB0350206 | 48.8 UR 15SS0360002 |
| METHACRYLONITRILE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| METHYL IODIDE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| METHYL METHACRYLATE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| METHYL TERT-BUTYL ETHER | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| METHYLENE CHLORIDE | 16 J 15SS0310002<br>15 J 15SB0310206<br>4 J 15SB0310610<br>33 J 15SB0311014 | 19 J 15SS0320002<br>10 J 15SB0320206 | 28 J 15SS0330002 | 8 J 15SS0340002 | 27 J 15SS0350002<br>20 J 15SB0350206 | 7 J 15SS0360002 |
| PROPIONITRILE | 40.4 UR 15SS0310002<br>42.8 UR 15SB0310206<br>42.3 UR 15SB0310610<br>44.7 UR 15SB0311014 | 41.8 UR 15SS0320002<br>40.5 UR 15SB0320206 | 43.3 UR 15SS0330002 | 36.6 UR 15SS0340002 | 49 UR 15SS0350002<br>31.8 UR 15SB0350206 | 48.8 UR 15SS0360002 |
| STYRENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| TETRACHLOROETHENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| TOLUENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| TOTAL XYLENES | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.13 J 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| TRANS-1,2-DICHLOROETHENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| TRANS-1,3-DICHLOROPROPENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| TRANS-1,4-DICHLORO-2-BUTENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| TRICHLOROETHENE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| TRICHLOROFLUOROMETHANE | 3 J 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>3 J 15SB0311014 | 2 J 15SS0320002<br>1.01 U 15SB0320206 | 3 J 15SS0330002 | 0.914 U 15SS0340002 | 2 J 15SS0350002<br>2 J 15SB0350206 | 1.22 U 15SS0360002 |
| VINYL ACETATE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 UJ 15SS0330002 | 0.914 UJ 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 UJ 15SS0360002 |
| VINYL CHLORIDE | 1.01 UJ 15SS0310002<br>1.07 U 15SB0310206<br>1.06 U 15SB0310610<br>1.12 U 15SB0311014 | 1.04 U 15SS0320002<br>1.01 U 15SB0320206 | 1.08 U 15SS0330002 | 0.914 U 15SS0340002 | 1.22 U 15SS0350002<br>0.796 U 15SB0350206 | 1.22 U 15SS0360002 |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 1,2,4-TRICHLOROBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 1,2-DICHLOROBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 1,3-DICHLOROBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 1,4-DICHLOROBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 1,4-DIOXANE | 114 U 15SS0310002 | 120 U 15SS0320002 | 122 U 15SS0330002 | 117 U 15SS0340002 | 128 U 15SS0350002 | 127 U 15SS0360002 |

APPENI 3LE G-1
RESULTS FOR CHEMICALS ANAL.. .. IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| 1,4-NAPHTHOQUINONE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 1,4-PHENYLENEDIAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 1-NAPHTHYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2,3,4,6-TETRACHLOROPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2,4,5-TRICHLOROPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2,4,6-TRICHLOROPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2,4-DICHLOROPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2,4-DIMETHYLPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2,4-DINITROPHENOL | 76 UJ 15SS0310002 | 80.4 UJ 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2,6-DICHLOROPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2-ACETYLAMINOFLUORENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2-CHLORONAPHTHALENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2-CHLOROPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2-METHYLNAPHTHALENE | 3.75 U 15SS0310002 | 3.96 U 15SS0320002 | 4.01 U 15SS0330002 | 3.87 U 15SS0340002 | 4.21 U 15SS0350002 | 4.19 U 15SS0360002 |
| 2-METHYLPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| 2-NAPHTHYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2-NITROANILINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2-NITROPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 2-PICOLINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 3&4-METHYLPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 3,3'-DICHLOROBENZIDINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 3,3'-DIMETHYLBENZIDINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 UJ 15SS0330002 | 78.5 UJ 15SS0340002 | 85.5 UJ 15SS0350002 | 85.1 UJ 15SS0360002 |
| 3-METHYLCHOLANTHRENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 3-NITROANILINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 4,6-DINITRO-2-METHYLPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 4-AMINOBIPHENYL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 4-BROMOPHENYL PHENYL ETHER | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 4-CHLORO-3-METHYLPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 4-CHLOROANILINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 4-CHLOROPHENYL PHENYL ETHER | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 4-NITROANILINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| 4-NITROPHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 4-NITROQUINOLINE-1-OXIDE | 76 UR 15SS0310002 | 80.4 UR 15SS0320002 | 81.4 UR 15SS0330002 | 78.5 UR 15SS0340002 | 85.5 UR 15SS0350002 | 85.1 UR 15SS0360002 |
| 5-NITRO-O-TOLUIDINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| A,A-DIMETHYLPHENETHYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| ACENAPHTHENE | 3.75 U 15SS0310002 | 3.96 U 15SS0320002 | 4.01 U 15SS0330002 | 3.87 U 15SS0340002 | 4.21 U 15SS0350002 | 4.19 U 15SS0360002 |
| ACENAPHTHYLENE | 3.75 U 15SS0310002 | 3.96 U 15SS0320002 | 4.01 U 15SS0330002 | 3.87 U 15SS0340002 | 4.21 U 15SS0350002 | 4.19 U 15SS0360002 |
| ACETOPHENONE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| ANILINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| ANTHRACENE | 3.75 U 15SS0310002 | 3.96 U 15SS0320002 | 4.01 U 15SS0330002 | 3.87 U 15SS0340002 | 4.21 U 15SS0350002 | 4.19 U 15SS0360002 |
| ARAMITE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| BENZO(A)ANTHRACENE | 3.75 U 15SS0310002 | 3.96 U 15SS0320002 | 12 15SS0330002 | 3.87 U 15SS0340002 | 17 J 15SS0350002 | 5 J 15SS0360002 |
| BENZO(A)PYRENE | 3.75 UJ 15SS0310002 | 3.96 UJ 15SS0320002 | 7 J 15SS0330002 | 3.87 U 15SS0340002 | 19 J 15SS0350002 | 4.19 U 15SS0360002 |
| BENZO(B)FLUORANTHENE | 3.75 UJ 15SS0310002 | 3.96 UJ 15SS0320002 | 9 15SS0330002 | 3.87 U 15SS0340002 | 23 J 15SS0350002 | 4.19 U 15SS0360002 |
| BENZO(G,H,I)PERYLENE | 3.75 UJ 15SS0310002 | 3.96 UJ 15SS0320002 | 17 15SS0330002 | 3.87 U 15SS0340002 | 24 J 15SS0350002 | 4.19 U 15SS0360002 |
| BENZO(K)FLUORANTHENE | 3.75 UJ 15SS0310002 | 3.96 UJ 15SS0320002 | 6 J 15SS0330002 | 3.87 U 15SS0340002 | 10 J 15SS0350002 | 4.19 U 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| BENZYL ALCOHOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| BIS(2-CHLOROETHOXY)METHANE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| BIS(2-CHLOROETHYL)ETHER | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| BIS(2-ETHYLHEXYL)PHTHALATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 85 J 15SS0340002 | 85.5 U 15SS0350002 | 170 J 15SS0360002 |
| BUTYL BENZYL PHTHALATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| CHLOROBENZILATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| CHRYSENE | 3.75 U 15SS0310002 | 3.96 U 15SS0320002 | 18 15SS0330002 | 3.87 U 15SS0340002 | 20 J 15SS0350002 | 6 J 15SS0360002 |
| DI-N-BUTYL PHTHALATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| DI-N-OCTYL PHTHALATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| DIALLATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| DIBENZO(A,H)ANTHRACENE | 3.75 UJ 15SS0310002 | 3.96 UJ 15SS0320002 | 4.01 U 15SS0330002 | 3.87 U 15SS0340002 | 4.21 UJ 15SS0350002 | 4.19 U 15SS0360002 |
| DIBENZOFURAN | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| DIETHYL PHTHALATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| DIMETHYL PHTHALATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| DIPHENYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| ETHYL METHANE SULFONATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |

APPEND. ,LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| FLUORANTHENE | 3.75 U 15SS0310002 | 5 J 15SS0320002 | 38 15SS0330002 | 6 J 15SS0340002 | 29 15SS0350002 | 11 15SS0360002 |
| FLUORENE | 3.75 U 15SS0310002 | 3.96 U 15SS0320002 | 4.01 U 15SS0330002 | 3.87 U 15SS0340002 | 4.21 U 15SS0350002 | 4.19 U 15SS0360002 |
| HEXACHLOROBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| HEXACHLOROBUTADIENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| HEXACHLOROCYCLOPENTADIENE | 76 UJ 15SS0310002 | 80.4 UJ 15SS0320002 | 81.4 UJ 15SS0330002 | 78.5 UJ 15SS0340002 | 85.5 UJ 15SS0350002 | 85.1 UJ 15SS0360002 |
| HEXACHLOROETHANE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| HEXACHLOROPROPENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| INDENO(1,2,3-CD)PYRENE | 3.75 UJ 15SS0310002 | 3.96 UJ 15SS0320002 | 4.01 U 15SS0330002 | 3.87 U 15SS0340002 | 19 J 15SS0350002 | 4.19 U 15SS0360002 |
| ISODRIN | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| ISOPHORONE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| ISOSAFROLE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| KEPONE | 76 UJ 15SS0310002 | 80.4 UJ 15SS0320002 | 81.4 UJ 15SS0330002 | 78.5 UJ 15SS0340002 | 85.5 UR 15SS0350002 | 85.1 UJ 15SS0360002 |
| METHAPYRILENE | 76 UJ 15SS0310002 | 80.4 UJ 15SS0320002 | 81.4 UJ 15SS0330002 | 78.5 UJ 15SS0340002 | 85.5 UJ 15SS0350002 | 85.1 UJ 15SS0360002 |
| METHYL METHANE SULFONATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| N-NITROSO-DI-N-BUTYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| N-NITROSO-DI-N-PROPYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| N-NITROSODIETHYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| N-NITROSODIMETHYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| N-NITROSODIPHENYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| N-NITROSOMETHYLETHYLAMINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| N-NITROSOMORPHOLINE | 76 UJ 15SS0310002 | 80.4 UJ 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| N-NITROSOPIPERIDINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| N-NITROSOPYRROLIDINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| NAPHTHALENE | 3.75 U 15SS0310002 | 3.96 U 15SS0320002 | 4.01 U 15SS0330002 | 3.87 U 15SS0340002 | 4.21 U 15SS0350002 | 4.19 U 15SS0360002 |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| O-TOLUIDINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| P-(DIMETHYLAMINO)AZOBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| PENTACHLOROBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| PENTACHLOROETHANE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| PENTACHLORONITROBENZENE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| PHENACETIN | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| PHENANTHRENE | 3.75 U 15SS0310002 | 5 J 15SS0320002 | 22 15SS0330002 | 3.87 U 15SS0340002 | 20 15SS0350002 | 7 J 15SS0360002 |

APPEND LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| PHENOL | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| PRONAMIDE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| PYRENE | 3.75 U 15SS0310002 | 7 J 15SS0320002 | 30 15SS0330002 | 6 J 15SS0340002 | 47 J 15SS0350002 | 10 15SS0360002 |
| PYRIDINE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| SAFROLE | 76 U 15SS0310002 | 80.4 U 15SS0320002 | 81.4 U 15SS0330002 | 78.5 U 15SS0340002 | 85.5 U 15SS0350002 | 85.1 U 15SS0360002 |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| 4,4'-DDE | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| 4,4'-DDT | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| ALDRIN | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| ALPHA-BHC | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| ALPHA-CHLORDANE | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| AROCLOR-1016 | 10.2 U 15SS0310002 | 10.8 U 15SS0320002 | 10.9 U 15SS0330002 | 10.6 U 15SS0340002 | 11.5 U 15SS0350002 | 11.4 U 15SS0360002 |
| AROCLOR-1221 | 10.2 U 15SS0310002 | 10.8 U 15SS0320002 | 10.9 U 15SS0330002 | 10.6 U 15SS0340002 | 11.5 U 15SS0350002 | 11.4 U 15SS0360002 |
| AROCLOR-1232 | 10.2 U 15SS0310002 | 10.8 U 15SS0320002 | 10.9 U 15SS0330002 | 10.6 U 15SS0340002 | 11.5 U 15SS0350002 | 11.4 U 15SS0360002 |
| AROCLOR-1242 | 10.2 U 15SS0310002 | 10.8 U 15SS0320002 | 10.9 U 15SS0330002 | 10.6 U 15SS0340002 | 11.5 U 15SS0350002 | 11.4 U 15SS0360002 |
| AROCLOR-1248 | 10.2 U 15SS0310002 | 10.8 U 15SS0320002 | 10.9 U 15SS0330002 | 10.6 U 15SS0340002 | 11.5 U 15SS0350002 | 11.4 U 15SS0360002 |
| AROCLOR-1254 | 10.2 U 15SS0310002 | 10.8 U 15SS0320002 | 10.9 U 15SS0330002 | 10.6 U 15SS0340002 | 11.5 U 15SS0350002 | 11.4 U 15SS0360002 |
| AROCLOR-1260 | 10.2 U 15SS0310002 | 10.8 U 15SS0320002 | 10.9 U 15SS0330002 | 20 15SS0340002 | 11.5 U 15SS0350002 | 32 15SS0360002 |
| BETA-BHC | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| DELTA-BHC | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| DIELDRIN | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| ENDOSULFAN I | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| ENDOSULFAN II | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| ENDOSULFAN SULFATE | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| ENDRIN ALDEHYDE | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| ENDRIN KETONE | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| ENDRIN | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| GAMMA-BHC (LINDANE) | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| GAMMA-CHLORDANE | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| HEPTACHLOR EPOXIDE | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| HEPTACHLOR | 0.738 U 15SS0310002 | 0.78 U 15SS0320002 | 0.79 U 15SS0330002 | 0.762 U 15SS0340002 | 0.829 U 15SS0350002 | 0.826 U 15SS0360002 |
| METHOXYCHLOR | 7.38 U 15SS0310002 | 7.8 U 15SS0320002 | 7.9 U 15SS0330002 | 7.62 U 15SS0340002 | 8.29 U 15SS0350002 | 8.26 U 15SS0360002 |
| TOXAPHENE | 19.3 U 15SS0310002 | 20.4 U 15SS0320002 | 20.7 U 15SS0330002 | 19.9 U 15SS0340002 | 21.7 U 15SS0350002 | 21.6 U 15SS0360002 |
| **Herbicides (ug/kg)** | | | | | | |
| 2,4,5-T | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| 2,4,5-TP (SILVEX) | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| 2,4-D | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| DINOSEB | 1.53 U 15SS0310002 | 1.62 U 15SS0320002 | 1.64 U 15SS0330002 | 1.58 U 15SS0340002 | 1.72 U 15SS0350002 | 1.72 U 15SS0360002 |
| HEXACHLOROPHENE | 0.965 U 15SS0310002 | 1.02 U 15SS0320002 | 1.03 U 15SS0330002 | 0.996 U 15SS0340002 | 1.08 U 15SS0350002 | 1.08 U 15SS0360002 |
| PENTACHLOROPHENOL | 0.511 U 15SS0310002 | 0.54 U 15SS0320002 | 0.547 U 15SS0330002 | 0.528 U 15SS0340002 | 0.574 U 15SS0350002 | 0.572 U 15SS0360002 |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | 29900 J 15SS0310002 | 13900 J 15SS0320002 | 14300 J 15SS0330002 | 15800 J 15SS0340002 | 19500 J 15SS0350002 | 12500 J 15SS0360002 |
| ANTIMONY | 0.022 U 15SS0310002 | 0.19 U 15SS0320002 | 0.46 U 15SS0330002 | 0.44 U 15SS0340002 | 0.25 U 15SS0350002 | 0.27 U 15SS0360002 |
| ARSENIC | 3.4 J 15SS0310002 | 6.2 J 15SS0320002 | 12.7 J 15SS0330002 | 5.8 J 15SS0340002 | 14.9 J 15SS0350002 | 20.7 J 15SS0360002 |

APPEND LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| BARIUM | 76.6 J 15SS0310002 | 69.2 J 15SS0320002 | 74.8 J 15SS0330002 | 68.6 J 15SS0340002 | 102 J 15SS0350002 | 98 J 15SS0360002 |
| BERYLLIUM | 0.64 15SS0310002 | 0.81 15SS0320002 | 0.62 15SS0330002 | 0.52 15SS0340002 | 1.6 15SS0350002 | 1.5 15SS0360002 |
| CADMIUM | 0.21 J 15SS0310002 | 0.21 J 15SS0320002 | 0.32 J 15SS0330002 | 0.36 J 15SS0340002 | 0.34 J 15SS0350002 | 0.37 J 15SS0360002 |
| CALCIUM | 2530 J 15SS0310002 | 1340 J 15SS0320002 | 1530 J 15SS0330002 | 7850 J 15SS0340002 | 1690 J 15SS0350002 | 1580 J 15SS0360002 |
| CHROMIUM | 31 J 15SS0310002 | 22.1 J 15SS0320002 | 29.5 J 15SS0330002 | 20.4 J 15SS0340002 | 34.4 J 15SS0350002 | 49.7 J 15SS0360002 |
| COBALT | 3.4 J 15SS0310002 | 10.9 J 15SS0320002 | 8.1 J 15SS0330002 | 6.2 J 15SS0340002 | 59.6 J 15SS0350002 | 9.2 J 15SS0360002 |
| COPPER | 10.5 J 15SS0310002 | 8.4 J 15SS0320002 | 16.8 J 15SS0330002 | 9.3 J 15SS0340002 | 11 J 15SS0350002 | 15.3 J 15SS0360002 |
| IRON | 19000 J 15SS0310002 | 23700 J 15SS0320002 | 51200 J 15SS0330002 | 16700 J 15SS0340002 | 48200 J 15SS0350002 | 57600 J 15SS0360002 |
| LEAD | 12.8 J 15SS0310002 | 15.6 J 15SS0320002 | 26.3 J 15SS0330002 | 21.5 J 15SS0340002 | 24.6 J 15SS0350002 | 21.6 J 15SS0360002 |
| MAGNESIUM | 1660 J 15SS0310002 | 1110 J 15SS0320002 | 1090 J 15SS0330002 | 1810 J 15SS0340002 | 1520 J 15SS0350002 | 790 J 15SS0360002 |
| MANGANESE | 58.3 J 15SS0310002 | 568 J 15SS0320002 | 423 J 15SS0330002 | 294 J 15SS0340002 | 4400 J 15SS0350002 | 857 J 15SS0360002 |
| MERCURY | 0.007 U 15SS0310002 | 0.025 J 15SS0320002 | 0.041 J 15SS0330002 | 0.023 J 15SS0340002 | 0.049 J 15SS0350002 | 0.063 J 15SS0360002 |
| NICKEL | 15.2 J 15SS0310002 | 11.7 J 15SS0320002 | 13.8 J 15SS0330002 | 12.3 J 15SS0340002 | 31.6 J 15SS0350002 | 16.8 J 15SS0360002 |
| POTASSIUM | 1660 J 15SS0310002 | 968 J 15SS0320002 | 1270 J 15SS0330002 | 1340 J 15SS0340002 | 1400 J 15SS0350002 | 974 J 15SS0360002 |
| SELENIUM | 0.11 J 15SS0310002 | 0.4 J 15SS0320002 | 0.76 15SS0330002 | 0.36 J 15SS0340002 | 0.78 15SS0350002 | 0.71 15SS0360002 |
| SILVER | 0.043 U 15SS0310002 | 0.048 U 15SS0320002 | 0.05 U 15SS0330002 | 0.043 U 15SS0340002 | 0.051 U 15SS0350002 | 0.06 U 15SS0360002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB031<br>12/9/2004 | 15SB032<br>12/9/2004 | 15SB033<br>12/14/2004 | 15SB034<br>12/14/2004 | 15SB035<br>12/9/2004 | 15SB036<br>12/14/2004 |
|---|---|---|---|---|---|---|
| SODIUM | 76.6 U 15SS0310002 | 81.8 U 15SS0320002 | 48.7 U 15SS0330002 | 56.3 U 15SS0340002 | 76.5 U 15SS0350002 | 35.3 U 15SS0360002 |
| THALLIUM | 0.35 J 15SS0310002 | 0.29 J 15SS0320002 | 0.33 J 15SS0330002 | 0.3 J 15SS0340002 | 0.43 J 15SS0350002 | 0.21 J 15SS0360002 |
| TIN | 0.38 U 15SS0310002 | 0.27 U 15SS0320002 | 0.32 U 15SS0330002 | 0.35 U 15SS0340002 | 0.28 U 15SS0350002 | 0.32 U 15SS0360002 |
| VANADIUM | 30.2 15SS0310002 | 27.1 15SS0320002 | 31.6 15SS0330002 | 26.9 15SS0340002 | 41.7 15SS0350002 | 57.4 15SS0360002 |
| ZINC | 24.6 J 15SS0310002 | 34.2 J 15SS0320002 | 50.4 J 15SS0330002 | 47.3 J 15SS0340002 | 63.2 J 15SS0350002 | 53.5 J 15SS0360002 |

APPEND LE G-1
RESULTS FOR CHEMICALS ANALY IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| Volatile Organics (ug/kg) | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,1,1-TRICHLOROETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,1,2,2-TETRACHLOROETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,1,2-TRICHLOROETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,1-DICHLOROETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,1-DICHLOROETHENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,2,3-TRICHLOROPROPANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,2-DIBROMO-3-CHLOROPROPANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,2-DIBROMOETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,2-DICHLOROETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 1,2-DICHLOROPROPANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 2-BUTANONE | 3 J 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 6 J 15SS0420002<br>0.873 U 15SB0420206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| 2-HEXANONE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 3-CHLOROPROPENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| 4-METHYL-2-PENTANONE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| ACETONE | 32 U 15SS0370002<br>3 BU 15SB0370206 | 23 U 15SS0380002 | 3 U 15SS0390002 | 18 U 15SS0400002<br>3 J 15SB0400206 | 32 U 15SS0410002 | 28 J 15SS0420002<br>6 J 15SB0420206 |
| ACETONITRILE | 45.9 UR 15SS0370002<br>49.2 UR 15SB0370206 | 43.5 UR 15SS0380002 | 36.8 UR 15SS0390002 | 46.2 UR 15SS0400002<br>39.6 UR 15SB0400206 | 44.9 UR 15SS0410002 | 39.2 UR 15SS0420002<br>34.9 UR 15SB0420206 |
| ACROLEIN | 1.15 UR 15SS0370002<br>1.23 UR 15SB0370206 | 1.09 UR 15SS0380002 | 0.919 UR 15SS0390002 | 1.15 UR 15SS0400002<br>0.99 UR 15SB0400206 | 1.12 UR 15SS0410002 | 0.98 UR 15SS0420002<br>0.873 UR 15SB0420206 |
| ACRYLONITRILE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| BENZENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| BROMODICHLOROMETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| BROMOFORM | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| BROMOMETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| CARBON DISULFIDE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 UJ 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 UJ 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| CHLOROBENZENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| CHLORODIBROMOMETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| CHLOROETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| CHLOROFORM | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| CHLOROMETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| CHLOROPRENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| CIS-1,2-DICHLOROETHENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 1 J 15SS0420002<br>0.873 U 15SB0420206 |
| CIS-1,3-DICHLOROPROPENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| DIBROMOMETHANE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| DICHLORODIFLUOROMETHANE | 1.15 U 15SS0370002<br>1.23 UR 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| ETHYL METHACRYLATE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| ETHYLBENZENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| ISOBUTANOL | 45.9 UR 15SS0370002<br>49.2 UR 15SB0370206 | 43.5 UR 15SS0380002 | 36.8 UR 15SS0390002 | 46.2 UR 15SS0400002<br>39.6 UR 15SB0400206 | 44.9 UR 15SS0410002 | 39.2 UR 15SS0420002<br>34.9 UR 15SB0420206 |
| METHACRYLONITRILE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| METHYL IODIDE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| METHYL METHACRYLATE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| METHYL TERT-BUTYL ETHER | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| METHYLENE CHLORIDE | 5 J 15SS0370002<br>20 J 15SB0370206 | 39 J 15SS0380002 | 14 J 15SS0390002 | 51 J 15SS0400002<br>0.99 UJ 15SB0400206 | 9 J 15SS0410002 | 5 U 15SS0420002<br>14 J 15SB0420206 |
| PROPIONITRILE | 45.9 UR 15SS0370002<br>49.2 UR 15SB0370206 | 43.5 UR 15SS0380002 | 36.8 UR 15SS0390002 | 46.2 UR 15SS0400002<br>39.6 UR 15SB0400206 | 44.9 UR 15SS0410002 | 39.2 UR 15SS0420002<br>34.9 UR 15SB0420206 |
| STYRENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| TETRACHLOROETHENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| TOLUENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| TOTAL XYLENES | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| TRANS-1,2-DICHLOROETHENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| TRANS-1,3-DICHLOROPROPENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| TRANS-1,4-DICHLORO-2-BUTENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| TRICHLOROETHENE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| TRICHLOROFLUOROMETHANE | 1.15 U 15SS0370002<br>2 J 15SB0370206 | 2 J 15SS0380002 | 0.919 U 15SS0390002 | 2 J 15SS0400002<br>0.99 U 15SB0400206 | 2 J 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| VINYL ACETATE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 UJ 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 UJ 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| VINYL CHLORIDE | 1.15 U 15SS0370002<br>1.23 U 15SB0370206 | 1.09 U 15SS0380002 | 0.919 U 15SS0390002 | 1.15 U 15SS0400002<br>0.99 U 15SB0400206 | 1.12 U 15SS0410002 | 0.98 U 15SS0420002<br>0.873 U 15SB0420206 |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 1,2,4-TRICHLOROBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 1,2-DICHLOROBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 1,3-DICHLOROBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 1,4-DICHLOROBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 1,4-DIOXANE | 127 U 15SS0370002 | 121 U 15SS0380002 | 112 U 15SS0390002 | 130 U 15SS0400002 | 125 U 15SS0410002 | 123 U 15SS0420002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| 1,4-NAPHTHOQUINONE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 1,4-PHENYLENEDIAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 1-NAPHTHYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2,3,4,6-TETRACHLOROPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2,4,5-TRICHLOROPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2,4,6-TRICHLOROPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2,4-DICHLOROPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2,4-DIMETHYLPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2,4-DINITROPHENOL | 85.4 UJ 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2,6-DICHLOROPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2-ACETYLAMINOFLUORENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2-CHLORONAPHTHALENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2-CHLOROPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2-METHYLNAPHTHALENE | 4.2 U 15SS0370002 | 5 J 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| 2-METHYLPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |

APPENDI .E G-1
RESULTS FOR CHEMICALS ANALYZ. .N ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| 2-NAPHTHYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2-NITROANILINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2-NITROPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 2-PICOLINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 3&4-METHYLPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 3,3'-DICHLOROBENZIDINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 3,3'-DIMETHYLBENZIDINE | 85.4 U 15SS0370002 | 80.9 UJ 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 UJ 15SS0410002 | 82.1 U 15SS0420002 |
| 3-METHYLCHOLANTHRENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 3-NITROANILINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 4,6-DINITRO-2-METHYLPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 4-AMINOBIPHENYL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 4-BROMOPHENYL PHENYL ETHER | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 4-CHLORO-3-METHYLPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 4-CHLOROANILINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 4-CHLOROPHENYL PHENYL ETHER | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 4-NITROANILINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| 4-NITROPHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 4-NITROQUINOLINE-1-OXIDE | 85.4 UR 15SS0370002 | 80.9 UR 15SS0380002 | 75.1 UR 15SS0390002 | 86.9 UR 15SS0400002 | 83.6 UR 15SS0410002 | 82.1 UR 15SS0420002 |
| 5-NITRO-O-TOLUIDINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| A,A-DIMETHYLPHENETHYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| ACENAPHTHENE | 4.2 U 15SS0370002 | 21 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| ACENAPHTHYLENE | 4.2 U 15SS0370002 | 3.99 U 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| ACETOPHENONE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| ANILINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| ANTHRACENE | 4.2 U 15SS0370002 | 9 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| ARAMITE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| BENZO(A)ANTHRACENE | 4.2 UJ 15SS0370002 | 42 15SS0380002 | 3.7 U 15SS0390002 | 7 J 15SS0400002 | 4.12 U 15SS0410002 | 8 J 15SS0420002 |
| BENZO(A)PYRENE | 4.2 UJ 15SS0370002 | 26 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 9 15SS0420002 |
| BENZO(B)FLUORANTHENE | 4.2 UJ 15SS0370002 | 27 15SS0380002 | 3.7 U 15SS0390002 | 5 J 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| BENZO(G,H,I)PERYLENE | 4.2 UJ 15SS0370002 | 33 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 14 15SS0420002 |
| BENZO(K)FLUORANTHENE | 4.2 UJ 15SS0370002 | 21 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |

APPENDIX G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| BENZYL ALCOHOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| BIS(2-CHLOROETHOXY)METHANE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| BIS(2-CHLOROETHYL)ETHER | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| BIS(2-ETHYLHEXYL)PHTHALATE | 100 J 15SS0370002 | 250 J 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 130 J 15SS0410002 | 82.1 U 15SS0420002 |
| BUTYL BENZYL PHTHALATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| CHLOROBENZILATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| CHRYSENE | 4.2 UJ 15SS0370002 | 69 15SS0380002 | 3.7 U 15SS0390002 | 6 J 15SS0400002 | 4.12 U 15SS0410002 | 10 15SS0420002 |
| DI-N-BUTYL PHTHALATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 100 J 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| DI-N-OCTYL PHTHALATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| DIALLATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| DIBENZO(A,H)ANTHRACENE | 4.2 UJ 15SS0370002 | 3.99 U 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| DIBENZOFURAN | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| DIETHYL PHTHALATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| DIMETHYL PHTHALATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| DIPHENYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| ETHYL METHANE SULFONATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| FLUORANTHENE | 4.2 U 15SS0370002 | 160 15SS0380002 | 3.7 U 15SS0390002 | 10 15SS0400002 | 4.12 U 15SS0410002 | 17 15SS0420002 |
| FLUORENE | 4.2 U 15SS0370002 | 3.99 U 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| HEXACHLOROBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| HEXACHLOROBUTADIENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| HEXACHLOROCYCLOPENTADIENE | 85.4 UJ 15SS0370002 | 80.9 UJ 15SS0380002 | 75.1 UJ 15SS0390002 | 86.9 UJ 15SS0400002 | 83.6 UJ 15SS0410002 | 82.1 UJ 15SS0420002 |
| HEXACHLOROETHANE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| HEXACHLOROPROPENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| INDENO(1,2,3-CD)PYRENE | 4.2 UJ 15SS0370002 | 3.99 U 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| ISODRIN | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| ISOPHORONE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| ISOSAFROLE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| KEPONE | 85.4 UJ 15SS0370002 | 80.9 UJ 15SS0380002 | 75.1 UR 15SS0390002 | 86.9 UR 15SS0400002 | 83.6 UJ 15SS0410002 | 82.1 UR 15SS0420002 |
| METHAPYRILENE | 85.4 UJ 15SS0370002 | 80.9 UJ 15SS0380002 | 75.1 UJ 15SS0390002 | 86.9 UJ 15SS0400002 | 83.6 UJ 15SS0410002 | 82.1 UJ 15SS0420002 |
| METHYL METHANE SULFONATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| N-NITROSO-DI-N-BUTYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| N-NITROSO-DI-N-PROPYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |

APPENDIX LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| N-NITROSODIETHYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| N-NITROSODIMETHYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| N-NITROSODIPHENYLAMINE | 85.4 U 15SS0370002 | 1500 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| N-NITROSOMETHYLETHYLAMINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| N-NITROSOMORPHOLINE | 85.4 UJ 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| N-NITROSOPIPERIDINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| N-NITROSOPYRROLIDINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| NAPHTHALENE | 4.2 U 15SS0370002 | 7 J 15SS0380002 | 3.7 U 15SS0390002 | 4.28 U 15SS0400002 | 4.12 U 15SS0410002 | 4.04 U 15SS0420002 |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| O-TOLUIDINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| P-(DIMETHYLAMINO)AZOBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| PENTACHLOROBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| PENTACHLOROETHANE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| PENTACHLORONITROBENZENE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| PHENACETIN | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| PHENANTHRENE | 4.2 U 15SS0370002 | 52 15SS0380002 | 3.7 U 15SS0390002 | 12 15SS0400002 | 4.12 U 15SS0410002 | 16 15SS0420002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| PHENOL | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| PRONAMIDE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| PYRENE | 4.2 UJ 15SS0370002 | 110 15SS0380002 | 3.7 U 15SS0390002 | 12 15SS0400002 | 4.12 U 15SS0410002 | 23 15SS0420002 |
| PYRIDINE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| SAFROLE | 85.4 U 15SS0370002 | 80.9 U 15SS0380002 | 75.1 U 15SS0390002 | 86.9 U 15SS0400002 | 83.6 U 15SS0410002 | 82.1 U 15SS0420002 |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | 1.72 U 15SS0370002 | 1.63 UJ 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| 4,4'-DDE | 1.72 U 15SS0370002 | 1.63 UJ 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| 4,4'-DDT | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| ALDRIN | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| ALPHA-BHC | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| ALPHA-CHLORDANE | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| AROCLOR-1016 | 11.5 U 15SS0370002 | 10.9 U 15SS0380002 | 10.1 U 15SS0390002 | 11.7 U 15SS0400002 | 11.2 U 15SS0410002 | |
| AROCLOR-1221 | 11.5 U 15SS0370002 | 10.9 U 15SS0380002 | 10.1 U 15SS0390002 | 11.7 U 15SS0400002 | 11.2 U 15SS0410002 | |
| AROCLOR-1232 | 11.5 U 15SS0370002 | 10.9 U 15SS0380002 | 10.1 U 15SS0390002 | 11.7 U 15SS0400002 | 11.2 U 15SS0410002 | |
| AROCLOR-1242 | 11.5 U 15SS0370002 | 10.9 U 15SS0380002 | 10.1 U 15SS0390002 | 11.7 U 15SS0400002 | 11.2 U 15SS0410002 | |
| AROCLOR-1248 | 11.5 U 15SS0370002 | 10.9 U 15SS0380002 | 10.1 U 15SS0390002 | 11.7 U 15SS0400002 | 11.2 U 15SS0410002 | |
| AROCLOR-1254 | 11.5 U 15SS0370002 | 10.9 U 15SS0380002 | 10.1 U 15SS0390002 | 11.7 U 15SS0400002 | 11.2 U 15SS0410002 | |
| AROCLOR-1260 | 11.5 U 15SS0370002 | 10.9 U 15SS0380002 | 10.1 U 15SS0390002 | 11.7 U 15SS0400002 | 11.2 U 15SS0410002 | |
| BETA-BHC | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| DELTA-BHC | 0.828 U 15SS0370002 | 0.785 UJ 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| DIELDRIN | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |

APPEND! LE G-1
RESULTS FOR CHEMICALS ANALY. .N ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| ENDOSULFAN I | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| ENDOSULFAN II | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| ENDOSULFAN SULFATE | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| ENDRIN ALDEHYDE | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| ENDRIN KETONE | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| ENDRIN | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| GAMMA-BHC (LINDANE) | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| GAMMA-CHLORDANE | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| HEPTACHLOR EPOXIDE | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| HEPTACHLOR | 0.828 U 15SS0370002 | 0.785 U 15SS0380002 | 0.729 U 15SS0390002 | 0.843 U 15SS0400002 | 0.811 U 15SS0410002 | |
| METHOXYCHLOR | 8.28 U 15SS0370002 | 7.85 U 15SS0380002 | 7.29 U 15SS0390002 | 8.43 U 15SS0400002 | 8.11 U 15SS0410002 | |
| TOXAPHENE | 21.7 U 15SS0370002 | 20.5 U 15SS0380002 | 19.1 U 15SS0390002 | 22 U 15SS0400002 | 21.2 U 15SS0410002 | |
| **Herbicides (ug/kg)** | | | | | | |
| 2,4,5-T | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| 2,4,5-TP (SILVEX) | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| 2,4-D | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| DINOSEB | 1.72 U 15SS0370002 | 1.63 U 15SS0380002 | 1.51 U 15SS0390002 | 1.75 U 15SS0400002 | 1.69 U 15SS0410002 | |
| HEXACHLOROPHENE | 1.08 U 15SS0370002 | 1.03 U 15SS0380002 | 0.953 U 15SS0390002 | 1.1 U 15SS0400002 | 1.06 U 15SS0410002 | |
| PENTACHLOROPHENOL | 0.573 U 15SS0370002 | 0.543 U 15SS0380002 | 0.504 U 15SS0390002 | 0.584 U 15SS0400002 | 0.562 U 15SS0410002 | |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | 16700 J 15SS0370002 | 11300 J 15SS0380002 | 13600 J 15SS0390002 | 19200 J 15SS0400002 | 18500 J 15SS0410002 | 19300 J 15SS0420002 |
| ANTIMONY | 0.09 U 15SS0370002 | 0.54 U 15SS0380002 | 0.19 U 15SS0390002 | 0.22 U 15SS0400002 | 0.03 U 15SS0410002 | 0.24 U 15SS0420002 |
| ARSENIC | 7.2 J 15SS0370002 | 12.9 J 15SS0380002 | 4.9 J 15SS0390002 | 5 J 15SS0400002 | 6.1 J 15SS0410002 | 7.8 J 15SS0420002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| BARIUM | 117 J 15SS0370002 | 135 J 15SS0380002 | 50.9 J 15SS0390002 | 86.5 J 15SS0400002 | 112 J 15SS0410002 | 82.9 J 15SS0420002 |
| BERYLLIUM | 1.1 15SS0370002 | 0.65 15SS0380002 | 0.31 J 15SS0390002 | 0.59 15SS0400002 | 0.76 15SS0410002 | 0.49 J 15SS0420002 |
| CADMIUM | 0.25 J 15SS0370002 | 0.25 J 15SS0380002 | 0.19 J 15SS0390002 | 0.39 J 15SS0400002 | 0.23 J 15SS0410002 | 0.25 J 15SS0420002 |
| CALCIUM | 1470 J 15SS0370002 | 170 J 15SS0380002 | 883 J 15SS0390002 | 110000 J 15SS0400002 | 753 J 15SS0410002 | 4720 J 15SS0420002 |
| CHROMIUM | 26.3 J 15SS0370002 | 32.3 J 15SS0380002 | 18.1 J 15SS0390002 | 23 J 15SS0400002 | 16.9 J 15SS0410002 | 23.4 J 15SS0420002 |
| COBALT | 20.8 J 15SS0370002 | 11.3 J 15SS0380002 | 4.3 J 15SS0390002 | 7 J 15SS0400002 | 14.3 J 15SS0410002 | 5.2 J 15SS0420002 |
| COPPER | 11.1 J 15SS0370002 | 10.6 J 15SS0380002 | 7.5 J 15SS0390002 | 9.4 J 15SS0400002 | 7.6 J 15SS0410002 | 12.8 J 15SS0420002 |
| IRON | 36900 J 15SS0370002 | 37300 J 15SS0380002 | 15200 J 15SS0390002 | 14900 J 15SS0400002 | 15400 J 15SS0410002 | 21900 J 15SS0420002 |
| LEAD | 19.2 J 15SS0370002 | 25.7 J 15SS0380002 | 13.2 J 15SS0390002 | 10 J 15SS0400002 | 15.4 J 15SS0410002 | 10.2 J 15SS0420002 |
| MAGNESIUM | 1210 J 15SS0370002 | 754 J 15SS0380002 | 1540 J 15SS0390002 | 9980 J 15SS0400002 | 1560 J 15SS0410002 | 3240 J 15SS0420002 |
| MANGANESE | 1570 J 15SS0370002 | 815 J 15SS0380002 | 421 15SS0390002 | 310 15SS0400002 | 992 J 15SS0410002 | 176 15SS0420002 |
| MERCURY | 0.044 J 15SS0370002 | 0.052 J 15SS0380002 | 0.01 J 15SS0390002 | 0.019 J 15SS0400002 | 0.041 J 15SS0410002 | 0.017 J 15SS0420002 |
| NICKEL | 19.5 J 15SS0370002 | 13.6 J 15SS0380002 | 8.6 J 15SS0390002 | 15.3 J 15SS0400002 | 20.4 J 15SS0410002 | 13 J 15SS0420002 |
| POTASSIUM | 1150 J 15SS0370002 | 908 J 15SS0380002 | 900 J 15SS0390002 | 1930 J 15SS0400002 | 1330 J 15SS0410002 | 1550 J 15SS0420002 |
| SELENIUM | 0.52 15SS0370002 | 1.1 15SS0380002 | 0.19 J 15SS0390002 | 0.69 15SS0400002 | 0.57 15SS0410002 | 0.28 J 15SS0420002 |
| SILVER | 0.05 U 15SS0370002 | 0.046 U 15SS0380002 | 0.046 U 15SS0390002 | 0.055 U 15SS0400002 | 0.047 U 15SS0410002 | 0.054 U 15SS0420002 |

APPENDI .E G-1
RESULTS FOR CHEMICALS ANALYZE N ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB037<br>12/9/2004 | 15SB038<br>12/14/2004 | 15SB039<br>12/10/2004 | 15SB040<br>12/10/2004 | 15SB041<br>12/14/2004 | 15SB042<br>12/10/2004 |
|---|---|---|---|---|---|---|
| SODIUM | 53.3 U 15SS0370002 | 61 U 15SS0380002 | 135 J 15SS0390002 | 136 J 15SS0400002 | 49.7 U 15SS0410002 | 116 J 15SS0420002 |
| THALLIUM | 0.34 J 15SS0370002 | 0.47 J 15SS0380002 | 0.18 U 15SS0390002 | 0.28 U 15SS0400002 | 0.36 J 15SS0410002 | 0.23 U 15SS0420002 |
| TIN | 0.21 U 15SS0370002 | 0.21 U 15SS0380002 | 0.49 U 15SS0390002 | 0.58 U 15SS0400002 | 0.26 U 15SS0410002 | 0.61 U 15SS0420002 |
| VANADIUM | 29.5 15SS0370002 | 31.3 15SS0380002 | 30.2 J 15SS0390002 | 34.7 J 15SS0400002 | 27.3 15SS0410002 | 36.6 J 15SS0420002 |
| ZINC | 59.7 J 15SS0370002 | 34.8 J 15SS0380002 | 19.4 J 15SS0390002 | 36 J 15SS0400002 | 48.5 J 15SS0410002 | 36.3 J 15SS0420002 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| Volatile Organics (ug/kg) | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,1,1-TRICHLOROETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,1,2,2-TETRACHLOROETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,1,2-TRICHLOROETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,1-DICHLOROETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,1-DICHLOROETHENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,2,3-TRICHLOROPROPANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,2-DIBROMO-3-CHLOROPROPANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,2-DIBROMOETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,2-DICHLOROETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 1,2-DICHLOROPROPANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 2-BUTANONE | 1.04 U 15SS0430002<br>3 J 15SB0430206 | 19 15SS0440002<br>2 J 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>4 J 15SB0460206<br>7 J 15SB0460610<br>18 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>2 J 15SB0480206-D<br>2 J 15SB0480610<br>0.867 U 15SB0481015 |

APPENDI. LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| 2-HEXANONE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>2 J 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 3-CHLOROPROPENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| 4-METHYL-2-PENTANONE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| ACETONE | 11 U 15SS0430002<br>29 J 15SB0430206 | 79 J 15SS0440002<br>15 J 15SB0440206 | 3 U 15SS0450002<br>11 U 15SB0450206<br>18 J 15SB0450610<br>6 J 15SB0451012 | 3 U 15SS0460002<br>40 J 15SB0460206<br>69 J 15SB0460610<br>71 J 15SB0461020 | 2 U 15SS0470002 | 4 U 15SS0480002<br>12 U 15SB0480206-D<br>20 BU 15SB0480610<br>5 BU 15SB0481015 |
| ACETONITRILE | 41.8 UR 15SS0430002<br>37.3 UR 15SB0430206 | 38.9 UR 15SS0440002<br>32.6 UR 15SB0440206 | 36.3 UR 15SS0450002<br>38 UR 15SB0450206<br>38 UR 15SB0450610<br>37.1 UR 15SB0451012 | 37.1 UR 15SS0460002<br>35.1 UR 15SB0460206<br>41.5 UR 15SB0460610<br>51.2 UR 15SB0461020 | 35.2 UR 15SS0470002 | 37.3 UR 15SS0480002<br>35.9 UR 15SB0480206-D<br>44 UR 15SB0480610<br>34.7 UR 15SB0481015 |
| ACROLEIN | 1.04 UR 15SS0430002<br>0.933 UR 15SB0430206 | 0.972 UR 15SS0440002<br>0.815 UR 15SB0440206 | 0.908 UR 15SS0450002<br>0.95 UR 15SB0450206<br>0.95 UR 15SB0450610<br>0.928 UR 15SB0451012 | 0.927 UR 15SS0460002<br>0.878 UR 15SB0460206<br>1.04 UR 15SB0460610<br>1.28 UR 15SB0461020 | 0.88 UR 15SS0470002 | 0.932 UR 15SS0480002<br>0.899 UR 15SB0480206-D<br>1.1 UR 15SB0480610<br>0.867 UR 15SB0481015 |
| ACRYLONITRILE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| BENZENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| BROMODICHLOROMETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| BROMOFORM | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| BROMOMETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CARBON DISULFIDE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 1 J 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>2 J 15SB0460610<br>3 J 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>2 J 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CHLOROBENZENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CHLORODIBROMOMETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CHLOROETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CHLOROFORM | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CHLOROMETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CHLOROPRENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CIS-1,2-DICHLOROETHENE | 1.04 U 15SS0430002<br>2 J 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| CIS-1,3-DICHLOROPROPENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| DIBROMOMETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| DICHLORODIFLUOROMETHANE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 UR 15SS0470002 | 0.932 UR 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 UR 15SB0480610<br>0.867 U 15SB0481015 |
| ETHYL METHACRYLATE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |

APPEND. ,LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| ETHYLBENZENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| ISOBUTANOL | 41.8 UR 15SS0430002<br>37.3 UR 15SB0430206 | 38.9 UR 15SS0440002<br>32.6 UR 15SB0440206 | 36.3 UR 15SS0450002<br>38 UR 15SB0450206<br>38 UR 15SB0450610<br>37.1 UR 15SB0451012 | 37.1 UR 15SS0460002<br>35.1 UR 15SB0460206<br>41.5 UR 15SB0460610<br>51.2 UR 15SB0461020 | 35.2 UR 15SS0470002 | 37.3 UR 15SS0480002<br>35.9 UR 15SB0480206-D<br>44 UR 15SB0480610<br>34.7 UR 15SB0481015 |
| METHACRYLONITRILE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| METHYL IODIDE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| METHYL METHACRYLATE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| METHYL TERT-BUTYL ETHER | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| METHYLENE CHLORIDE | 4 U 15SS0430002<br>15 J 15SB0430206 | 7 U 15SS0440002<br>12 J 15SB0440206 | 4 U 15SS0450002<br>10 U 15SB0450206<br>54 J 15SB0450610<br>13 J 15SB0451012 | 4 U 15SS0460002<br>10 U 15SB0460206<br>33 J 15SB0460610<br>21 J 15SB0461020 | 6 J 15SS0470002 | 10 J 15SS0480002<br>5 J 15SB0480206-D<br>3 J 15SB0480610<br>11 J 15SB0481015 |
| PROPIONITRILE | 41.8 UR 15SS0430002<br>37.3 UR 15SB0430206 | 38.9 UR 15SS0440002<br>32.6 UR 15SB0440206 | 36.3 UR 15SS0450002<br>38 UR 15SB0450206<br>38 UR 15SB0450610<br>37.1 UR 15SB0451012 | 37.1 UR 15SS0460002<br>35.1 UR 15SB0460206<br>41.5 UR 15SB0460610<br>51.2 UR 15SB0461020 | 35.2 UR 15SS0470002 | 37.3 UR 15SS0480002<br>35.9 UR 15SB0480206-D<br>44 UR 15SB0480610<br>34.7 UR 15SB0481015 |
| STYRENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| TETRACHLOROETHENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| TOLUENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| TOTAL XYLENES | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| TRANS-1,2-DICHLOROETHENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| TRANS-1,3-DICHLOROPROPENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| TRANS-1,4-DICHLORO-2-BUTENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| TRICHLOROETHENE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| TRICHLOROFLUOROMETHANE | 1.04 U 15SS0430002<br>1 J 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>3 15SB0450610<br>1 J 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>2 J 15SB0460610<br>2 J 15SB0461020 | 0.88 U 15SS0470002 | 1 J 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| VINYL ACETATE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| VINYL CHLORIDE | 1.04 U 15SS0430002<br>0.933 U 15SB0430206 | 0.972 U 15SS0440002<br>0.815 U 15SB0440206 | 0.908 U 15SS0450002<br>0.95 U 15SB0450206<br>0.95 U 15SB0450610<br>0.928 U 15SB0451012 | 0.927 U 15SS0460002<br>0.878 U 15SB0460206<br>1.04 U 15SB0460610<br>1.28 U 15SB0461020 | 0.88 U 15SS0470002 | 0.932 U 15SS0480002<br>0.899 U 15SB0480206-D<br>1.1 U 15SB0480610<br>0.867 U 15SB0481015 |
| **Semivolatile Organics (ug/kg)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 1,2,4-TRICHLOROBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 1,2-DICHLOROBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 1,3-DICHLOROBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 1,4-DICHLOROBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 1,4-DIOXANE | 122 U 15SS0430002 | 118 U 15SS0440002 | 115 U 15SS0450002<br>114 U 15SB0450206 | 119 U 15SS0460002<br>120 U 15SB0460206 | 113 U 15SS0470002 | 117 U 15SS0480002<br>114 U 15SB0480206-D |

APPENDIX LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| 1,4-NAPHTHOQUINONE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 1,4-PHENYLENEDIAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 1-NAPHTHYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2,3,4,6-TETRACHLOROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2,4,5-TRICHLOROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2,4,6-TRICHLOROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2,4-DICHLOROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2,4-DIMETHYLPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2,4-DINITROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 UJ 15SS0470002 | 78.1 UJ 15SS0480002<br>76.2 UJ 15SB0480206-D |
| 2,6-DICHLOROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2-ACETYLAMINOFLUORENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2-CHLORONAPHTHALENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2-CHLOROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2-METHYLNAPHTHALENE | 8 J 15SS0430002 | 6 J 15SS0440002 | 10 15SS0450002<br>18 15SB0450206 | 8 15SS0460002<br>3.97 U 15SB0460206 | 5 J 15SS0470002 | 6 J 15SS0480002<br>3.75 U 15SB0480206-D |
| 2-METHYLPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| 2-NAPHTHYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2-NITROANILINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2-NITROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 2-PICOLINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 3&4-METHYLPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 3,3'-DICHLOROBENZIDINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 3,3'-DIMETHYLBENZIDINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 3-METHYLCHOLANTHRENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 3-NITROANILINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 4,6-DINITRO-2-METHYLPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 4-AMINOBIPHENYL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 4-BROMOPHENYL PHENYL ETHER | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 4-CHLORO-3-METHYLPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 4-CHLOROANILINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 4-CHLOROPHENYL PHENYL ETHER | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 4-NITROANILINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |

APPENDI[illegible]E G-1
RESULTS FOR CHEMICALS ANALYZ[illegible]N ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| 4-NITROPHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 4-NITROQUINOLINE-1-OXIDE | 81.4 UR 15SS0430002 | 79.4 UR 15SS0440002 | 77 UR 15SS0450002<br>76.7 UR 15SB0450206 | 79.7 UR 15SS0460002<br>80.6 UR 15SB0460206 | 75.6 UR 15SS0470002 | 78.1 UR 15SS0480002<br>76.2 UR 15SB0480206-D |
| 5-NITRO-O-TOLUIDINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| A,A-DIMETHYLPHENETHYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| ACENAPHTHENE | 26 15SS0430002 | 3.91 U 15SS0440002 | 3.79 U 15SS0450002<br>3.78 U 15SB0450206 | 6 J 15SS0460002<br>3.97 U 15SB0460206 | 3.72 U 15SS0470002 | 3.85 U 15SS0480002<br>3.75 U 15SB0480206-D |
| ACENAPHTHYLENE | 4.01 U 15SS0430002 | 3.91 U 15SS0440002 | 3.79 U 15SS0450002<br>3.78 U 15SB0450206 | 26 15SS0460002<br>3.97 U 15SB0460206 | 7 J 15SS0470002 | 3.85 U 15SS0480002<br>3.75 U 15SB0480206-D |
| ACETOPHENONE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 150 J 15SS0460002<br>140 J 15SB0460206 | 75.6 U 15SS0470002 | 310 U 15SS0480002<br>89 U 15SB0480206-D |
| ANILINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| ANTHRACENE | 56 15SS0430002 | 6 J 15SS0440002 | 3.79 U 15SS0450002<br>3.78 U 15SB0450206 | 38 15SS0460002<br>3.97 U 15SB0460206 | 14 15SS0470002 | 5 J 15SS0480002<br>3.75 U 15SB0480206-D |
| ARAMITE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| BENZO(A)ANTHRACENE | 110 15SS0430002 | 35 15SS0440002 | 24 15SS0450002<br>8 15SB0450206 | 210 15SS0460002<br>14 15SB0460206 | 85 15SS0470002 | 3.85 UJ 15SS0480002<br>3.75 U 15SB0480206-D |
| BENZO(A)PYRENE | 100 15SS0430002 | 36 15SS0440002 | 52 15SS0450002<br>10 15SB0450206 | 210 15SS0460002<br>12 15SB0460206 | 61 J 15SS0470002 | 3.85 U 15SS0480002<br>3.75 UJ 15SB0480206-D |
| BENZO(B)FLUORANTHENE | 100 15SS0430002 | 48 15SS0440002 | 80 15SS0450002<br>18 15SB0450206 | 340 15SS0460002<br>22 15SB0460206 | 73 J 15SS0470002 | 3.85 U 15SS0480002<br>3.75 UJ 15SB0480206-D |
| BENZO(G,H,I)PERYLENE | 140 15SS0430002 | 48 15SS0440002 | 86 15SS0450002<br>19 15SB0450206 | 260 15SS0460002<br>16 15SB0460206 | 58 J 15SS0470002 | 3.85 U 15SS0480002<br>3.75 UJ 15SB0480206-D |
| BENZO(K)FLUORANTHENE | 52 15SS0430002 | 33 15SS0440002 | 47 15SS0450002<br>3.78 U 15SB0450206 | 170 15SS0460002<br>9 15SB0460206 | 43 J 15SS0470002 | 3.85 U 15SS0480002<br>3.75 UJ 15SB0480206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| BENZYL ALCOHOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| BIS(2-CHLOROETHOXY)METHANE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| BIS(2-CHLOROETHYL)ETHER | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| BIS(2-ETHYLHEXYL)PHTHALATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| BUTYL BENZYL PHTHALATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| CHLOROBENZILATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| CHRYSENE | 130 15SS0430002 | 63 15SS0440002 | 63 15SS0450002<br>19 15SB0450206 | 270 15SS0460002<br>18 15SB0460206 | 83 15SS0470002 | 3.85 UJ 15SS0480002<br>3.75 U 15SB0480206-D |
| DI-N-BUTYL PHTHALATE | 81.4 U 15SS0430002 | 290 J 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>180 J 15SB0460206 | 75.6 U 15SS0470002 | 240 J 15SS0480002<br>76.2 U 15SB0480206-D |
| DI-N-OCTYL PHTHALATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| DIALLATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| DIBENZO(A,H)ANTHRACENE | 4.01 U 15SS0430002 | 3.91 U 15SS0440002 | 18 15SS0450002<br>3.78 U 15SB0450206 | 75 15SS0460002<br>3.97 U 15SB0460206 | 3.72 UJ 15SS0470002 | 3.85 U 15SS0480002<br>3.75 UJ 15SB0480206-D |
| DIBENZOFURAN | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| DIETHYL PHTHALATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| DIMETHYL PHTHALATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| DIPHENYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| ETHYL METHANE SULFONATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |

APPENDI. .E G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| FLUORANTHENE | 240 15SS0430002 | 88 15SS0440002 | 40 15SS0450002<br>12 15SB0450206 | 210 15SS0460002<br>16 15SB0460206 | 110 15SS0470002 | 5 J 15SS0480002<br>3.75 U 15SB0480206-D |
| FLUORENE | 28 15SS0430002 | 3.91 U 15SS0440002 | 3.79 U 15SS0450002<br>4 J 15SB0450206 | 6 J 15SS0460002<br>3.97 U 15SB0460206 | 3.72 U 15SS0470002 | 3.85 U 15SS0480002<br>3.75 U 15SB0480206-D |
| HEXACHLOROBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| HEXACHLOROBUTADIENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| HEXACHLOROCYCLOPENTADIENE | 81.4 UJ 15SS0430002 | 79.4 UJ 15SS0440002 | 77 UJ 15SS0450002<br>76.7 UR 15SB0450206 | 79.7 UJ 15SS0460002<br>80.6 UJ 15SB0460206 | 75.6 UJ 15SS0470002 | 78.1 UJ 15SS0480002<br>76.2 UJ 15SB0480206-D |
| HEXACHLOROETHANE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| HEXACHLOROPROPENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| INDENO(1,2,3-CD)PYRENE | 89 15SS0430002 | 38 15SS0440002 | 57 15SS0450002<br>9 15SB0450206 | 210 15SS0460002<br>12 15SB0460206 | 43 J 15SS0470002 | 3.85 U 15SS0480002<br>3.75 UJ 15SB0480206-D |
| ISODRIN | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| ISOPHORONE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| ISOSAFROLE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>6000 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| KEPONE | 81.4 UR 15SS0430002 | 79.4 UR 15SS0440002 | 77 UR 15SS0450002<br>76.7 UR 15SB0450206 | 79.7 UR 15SS0460002<br>80.6 UR 15SB0460206 | 75.6 UJ 15SS0470002 | 78.1 UJ 15SS0480002<br>76.2 UJ 15SB0480206-D |
| METHAPYRILENE | 81.4 UJ 15SS0430002 | 79.4 UJ 15SS0440002 | 77 UJ 15SS0450002<br>76.7 UJ 15SB0450206 | 79.7 UJ 15SS0460002<br>80.6 UJ 15SB0460206 | 75.6 UJ 15SS0470002 | 78.1 UJ 15SS0480002<br>76.2 UJ 15SB0480206-D |
| METHYL METHANE SULFONATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| N-NITROSO-DI-N-BUTYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| N-NITROSO-DI-N-PROPYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| N-NITROSODIETHYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| N-NITROSODIMETHYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| N-NITROSODIPHENYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| N-NITROSOMETHYLETHYLAMINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| N-NITROSOMORPHOLINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 UJ 15SS0470002 | 78.1 UJ 15SS0480002<br>76.2 UJ 15SB0480206-D |
| N-NITROSOPIPERIDINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| N-NITROSOPYRROLIDINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| NAPHTHALENE | 16 15SS0430002 | 5 J 15SS0440002 | 7 J 15SS0450002<br>7 J 15SB0450206 | 8 15SS0460002<br>6 J 15SB0460206 | 3.72 U 15SS0470002 | 3.85 U 15SS0480002<br>3.75 U 15SB0480206-D |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| O-TOLUIDINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| P-(DIMETHYLAMINO)AZOBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| PENTACHLOROBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| PENTACHLOROETHANE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| PENTACHLORONITROBENZENE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| PHENACETIN | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| PHENANTHRENE | 270 15SS0430002 | 47 15SS0440002 | 25 15SS0450002<br>42 15SB0450206 | 46 15SS0460002<br>6 J 15SB0460206 | 63 15SS0470002 | 5 J 15SS0480002<br>6 J 15SB0480206-D |

APPENDI LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| PHENOL | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| PRONAMIDE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| PYRENE | 320 15SS0430002 | 140 15SS0440002 | 85 15SS0450002<br>24 15SB0450206 | 330 15SS0460002<br>26 15SB0460206 | 140 15SS0470002 | 7 J 15SS0480002<br>14 15SB0480206-D |
| PYRIDINE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| SAFROLE | 81.4 U 15SS0430002 | 79.4 U 15SS0440002 | 77 U 15SS0450002<br>76.7 U 15SB0450206 | 79.7 U 15SS0460002<br>80.6 U 15SB0460206 | 75.6 U 15SS0470002 | 78.1 U 15SS0480002<br>76.2 U 15SB0480206-D |
| **Pesticides PCBs (ug/kg)** | | | | | | |
| 4,4'-DDD | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 3.3 J 15SS0480002<br>2.3 J 15SB0480206 |
| 4,4'-DDE | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 1.66 U 15SS0480002<br>1.59 U 15SB0480206 |
| 4,4'-DDT | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 1.66 U 15SS0480002<br>1.59 J 15SB0480206 |
| ALDRIN | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| ALPHA-BHC | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| ALPHA-CHLORDANE | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| AROCLOR-1016 | | | 10.3 U 15SS0450002<br>10.3 U 15SB0450206 | 10.7 U 15SS0460002<br>10.8 U 15SB0460206 | 11.5 UJ 15SS0470002 | 11.1 UJ 15SS0480002<br>10.6 UJ 15SB0480206 |
| AROCLOR-1221 | | | 10.3 U 15SS0450002<br>10.3 U 15SB0450206 | 10.7 U 15SS0460002<br>10.8 U 15SB0460206 | 11.5 U 15SS0470002 | 11.1 U 15SS0480002<br>10.6 U 15SB0480206 |
| AROCLOR-1232 | | | 10.3 U 15SS0450002<br>10.3 U 15SB0450206 | 10.7 U 15SS0460002<br>10.8 U 15SB0460206 | 11.5 U 15SS0470002 | 11.1 U 15SS0480002<br>10.6 U 15SB0480206 |
| AROCLOR-1242 | | | 10.3 U 15SS0450002<br>10.3 U 15SB0450206 | 10.7 U 15SS0460002<br>10.8 U 15SB0460206 | 11.5 U 15SS0470002 | 11.1 U 15SS0480002<br>10.6 U 15SB0480206 |
| AROCLOR-1248 | | | 10.3 U 15SS0450002<br>10.3 U 15SB0450206 | 10.7 U 15SS0460002<br>10.8 U 15SB0460206 | 11.5 U 15SS0470002 | 11.1 U 15SS0480002<br>10.6 U 15SB0480206 |
| AROCLOR-1254 | | | 10.3 U 15SS0450002<br>10.3 U 15SB0450206 | 10.7 U 15SS0460002<br>10.8 U 15SB0460206 | 11.5 U 15SS0470002 | 11.1 U 15SS0480002<br>10.6 U 15SB0480206 |
| AROCLOR-1260 | | | 10.3 U 15SS0450002<br>10.3 U 15SB0450206 | 10.7 U 15SS0460002<br>10.8 U 15SB0460206 | 11.5 U 15SS0470002 | 11.1 U 15SS0480002<br>10.6 U 15SB0480206 |
| BETA-BHC | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| DELTA-BHC | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| DIELDRIN | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 1.66 U 15SS0480002<br>1.59 U 15SB0480206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| ENDOSULFAN I | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| ENDOSULFAN II | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 1.66 U 15SS0480002<br>1.59 U 15SB0480206 |
| ENDOSULFAN SULFATE | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 1.66 U 15SS0480002<br>1.59 U 15SB0480206 |
| ENDRIN ALDEHYDE | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 1.66 U 15SS0480002<br>1.59 U 15SB0480206 |
| ENDRIN KETONE | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 1.66 U 15SS0480002<br>1.59 U 15SB0480206 |
| ENDRIN | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.73 U 15SS0470002 | 1.66 U 15SS0480002<br>1.59 U 15SB0480206 |
| GAMMA-BHC (LINDANE) | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| GAMMA-CHLORDANE | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| HEPTACHLOR EPOXIDE | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| HEPTACHLOR | | | 0.747 U 15SS0450002<br>0.744 U 15SB0450206 | 0.773 U 15SS0460002<br>0.782 U 15SB0460206 | 0.831 U 15SS0470002 | 0.8 U 15SS0480002<br>0.767 U 15SB0480206 |
| METHOXYCHLOR | | | 7.47 U 15SS0450002<br>7.44 U 15SB0450206 | 7.73 U 15SS0460002<br>7.82 U 15SB0460206 | 8.31 U 15SS0470002 | 8 U 15SS0480002<br>7.67 U 15SB0480206 |
| TOXAPHENE | | | 19.5 U 15SS0450002<br>19.5 U 15SB0450206 | 20.2 U 15SS0460002<br>20.5 U 15SB0460206 | 21.7 U 15SS0470002 | 20.9 U 15SS0480002<br>20 U 15SB0480206 |
| **Herbicides (ug/kg)** | | | | | | |
| 2,4,5-T | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.52 U 15SS0470002 | 1.57 U 15SS0480002<br>1.54 U 15SB0480206-D |
| 2,4,5-TP (SILVEX) | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.52 U 15SS0470002 | 1.57 U 15SS0480002<br>1.54 U 15SB0480206-D |
| 2,4-D | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.52 U 15SS0470002 | 1.57 U 15SS0480002<br>1.54 U 15SB0480206-D |
| DINOSEB | | | 1.55 U 15SS0450002<br>1.54 U 15SB0450206 | 1.61 U 15SS0460002<br>1.62 U 15SB0460206 | 1.52 U 15SS0470002 | 1.57 U 15SS0480002<br>1.54 U 15SB0480206-D |
| HEXACHLOROPHENE | | | 0.977 U 15SS0450002<br>0.973 U 15SB0450206 | 1.01 U 15SS0460002<br>1.02 U 15SB0460206 | 0.959 U 15SS0470002 | 0.991 U 15SS0480002<br>0.967 U 15SB0480206-D |
| PENTACHLOROPHENOL | | | 0.517 U 15SS0450002<br>0.515 U 15SB0450206 | 0.535 U 15SS0460002<br>0.542 U 15SB0460206 | 0.508 U 15SS0470002 | 0.524 U 15SS0480002<br>0.512 U 15SB0480206-D |
| **Inorganics (mg/kg)** | | | | | | |
| ALUMINUM | 16400 J 15SS0430002 | 24700 J 15SS0440002 | 19300 J 15SS0450002<br>14400 J 15SB0450206 | 22600 J 15SS0460002<br>19100 J 15SB0460206 | 21100 J 15SS0470002 | 20100 J 15SS0480002<br>20400 J 15SB0480206-D |
| ANTIMONY | 0.35 U 15SS0430002 | 0.32 U 15SS0440002 | 0.32 U 15SS0450002<br>0.24 U 15SB0450206 | 0.32 U 15SS0460002<br>0.25 U 15SB0460206 | 0.2 U 15SS0470002 | 0.37 U 15SS0480002<br>0.39 U 15SB0480206-D |
| ARSENIC | 8.5 J 15SS0430002 | 6.1 J 15SS0440002 | 11.8 J 15SS0450002<br>7.2 J 15SB0450206 | 8.3 J 15SS0460002<br>5.2 J 15SB0460206 | 9.9 J 15SS0470002 | 8.4 J 15SS0480002<br>17.5 J 15SB0480206-D |

APPENDIX G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| BARIUM | 60.1 J 15SS0430002 | 113 J 15SS0440002 | 87.1 J 15SS0450002<br>65.8 J 15SB0450206 | 69.2 J 15SS0460002<br>69.3 J 15SB0460206 | 84.5 J 15SS0470002 | 87.1 J 15SS0480002<br>104 J 15SB0480206-D |
| BERYLLIUM | 0.97 15SS0430002 | 0.85 15SS0440002 | 0.6 15SS0450002<br>0.79 15SB0450206 | 0.64 15SS0460002<br>0.55 15SB0460206 | 0.59 15SS0470002 | 0.77 J 15SS0480002<br>0.71 J 15SB0480206-D |
| CADMIUM | 0.21 J 15SS0430002 | 0.18 J 15SS0440002 | 0.25 J 15SS0450002<br>0.27 J 15SB0450206 | 0.26 J 15SS0460002<br>0.22 J 15SB0460206 | 0.25 J 15SS0470002 | 0.86 J 15SS0480002<br>0.59 15SB0480206-D |
| CALCIUM | 1270 J 15SS0430002 | 4000 J 15SS0440002 | 9140 J 15SS0450002<br>22900 J 15SB0450206 | 3300 J 15SS0460002<br>1400 J 15SB0460206 | 2280 J 15SS0470002 | 32700 J 15SS0480002<br>29200 J 15SB0480206-D |
| CHROMIUM | 40.2 J 15SS0430002 | 36.8 J 15SS0440002 | 21 J 15SS0450002<br>26.5 J 15SB0450206 | 25.1 J 15SS0460002<br>21.4 J 15SB0460206 | 23 J 15SS0470002 | 23.3 J 15SS0480002<br>22.5 J 15SB0480206-D |
| COBALT | 5.3 J 15SS0430002 | 5.1 J 15SS0440002 | 6.4 J 15SS0450002<br>7.4 J 15SB0450206 | 5.1 J 15SS0460002<br>10.2 J 15SB0460206 | 4.3 J 15SS0470002 | 7 J 15SS0480002<br>11 J 15SB0480206-D |
| COPPER | 13.3 J 15SS0430002 | 16.8 J 15SS0440002 | 9.2 J 15SS0450002<br>11.9 J 15SB0450206 | 13 J 15SS0460002<br>10.2 J 15SB0460206 | 15.8 J 15SS0470002 | 10.7 J 15SS0480002<br>15.1 J 15SB0480206-D |
| IRON | 46500 J 15SS0430002 | 34300 J 15SS0440002 | 16300 J 15SS0450002<br>20000 J 15SB0450206 | 24300 J 15SS0460002<br>19000 J 15SB0460206 | 25300 J 15SS0470002 | 23500 J 15SS0480002<br>21800 J 15SB0480206-D |
| LEAD | 13.4 J 15SS0430002 | 11 J 15SS0440002 | 10.6 J 15SS0450002<br>9.5 J 15SB0450206 | 11 J 15SS0460002<br>9.2 J 15SB0460206 | 16.1 J 15SS0470002 | 14.8 J 15SS0480002<br>26.4 J 15SB0480206-D |
| MAGNESIUM | 1290 J 15SS0430002 | 2540 J 15SS0440002 | 3020 J 15SS0450002<br>3550 J 15SB0450206 | 3560 J 15SS0460002<br>2090 J 15SB0460206 | 2890 J 15SS0470002 | 3550 J 15SS0480002<br>3530 J 15SB0480206-D |
| MANGANESE | 170 15SS0430002 | 116 15SS0440002 | 156 15SS0450002<br>241 15SB0450206 | 246 15SS0460002<br>101 15SB0460206 | 180 J 15SS0470002 | 346 J 15SS0480002<br>333 J 15SB0480206-D |
| MERCURY | 0.007 U 15SS0430002 | 0.05 J 15SS0440002 | 0.031 J 15SS0450002<br>0.012 J 15SB0450206 | 0.026 J 15SS0460002<br>0.007 U 15SB0460206 | 0.083 J 15SS0470002 | 0.038 J 15SS0480002<br>0.015 J 15SB0480206-D |
| NICKEL | 15.7 J 15SS0430002 | 16.7 J 15SS0440002 | 12.7 J 15SS0450002<br>21.6 J 15SB0450206 | 13.2 J 15SS0460002<br>12 J 15SB0460206 | 13.6 J 15SS0470002 | 14.3 J 15SS0480002<br>17.9 J 15SB0480206-D |
| POTASSIUM | 1130 J 15SS0430002 | 2720 J 15SS0440002 | 1510 J 15SS0450002<br>2350 J 15SB0450206 | 1550 J 15SS0460002<br>1050 J 15SB0460206 | 1660 J 15SS0470002 | 1740 J 15SS0480002<br>1640 J 15SB0480206-D |
| SELENIUM | 0.31 J 15SS0430002 | 0.33 J 15SS0440002 | 0.29 J 15SS0450002<br>0.36 J 15SB0450206 | 0.33 J 15SS0460002<br>0.16 J 15SB0460206 | 0.46 J 15SS0470002 | 0.39 J 15SS0480002<br>0.4 J 15SB0480206-D |
| SILVER | 0.045 U 15SS0430002 | 0.046 U 15SS0440002 | 0.04 J 15SS0450002<br>0.044 U 15SB0450206 | 0.05 U 15SS0460002<br>0.05 J 15SB0460206 | 0.044 U 15SS0470002 | 0.05 U 15SS0480002<br>0.044 U 15SB0480206-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB043<br>12/10/2004 | 15SB044<br>12/10/2004 | 15SB045<br>12/10/2004 | 15SB046<br>12/10/2004 | 15SB047<br>12/9/2004 | 15SB048<br>12/9/2004 |
|---|---|---|---|---|---|---|
| SODIUM | 76.4 J 15SS0430002 | 142 J 15SS0440002 | 99.9 J 15SS0450002<br>120 J 15SB0450206 | 126 J 15SS0460002<br>82.3 J 15SB0460206 | 121 U 15SS0470002 | 87.7 J 15SS0480002<br>100 U 15SB0480206-D |
| THALLIUM | 0.19 U 15SS0430002 | 0.28 U 15SS0440002 | 0.26 U 15SS0450002<br>0.17 U 15SB0450206 | 0.28 U 15SS0460002<br>0.23 U 15SB0460206 | 0.37 J 15SS0470002 | 0.26 U 15SS0480002<br>0.39 J 15SB0480206-D |
| TIN | 0.63 U 15SS0430002 | 0.67 U 15SS0440002 | 0.66 U 15SS0450002<br>0.5 U 15SB0450206 | 0.71 U 15SS0460002<br>0.71 U 15SB0460206 | 0.36 U 15SS0470002 | 0.56 U 15SS0480002<br>0.65 U 15SB0480206-D |
| VANADIUM | 37.2 J 15SS0430002 | 34.5 J 15SS0440002 | 30.4 J 15SS0450002<br>23.8 J 15SB0450206 | 40.5 J 15SS0460002<br>31 J 15SB0460206 | 39.4 15SS0470002 | 37.3 J 15SS0480002<br>36 15SB0480206-D |
| ZINC | 38.1 J 15SS0430002 | 30.6 J 15SS0440002 | 40.6 J 15SS0450002<br>42.3 J 15SB0450206 | 36.7 J 15SS0460002<br>26 J 15SB0460206 | 42.7 J 15SS0470002 | 43.7 15SS0480002<br>63.5 J 15SB0480206-D |

APPENDI .E G-1
RESULTS FOR CHEMICALS ANALYZ. .N ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| **Volatile Organics (ug/kg)** | | |
| 1,1,1,2-TETRACHLOROETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,1,1-TRICHLOROETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,1,2,2-TETRACHLOROETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,1,2-TRICHLOROETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,1-DICHLOROETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,1-DICHLOROETHENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,2,3-TRICHLOROPROPANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,2-DIBROMO-3-CHLOROPROPANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,2-DIBROMOETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,2-DICHLOROETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 1,2-DICHLOROPROPANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 2-BUTANONE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>4 J 15SB0620206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| 2-HEXANONE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 3-CHLOROPROPENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| 4-METHYL-2-PENTANONE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| ACETONE | 12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>32 J 15SB0620206 |
| ACETONITRILE | 44.7 UR 15SS0490002 | 43.6 UR 15SS0620002-D<br>49.5 UR 15SB0620206 |
| ACROLEIN | 1.12 UR 15SS0490002 | 1.09 UR 15SS0620002-D<br>1.24 UR 15SB0620206 |
| ACRYLONITRILE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| BENZENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| BROMODICHLOROMETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| BROMOFORM | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| BROMOMETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CARBON DISULFIDE | 1.12 UJ 15SS0490002 | 1.09 UJ 15SS0620002-D<br>1.24 UJ 15SB0620206 |

APPENDI' 'LE G-1
RESULTS FOR CHEMICALS ANALY. 'N ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| CARBON TETRACHLORIDE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CHLOROBENZENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CHLORODIBROMOMETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CHLOROETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CHLOROFORM | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CHLOROMETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CHLOROPRENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CIS-1,2-DICHLOROETHENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| CIS-1,3-DICHLOROPROPENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| DIBROMOMETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| DICHLORODIFLUOROMETHANE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| ETHYL METHACRYLATE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| ETHYLBENZENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| ISOBUTANOL | 44.7 UR 15SS0490002 | 43.6 UR 15SS0620002-D<br>49.5 UR 15SB0620206 |
| METHACRYLONITRILE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| METHYL IODIDE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| METHYL METHACRYLATE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| METHYL TERT-BUTYL ETHER | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| METHYLENE CHLORIDE | 28 J 15SS0490002 | 56 J 15SS0620002-D<br>1.24 UJ 15SB0620206 |
| PROPIONITRILE | 44.7 UR 15SS0490002 | 43.6 UR 15SS0620002-D<br>49.5 UR 15SB0620206 |
| STYRENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| TETRACHLOROETHENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| TOLUENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| TOTAL XYLENES | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |

APPENDI. LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| TRANS-1,2-DICHLOROETHENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| TRANS-1,3-DICHLOROPROPENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| TRANS-1,4-DICHLORO-2-BUTENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| TRICHLOROETHENE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| TRICHLOROFLUOROMETHANE | 2 J 15SS0490002 | 4 15SS0620002-D<br>1.24 U 15SB0620206 |
| VINYL ACETATE | 1.12 UJ 15SS0490002 | 1.09 UJ 15SS0620002-D<br>1.24 UJ 15SB0620206 |
| VINYL CHLORIDE | 1.12 U 15SS0490002 | 1.09 U 15SS0620002-D<br>1.24 U 15SB0620206 |
| **Semivolatile Organics (ug/kg)** | | |
| 1,2,4,5-TETRACHLOROBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 1,2,4-TRICHLOROBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 1,2-DICHLOROBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 1,3-DICHLOROBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 1,4-DICHLOROBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 1,4-DIOXANE | 128 U 15SS0490002 | 121 U 15SS0620002-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| 1,4-NAPHTHOQUINONE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 1,4-PHENYLENEDIAMINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 1-NAPHTHYLAMINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2,3,4,6-TETRACHLOROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2,4,5-TRICHLOROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2,4,6-TRICHLOROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2,4-DICHLOROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2,4-DIMETHYLPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2,4-DINITROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2,6-DICHLOROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2-ACETYLAMINOFLUORENE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |
| 2-CHLORONAPHTHALENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2-CHLOROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2-METHYLNAPHTHALENE | 16.9 U 15SS0490002 | 4 U 15SS0620002-D |
| 2-METHYLPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |

APPENDIX LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| 2-NAPHTHYLAMINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2-NITROANILINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2-NITROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 2-PICOLINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 3&4-METHYLPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 3,3'-DICHLOROBENZIDINE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |
| 3,3'-DIMETHYLBENZIDINE | 86 UJ 15SS0490002 | 81.1 UJ 15SS0620002-D |
| 3-METHYLCHOLANTHRENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 3-NITROANILINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 4,6-DINITRO-2-METHYLPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 4-AMINOBIPHENYL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 4-BROMOPHENYL PHENYL ETHER | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 4-CHLORO-3-METHYLPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 4-CHLOROANILINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 4-CHLOROPHENYL PHENYL ETHER | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 4-NITROANILINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| 4-NITROPHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 4-NITROQUINOLINE-1-OXIDE | 86 UR 15SS0490002 | 81.1 UR 15SS0620002-D |
| 5-NITRO-O-TOLUIDINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| A,A-DIMETHYLPHENETHYLAMINE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |
| ACENAPHTHENE | 16.9 U 15SS0490002 | 4 U 15SS0620002-D |
| ACENAPHTHYLENE | 87 15SS0490002 | 4 U 15SS0620002-D |
| ACETOPHENONE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| ANILINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| ANTHRACENE | 120 15SS0490002 | 4 U 15SS0620002-D |
| ARAMITE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| BENZO(A)ANTHRACENE | 850 15SS0490002 | 4 U 15SS0620002-D |
| BENZO(A)PYRENE | 820 15SS0490002 | 4 U 15SS0620002-D |
| BENZO(B)FLUORANTHENE | 970 15SS0490002 | 4 U 15SS0620002-D |
| BENZO(G,H,I)PERYLENE | 710 15SS0490002 | 4 U 15SS0620002-D |
| BENZO(K)FLUORANTHENE | 750 15SS0490002 | 4 U 15SS0620002-D |

APPENDI. .E G-1
RESULTS FOR CHEMICALS ANALYZ.. IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| BENZYL ALCOHOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| BIS(2-CHLOROETHOXY)METHANE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| BIS(2-CHLOROETHYL)ETHER | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| BIS(2-ETHYLHEXYL)PHTHALATE | 150 J 15SS0490002 | 81.1 U 15SS0620002-D |
| BUTYL BENZYL PHTHALATE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |
| CHLOROBENZILATE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |
| CHRYSENE | 1100 15SS0490002 | 4 U 15SS0620002-D |
| DI-N-BUTYL PHTHALATE | 130 J 15SS0490002 | 81.1 U 15SS0620002-D |
| DI-N-OCTYL PHTHALATE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| DIALLATE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| DIBENZO(A,H)ANTHRACENE | 220 15SS0490002 | 4 U 15SS0620002-D |
| DIBENZOFURAN | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| DIETHYL PHTHALATE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| DIMETHYL PHTHALATE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| DIPHENYLAMINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| ETHYL METHANE SULFONATE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| FLUORANTHENE | 940 15SS0490002 | 4 U 15SS0620002-D |
| FLUORENE | 16.9 U 15SS0490002 | 4 U 15SS0620002-D |
| HEXACHLOROBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| HEXACHLOROBUTADIENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| HEXACHLOROCYCLOPENTADIENE | 86 UJ 15SS0490002 | 81.1 UJ 15SS0620002-D |
| HEXACHLOROETHANE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| HEXACHLOROPROPENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| INDENO(1,2,3-CD)PYRENE | 650 15SS0490002 | 4 U 15SS0620002-D |
| ISODRIN | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| ISOPHORONE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| ISOSAFROLE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| KEPONE | 86 UJ 15SS0490002 | 81.1 UJ 15SS0620002-D |
| METHAPYRILENE | 86 U 15SS0490002 | 81.1 UJ 15SS0620002-D |
| METHYL METHANE SULFONATE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| N-NITROSO-DI-N-BUTYLAMINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| N-NITROSO-DI-N-PROPYLAMINE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |

APPENDI. .E G-1
RESULTS FOR CHEMICALS ANALYZ.. IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| N-NITROSODIETHYLAMINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| N-NITROSODIMETHYLAMINE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |
| N-NITROSODIPHENYLAMINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| N-NITROSOMETHYLETHYLAMINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| N-NITROSOMORPHOLINE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |
| N-NITROSOPIPERIDINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| N-NITROSOPYRROLIDINE | 86 UJ 15SS0490002 | 81.1 U 15SS0620002-D |
| NAPHTHALENE | 16.9 U 15SS0490002 | 4 U 15SS0620002-D |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| O-TOLUIDINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| P-(DIMETHYLAMINO)AZOBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| PENTACHLOROBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| PENTACHLOROETHANE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| PENTACHLORONITROBENZENE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| PHENACETIN | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| PHENANTHRENE | 130 15SS0490002 | 4 U 15SS0620002-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| PHENOL | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| PRONAMIDE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| PYRENE | 1600 15SS0490002 | 4 U 15SS0620002-D |
| PYRIDINE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| SAFROLE | 86 U 15SS0490002 | 81.1 U 15SS0620002-D |
| **Pesticides PCBs (ug/kg)** | | |
| 4,4'-DDD | 2.7 J 15SS0490002 | 1.63 UJ 15SS0620002-D |
| 4,4'-DDE | 12 15SS0490002 | 1.63 UJ 15SS0620002-D |
| 4,4'-DDT | 14 15SS0490002 | 1.63 U 15SS0620002-D |
| ALDRIN | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| ALPHA-BHC | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| ALPHA-CHLORDANE | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| AROCLOR-1016 | 11.6 U 15SS0490002 | 10.9 U 15SS0620002-D |
| AROCLOR-1221 | 11.6 U 15SS0490002 | 10.9 U 15SS0620002-D |
| AROCLOR-1232 | 11.6 U 15SS0490002 | 10.9 U 15SS0620002-D |
| AROCLOR-1242 | 11.6 U 15SS0490002 | 10.9 U 15SS0620002-D |
| AROCLOR-1248 | 11.6 U 15SS0490002 | 10.9 U 15SS0620002-D |
| AROCLOR-1254 | 11.6 U 15SS0490002 | 10.9 U 15SS0620002-D |
| AROCLOR-1260 | 11.6 U 15SS0490002 | 10.9 U 15SS0620002-D |
| BETA-BHC | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| DELTA-BHC | 0.834 U 15SS0490002 | 0.787 UJ 15SS0620002-D |
| DIELDRIN | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |

APPENDI _E G-1
RESULTS FOR CHEMICALS ANALYZ_ _ IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| ENDOSULFAN I | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| ENDOSULFAN II | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| ENDOSULFAN SULFATE | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| ENDRIN ALDEHYDE | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| ENDRIN KETONE | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| ENDRIN | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| GAMMA-BHC (LINDANE) | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| GAMMA-CHLORDANE | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| HEPTACHLOR EPOXIDE | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| HEPTACHLOR | 0.834 U 15SS0490002 | 0.787 U 15SS0620002-D |
| METHOXYCHLOR | 8.34 U 15SS0490002 | 7.87 U 15SS0620002-D |
| TOXAPHENE | 21.8 U 15SS0490002 | 20.6 U 15SS0620002-D |
| **Herbicides (ug/kg)** | | |
| 2,4,5-T | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| 2,4,5-TP (SILVEX) | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| 2,4-D | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| DINOSEB | 1.73 U 15SS0490002 | 1.63 U 15SS0620002-D |
| HEXACHLOROPHENE | 1.09 U 15SS0490002 | 1.03 U 15SS0620002-D |
| PENTACHLOROPHENOL | 28 J 15SS0490002 | 0.545 U 15SS0620002-D |
| **Inorganics (mg/kg)** | | |
| ALUMINUM | 17800 J 15SS0490002 | 15200 J 15SS0620002-D |
| ANTIMONY | 0.5 U 15SS0490002 | 0.12 U 15SS0620002-D |
| ARSENIC | 8 J 15SS0490002 | 5.6 J 15SS0620002-D |

APPENDIX TABLE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| BARIUM | 110 J 15SS0490002 | 108 J 15SS0620002-D |
| BERYLLIUM | 1 15SS0490002 | 0.75 15SS0620002-D |
| CADMIUM | 0.4 J 15SS0490002 | 0.26 J 15SS0620002-D |
| CALCIUM | 3610 J 15SS0490002 | 1510 J 15SS0620002-D |
| CHROMIUM | 20.8 J 15SS0490002 | 18 J 15SS0620002-D |
| COBALT | 13.1 J 15SS0490002 | 12.4 J 15SS0620002-D |
| COPPER | 11.7 J 15SS0490002 | 7.6 J 15SS0620002-D |
| IRON | 20300 J 15SS0490002 | 14600 J 15SS0620002-D |
| LEAD | 25.6 J 15SS0490002 | 19.2 J 15SS0620002-D |
| MAGNESIUM | 1870 J 15SS0490002 | 1660 J 15SS0620002-D |
| MANGANESE | 687 J 15SS0490002 | 1470 J 15SS0620002-D |
| MERCURY | 0.035 J 15SS0490002 | 0.027 J 15SS0620002-D |
| NICKEL | 21.2 J 15SS0490002 | 14.6 J 15SS0620002-D |
| POTASSIUM | 1370 J 15SS0490002 | 1260 J 15SS0620002-D |
| SELENIUM | 0.55 15SS0490002 | 0.37 J 15SS0620002-D |
| SILVER | 0.07 U 15SS0490002 | 0.05 U 15SS0620002-D |

APPENDI LE G-1
RESULTS FOR CHEMICALS ANALYZED IN ALL SOIL SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION<br>SAMPLE DATE | 15SB049<br>12/14/2004 | 15SB062<br>12/14/2004 |
|---|---|---|
| SODIUM | 81.6 U 15SS0490002 | 75.7 U 15SS0620002-D |
| THALLIUM | 0.35 J 15SS0490002 | 0.39 J 15SS0620002-D |
| TIN | 0.53 U 15SS0490002 | 0.29 U 15SS0620002-D |
| VANADIUM | 30.1 15SS0490002 | 26.2 15SS0620002-D |
| ZINC | 56.4 J 15SS0490002 | 37.1 J 15SS0620002-D |

Data qualifiers (e.g., U, J) are defined in section 3 of the text.
ug/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
(1) - Locations 8-10, 33,34, 36,38,39,41,50-61 were not sampled at depth due to refusal or no visible signs of conatmination in soil core

APPENC LE G-2
RESULTS FOR CHEMICALS ANALYZED IN . SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD004 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 |
| SAMPLE NUMBER | 15ST00401 | 15ST00401-F | 15SW00601 | 15SW00601-D | 15SW00601-F | 15SW00601-F-D |
| SAMPLE CODE | NORMAL | NORMAL | ORIG | DUP | ORIG | DUP |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| **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 UJ | | 0.3 UJ | 0.3 UJ | | |
| 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 | | |
| 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 UJ | | 0.5 UJ | 0.5 UJ | | |
| 4-METHYL-2-PENTANONE | 0.5 U | | 0.5 U | 0.5 U | | |
| ACETONE | 0.5 U | | 0.5 U | 0.5 U | | |
| ACETONITRILE | 20 UR | | 20 UR | 20 UR | | |
| 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 UJ | | 0.3 UJ | 0.3 UJ | | |
| 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 | | 0.3 U | 0.3 U | | |
| 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 | | 0.3 U | 0.3 U | | |
| 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 UR | | 20 UR | 20 UR | | |
| METHACRYLONITRILE | 0.3 U | | 0.3 U | 0.3 U | | |
| METHYL IODIDE | 0.5 U | | 0.5 U | 0.5 U | | |
| METHYL METHACRYLATE | 0.5 U | | 0.5 U | 0.5 U | | |
| METHYL TERT-BUTYL ETHER | 0.5 U | | 0.5 U | 0.5 U | | |
| METHYLENE CHLORIDE | 0.3 UJ | | 0.3 UJ | 0.3 UJ | | |
| PROPIONITRILE | 20 UR | | 20 UR | 20 UR | | |
| 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 | | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD004 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 |
| SAMPLE NUMBER | 15ST00401 | 15ST00401-F | 15SW00601 | 15SW00601-D | 15SW00601-F | 15SW00601-F-D |
| SAMPLE CODE | NORMAL | NORMAL | ORIG | DUP | ORIG | DUP |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 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 | 0.3 U | | 0.3 U | 0.3 U | | |
| 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 | 0.3 U | | |
| **Semivolatile Organics (ug/L)** | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | 1 U | | 0.952 U | 0.962 U | | |
| 1,2,4-TRICHLOROBENZENE | 1 U | | 0.952 U | 0.962 U | | |
| 1,2-DICHLOROBENZENE | 1 U | | 0.952 U | 0.962 U | | |
| 1,3-DICHLOROBENZENE | 1 U | | 0.952 U | 0.962 U | | |
| 1,4-DICHLOROBENZENE | 1 U | | 0.952 U | 0.962 U | | |
| 1,4-DIOXANE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| 1,4-NAPHTHOQUINONE | 1 U | | 0.952 U | 0.962 U | | |
| 1,4-PHENYLENEDIAMINE | 1 U | | 0.952 U | 0.962 U | | |
| 1-NAPHTHYLAMINE | 1 U | | 0.952 U | 0.962 U | | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| 2,3,4,6-TETRACHLOROPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2,4,5-TRICHLOROPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2,4,6-TRICHLOROPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2,4-DICHLOROPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2,4-DIMETHYLPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2,4-DINITROPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2,6-DICHLOROPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2-ACETYLAMINOFLUORENE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| 2-CHLORONAPHTHALENE | 1 U | | 0.952 U | 0.962 U | | |
| 2-CHLOROPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2-METHYLNAPHTHALENE | 0.05 U | | 0.049 U | 0.053 U | | |
| 2-METHYLPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2-NAPHTHYLAMINE | 1 U | | 0.952 U | 0.962 U | | |
| 2-NITROANILINE | 1 U | | 0.952 U | 0.962 U | | |
| 2-NITROPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 2-PICOLINE | 1 U | | 0.952 U | 0.962 U | | |
| 3&4-METHYLPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 3,3'-DICHLOROBENZIDINE | 1 U | | 0.952 UR | 0.962 U | | |
| 3,3'-DIMETHYLBENZIDINE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| 3-METHYLCHOLANTHRENE | 1 U | | 0.952 U | 0.962 U | | |
| 3-NITROANILINE | 1 U | | 0.952 U | 0.962 U | | |
| 4,6-DINITRO-2-METHYLPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 4-AMINOBIPHENYL | 1 U | | 0.952 U | 0.962 U | | |
| 4-BROMOPHENYL PHENYL ETHER | 1 U | | 0.952 U | 0.962 U | | |
| 4-CHLORO-3-METHYLPHENOL | 1 U | | 0.952 U | 0.962 U | | |
| 4-CHLOROANILINE | 1 U | | 0.952 U | 0.962 U | | |
| 4-CHLOROPHENYL PHENYL ETHER | 1 U | | 0.952 U | 0.962 U | | |
| 4-NITROANILINE | 1 U | | 0.952 U | 0.962 U | | |
| 4-NITROPHENOL | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| 4-NITROQUINOLINE-1-OXIDE | 1 UR | | 0.952 UR | 0.962 UR | | |
| 5-NITRO-O-TOLUIDINE | 1 U | | 0.952 U | 0.962 U | | |

APPENDI LE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD004 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 |
| SAMPLE NUMBER | 15ST00401 | 15ST00401-F | 15SW00601 | 15SW00601-D | 15SW00601-F | 15SW00601-F-D |
| SAMPLE CODE | NORMAL | NORMAL | ORIG | DUP | ORIG | DUP |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 1 U | | 0.952 U | 0.962 U | | |
| A,A-DIMETHYLPHENETHYLAMINE | 1 U | | 0.952 U | 0.962 U | | |
| ACENAPHTHENE | 0.05 U | | 0.049 U | 0.053 U | | |
| ACENAPHTHYLENE | 0.05 U | | 0.049 U | 0.06 J | | |
| ACETOPHENONE | 1 U | | 0.952 U | 0.962 U | | |
| ANILINE | 1 U | | 0.952 U | 0.962 U | | |
| ANTHRACENE | 0.05 U | | 0.07 J | 0.1 J | | |
| ARAMITE | 1 U | | 0.952 U | 0.962 U | | |
| BENZO(A)ANTHRACENE | 0.05 U | | 0.25 | 0.31 | | |
| BENZO(A)PYRENE | 0.05 U | | 0.25 | 0.3 | | |
| BENZO(B)FLUORANTHENE | 0.05 U | | 0.56 | 0.65 | | |
| BENZO(G,H,I)PERYLENE | 0.05 U | | 0.24 | 0.3 | | |
| BENZO(K)FLUORANTHENE | 0.05 U | | 0.19 J | 0.29 J | | |
| BENZYL ALCOHOL | 1 U | | 0.952 U | 0.962 U | | |
| BIS(2-CHLOROETHOXY)METHANE | 1 U | | 0.952 U | 0.962 U | | |
| BIS(2-CHLOROETHYL)ETHER | 1 U | | 0.952 U | 0.962 U | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 1 U | | 0.952 U | 0.962 U | | |
| BUTYL BENZYL PHTHALATE | 1 U | | 0.952 U | 0.962 U | | |
| CHLOROBENZILATE | 1 U | | 0.952 U | 0.962 U | | |
| CHRYSENE | 0.05 U | | 0.48 | 0.56 | | |
| DI-N-BUTYL PHTHALATE | 1 U | | 0.952 U | 0.962 U | | |
| DI-N-OCTYL PHTHALATE | 1 U | | 0.952 U | 0.962 U | | |
| DIALLATE | 1 U | | 0.952 U | 0.962 U | | |
| DIBENZO(A,H)ANTHRACENE | 0.05 U | | 0.049 U | 0.053 U | | |
| DIBENZOFURAN | 1 U | | 0.952 U | 0.962 U | | |
| DIETHYL PHTHALATE | 1 U | | 0.952 U | 0.962 U | | |
| DIMETHYL PHTHALATE | 1 U | | 0.952 U | 0.962 U | | |
| DIPHENYLAMINE | 1 U | | 0.952 U | 0.962 U | | |
| ETHYL METHANE SULFONATE | 1 U | | 0.952 U | 0.962 U | | |
| FLUORANTHENE | 0.05 U | | 1.32 | 1.51 | | |
| FLUORENE | 0.05 U | | 0.049 U | 0.06 J | | |
| HEXACHLOROBENZENE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| HEXACHLOROBUTADIENE | 1 U | | 0.952 U | 0.962 U | | |
| HEXACHLOROCYCLOPENTADIENE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| HEXACHLOROETHANE | 1 U | | 0.952 U | 0.962 U | | |
| HEXACHLOROPROPENE | 1 U | | 0.952 U | 0.962 U | | |
| INDENO(1,2,3-CD)PYRENE | 0.05 U | | 0.22 | 0.26 | | |
| ISODRIN | 1 U | | 0.952 U | 0.962 U | | |
| ISOPHORONE | 1 U | | 0.952 U | 0.962 U | | |
| ISOSAFROLE | 1 U | | 0.952 U | 0.962 U | | |
| KEPONE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| METHAPYRILENE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| METHYL METHANE SULFONATE | 1 U | | 0.952 U | 0.962 U | | |
| N-NITROSO-DI-N-BUTYLAMINE | 1 U | | 0.952 U | 0.962 U | | |
| N-NITROSO-DI-N-PROPYLAMINE | 1 U | | 0.952 U | 0.962 U | | |
| N-NITROSODIETHYLAMINE | 1 U | | 0.952 U | 0.962 U | | |
| N-NITROSODIMETHYLAMINE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| N-NITROSODIPHENYLAMINE | 1 U | | 0.952 U | 0.962 U | | |
| N-NITROSOMETHYLETHYLAMINE | 1 U | | 0.952 U | 0.962 U | | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD004 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 |
| SAMPLE NUMBER | 15ST00401 | 15ST00401-F | 15SW00601 | 15SW00601-D | 15SW00601-F | 15SW00601-F-D |
| SAMPLE CODE | NORMAL | NORMAL | ORIG | DUP | ORIG | DUP |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| N-NITROSOMORPHOLINE | 1 U | | 0.952 U | 0.962 U | | |
| N-NITROSOPIPERIDINE | 1 U | | 0.952 U | 0.962 U | | |
| N-NITROSOPYRROLIDINE | 1 U | | 0.952 U | 0.962 U | | |
| NAPHTHALENE | 0.05 U | | 0.049 U | 0.053 U | | |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 1 U | | 0.952 U | 0.962 U | | |
| O-TOLUIDINE | 1 U | | 0.952 U | 0.962 U | | |
| P-(DIMETHYLAMINO)AZOBENZENE | 1 U | | 0.952 U | 0.962 U | | |
| PENTACHLOROBENZENE | 1 U | | 0.952 U | 0.962 U | | |
| PENTACHLOROETHANE | 1 U | | 0.952 U | 0.962 U | | |
| PENTACHLORONITROBENZENE | 1 U | | 0.952 U | 0.962 U | | |
| PHENACETIN | 1 U | | 0.952 U | 0.962 U | | |
| PHENANTHRENE | 0.05 U | | 0.47 | 0.63 | | |
| PHENOL | 1 U | | 0.952 U | 0.962 U | | |
| PRONAMIDE | 1 U | | 0.952 U | 0.962 U | | |
| PYRENE | 0.05 U | | 1.03 | 1.23 | | |
| PYRIDINE | 1 UJ | | 0.952 UJ | 0.962 UJ | | |
| SAFROLE | 1 U | | 0.952 U | 0.962 U | | |
| **Pesticides PCBs (ug/L)** | | | | | | |
| 4,4'-DDD | 0.052 U | | 0.048 U | 0.049 U | | |
| 4,4'-DDE | 0.052 U | | 0.048 U | 0.049 U | | |
| 4,4'-DDT | 0.052 U | | 0.048 U | 0.049 U | | |
| ALDRIN | 0.026 U | | 0.024 U | 0.024 U | | |
| ALPHA-BHC | 0.026 U | | 0.024 U | 0.024 U | | |
| ALPHA-CHLORDANE | 0.026 U | | 0.024 U | 0.024 U | | |
| AROCLOR-1016 | 0.258 U | | 0.24 U | 0.243 U | | |
| AROCLOR-1221 | 0.258 U | | 0.24 U | 0.243 U | | |
| AROCLOR-1232 | 0.258 U | | 0.24 U | 0.243 U | | |
| AROCLOR-1242 | 0.258 U | | 0.24 U | 0.243 U | | |
| AROCLOR-1248 | 0.258 U | | 0.24 U | 0.243 U | | |
| AROCLOR-1254 | 0.258 U | | 0.24 U | 0.243 U | | |
| AROCLOR-1260 | 0.258 U | | 0.24 U | 0.243 U | | |
| BETA-BHC | 0.026 U | | 0.024 U | 0.024 U | | |
| DELTA-BHC | 0.026 U | | 0.024 U | 0.024 U | | |
| DIELDRIN | 0.052 U | | 0.048 U | 0.049 U | | |
| ENDOSULFAN I | 0.026 U | | 0.024 U | 0.024 U | | |
| ENDOSULFAN II | 0.052 U | | 0.048 U | 0.049 U | | |
| ENDOSULFAN SULFATE | 0.052 U | | 0.048 U | 0.049 U | | |
| ENDRIN | 0.052 U | | 0.048 U | 0.049 U | | |
| ENDRIN ALDEHYDE | 0.052 U | | 0.048 U | 0.049 U | | |
| ENDRIN KETONE | 0.052 U | | 0.048 U | 0.049 U | | |
| GAMMA-BHC (LINDANE) | 0.026 U | | 0.024 U | 0.024 U | | |
| GAMMA-CHLORDANE | 0.026 U | | 0.024 U | 0.024 U | | |
| HEPTACHLOR | 0.026 U | | 0.024 U | 0.024 U | | |
| HEPTACHLOR EPOXIDE | 0.026 U | | 0.024 U | 0.024 U | | |
| METHOXYCHLOR | 0.258 U | | 0.24 U | 0.243 U | | |
| TOXAPHENE | 2.58 U | | 2.4 U | 2.43 U | | |
| **Herbicides (ug/L)** | | | | | | |
| 2,4,5-T | 0.04 U | | 0.04 U | 0.04 U | | |
| 2,4,5-TP (SILVEX) | 0.04 U | | 0.04 U | 0.04 U | | |

APPENDI. .E G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD004 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 |
| SAMPLE NUMBER | 15ST00401 | 15ST00401-F | 15SW00601 | 15SW00601-D | 15SW00601-F | 15SW00601-F-D |
| SAMPLE CODE | NORMAL | NORMAL | ORIG | DUP | ORIG | DUP |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 2,4-D | 0.04 U | | 0.04 U | 0.04 U | | |
| DINOSEB | 0.04 U | | 0.04 U | 0.04 U | | |
| HEXACHLOROPHENE | 0.025 U | | 0.025 U | 0.025 U | | |
| PENTACHLOROPHENOL | 0.06 J | | 0.075 J | 0.081 J | | |
| **Total Metals (ug/L)** | | | | | | |
| ALUMINUM | 54.6 J | | 240 J | 268 J | | |
| ANTIMONY | 0.3 U | | 0.22 U | 0.59 U | | |
| ARSENIC | 0.59 U | | 0.57 U | 0.76 U | | |
| BARIUM | 78.8 J | | 74.4 J | 77.4 J | | |
| BERYLLIUM | 0.02 U | | 0.03 U | 0.2 U | | |
| CADMIUM | 0.06 U | | 0.1 U | 0.27 U | | |
| CALCIUM | 68600 J | | 81200 J | 83300 J | | |
| CHROMIUM | 0.94 U | | 0.79 U | 0.97 U | | |
| COBALT | 0.16 U | | 5.8 J | 6.2 J | | |
| COPPER | 1.6 J | | 1.4 J | 1.5 J | | |
| IRON | 49.9 U | | 699 J | 781 J | | |
| LEAD | 0.369 U | | 0.48 U | 0.595 U | | |
| MAGNESIUM | 12000 J | | 18700 J | 17200 J | | |
| MANGANESE | 6.4 J | | 1230 | 1290 | | |
| MERCURY | 0.043 U | | 0.042 U | 0.036 U | | |
| NICKEL | 1.4 J | | 3.7 J | 3.8 J | | |
| POTASSIUM | 757 J | | 2350 J | 2400 J | | |
| SELENIUM | 1.3 J | | 0.56 U | 0.74 U | | |
| SILVER | 0.028 UJ | | 0.028 UJ | 0.21 U | | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD004 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 | 15SW/SD006 |
| SAMPLE NUMBER | 15ST00401 | 15ST00401-F | 15SW00601 | 15SW00601-D | 15SW00601-F | 15SW00601-F-D |
| SAMPLE CODE | NORMAL | NORMAL | ORIG | DUP | ORIG | DUP |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| SODIUM | 126000 J | | 59400 J | 61800 J | | |
| THALLIUM | 0.06 U | | 0.08 U | 0.12 U | | |
| TIN | 0.048 U | | 0.048 U | 0.22 U | | |
| VANADIUM | 1.14 U | | 1.14 U | 1.14 U | | |
| ZINC | 102 J | | 25.2 J | 25.6 J | | |
| **Dissolved Metals (ug/L)** | | | | | | |
| ALUMINUM, FILTERED | | 8.35 U | | | 8.35 U | 8.35 U |
| ANTIMONY, FILTERED | | 0.085 U | | | 0.085 U | 0.48 U |
| ARSENIC, FILTERED | | 0.22 U | | | 0.25 U | 0.14 U |
| BARIUM, FILTERED | | 78.9 J | | | 74.4 J | 77.1 J |
| BERYLLIUM, FILTERED | | 0.02 U | | | 0.02 U | 0.02 U |
| CADMIUM, FILTERED | | 0.039 U | | | 0.06 U | 0.039 U |
| CALCIUM, FILTERED | | 72500 J | | | 87200 J | 81000 J |
| CHROMIUM, FILTERED | | 1.3 U | | | 0.52 U | 0.66 U |
| COBALT, FILTERED | | 0.26 J | | | 6.1 | 6.5 |
| COPPER, FILTERED | | 3.2 J | | | 1.6 J | 1.7 J |
| IRON, FILTERED | | 311 J | | | 210 U | 359 J |
| LEAD, FILTERED | | 0.18 U | | | 0.069 U | 0.169 U |
| MAGNESIUM, FILTERED | | 14100 | | | 19900 | 19600 |
| MANGANESE, FILTERED | | 6.1 J | | | 1230 | 1190 |
| MERCURY, FILTERED | | 0.049 U | | | 0.033 U | 0.035 U |
| NICKEL, FILTERED | | 3.8 J | | | 5.1 J | 6.5 J |
| POTASSIUM, FILTERED | | 788 J | | | 2530 J | 2580 J |
| SELENIUM, FILTERED | | 1.1 J | | | 0.55 U | 0.55 U |
| SILVER, FILTERED | | 0.028 UJ | | | 0.028 UJ | 0.15 U |
| SODIUM, FILTERED | | 132000 J | | | 59800 J | 59600 J |
| THALLIUM, FILTERED | | 0.043 U | | | 0.09 U | 0.08 U |
| TIN, FILTERED | | 0.19 U | | | 0.17 U | 0.22 U |
| VANADIUM, FILTERED | | 1.14 U | | | 1.14 U | 1.14 U |
| ZINC, FILTERED | | 88 J | | | 15.7 J | 15.7 J |
| **Field Parameters** | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | 10.76 | | 10.47 | | | |
| OXIDATION REDUCTION POTENTIAL (MV) | 53.1 | | 30.4 | | | |
| PH (S.U.) | 7.76 | | 7.75 | | | |
| SPECIFIC CONDUCTANCE (MS/CM) | 0.72 | | 1.028 | | | |
| TEMPERATURE (C) | 12.21 | | 10.97 | | | |
| TURBIDITY (NTU) | 5.3 | | 13 | | | |

APPENDIX G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD009 | 15SW/SD010 | 15SW/SD010 |
| SAMPLE NUMBER | 15SW00701 | 15SW00801 | 15SW00901 | 15SW00901-F | 15ST01001 | 15ST01001-F |
| SAMPLE CODE | NOT FOUND | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| **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 UJ | | 0.3 UJ | |
| 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 | |
| 2-BUTANONE | | | 0.5 U | | 0.5 U | |
| 2-HEXANONE | | | 0.5 U | | 0.5 U | |
| 3-CHLOROPROPENE | | | 0.5 UJ | | 0.5 UJ | |
| 4-METHYL-2-PENTANONE | | | 0.5 U | | 0.5 U | |
| ACETONE | | | 0.5 U | | 0.5 U | |
| ACETONITRILE | | | 20 UR | | 20 UR | |
| 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 UJ | |
| 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 UR | | 20 UR | |
| METHACRYLONITRILE | | | 0.3 U | | 0.3 U | |
| METHYL IODIDE | | | 0.5 U | | 0.5 U | |
| METHYL METHACRYLATE | | | 0.5 U | | 0.5 U | |
| METHYL TERT-BUTYL ETHER | | | 0.5 U | | 0.5 U | |
| METHYLENE CHLORIDE | | | 0.3 UJ | | 0.3 UJ | |
| PROPIONITRILE | | | 20 UR | | 20 UR | |
| 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 | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD009 | 15SW/SD010 | 15SW/SD010 |
| SAMPLE NUMBER | 15SW00701 | 15SW00801 | 15SW00901 | 15SW00901-F | 15ST01001 | 15ST01001-F |
| SAMPLE CODE | NOT FOUND | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| 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 | | | 0.952 U | | 1.01 U | |
| 1,2,4-TRICHLOROBENZENE | | | 0.952 U | | 1.01 U | |
| 1,2-DICHLOROBENZENE | | | 0.952 U | | 1.01 U | |
| 1,3-DICHLOROBENZENE | | | 0.952 U | | 1.01 U | |
| 1,4-DICHLOROBENZENE | | | 0.952 U | | 1.01 U | |
| 1,4-DIOXANE | | | 0.952 UJ | | 1.01 U | |
| 1,4-NAPHTHOQUINONE | | | 0.952 U | | 1.01 U | |
| 1,4-PHENYLENEDIAMINE | | | 0.952 U | | 1.01 U | |
| 1-NAPHTHYLAMINE | | | 0.952 U | | 1.01 U | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | | | 0.952 UJ | | 1.01 UJ | |
| 2,3,4,6-TETRACHLOROPHENOL | | | 0.952 U | | 1.01 U | |
| 2,4,5-TRICHLOROPHENOL | | | 0.952 U | | 1.01 U | |
| 2,4,6-TRICHLOROPHENOL | | | 0.952 U | | 1.01 U | |
| 2,4-DICHLOROPHENOL | | | 0.952 U | | 1.01 U | |
| 2,4-DIMETHYLPHENOL | | | 0.952 U | | 1.01 U | |
| 2,4-DINITROPHENOL | | | 0.952 U | | 1.01 U | |
| 2,6-DICHLOROPHENOL | | | 0.952 U | | 1.01 U | |
| 2-ACETYLAMINOFLUORENE | | | 0.952 UJ | | 1.01 U | |
| 2-CHLORONAPHTHALENE | | | 0.952 U | | 1.01 U | |
| 2-CHLOROPHENOL | | | 0.952 U | | 1.01 U | |
| 2-METHYLNAPHTHALENE | | | 0.048 U | | 0.049 U | |
| 2-METHYLPHENOL | | | 0.952 U | | 1.01 U | |
| 2-NAPHTHYLAMINE | | | 0.952 U | | 1.01 U | |
| 2-NITROANILINE | | | 0.952 U | | 1.01 U | |
| 2-NITROPHENOL | | | 0.952 U | | 1.01 U | |
| 2-PICOLINE | | | 0.952 U | | 1.01 U | |
| 3&4-METHYLPHENOL | | | 0.952 U | | 1.01 UJ | |
| 3,3'-DICHLOROBENZIDINE | | | 0.952 U | | 1.01 U | |
| 3,3'-DIMETHYLBENZIDINE | | | 0.952 UJ | | 1.01 U | |
| 3-METHYLCHOLANTHRENE | | | 0.952 U | | 1.01 U | |
| 3-NITROANILINE | | | 0.952 U | | 1.01 U | |
| 4,6-DINITRO-2-METHYLPHENOL | | | 0.952 U | | 1.01 U | |
| 4-AMINOBIPHENYL | | | 0.952 U | | 1.01 U | |
| 4-BROMOPHENYL PHENYL ETHER | | | 0.952 U | | 1.01 U | |
| 4-CHLORO-3-METHYLPHENOL | | | 0.952 U | | 1.01 U | |
| 4-CHLOROANILINE | | | 0.952 U | | 1.01 U | |
| 4-CHLOROPHENYL PHENYL ETHER | | | 0.952 U | | 1.01 U | |
| 4-NITROANILINE | | | 0.952 U | | 1.01 U | |
| 4-NITROPHENOL | | | 0.952 UJ | | 1.01 U | |
| 4-NITROQUINOLINE-1-OXIDE | | | 0.952 UR | | 1.01 UR | |
| 5-NITRO-O-TOLUIDINE | | | 0.952 U | | 1.01 U | |

APPENDIX G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD009 | 15SW/SD010 | 15SW/SD010 |
| SAMPLE NUMBER | 15SW00701 | 15SW00801 | 15SW00901 | 15SW00901-F | 15ST01001 | 15ST01001-F |
| SAMPLE CODE | NOT FOUND | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | | | 0.952 U | | 1.01 U | |
| A,A-DIMETHYLPHENETHYLAMINE | | | 0.952 U | | 1.01 U | |
| ACENAPHTHENE | | | 0.048 U | | 0.33 | |
| ACENAPHTHYLENE | | | 0.048 U | | 0.43 | |
| ACETOPHENONE | | | 0.952 U | | 1.01 UJ | |
| ANILINE | | | 0.952 U | | 1.01 U | |
| ANTHRACENE | | | 0.048 U | | 0.36 | |
| ARAMITE | | | 0.952 U | | 1.01 U | |
| BENZO(A)ANTHRACENE | | | 0.048 U | | 1.84 | |
| BENZO(A)PYRENE | | | 0.048 U | | 2.38 | |
| BENZO(B)FLUORANTHENE | | | 0.048 U | | 5.83 | |
| BENZO(G,H,I)PERYLENE | | | 0.048 U | | 2.46 | |
| BENZO(K)FLUORANTHENE | | | 0.048 U | | 1.72 | |
| BENZYL ALCOHOL | | | 0.952 U | | 1.01 U | |
| BIS(2-CHLOROETHOXY)METHANE | | | 0.952 U | | 1.01 U | |
| BIS(2-CHLOROETHYL)ETHER | | | 0.952 U | | 1.01 U | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | | 0.952 U | | 1.01 J | |
| BUTYL BENZYL PHTHALATE | | | 0.952 U | | 1.01 U | |
| CHLOROBENZILATE | | | 0.952 U | | 1.01 U | |
| CHRYSENE | | | 0.048 U | | 4.46 | |
| DI-N-BUTYL PHTHALATE | | | 0.952 U | | 1.01 U | |
| DI-N-OCTYL PHTHALATE | | | 0.952 U | | 1.01 U | |
| DIALLATE | | | 0.952 U | | 1.01 U | |
| DIBENZO(A,H)ANTHRACENE | | | 0.048 U | | 0.46 | |
| DIBENZOFURAN | | | 0.952 U | | 1.01 U | |
| DIETHYL PHTHALATE | | | 0.952 U | | 1.01 U | |
| DIMETHYL PHTHALATE | | | 0.952 U | | 1.01 U | |
| DIPHENYLAMINE | | | 0.952 U | | 1.01 U | |
| ETHYL METHANE SULFONATE | | | 0.952 U | | 1.01 U | |
| FLUORANTHENE | | | 0.048 U | | 11.9 | |
| FLUORENE | | | 0.048 U | | 0.34 | |
| HEXACHLOROBENZENE | | | 0.952 UJ | | 1.01 UJ | |
| HEXACHLOROBUTADIENE | | | 0.952 U | | 1.01 U | |
| HEXACHLOROCYCLOPENTADIENE | | | 0.952 UJ | | 1.01 UJ | |
| HEXACHLOROETHANE | | | 0.952 U | | 1.01 U | |
| HEXACHLOROPROPENE | | | 0.952 U | | 1.01 U | |
| INDENO(1,2,3-CD)PYRENE | | | 0.048 U | | 2.09 | |
| ISODRIN | | | 0.952 U | | 1.01 U | |
| ISOPHORONE | | | 0.952 U | | 1.01 U | |
| ISOSAFROLE | | | 0.952 U | | 1.01 U | |
| KEPONE | | | 0.952 UJ | | 1.01 UJ | |
| METHAPYRILENE | | | 0.952 UJ | | 1.01 U | |
| METHYL METHANE SULFONATE | | | 0.952 U | | 1.01 U | |
| N-NITROSO-DI-N-BUTYLAMINE | | | 0.952 U | | 1.01 U | |
| N-NITROSO-DI-N-PROPYLAMINE | | | 0.952 U | | 1.01 UJ | |
| N-NITROSODIETHYLAMINE | | | 0.952 U | | 1.01 U | |
| N-NITROSODIMETHYLAMINE | | | 0.952 UJ | | 1.01 U | |
| N-NITROSODIPHENYLAMINE | | | 0.952 U | | 1.01 U | |
| N-NITROSOMETHYLETHYLAMINE | | | 0.952 U | | 1.01 U | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD009 | 15SW/SD010 | 15SW/SD010 |
| SAMPLE NUMBER | 15SW00701 | 15SW00801 | 15SW00901 | 15SW00901-F | 15ST01001 | 15ST01001-F |
| SAMPLE CODE | NOT FOUND | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| N-NITROSOMORPHOLINE | | | 0.952 U | | 1.01 UJ | |
| N-NITROSOPIPERIDINE | | | 0.952 U | | 1.01 UJ | |
| N-NITROSOPYRROLIDINE | | | 0.952 U | | 1.01 U | |
| NAPHTHALENE | | | 0.048 U | | 0.12 | |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | | | 0.952 U | | 1.01 U | |
| O-TOLUIDINE | | | 0.952 U | | 1.01 U | |
| P-(DIMETHYLAMINO)AZOBENZENE | | | 0.952 U | | 1.01 U | |
| PENTACHLOROBENZENE | | | 0.952 U | | 1.01 U | |
| PENTACHLOROETHANE | | | 0.952 U | | 1.01 U | |
| PENTACHLORONITROBENZENE | | | 0.952 U | | 1.01 U | |
| PHENACETIN | | | 0.952 U | | 1.01 U | |
| PHENANTHRENE | | | 0.048 U | | 4.73 | |
| PHENOL | | | 0.952 U | | 1.01 U | |
| PRONAMIDE | | | 0.952 U | | 1.01 U | |
| PYRENE | | | 0.06 J | | 8.61 | |
| PYRIDINE | | | 0.952 UJ | | 1.01 UJ | |
| SAFROLE | | | 0.952 U | | 1.01 U | |
| **Pesticides PCBs (ug/L)** | | | | | | |
| 4,4'-DDD | | | 0.048 U | | 0.05 U | |
| 4,4'-DDE | | | 0.048 U | | 0.05 U | |
| 4,4'-DDT | | | 0.048 U | | 0.05 U | |
| ALDRIN | | | 0.024 U | | 0.025 U | |
| ALPHA-BHC | | | 0.024 U | | 0.025 U | |
| ALPHA-CHLORDANE | | | 0.024 U | | 0.025 U | |
| AROCLOR-1016 | | | 0.24 U | | 0.248 U | |
| AROCLOR-1221 | | | 0.24 U | | 0.248 U | |
| AROCLOR-1232 | | | 0.24 U | | 0.248 U | |
| AROCLOR-1242 | | | 0.24 U | | 0.248 U | |
| AROCLOR-1248 | | | 0.24 U | | 0.248 U | |
| AROCLOR-1254 | | | 0.24 U | | 0.248 U | |
| AROCLOR-1260 | | | 0.24 U | | 0.248 U | |
| BETA-BHC | | | 0.024 U | | 0.025 U | |
| DELTA-BHC | | | 0.024 U | | 0.025 U | |
| DIELDRIN | | | 0.048 U | | 0.05 U | |
| ENDOSULFAN I | | | 0.024 U | | 0.025 U | |
| ENDOSULFAN II | | | 0.048 U | | 0.05 U | |
| ENDOSULFAN SULFATE | | | 0.048 U | | 0.05 U | |
| ENDRIN | | | 0.048 U | | 0.05 U | |
| ENDRIN ALDEHYDE | | | 0.048 U | | 0.05 U | |
| ENDRIN KETONE | | | 0.048 U | | 0.05 U | |
| GAMMA-BHC (LINDANE) | | | 0.024 U | | 0.025 U | |
| GAMMA-CHLORDANE | | | 0.024 U | | 0.025 U | |
| HEPTACHLOR | | | 0.024 U | | 0.025 U | |
| HEPTACHLOR EPOXIDE | | | 0.024 U | | 0.025 U | |
| METHOXYCHLOR | | | 0.24 U | | 0.248 U | |
| TOXAPHENE | | | 2.4 U | | 2.48 U | |
| **Herbicides (ug/L)** | | | | | | |
| 2,4,5-T | | | 0.04 U | | 0.04 U | |
| 2,4,5-TP (SILVEX) | | | 0.04 U | | 0.04 U | |

APPEND LE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD009 | 15SW/SD010 | 15SW/SD010 |
| SAMPLE NUMBER | 15SW00701 | 15SW00801 | 15SW00901 | 15SW00901-F | 15ST01001 | 15ST01001-F |
| SAMPLE CODE | NOT FOUND | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| 2,4-D | | | 0.04 U | | 0.04 U | |
| DINOSEB | | | 0.04 U | | 0.04 U | |
| HEXACHLOROPHENE | | | 0.025 U | | 0.025 U | |
| PENTACHLOROPHENOL | | | 0.022 J | | 0.037 J | |
| **Total Metals (ug/L)** | | | | | | |
| ALUMINUM | | | 61.2 J | | 606 J | |
| ANTIMONY | | | 0.4 U | | 0.27 U | |
| ARSENIC | | | 0.87 U | | 0.61 U | |
| BARIUM | | | 61.7 J | | 25.4 J | |
| BERYLLIUM | | | 0.06 U | | 0.07 U | |
| CADMIUM | | | 0.18 U | | 0.15 U | |
| CALCIUM | | | 69200 J | | 30400 J | |
| CHROMIUM | | | 0.97 U | | 1.3 J | |
| COBALT | | | 1.7 J | | 0.53 U | |
| COPPER | | | 1.3 J | | 2.6 J | |
| IRON | | | 911 J | | 764 J | |
| LEAD | | | 0.387 U | | 1.6 J | |
| MAGNESIUM | | | 12700 J | | 8600 J | |
| MANGANESE | | | 401 | | 48.1 | |
| MERCURY | | | 0.043 U | | 0.05 U | |
| NICKEL | | | 0.88 U | | 1.9 J | |
| POTASSIUM | | | 1350 J | | 2250 J | |
| SELENIUM | | | 0.66 U | | 0.65 U | |
| SILVER | | | 0.07 U | | 0.04 U | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL |
| LOCATION | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD009 | 15SW/SD010 | 15SW/SD010 |
| SAMPLE NUMBER | 15SW00701 | 15SW00801 | 15SW00901 | 15SW00901-F | 15ST01001 | 15ST01001-F |
| SAMPLE CODE | NOT FOUND | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| SODIUM | | | 74400 J | | 15600 J | |
| THALLIUM | | | 0.08 U | | 0.12 U | |
| TIN | | | 0.07 U | | 0.35 U | |
| VANADIUM | | | 1.14 U | | 1.4 J | |
| ZINC | | | 18.5 J | | 28.7 J | |
| **Dissolved Metals (ug/L)** | | | | | | |
| ALUMINUM, FILTERED | | | | 8.35 U | | 29.8 J |
| ANTIMONY, FILTERED | | | | 0.085 U | | 0.085 U |
| ARSENIC, FILTERED | | | | 0.047 U | | 0.047 U |
| BARIUM, FILTERED | | | | 61.1 J | | 18.7 J |
| BERYLLIUM, FILTERED | | | | 0.02 U | | 0.02 U |
| CADMIUM, FILTERED | | | | 0.04 U | | 0.039 U |
| CALCIUM, FILTERED | | | | 70300 J | | 30400 J |
| CHROMIUM, FILTERED | | | | 0.87 U | | 0.98 U |
| COBALT, FILTERED | | | | 2 | | 0.27 J |
| COPPER, FILTERED | | | | 1.8 J | | 1 J |
| IRON, FILTERED | | | | 425 J | | 120 U |
| LEAD, FILTERED | | | | 0.193 U | | 0.069 U |
| MAGNESIUM, FILTERED | | | | 15400 | | 10000 |
| MANGANESE, FILTERED | | | | 394 | | 31 |
| MERCURY, FILTERED | | | | 0.03 U | | 0.036 U |
| NICKEL, FILTERED | | | | 3.2 J | | 2 J |
| POTASSIUM, FILTERED | | | | 1560 J | | 2260 J |
| SELENIUM, FILTERED | | | | 0.46 U | | 0.45 U |
| SILVER, FILTERED | | | | 0.03 U | | 0.028 UJ |
| SODIUM, FILTERED | | | | 75000 J | | 16100 J |
| THALLIUM, FILTERED | | | | 0.05 U | | 0.07 U |
| TIN, FILTERED | | | | 0.2 U | | 0.15 U |
| VANADIUM, FILTERED | | | | 1.14 U | | 1.14 U |
| ZINC, FILTERED | | | | 20.2 J | | 2.1 J |
| **Field Parameters** | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | | | 10.14 | | 10.38 | |
| OXIDATION REDUCTION POTENTIAL (MV) | | | -6.8 | | 32.7 | |
| PH (S.U.) | | | 7.03 | | 7.84 | |
| SPECIFIC CONDUCTANCE (MS/CM) | | | 0.522 | | 0.237 | |
| TEMPERATURE (C ) | | | 10.48 | | 12.94 | |
| TURBIDITY (NTU) | | | 8.3 | | 35 | |

APPENDI .E G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY |
| LOCATION | 15SW/SD011 | 15SW/SD011 | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD013 | 15SW/SD016 | 15SW/SD016 |
| SAMPLE NUMBER | 15ST01101 | 15ST01101-F | 15ST01201 | 15SW00501 | 15SW00501-F | 15SW01301 | 15SW01301-F | 15SW01601 | 15SW01601-F |
| SAMPLE CODE | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 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 UJ | | | 0.3 UJ | | 0.3 UJ | | 0.3 UJ | |
| 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 | |
| 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 UJ | | | 0.5 UJ | | 0.5 UJ | | 0.5 UJ | |
| 4-METHYL-2-PENTANONE | 0.5 U | | | 0.5 U | | 0.5 U | | 0.5 U | |
| ACETONE | 0.5 U | | | 0.5 U | | 0.5 U | | 0.5 U | |
| ACETONITRILE | 20 UR | | | 20 UR | | 20 UR | | 20 UR | |
| 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 UJ | | | 0.3 UJ | | 0.3 UJ | | 0.3 UJ | |
| 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 | | 0.3 U | |
| 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 U | | | 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 UR | | | 20 UR | | 20 UR | | 20 UR | |
| 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 | |
| METHYL METHACRYLATE | 0.5 U | | | 0.5 U | | 0.5 U | | 0.5 U | |
| METHYL TERT-BUTYL ETHER | 0.5 U | | | 0.5 U | | 0.5 U | | 0.5 U | |
| METHYLENE CHLORIDE | 0.3 UJ | | | 0.3 UJ | | 0.3 UJ | | 0.3 UJ | |
| PROPIONITRILE | 20 UR | | | 20 UR | | 20 UR | | 20 UR | |
| 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 | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY |
| LOCATION | 15SW/SD011 | 15SW/SD011 | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD013 | 15SW/SD016 | 15SW/SD016 |
| SAMPLE NUMBER | 15ST01101 | 15ST01101-F | 15ST01201 | 15SW00501 | 15SW00501-F | 15SW01301 | 15SW01301-F | 15SW01601 | 15SW01601-F |
| SAMPLE CODE | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 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 | | | 0.3 U | | 0.3 U | | 0.3 U | |
| 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 | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 1,2,4-TRICHLOROBENZENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 1,2-DICHLOROBENZENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 1,3-DICHLOROBENZENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 1,4-DICHLOROBENZENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 1,4-DIOXANE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| 1,4-NAPHTHOQUINONE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 1,4-PHENYLENEDIAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 1-NAPHTHYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| 2,3,4,6-TETRACHLOROPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2,4,5-TRICHLOROPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2,4,6-TRICHLOROPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2,4-DICHLOROPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2,4-DIMETHYLPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2,4-DINITROPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2,6-DICHLOROPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2-ACETYLAMINOFLUORENE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| 2-CHLORONAPHTHALENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2-CHLOROPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2-METHYLNAPHTHALENE | 0.053 U | | | 0.048 U | | 0.05 U | | 0.049 U | |
| 2-METHYLPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2-NAPHTHYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2-NITROANILINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2-NITROPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 2-PICOLINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 3&4-METHYLPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 3,3'-DICHLOROBENZIDINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 3,3'-DIMETHYLBENZIDINE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| 3-METHYLCHOLANTHRENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 3-NITROANILINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 4,6-DINITRO-2-METHYLPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 4-AMINOBIPHENYL | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 4-BROMOPHENYL PHENYL ETHER | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 4-CHLORO-3-METHYLPHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 4-CHLOROANILINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 4-CHLOROPHENYL PHENYL ETHER | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 4-NITROANILINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| 4-NITROPHENOL | 1.03 UR | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| 4-NITROQUINOLINE-1-OXIDE | 1.03 UR | | | 0.962 UR | | 0.98 UR | | 0.98 UR | |
| 5-NITRO-O-TOLUIDINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |

APPEND LE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY |
| LOCATION | 15SW/SD011 | 15SW/SD011 | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD013 | 15SW/SD016 | 15SW/SD016 |
| SAMPLE NUMBER | 15ST01101 | 15ST01101-F | 15ST01201 | 15SW00501 | 15SW00501-F | 15SW01301 | 15SW01301-F | 15SW01601 | 15SW01601-F |
| SAMPLE CODE | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| A,A-DIMETHYLPHENETHYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| ACENAPHTHENE | 0.053 U | | | 0.048 U | | 0.06 J | | 0.049 U | |
| ACENAPHTHYLENE | 0.053 U | | | 0.048 U | | 0.05 U | | 0.049 U | |
| ACETOPHENONE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| ANILINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| ANTHRACENE | 0.2 | | | 0.048 U | | 0.05 U | | 0.049 U | |
| ARAMITE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| BENZO(A)ANTHRACENE | 1.04 | | | 0.048 U | | 0.05 U | | 0.13 | |
| BENZO(A)PYRENE | 1.62 | | | 0.048 U | | 0.05 U | | 0.14 | |
| BENZO(B)FLUORANTHENE | 3.6 | | | 0.048 U | | 0.05 U | | 0.28 | |
| BENZO(G,H,I)PERYLENE | 1.77 | | | 0.048 U | | 0.05 U | | 0.13 | |
| BENZO(K)FLUORANTHENE | 0.96 | | | 0.048 U | | 0.05 U | | 0.11 | |
| BENZYL ALCOHOL | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| BIS(2-CHLOROETHOXY)METHANE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| BIS(2-CHLOROETHYL)ETHER | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| BUTYL BENZYL PHTHALATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| CHLOROBENZILATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| CHRYSENE | 2.75 | | | 0.048 U | | 0.05 U | | 0.25 | |
| DI-N-BUTYL PHTHALATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| DI-N-OCTYL PHTHALATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| DIALLATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| DIBENZO(A,H)ANTHRACENE | 0.3 | | | 0.048 U | | 0.05 U | | 0.049 U | |
| DIBENZOFURAN | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| DIETHYL PHTHALATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| DIMETHYL PHTHALATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| DIPHENYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| ETHYL METHANE SULFONATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| FLUORANTHENE | 4.84 | | | 0.048 U | | 0.1 | | 0.81 | |
| FLUORENE | 0.08 J | | | 0.048 U | | 0.05 U | | 0.049 U | |
| HEXACHLOROBENZENE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| HEXACHLOROBUTADIENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| HEXACHLOROCYCLOPENTADIENE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| HEXACHLOROETHANE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| HEXACHLOROPROPENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| INDENO(1,2,3-CD)PYRENE | 1.5 | | | 0.048 U | | 0.05 U | | 0.09 J | |
| ISODRIN | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| ISOPHORONE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| ISOSAFROLE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| KEPONE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| METHAPYRILENE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| METHYL METHANE SULFONATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| N-NITROSO-DI-N-BUTYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| N-NITROSO-DI-N-PROPYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| N-NITROSODIETHYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| N-NITROSODIMETHYLAMINE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| N-NITROSODIPHENYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| N-NITROSOMETHYLETHYLAMINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY |
| LOCATION | 15SW/SD011 | 15SW/SD011 | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD013 | 15SW/SD016 | 15SW/SD016 |
| SAMPLE NUMBER | 15ST01101 | 15ST01101-F | 15ST01201 | 15SW00501 | 15SW00501-F | 15SW01301 | 15SW01301-F | 15SW01601 | 15SW01601-F |
| SAMPLE CODE | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| N-NITROSOMORPHOLINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| N-NITROSOPIPERIDINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| N-NITROSOPYRROLIDINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| NAPHTHALENE | 0.053 U | | | 0.048 U | | 0.05 J | | 0.049 U | |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| O-TOLUIDINE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| P-(DIMETHYLAMINO)AZOBENZENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| PENTACHLOROBENZENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| PENTACHLOROETHANE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| PENTACHLORONITROBENZENE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| PHENACETIN | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| PHENANTHRENE | 2.48 | | | 0.048 U | | 0.06 J | | 0.34 | |
| PHENOL | 1.03 UR | | | 0.962 U | | 0.98 U | | 0.98 U | |
| PRONAMIDE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| PYRENE | 5.55 | | | 0.05 J | | 0.09 J | | 0.57 | |
| PYRIDINE | 1.03 UJ | | | 0.962 UJ | | 0.98 UJ | | 0.98 UJ | |
| SAFROLE | 1.03 U | | | 0.962 U | | 0.98 U | | 0.98 U | |
| **Pesticides PCBs (ug/L)** | | | | | | | | | |
| 4,4'-DDD | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| 4,4'-DDE | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| 4,4'-DDT | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| ALDRIN | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| ALPHA-BHC | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| ALPHA-CHLORDANE | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| AROCLOR-1016 | 0.28 U | | | 0.245 U | | 0.24 U | | 0.27 U | |
| AROCLOR-1221 | 0.28 U | | | 0.245 U | | 0.24 U | | 0.27 U | |
| AROCLOR-1232 | 0.28 U | | | 0.245 U | | 0.24 U | | 0.27 U | |
| AROCLOR-1242 | 0.28 U | | | 0.245 U | | 0.24 U | | 0.27 U | |
| AROCLOR-1248 | 0.28 U | | | 0.245 U | | 0.24 U | | 0.27 U | |
| AROCLOR-1254 | 0.28 U | | | 0.245 U | | 0.24 U | | 0.27 U | |
| AROCLOR-1260 | 0.28 U | | | 0.245 U | | 0.24 U | | 0.27 U | |
| BETA-BHC | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| DELTA-BHC | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| DIELDRIN | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| ENDOSULFAN I | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| ENDOSULFAN II | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| ENDOSULFAN SULFATE | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| ENDRIN | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| ENDRIN ALDEHYDE | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| ENDRIN KETONE | 0.056 U | | | | | 0.048 U | | 0.054 U | |
| GAMMA-BHC (LINDANE) | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| GAMMA-CHLORDANE | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| HEPTACHLOR | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| HEPTACHLOR EPOXIDE | 0.028 U | | | | | 0.024 U | | 0.027 U | |
| METHOXYCHLOR | 0.28 U | | | | | 0.24 U | | 0.27 U | |
| TOXAPHENE | 2.8 U | | | | | 2.4 U | | 2.7 U | |
| **Herbicides (ug/L)** | | | | | | | | | |
| 2,4,5-T | 0.04 U | | | | | 0.04 U | | 0.04 U | |
| 2,4,5-TP (SILVEX) | 0.04 U | | | | | 0.04 U | | 0.04 U | |

APPEN BLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY |
| LOCATION | 15SW/SD011 | 15SW/SD011 | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD013 | 15SW/SD016 | 15SW/SD016 |
| SAMPLE NUMBER | 15ST01101 | 15ST01101-F | 15ST01201 | 15SW00501 | 15SW00501-F | 15SW01301 | 15SW01301-F | 15SW01601 | 15SW01601-F |
| SAMPLE CODE | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 2,4-D | 0.04 U | | | | | 0.04 U | | 0.04 U | |
| DINOSEB | 0.04 U | | | | | 0.04 U | | 0.04 U | |
| HEXACHLOROPHENE | 0.025 U | | | | | 0.025 U | | 0.025 U | |
| PENTACHLOROPHENOL | 0.033 J | | | | | 0.028 J | | 0.065 J | |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 500 J | | | 130 J | | 586 J | | 1850 J | |
| ANTIMONY | 0.27 U | | | 0.25 U | | 2.5 J | | 0.23 U | |
| ARSENIC | 0.54 U | | | 0.5 U | | 1 U | | 1.2 U | |
| BARIUM | 79.4 J | | | 84.1 J | | 162 J | | 55.6 J | |
| BERYLLIUM | 0.04 U | | | 0.04 U | | 0.03 U | | 0.15 U | |
| CADMIUM | 0.18 U | | | 0.13 U | | 0.5 U | | 0.12 U | |
| CALCIUM | 96300 J | | | 86900 J | | 96900 J | | 64100 J | |
| CHROMIUM | 3.6 J | | | 0.6 U | | 1 U | | 3.5 J | |
| COBALT | 0.53 U | | | 0.91 U | | 1.4 J | | 3.7 J | |
| COPPER | 8.1 J | | | 1.1 U | | 4.9 J | | 3.4 J | |
| IRON | 976 J | | | 431 J | | 2660 J | | 2700 J | |
| LEAD | 1.8 J | | | 0.327 U | | 2.3 J | | 2.5 J | |
| MAGNESIUM | 18900 J | | | 16100 J | | 15400 J | | 12600 J | |
| MANGANESE | 36.5 J | | | 242 | | 463 | | 308 | |
| MERCURY | 0.052 U | | | 0.036 U | | 0.034 U | | 0.044 U | |
| NICKEL | 2.3 J | | | 1.5 J | | 1.9 J | | 7.8 J | |
| POTASSIUM | 6500 J | | | 2230 J | | 2640 J | | 2300 J | |
| SELENIUM | 0.45 U | | | 0.46 U | | 0.75 U | | 0.38 U | |
| SILVER | 0.07 U | | | 0.03 U | | 0.028 UJ | | 0.028 UJ | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER AND OUTFALL | SEWER AND OUTFALL | SEWER AND OUTFALL | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY |
| LOCATION | 15SW/SD011 | 15SW/SD011 | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD013 | 15SW/SD016 | 15SW/SD016 |
| SAMPLE NUMBER | 15ST01101 | 15ST01101-F | 15ST01201 | 15SW00501 | 15SW00501-F | 15SW01301 | 15SW01301-F | 15SW01601 | 15SW01601-F |
| SAMPLE CODE | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/12/2005 | 1/12/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| SODIUM | 135000 J | | | 64700 J | | 15700 J | | 46500 J | |
| THALLIUM | 0.08 U | | | 0.07 U | | 0.09 U | | 0.11 U | |
| TIN | 0.33 U | | | 0.048 U | | 0.048 U | | 0.06 U | |
| VANADIUM | 1.6 J | | | 1.14 U | | 1.2 J | | 3.8 | |
| ZINC | 33.4 J | | | 9.2 J | | 61.3 J | | 26 J | |
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | | 10.1 J | | | 8.35 U | | 8.35 U | | 21.9 J |
| ANTIMONY, FILTERED | | 0.085 U | | | 0.085 U | | 1.8 U | | 0.085 U |
| ARSENIC, FILTERED | | 0.047 U | | | 0.17 U | | 0.33 U | | 0.07 U |
| BARIUM, FILTERED | | 88.8 J | | | 80 J | | 149 J | | 47.2 J |
| BERYLLIUM, FILTERED | | 0.02 U | | | 0.02 U | | 0.02 U | | 0.02 U |
| CADMIUM, FILTERED | | 0.039 U | | | 0.04 U | | 0.33 U | | 0.15 U |
| CALCIUM, FILTERED | | 99600 J | | | 83400 J | | 99600 J | | 61800 J |
| CHROMIUM, FILTERED | | 3.4 J | | | 0.49 U | | 0.32 U | | 0.5 U |
| COBALT, FILTERED | | 0.27 J | | | 0.96 J | | 1.1 | | 2.6 |
| COPPER, FILTERED | | 5 J | | | 1.7 J | | 2 J | | 2.7 J |
| IRON, FILTERED | | 422 J | | | 359 J | | 952 J | | 166 U |
| LEAD, FILTERED | | 0.122 U | | | 0.206 U | | 0.199 U | | 0.123 U |
| MAGNESIUM, FILTERED | | 21700 | | | 18000 | | 16000 | | 12100 |
| MANGANESE, FILTERED | | 4.7 J | | | 227 | | 437 | | 260 |
| MERCURY, FILTERED | | 0.038 U | | | 0.037 U | | 0.03 U | | 0.049 U |
| NICKEL, FILTERED | | 4.3 J | | | 3.3 J | | 3.4 J | | 6.6 J |
| POTASSIUM, FILTERED | | 7590 J | | | 2420 J | | 2720 J | | 1900 J |
| SELENIUM, FILTERED | | 0.34 U | | | 0.54 U | | 0.67 J | | 0.31 U |
| SILVER, FILTERED | | 0.028 UJ | | | 0.028 UJ | | 0.028 UJ | | 0.028 UJ |
| SODIUM, FILTERED | | 141000 J | | | 64500 J | | 15300 J | | 49300 J |
| THALLIUM, FILTERED | | 0.043 U | | | 0.06 U | | 0.08 U | | 0.08 U |
| TIN, FILTERED | | 0.3 U | | | 0.16 U | | 0.048 U | | 0.23 U |
| VANADIUM, FILTERED | | 1.14 U | | | 1.14 U | | 1.14 U | | 1.14 U |
| ZINC, FILTERED | | 5 J | | | 7.1 J | | 41.1 J | | 4.3 J |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | 9.66 | | | 9.53 | | 10.39 | | 11.08 | |
| OXIDATION REDUCTION POTENTIAL (MV) | 115.5 | | | 24.3 | | -0.1 | | 79.3 | |
| PH (S.U.) | 7.61 | | | 7.64 | | 7.7 | | 7.86 | |
| SPECIFIC CONDUCTANCE (MS/CM) | 0.946 | | | 1.08 | | 0.783 | | 0.771 | |
| TEMPERATURE (C) | 13.33 | | | 11.41 | | 9.64 | | 10.27 | |
| TURBIDITY (NTU) | 12 | | | 9.1 | | 370 | | 140 | |

APPENDIX G-2
RESULTS FOR CHEMICALS ANALYZED IN SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK |
| LOCATION | 15SW/SD017 | 15SW/SD017 | 15SW/SD018 | 15SW/SD018 | 15SW/SD019 | 15SW/SD019 | 15SW/SD001 | 15SW/SD001 | 15SW/SD002 |
| SAMPLE NUMBER | 15SW01701 | 15SW01701-F | 15SW01801 | 15SW01801-F | 15SW01901 | 15SW01901-F | 15SW00101 | 15SW00101-F | 15SW00201 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| **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 UJ | | 0.3 U | | 0.3 U | | 0.3 UJ | | 0.3 UJ |
| 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 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 |
| 2-BUTANONE | 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 |
| 3-CHLOROPROPENE | 0.5 UJ | | 0.5 U | | 0.5 U | | 0.5 UJ | | 0.5 UJ |
| 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 UJ | | 0.5 UJ | | 3.1 J | | 4 J |
| ACETONITRILE | 20 UR | | 20 UR | | 20 UR | | 20 UR | | 20 UR |
| 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 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 UJ | | 0.3 U | | 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 |
| 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 UJ | | 0.5 UJ | | 0.5 U | | 0.5 U |
| ETHYLBENZENE | 0.3 U | | 0.3 U | | 0.3 U | | 0.3 U | | 0.3 U |
| ISOBUTANOL | 20 UR | | 20 UR | | 20 UR | | 20 UR | | 20 UR |
| METHACRYLONITRILE | 0.3 U | | 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 | | 0.5 U |
| METHYL METHACRYLATE | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U |
| METHYL TERT-BUTYL ETHER | 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 UJ | | 0.3 UJ | | 0.3 UJ |
| PROPIONITRILE | 20 UR | | 20 UR | | 20 UR | | 20 UR | | 20 UR |
| 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 |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK |
| LOCATION | 15SW/SD017 | 15SW/SD017 | 15SW/SD018 | 15SW/SD018 | 15SW/SD019 | 15SW/SD019 | 15SW/SD001 | 15SW/SD001 | 15SW/SD002 |
| SAMPLE NUMBER | 15SW01701 | 15SW01701-F | 15SW01801 | 15SW01801-F | 15SW01901 | 15SW01901-F | 15SW00101 | 15SW00101-F | 15SW00201 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 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 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 | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 1,2,4-TRICHLOROBENZENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 1,2-DICHLOROBENZENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 1,3-DICHLOROBENZENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 1,4-DICHLOROBENZENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 1,4-DIOXANE | 0.971 UJ | | 1.04 U | | 0.972 U | | 0.971 UJ | | 1.03 UJ |
| 1,4-NAPHTHOQUINONE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 1,4-PHENYLENEDIAMINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 1-NAPHTHYLAMINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 0.971 UJ | | 1.04 U | | 0.971 UJ | | 0.971 UJ | | 1.03 UJ |
| 2,3,4,6-TETRACHLOROPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2,4,5-TRICHLOROPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2,4,6-TRICHLOROPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2,4-DICHLOROPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2,4-DIMETHYLPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2,4-DINITROPHENOL | 0.971 U | | 1.04 UJ | | 0.971 U | | 0.971 U | | 1.03 U |
| 2,6-DICHLOROPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2-ACETYLAMINOFLUORENE | 0.971 UJ | | 1.04 U | | 0.971 U | | 0.971 UJ | | 1.03 UJ |
| 2-CHLORONAPHTHALENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2-CHLOROPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2-METHYLNAPHTHALENE | 0.048 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.056 U |
| 2-METHYLPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2-NAPHTHYLAMINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2-NITROANILINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2-NITROPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 2-PICOLINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 3&4-METHYLPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 3,3'-DICHLOROBENZIDINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 3,3'-DIMETHYLBENZIDINE | 0.971 UJ | | 1.04 UJ | | 0.971 UJ | | 0.971 UJ | | 1.03 UJ |
| 3-METHYLCHOLANTHRENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 3-NITROANILINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 4,6-DINITRO-2-METHYLPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 4-AMINOBIPHENYL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 4-BROMOPHENYL PHENYL ETHER | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 4-CHLORO-3-METHYLPHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 4-CHLOROANILINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 4-CHLOROPHENYL PHENYL ETHER | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 4-NITROANILINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| 4-NITROPHENOL | 0.971 UJ | | 1.04 UJ | | 0.971 U | | 0.971 UJ | | 1.03 UJ |
| 4-NITROQUINOLINE-1-OXIDE | 0.971 UR | | 1.04 UR | | 0.971 UR | | 0.971 UR | | 1.03 UR |
| 5-NITRO-O-TOLUIDINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |

APPENDI. .E G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK |
| LOCATION | 15SW/SD017 | 15SW/SD017 | 15SW/SD018 | 15SW/SD018 | 15SW/SD019 | 15SW/SD019 | 15SW/SD001 | 15SW/SD001 | 15SW/SD002 |
| SAMPLE NUMBER | 15SW01701 | 15SW01701-F | 15SW01801 | 15SW01801-F | 15SW01901 | 15SW01901-F | 15SW00101 | 15SW00101-F | 15SW00201 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| A,A-DIMETHYLPHENETHYLAMINE | 0.971 U | | 1.04 UJ | | 0.971 U | | 0.971 U | | 1.03 U |
| ACENAPHTHENE | 0.048 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.056 U |
| ACENAPHTHYLENE | 0.048 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.056 U |
| ACETOPHENONE | 0.971 U | | 1.04 U | | 0.971 UJ | | 0.971 U | | 1.03 U |
| ANILINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| ANTHRACENE | 0.05 J | | 0.052 U | | 0.049 U | | 0.049 U | | 0.056 U |
| ARAMITE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| BENZO(A)ANTHRACENE | 0.13 | | 0.052 U | | 0.049 U | | 0.09 J | | 0.14 |
| BENZO(A)PYRENE | 0.12 | | 0.052 U | | 0.049 U | | 0.1 | | 0.16 |
| BENZO(B)FLUORANTHENE | 0.21 | | 0.052 U | | 0.049 U | | 0.22 | | 0.31 |
| BENZO(G,H,I)PERYLENE | 0.11 | | 0.052 U | | 0.049 U | | 0.1 | | 0.14 |
| BENZO(K)FLUORANTHENE | 0.14 | | 0.052 U | | 0.049 U | | 0.08 J | | 0.13 |
| BENZYL ALCOHOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| BIS(2-CHLOROETHOXY)METHANE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| BIS(2-CHLOROETHYL)ETHER | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| BIS(2-ETHYLHEXYL)PHTHALATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| BUTYL BENZYL PHTHALATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| CHLOROBENZILATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| CHRYSENE | 0.21 | | 0.052 U | | 0.049 U | | 0.2 | | 0.32 |
| DI-N-BUTYL PHTHALATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| DI-N-OCTYL PHTHALATE | 0.971 U | | 1.04 U | | 0.971 UJ | | 0.971 U | | 1.03 U |
| DIALLATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| DIBENZO(A,H)ANTHRACENE | 0.048 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.056 U |
| DIBENZOFURAN | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| DIETHYL PHTHALATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| DIMETHYL PHTHALATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| DIPHENYLAMINE | 0.971 U | | 1.04 U | | 0.97 U | | 0.971 U | | 1.03 U |
| ETHYL METHANE SULFONATE | 0.971 U | | 1.04 U | | 0.971 UJ | | 0.971 U | | 1.03 U |
| FLUORANTHENE | 0.71 | | 0.052 U | | 0.049 U | | 0.56 | | 0.95 |
| FLUORENE | 0.048 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.056 U |
| HEXACHLOROBENZENE | 0.971 UJ | | 1.04 U | | 0.971 UJ | | 0.971 UJ | | 1.03 UJ |
| HEXACHLOROBUTADIENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| HEXACHLOROCYCLOPENTADIENE | 0.971 UJ | | 1.04 UJ | | 0.971 UJ | | 0.971 UJ | | 1.03 UJ |
| HEXACHLOROETHANE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| HEXACHLOROPROPENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| INDENO(1,2,3-CD)PYRENE | 0.09 J | | 0.052 U | | 0.049 U | | 0.08 J | | 0.11 |
| ISODRIN | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| ISOPHORONE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| ISOSAFROLE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| KEPONE | 0.971 UJ | | 1.04 UJ | | 0.971 UJ | | 0.971 UJ | | 1.03 UJ |
| METHAPYRILENE | 0.971 UJ | | 1.04 UJ | | 0.971 UJ | | 0.971 UJ | | 1.03 UJ |
| METHYL METHANE SULFONATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| N-NITROSO-DI-N-BUTYLAMINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| N-NITROSO-DI-N-PROPYLAMINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| N-NITROSODIETHYLAMINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| N-NITROSODIMETHYLAMINE | 0.971 UJ | | 1.04 UJ | | 0.971 U | | 0.971 UJ | | 1.03 UJ |
| N-NITROSODIPHENYLAMINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| N-NITROSOMETHYLETHYLAMINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK |
| LOCATION | 15SW/SD017 | 15SW/SD017 | 15SW/SD018 | 15SW/SD018 | 15SW/SD019 | 15SW/SD019 | 15SW/SD001 | 15SW/SD001 | 15SW/SD002 |
| SAMPLE NUMBER | 15SW01701 | 15SW01701-F | 15SW01801 | 15SW01801-F | 15SW01901 | 15SW01901-F | 15SW00101 | 15SW00101-F | 15SW00201 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| N-NITROSOMORPHOLINE | 0.971 U | | 1.04 U | | 0.971 UJ | | 0.971 U | | 1.03 U |
| N-NITROSOPIPERIDINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| N-NITROSOPYRROLIDINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| NAPHTHALENE | 0.048 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.056 U |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| O-TOLUIDINE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| P-(DIMETHYLAMINO)AZOBENZENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| PENTACHLOROBENZENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| PENTACHLOROETHANE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| PENTACHLORONITROBENZENE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| PHENACETIN | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| PHENANTHRENE | 0.28 | | 0.052 U | | 0.049 U | | 0.23 | | 0.42 |
| PHENOL | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| PRONAMIDE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| PYRENE | 0.53 | | 0.052 U | | 0.049 U | | 0.41 | | 0.64 |
| PYRIDINE | 0.971 UJ | | 1.04 U | | 0.971 U | | 0.971 UJ | | 1.03 UJ |
| SAFROLE | 0.971 U | | 1.04 U | | 0.971 U | | 0.971 U | | 1.03 U |
| **Pesticides PCBs (ug/L)** | | | | | | | | | |
| 4,4'-DDD | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| 4,4'-DDE | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| 4,4'-DDT | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| ALDRIN | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| ALPHA-BHC | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| ALPHA-CHLORDANE | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| AROCLOR-1016 | 0.243 U | | 0.258 U | | 0.245 U | | 0.243 U | | 0.27 U |
| AROCLOR-1221 | 0.243 U | | 0.258 U | | 0.245 U | | 0.243 U | | 0.27 U |
| AROCLOR-1232 | 0.243 U | | 0.258 U | | 0.245 U | | 0.243 U | | 0.27 U |
| AROCLOR-1242 | 0.243 U | | 0.258 U | | 0.245 U | | 0.243 U | | 0.27 U |
| AROCLOR-1248 | 0.243 U | | 0.258 U | | 0.245 U | | 0.243 U | | 0.27 U |
| AROCLOR-1254 | 0.243 U | | 0.258 U | | 0.245 U | | 0.243 U | | 0.27 U |
| AROCLOR-1260 | 0.243 U | | 0.258 U | | 0.245 U | | 0.243 U | | 0.27 U |
| BETA-BHC | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| DELTA-BHC | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| DIELDRIN | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| ENDOSULFAN I | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| ENDOSULFAN II | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| ENDOSULFAN SULFATE | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| ENDRIN | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| ENDRIN ALDEHYDE | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| ENDRIN KETONE | 0.049 U | | 0.052 U | | 0.049 U | | 0.049 U | | 0.054 U |
| GAMMA-BHC (LINDANE) | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| GAMMA-CHLORDANE | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| HEPTACHLOR | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| HEPTACHLOR EPOXIDE | 0.024 U | | 0.026 U | | 0.024 U | | 0.024 U | | 0.027 U |
| METHOXYCHLOR | 0.243 U | | 0.258 U | | 0.243 U | | 0.243 U | | 0.27 U |
| TOXAPHENE | 2.43 U | | 2.58 U | | 2.43 U | | 2.43 U | | 2.7 U |
| **Herbicides (ug/L)** | | | | | | | | | |
| 2,4,5-T | 0.04 U | | 0.04 U | | 0.04 U | | 0.04 U | | 0.04 U |
| 2,4,5-TP (SILVEX) | 0.04 U | | 0.04 U | | 0.04 U | | 0.04 U | | 0.04 U |

APPENDIX G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK |
| LOCATION | 15SW/SD017 | 15SW/SD017 | 15SW/SD018 | 15SW/SD018 | 15SW/SD019 | 15SW/SD019 | 15SW/SD001 | 15SW/SD001 | 15SW/SD002 |
| SAMPLE NUMBER | 15SW01701 | 15SW01701-F | 15SW01801 | 15SW01801-F | 15SW01901 | 15SW01901-F | 15SW00101 | 15SW00101-F | 15SW00201 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| 2,4-D | 0.04 U | | 0.04 U | | 0.04 U | | 0.04 U | | 0.04 U |
| DINOSEB | 0.04 U | | 0.04 U | | 0.04 U | | 0.04 U | | 0.04 U |
| HEXACHLOROPHENE | 0.025 U | | 0.025 U | | 0.025 U | | 0.025 U | | 0.025 U |
| PENTACHLOROPHENOL | 0.062 J | | 0.013 U | | 0.013 U | | 0.05 J | | 0.053 J |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 1040 J | | 3020 J | | 1900 J | | 1080 J | | 41.6 U |
| ANTIMONY | 0.19 U | | 0.34 U | | 0.19 U | | 0.42 U | | 0.49 U |
| ARSENIC | 0.69 U | | 1.4 J | | 0.73 U | | 0.76 U | | 0.26 U |
| BARIUM | 61 J | | 72.4 J | | 63.4 J | | 45.6 J | | 34.4 J |
| BERYLLIUM | 0.08 U | | 0.13 U | | 0.07 U | | 0.1 U | | 0.05 U |
| CADMIUM | 0.09 U | | 0.09 U | | 0.1 U | | 0.09 U | | 0.07 U |
| CALCIUM | 71600 J | | 39000 J | | 32100 J | | 50800 J | | 43200 J |
| CHROMIUM | 1.9 J | | 3.6 J | | 2.2 J | | 1.9 J | | 0.42 U |
| COBALT | 4.2 J | | 1.6 | | 1.4 | | 1.4 J | | 0.5 U |
| COPPER | 1.9 J | | 5.1 J | | 3.2 J | | 2.5 J | | 1.3 J |
| IRON | 1430 J | | 3330 J | | 2160 J | | 1390 J | | 41 U |
| LEAD | 1.1 J | | 2.9 J | | 1.2 J | | 1.5 J | | 0.279 U |
| MAGNESIUM | 15200 J | | 8030 J | | 6630 J | | 10300 J | | 8840 J |
| MANGANESE | 404 | | 191 J | | 412 J | | 107 | | 42 |
| MERCURY | 0.03 U | | 0.03 U | | 0.03 U | | 0.047 U | | 0.043 U |
| NICKEL | 8 J | | 3.2 | | 2.3 | | 4.3 J | | 2.2 J |
| POTASSIUM | 2420 J | | 1550 J | | 1340 J | | 1940 J | | 1670 J |
| SELENIUM | 0.48 U | | 0.14 U | | 0.14 U | | 0.28 U | | 0.29 U |
| SILVER | 0.028 UJ | | 0.028 U | | 0.028 U | | 0.028 UJ | | 0.04 U |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TRIBUTARY | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK |
| LOCATION | 15SW/SD017 | 15SW/SD017 | 15SW/SD018 | 15SW/SD018 | 15SW/SD019 | 15SW/SD019 | 15SW/SD001 | 15SW/SD001 | 15SW/SD002 |
| SAMPLE NUMBER | 15SW01701 | 15SW01701-F | 15SW01801 | 15SW01801-F | 15SW01901 | 15SW01901-F | 15SW00101 | 15SW00101-F | 15SW00201 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/9/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 |
| SODIUM | 58900 J | | 29800 J | | 18400 J | | 28300 J | | 24000 J |
| THALLIUM | 0.09 U | | 0.06 U | | 0.043 U | | 0.11 U | | 0.09 U |
| TIN | 0.048 U | | 0.38 U | | 0.42 U | | 0.05 U | | 0.08 U |
| VANADIUM | 1.9 J | | 6.1 | | 3.4 | | 2.1 | | 1.14 U |
| ZINC | 32.3 J | | 22.8 J | | 10.6 U | | 12.7 J | | 3.5 U |
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | | 187 | | 10.2 U | | 10.6 U | | 25.9 J | |
| ANTIMONY, FILTERED | | 0.085 U | | 0.39 U | | 0.19 U | | 0.085 U | |
| ARSENIC, FILTERED | | 0.22 U | | 0.31 U | | 0.19 U | | 17 J | |
| BARIUM, FILTERED | | 56.4 J | | 71.7 J | | 51.9 J | | 41.2 J | |
| BERYLLIUM, FILTERED | | 0.03 U | | 0.02 U | | 0.02 U | | 0.02 U | |
| CADMIUM, FILTERED | | 0.04 U | | 0.36 J | | 0.09 J | | 0.17 U | |
| CALCIUM, FILTERED | | 69600 J | | 34200 | | 25200 | | 47600 J | |
| CHROMIUM, FILTERED | | 0.83 U | | 0.37 U | | 0.34 U | | 0.47 U | |
| COBALT, FILTERED | | 4.1 | | 0.38 J | | 0.94 J | | 0.92 J | |
| COPPER, FILTERED | | 1.9 J | | 1.4 J | | 1.3 J | | 1.5 J | |
| IRON, FILTERED | | 643 J | | 299 J | | 484 J | | 134 U | |
| LEAD, FILTERED | | 0.486 U | | 0.192 J | | 0.199 J | | 0.162 U | |
| MAGNESIUM, FILTERED | | 14800 | | 8210 J | | 6410 J | | 9720 | |
| MANGANESE, FILTERED | | 398 | | 87.7 J | | 367 J | | 92.3 | |
| MERCURY, FILTERED | | 0.03 U | | 0.22 U | | 0.049 U | | 0.03 U | |
| NICKEL, FILTERED | | 9 J | | 3 J | | 2.7 J | | 3.6 J | |
| POTASSIUM, FILTERED | | 2140 J | | 1100 J | | 861 J | | 1670 J | |
| SELENIUM, FILTERED | | 0.45 U | | 0.29 U | | 0.27 U | | 0.15 U | |
| SILVER, FILTERED | | 0.028 UJ | | 0.028 U | | 0.028 U | | 0.028 UJ | |
| SODIUM, FILTERED | | 59600 J | | 21800 J | | 14500 J | | 29400 J | |
| THALLIUM, FILTERED | | 0.08 U | | 0.1 J | | 0.09 J | | 0.08 U | |
| TIN, FILTERED | | 0.26 U | | 0.22 U | | 0.08 U | | 0.17 U | |
| VANADIUM, FILTERED | | 1.14 U | | 1.14 U | | 1.14 U | | 1.14 U | |
| ZINC, FILTERED | | 10.4 J | | 3.4 U | | 3.7 J | | 2.5 J | |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | 10.57 | | | | | | 11.5 | | 7.33 |
| OXIDATION REDUCTION POTENTIAL (MV) | 4.4 | | 27 | | -15.7 | | 78.7 | | 81 |
| PH (S.U.) | 7.74 | | 7.57 | | 7.82 | | 7.86 | | 7.25 |
| SPECIFIC CONDUCTANCE (MS/CM) | 0.947 | | 0.512 | | 0.375 | | 0.579 | | 0.48 |
| TEMPERATURE (C ) | 10.87 | | 6.73 | | 7.37 | | 9.7 | | 9.36 |
| TURBIDITY (NTU) | 60 | | 70 | | 25 | | 45 | | 90 |

APPENC LE G-2
RESULTS FOR CHEMICALS ANALYZED II, SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK | | | |
| LOCATION | 15SW/SD002 | 15SW/SD015 | 15SW/SD015 | 15SW/SD003 | 15SW/SD014 | 15SW/SD014 |
| SAMPLE NUMBER | 15SW00201-F | 15SW01501 | 15SW01501-F | 15ST00301 | 15SW01401 | 15SW01401-F |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 |
| **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 UJ | | | 0.3 UJ | |
| 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 | |
| 2-BUTANONE | | 0.5 U | | | 0.5 U | |
| 2-HEXANONE | | 0.5 U | | | 0.5 U | |
| 3-CHLOROPROPENE | | 0.5 UJ | | | 0.5 UJ | |
| 4-METHYL-2-PENTANONE | | 0.5 U | | | 0.5 U | |
| ACETONE | | 0.5 U | | | 0.5 U | |
| ACETONITRILE | | 20 UR | | | 20 UR | |
| 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 UJ | |
| 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 UR | | | 20 UR | |
| METHACRYLONITRILE | | 0.3 U | | | 0.3 U | |
| METHYL IODIDE | | 0.5 U | | | 0.5 U | |
| METHYL METHACRYLATE | | 0.5 U | | | 0.5 U | |
| METHYL TERT-BUTYL ETHER | | 0.5 U | | | 0.5 U | |
| METHYLENE CHLORIDE | | 0.3 UJ | | | 0.3 UJ | |
| PROPIONITRILE | | 20 UR | | | 20 UR | |
| 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 | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK | | | |
| LOCATION | 15SW/SD002 | 15SW/SD015 | 15SW/SD015 | 15SW/SD003 | 15SW/SD014 | 15SW/SD014 |
| SAMPLE NUMBER | 15SW00201-F | 15SW01501 | 15SW01501-F | 15ST00301 | 15SW01401 | 15SW01401-F |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 |
| 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 | | 1.06 U | | | 1.05 U | |
| 1,2,4-TRICHLOROBENZENE | | 1.06 U | | | 1.05 U | |
| 1,2-DICHLOROBENZENE | | 1.06 U | | | 1.05 U | |
| 1,3-DICHLOROBENZENE | | 1.06 U | | | 1.05 U | |
| 1,4-DICHLOROBENZENE | | 1.06 U | | | 1.05 U | |
| 1,4-DIOXANE | | 1.06 UJ | | | 1.05 UJ | |
| 1,4-NAPHTHOQUINONE | | 1.06 U | | | 1.05 U | |
| 1,4-PHENYLENEDIAMINE | | 1.06 U | | | 1.05 U | |
| 1-NAPHTHYLAMINE | | 1.06 U | | | 1.05 U | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | | 1.06 UJ | | | 1.05 UJ | |
| 2,3,4,6-TETRACHLOROPHENOL | | 1.06 UR | | | 1.05 U | |
| 2,4,5-TRICHLOROPHENOL | | 1.06 UR | | | 1.05 U | |
| 2,4,6-TRICHLOROPHENOL | | 1.06 UR | | | 1.05 U | |
| 2,4-DICHLOROPHENOL | | 1.06 UR | | | 1.05 U | |
| 2,4-DIMETHYLPHENOL | | 1.06 UR | | | 1.05 U | |
| 2,4-DINITROPHENOL | | 1.06 UR | | | 1.05 U | |
| 2,6-DICHLOROPHENOL | | 1.06 UR | | | 1.05 U | |
| 2-ACETYLAMINOFLUORENE | | 1.06 UJ | | | 1.05 UJ | |
| 2-CHLORONAPHTHALENE | | 1.06 U | | | 1.05 U | |
| 2-CHLOROPHENOL | | 1.06 UR | | | 1.05 U | |
| 2-METHYLNAPHTHALENE | | 0.05 U | | | 0.049 U | |
| 2-METHYLPHENOL | | 1.06 UR | | | 1.05 U | |
| 2-NAPHTHYLAMINE | | 1.06 U | | | 1.05 U | |
| 2-NITROANILINE | | 1.06 U | | | 1.05 U | |
| 2-NITROPHENOL | | 1.06 UR | | | 1.05 U | |
| 2-PICOLINE | | 1.06 U | | | 1.05 U | |
| 3&4-METHYLPHENOL | | 1.06 UR | | | 1.05 U | |
| 3,3'-DICHLOROBENZIDINE | | 1.06 U | | | 1.05 U | |
| 3,3'-DIMETHYLBENZIDINE | | 1.06 UJ | | | 1.05 UJ | |
| 3-METHYLCHOLANTHRENE | | 1.06 U | | | 1.05 U | |
| 3-NITROANILINE | | 1.06 U | | | 1.05 U | |
| 4,6-DINITRO-2-METHYLPHENOL | | 1.06 UR | | | 1.05 U | |
| 4-AMINOBIPHENYL | | 1.06 U | | | 1.05 U | |
| 4-BROMOPHENYL PHENYL ETHER | | 1.06 U | | | 1.05 U | |
| 4-CHLORO-3-METHYLPHENOL | | 1.06 UR | | | 1.05 U | |
| 4-CHLOROANILINE | | 1.06 U | | | 1.05 U | |
| 4-CHLOROPHENYL PHENYL ETHER | | 1.06 U | | | 1.05 U | |
| 4-NITROANILINE | | 1.06 U | | | 1.05 U | |
| 4-NITROPHENOL | | 1.06 UR | | | 1.05 UJ | |
| 4-NITROQUINOLINE-1-OXIDE | | 1.06 UR | | | 1.05 UR | |
| 5-NITRO-O-TOLUIDINE | | 1.06 U | | | 1.05 U | |

APPENDIX G-2
RESULTS FOR CHEMICALS ANALYZED IN SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK | | | |
| LOCATION | 15SW/SD002 | 15SW/SD015 | 15SW/SD015 | 15SW/SD003 | 15SW/SD014 | 15SW/SD014 |
| SAMPLE NUMBER | 15SW00201-F | 15SW01501 | 15SW01501-F | 15ST00301 | 15SW01401 | 15SW01401-F |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | | 1.06 U | | | 1.05 U | |
| A,A-DIMETHYLPHENETHYLAMINE | | 1.06 U | | | 1.05 U | |
| ACENAPHTHENE | | 0.05 U | | | 0.049 U | |
| ACENAPHTHYLENE | | 0.05 U | | | 0.049 U | |
| ACETOPHENONE | | 1.06 U | | | 1.05 U | |
| ANILINE | | 1.06 U | | | 1.05 U | |
| ANTHRACENE | | 0.05 U | | | 0.049 U | |
| ARAMITE | | 1.06 U | | | 1.05 U | |
| BENZO(A)ANTHRACENE | | 0.05 U | | | 0.12 | |
| BENZO(A)PYRENE | | 0.05 U | | | 0.1 | |
| BENZO(B)FLUORANTHENE | | 0.05 U | | | 0.2 | |
| BENZO(G,H,I)PERYLENE | | 0.05 U | | | 0.11 | |
| BENZO(K)FLUORANTHENE | | 0.05 U | | | 0.1 | |
| BENZYL ALCOHOL | | 1.06 U | | | 1.05 U | |
| BIS(2-CHLOROETHOXY)METHANE | | 1.06 U | | | 1.05 U | |
| BIS(2-CHLOROETHYL)ETHER | | 1.06 U | | | 1.05 U | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | 1.06 U | | | 1.05 U | |
| BUTYL BENZYL PHTHALATE | | 1.06 U | | | 1.05 U | |
| CHLOROBENZILATE | | 1.06 U | | | 1.05 U | |
| CHRYSENE | | 0.05 U | | | 0.18 | |
| DI-N-BUTYL PHTHALATE | | 1.06 U | | | 1.05 U | |
| DI-N-OCTYL PHTHALATE | | 1.06 U | | | 1.05 U | |
| DIALLATE | | 1.06 U | | | 1.05 U | |
| DIBENZO(A,H)ANTHRACENE | | 0.05 U | | | 0.049 U | |
| DIBENZOFURAN | | 1.06 U | | | 1.05 U | |
| DIETHYL PHTHALATE | | 1.06 U | | | 1.05 U | |
| DIMETHYL PHTHALATE | | 1.06 U | | | 1.05 U | |
| DIPHENYLAMINE | | 1.06 U | | | 1.05 U | |
| ETHYL METHANE SULFONATE | | 1.06 U | | | 1.05 U | |
| FLUORANTHENE | | 0.15 | | | 0.49 | |
| FLUORENE | | 0.05 U | | | 0.049 U | |
| HEXACHLOROBENZENE | | 1.06 UJ | | | 1.05 UJ | |
| HEXACHLOROBUTADIENE | | 1.06 U | | | 1.05 U | |
| HEXACHLOROCYCLOPENTADIENE | | 1.06 UJ | | | 1.05 UJ | |
| HEXACHLOROETHANE | | 1.06 U | | | 1.05 U | |
| HEXACHLOROPROPENE | | 1.06 U | | | 1.05 U | |
| INDENO(1,2,3-CD)PYRENE | | 0.05 U | | | 0.09 J | |
| ISODRIN | | 1.06 U | | | 1.05 U | |
| ISOPHORONE | | 1.06 U | | | 1.05 U | |
| ISOSAFROLE | | 1.06 U | | | 1.05 U | |
| KEPONE | | 1.06 UJ | | | 1.05 UJ | |
| METHAPYRILENE | | 1.06 UJ | | | 1.05 UJ | |
| METHYL METHANE SULFONATE | | 1.06 U | | | 1.05 U | |
| N-NITROSO-DI-N-BUTYLAMINE | | 1.06 U | | | 1.05 U | |
| N-NITROSO-DI-N-PROPYLAMINE | | 1.06 U | | | 1.05 U | |
| N-NITROSODIETHYLAMINE | | 1.06 U | | | 1.05 U | |
| N-NITROSODIMETHYLAMINE | | 1.06 UJ | | | 1.05 UJ | |
| N-NITROSODIPHENYLAMINE | | 1.06 U | | | 1.05 U | |
| N-NITROSOMETHYLETHYLAMINE | | 1.06 U | | | 1.05 U | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK | | | |
| LOCATION | 15SW/SD002 | 15SW/SD015 | 15SW/SD015 | 15SW/SD003 | 15SW/SD014 | 15SW/SD014 |
| SAMPLE NUMBER | 15SW00201-F | 15SW01501 | 15SW01501-F | 15ST00301 | 15SW01401 | 15SW01401-F |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 |
| N-NITROSOMORPHOLINE | | 1.06 U | | | 1.05 U | |
| N-NITROSOPIPERIDINE | | 1.06 U | | | 1.05 U | |
| N-NITROSOPYRROLIDINE | | 1.06 U | | | 1.05 U | |
| NAPHTHALENE | | 0.05 U | | | 0.049 U | |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | | 1.06 U | | | 1.05 U | |
| O-TOLUIDINE | | 1.06 U | | | 1.05 U | |
| P-(DIMETHYLAMINO)AZOBENZENE | | 1.06 U | | | 1.05 U | |
| PENTACHLOROBENZENE | | 1.06 U | | | 1.05 U | |
| PENTACHLOROETHANE | | 1.06 U | | | 1.05 U | |
| PENTACHLORONITROBENZENE | | 1.06 U | | | 1.05 U | |
| PHENACETIN | | 1.06 U | | | 1.05 U | |
| PHENANTHRENE | | 0.09 J | | | 0.32 | |
| PHENOL | | 1.06 UR | | | 1.05 U | |
| PRONAMIDE | | 1.06 U | | | 1.05 U | |
| PYRENE | | 0.12 | | | 0.42 | |
| PYRIDINE | | 1.06 UJ | | | 1.05 UJ | |
| SAFROLE | | 1.06 U | | | 1.05 U | |
| **Pesticides PCBs (ug/L)** | | | | | | |
| 4,4'-DDD | | 0.05 U | | | 0.057 U | |
| 4,4'-DDE | | 0.05 U | | | 0.057 U | |
| 4,4'-DDT | | 0.05 U | | | 0.057 U | |
| ALDRIN | | 0.025 U | | | 0.028 U | |
| ALPHA-BHC | | 0.025 U | | | 0.028 U | |
| ALPHA-CHLORDANE | | 0.025 U | | | 0.028 U | |
| AROCLOR-1016 | | 0.252 U | | | 0.285 U | |
| AROCLOR-1221 | | 0.252 U | | | 0.285 U | |
| AROCLOR-1232 | | 0.252 U | | | 0.285 U | |
| AROCLOR-1242 | | 0.252 U | | | 0.285 U | |
| AROCLOR-1248 | | 0.252 U | | | 0.285 U | |
| AROCLOR-1254 | | 0.252 U | | | 0.285 U | |
| AROCLOR-1260 | | 0.252 U | | | 0.285 U | |
| BETA-BHC | | 0.025 U | | | 0.028 U | |
| DELTA-BHC | | 0.025 U | | | 0.028 U | |
| DIELDRIN | | 0.05 U | | | 0.057 U | |
| ENDOSULFAN I | | 0.025 U | | | 0.028 U | |
| ENDOSULFAN II | | 0.05 U | | | 0.057 U | |
| ENDOSULFAN SULFATE | | 0.05 U | | | 0.057 U | |
| ENDRIN | | 0.05 U | | | 0.057 U | |
| ENDRIN ALDEHYDE | | 0.05 U | | | 0.057 U | |
| ENDRIN KETONE | | 0.05 U | | | 0.057 U | |
| GAMMA-BHC (LINDANE) | | 0.025 U | | | 0.028 U | |
| GAMMA-CHLORDANE | | 0.025 U | | | 0.028 U | |
| HEPTACHLOR | | 0.025 U | | | 0.028 U | |
| HEPTACHLOR EPOXIDE | | 0.025 U | | | 0.028 U | |
| METHOXYCHLOR | | 0.252 U | | | 0.285 U | |
| TOXAPHENE | | 2.52 U | | | 2.85 U | |
| **Herbicides (ug/L)** | | | | | | |
| 2,4,5-T | | 0.04 U | | | 0.04 U | |
| 2,4,5-TP (SILVEX) | | 0.04 U | | | 0.04 U | |

APPENDI .E G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK | | | |
| LOCATION | 15SW/SD002 | 15SW/SD015 | 15SW/SD015 | 15SW/SD003 | 15SW/SD014 | 15SW/SD014 |
| SAMPLE NUMBER | 15SW00201-F | 15SW01501 | 15SW01501-F | 15ST00301 | 15SW01401 | 15SW01401-F |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 |
| 2,4-D | | 0.04 U | | | 0.04 U | |
| DINOSEB | | 0.04 U | | | 0.04 U | |
| HEXACHLOROPHENE | | 0.025 U | | | 0.025 U | |
| PENTACHLOROPHENOL | | 0.037 J | | | 0.037 J | |
| **Total Metals (ug/L)** | | | | | | |
| ALUMINUM | | 194 J | | | 421 J | |
| ANTIMONY | | 0.48 U | | | 0.35 U | |
| ARSENIC | | 0.29 U | | | 0.38 U | |
| BARIUM | | 51 J | | | 40.7 J | |
| BERYLLIUM | | 0.05 U | | | 0.12 U | |
| CADMIUM | | 0.08 U | | | 0.09 U | |
| CALCIUM | | 47800 J | | | 40600 J | |
| CHROMIUM | | 0.43 U | | | 0.71 U | |
| COBALT | | 0.58 U | | | 1.2 U | |
| COPPER | | 1.7 J | | | 1.5 J | |
| IRON | | 306 J | | | 411 J | |
| LEAD | | 0.633 U | | | 0.606 U | |
| MAGNESIUM | | 10800 J | | | 9810 J | |
| MANGANESE | | 71.5 | | | 69 | |
| MERCURY | | 0.041 U | | | 0.033 U | |
| NICKEL | | 2.3 J | | | 3.8 J | |
| POTASSIUM | | 1800 J | | | 1610 J | |
| SELENIUM | | 0.25 U | | | 0.17 U | |
| SILVER | | 0.028 UJ | | | 0.04 U | |

APPENDIX TABLE G-2
RESULTS FOR CHEMICALS ANALYZED IN ALL SURFACE WATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|
| STREAM ORDER | TURKEY CREEK | TURKEY CREEK | TURKEY CREEK | | | |
| LOCATION | 15SW/SD002 | 15SW/SD015 | 15SW/SD015 | 15SW/SD003 | 15SW/SD014 | 15SW/SD014 |
| SAMPLE NUMBER | 15SW00201-F | 15SW01501 | 15SW01501-F | 15ST00301 | 15SW01401 | 15SW01401-F |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| SAMPLE DEPTH | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/11/2005 | 1/11/2005 |
| SODIUM | | 21400 J | | | 23000 J | |
| THALLIUM | | 0.08 U | | | 0.1 U | |
| TIN | | 0.048 U | | | 0.05 U | |
| VANADIUM | | 1.14 U | | | 1.14 U | |
| ZINC | | 5.2 J | | | 7.5 J | |
| **Dissolved Metals (ug/L)** | | | | | | |
| ALUMINUM, FILTERED | 2090 | | 28.6 J | | | 48.8 J |
| ANTIMONY, FILTERED | 0.085 U | | 0.085 U | | | 0.085 U |
| ARSENIC, FILTERED | 1 J | | 0.09 U | | | 0.06 U |
| BARIUM, FILTERED | 46.6 J | | 50.5 J | | | 33 J |
| BERYLLIUM, FILTERED | 0.14 U | | 0.02 U | | | 0.04 U |
| CADMIUM, FILTERED | 0.19 U | | 0.05 U | | | 0.05 U |
| CALCIUM, FILTERED | 42800 J | | 46800 J | | | 40400 J |
| CHROMIUM, FILTERED | 4.1 J | | 0.44 U | | | 0.43 U |
| COBALT, FILTERED | 2.1 | | 0.55 J | | | 0.86 J |
| COPPER, FILTERED | 5.2 J | | 1.2 J | | | 1.2 J |
| IRON, FILTERED | 2860 J | | 154 U | | | 103 U |
| LEAD, FILTERED | 3.1 J | | 0.204 U | | | 0.192 U |
| MAGNESIUM, FILTERED | 7630 | | 10700 | | | 11000 |
| MANGANESE, FILTERED | 114 | | 65.8 | | | 41.2 |
| MERCURY, FILTERED | 0.036 U | | 0.036 U | | | 0.031 U |
| NICKEL, FILTERED | 6.9 J | | 3.2 J | | | 4.3 J |
| POTASSIUM, FILTERED | 1630 J | | 1660 J | | | 1670 J |
| SELENIUM, FILTERED | 0.35 U | | 0.12 U | | | 0.21 U |
| SILVER, FILTERED | 0.05 U | | 0.028 UJ | | | 0.028 UJ |
| SODIUM, FILTERED | 19600 J | | 21500 J | | | 23900 J |
| THALLIUM, FILTERED | 0.13 U | | 0.1 U | | | 0.07 U |
| TIN, FILTERED | 0.56 U | | 0.09 U | | | 0.18 U |
| VANADIUM, FILTERED | 4.2 | | 1.14 U | | | 1.14 U |
| ZINC, FILTERED | 42.7 | | 3.1 J | | | 3.7 J |
| **Field Parameters** | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | | 11.33 | | | 11 | |
| OXIDATION REDUCTION POTENTIAL (MV) | | 3.4 | | | 55.3 | |
| PH (S.U.) | | 7.93 | | | 7.77 | |
| SPECIFIC CONDUCTANCE (MS/CM) | | 0.518 | | | 0.478 | |
| TEMPERATURE (C) | | 9.84 | | | 9.88 | |
| TURBIDITY (NTU) | | 19 | | | 39 | |

DOWNGRAD - Location is a downgradient location
UPGRAD - Location is a upgradient location.
NOT FOUND - Location was impacted by new construction and unable to be sampled.
Data qualifiers (e.g., U, J) are defined in section 3 of the text.
ug/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
S.U. - standard units
MS/CM - milliSiemens per centimeter
C - Celsius
NTU - nephelometric turbidity units

APPENDIX LE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD006 | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD010 | 15SW/SD011 |
| SAMPLE NUMBER | 15SD0040006 | 15SD0060006 | 15SD0070006 | 15SD0080006 | 15SD0090006 | 15SD0100006 | 15SD0110006 |
| SAMPLE CODE | NO SED | NORMAL | NOT FOUND | NOT FOUND | NORMAL | NO SED | NO SED |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| **Volatile Organics (ug/kg)** | | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | | 1.11 U | | | 1.12 U | | |
| 1,1,1-TRICHLOROETHANE | | 1.11 U | | | 1.12 U | | |
| 1,1,2,2-TETRACHLOROETHANE | | 1.11 U | | | 1.12 U | | |
| 1,1,2-TRICHLOROETHANE | | 1.11 U | | | 1.12 U | | |
| 1,1-DICHLOROETHANE | | 1.11 U | | | 1.12 U | | |
| 1,1-DICHLOROETHENE | | 1.11 U | | | 1.12 U | | |
| 1,2,3-TRICHLOROPROPANE | | 1.11 U | | | 1.12 U | | |
| 1,2-DIBROMO-3-CHLOROPROPANE | | 1.11 U | | | 1.12 U | | |
| 1,2-DIBROMOETHANE | | 1.11 U | | | 1.12 U | | |
| 1,2-DICHLOROETHANE | | 1.11 U | | | 1.12 U | | |
| 1,2-DICHLOROPROPANE | | 1.11 U | | | 1.12 U | | |
| 2-BUTANONE | | 1.11 U | | | 1.12 U | | |
| 2-HEXANONE | | 1.11 U | | | 1.12 U | | |
| 3-CHLOROPROPENE | | 1.11 U | | | 1.12 U | | |
| 4-METHYL-2-PENTANONE | | 1.11 U | | | 1.12 UJ | | |
| ACETONE | | 2 J | | | 8 J | | |
| ACETONITRILE | | 44.5 UR | | | 44.8 UR | | |
| ACROLEIN | | 1.11 UR | | | 1.12 UR | | |
| ACRYLONITRILE | | 1.11 U | | | 1.12 U | | |
| BENZENE | | 1.11 U | | | 1.12 U | | |
| BROMODICHLOROMETHANE | | 1.11 U | | | 1.12 U | | |
| BROMOFORM | | 1.11 U | | | 1.12 U | | |
| BROMOMETHANE | | 1.11 U | | | 1.12 U | | |
| CARBON DISULFIDE | | 1.11 U | | | 1.12 U | | |
| CARBON TETRACHLORIDE | | 1.11 U | | | 1.12 U | | |
| CHLOROBENZENE | | 1.11 U | | | 1.12 U | | |
| CHLORODIBROMOMETHANE | | 1.11 U | | | 1.12 U | | |
| CHLOROETHANE | | 1.11 U | | | 1.12 U | | |
| CHLOROFORM | | 1.11 U | | | 1.12 U | | |
| CHLOROMETHANE | | 1.11 U | | | 1.12 U | | |
| CHLOROPRENE | | 1.11 U | | | 1.12 U | | |
| CIS-1,2-DICHLOROETHENE | | 1.11 U | | | 1.12 U | | |
| CIS-1,3-DICHLOROPROPENE | | 1.11 U | | | 1.12 U | | |
| DIBROMOMETHANE | | 1.11 U | | | 1.12 U | | |
| DICHLORODIFLUOROMETHANE | | 1.11 U | | | 1.12 U | | |
| ETHYL METHACRYLATE | | 1.11 U | | | 1.12 U | | |
| ETHYLBENZENE | | 1.11 U | | | 1.12 U | | |
| ISOBUTANOL | | 44.5 UR | | | 44.8 UR | | |
| METHACRYLONITRILE | | 1.11 U | | | 1.12 U | | |
| METHYL IODIDE | | 1.11 U | | | 1.12 U | | |
| METHYL METHACRYLATE | | 1.11 U | | | 1.12 U | | |
| METHYL TERT-BUTYL ETHER | | 1.11 U | | | 1.12 U | | |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD006 | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD010 | 15SW/SD011 |
| SAMPLE NUMBER | 15SD0040006 | 15SD0060006 | 15SD0070006 | 15SD0080006 | 15SD0090006 | 15SD0100006 | 15SD0110006 |
| SAMPLE CODE | NO SED | NORMAL | NOT FOUND | NOT FOUND | NORMAL | NO SED | NO SED |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| METHYLENE CHLORIDE | | 1.11 UJ | | | 1.12 UJ | | |
| PROPIONITRILE | | 44.5 UR | | | 44.8 UR | | |
| STYRENE | | 1.11 U | | | 1.12 U | | |
| TETRACHLOROETHENE | | 1.11 U | | | 1.12 U | | |
| TOLUENE | | 1.11 U | | | 1.12 U | | |
| TOTAL XYLENES | | 1.11 U | | | 1.12 U | | |
| TRANS-1,2-DICHLOROETHENE | | 1.11 U | | | 1.12 U | | |
| TRANS-1,3-DICHLOROPROPENE | | 1.11 U | | | 1.12 U | | |
| TRANS-1,4-DICHLORO-2-BUTENE | | 1.11 U | | | 1.12 U | | |
| TRICHLOROETHENE | | 1.11 U | | | 1.12 U | | |
| TRICHLOROFLUOROMETHANE | | 1.11 U | | | 1.12 U | | |
| VINYL ACETATE | | 1.11 UJ | | | 1.12 U | | |
| VINYL CHLORIDE | | 1.11 U | | | 1.12 U | | |
| **Semivolatile Organics (ug/kg)** | | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | | 80.4 U | | | 82.6 U | | |
| 1,2,4-TRICHLOROBENZENE | | 80.4 U | | | 82.6 U | | |
| 1,2-DICHLOROBENZENE | | 80.4 U | | | 82.6 U | | |
| 1,3-DICHLOROBENZENE | | 80.4 U | | | 82.6 U | | |
| 1,4-DICHLOROBENZENE | | 80.4 U | | | 82.6 U | | |
| 1,4-DIOXANE | | 120 U | | | 123 U | | |
| 1,4-NAPHTHOQUINONE | | 80.4 U | | | 82.6 U | | |
| 1,4-PHENYLENEDIAMINE | | 80.4 U | | | 82.6 U | | |
| 1-NAPHTHYLAMINE | | 80.4 U | | | 82.6 U | | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | | 80.4 U | | | 82.6 U | | |
| 2,3,4,6-TETRACHLOROPHENOL | | 80.4 U | | | 82.6 U | | |
| 2,4,5-TRICHLOROPHENOL | | 80.4 U | | | 82.6 U | | |
| 2,4,6-TRICHLOROPHENOL | | 80.4 U | | | 82.6 U | | |
| 2,4-DICHLOROPHENOL | | 80.4 U | | | 82.6 U | | |
| 2,4-DIMETHYLPHENOL | | 80.4 U | | | 82.6 U | | |
| 2,4-DINITROPHENOL | | 80.4 UJ | | | 82.6 UJ | | |
| 2,6-DICHLOROPHENOL | | 80.4 U | | | 82.6 U | | |
| 2-ACETYLAMINOFLUORENE | | 80.4 U | | | 82.6 U | | |
| 2-CHLORONAPHTHALENE | | 80.4 U | | | 82.6 U | | |
| 2-CHLOROPHENOL | | 80.4 U | | | 82.6 U | | |
| 2-METHYLNAPHTHALENE | | 47 | | | 16.3 U | | |
| 2-METHYLPHENOL | | 80.4 U | | | 82.6 U | | |
| 2-NAPHTHYLAMINE | | 80.4 U | | | 82.6 U | | |
| 2-NITROANILINE | | 80.4 U | | | 82.6 U | | |
| 2-NITROPHENOL | | 80.4 U | | | 82.6 U | | |
| 2-PICOLINE | | 80.4 U | | | 82.6 U | | |
| 3&4-METHYLPHENOL | | 80.4 U | | | 82.6 U | | |
| 3,3'-DICHLOROBENZIDINE | | 80.4 U | | | 82.6 U | | |
| 3,3'-DIMETHYLBENZIDINE | | 80.4 U | | | 82.6 U | | |

APPEND. LE G-3
RESULTS FOR CHEMICALS ANALYZED ... ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD006 | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD010 | 15SW/SD011 |
| SAMPLE NUMBER | 15SD0040006 | 15SD0060006 | 15SD0070006 | 15SD0080006 | 15SD0090006 | 15SD0100006 | 15SD0110006 |
| SAMPLE CODE | NO SED | NORMAL | NOT FOUND | NOT FOUND | NORMAL | NO SED | NO SED |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| 3-METHYLCHOLANTHRENE | | 80.4 U | | | 82.6 U | | |
| 3-NITROANILINE | | 80.4 U | | | 82.6 U | | |
| 4,6-DINITRO-2-METHYLPHENOL | | 80.4 U | | | 82.6 U | | |
| 4-AMINOBIPHENYL | | 80.4 U | | | 82.6 U | | |
| 4-BROMOPHENYL PHENYL ETHER | | 80.4 U | | | 82.6 U | | |
| 4-CHLORO-3-METHYLPHENOL | | 80.4 U | | | 82.6 U | | |
| 4-CHLOROANILINE | | 80.4 U | | | 82.6 U | | |
| 4-CHLOROPHENYL PHENYL ETHER | | 80.4 U | | | 82.6 U | | |
| 4-NITROANILINE | | 80.4 U | | | 82.6 U | | |
| 4-NITROPHENOL | | 80.4 UJ | | | 82.6 UJ | | |
| 4-NITROQUINOLINE-1-OXIDE | | 80.4 UR | | | 82.6 UR | | |
| 5-NITRO-O-TOLUIDINE | | 80.4 U | | | 82.6 U | | |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | | 80.4 U | | | 82.6 U | | |
| A,A-DIMETHYLPHENETHYLAMINE | | 80.4 U | | | 82.6 U | | |
| ACENAPHTHENE | | 560 | | | 18 J | | |
| ACENAPHTHYLENE | | 15.8 U | | | 16.3 U | | |
| ACETOPHENONE | | 80.4 U | | | 82.6 U | | |
| ANILINE | | 80.4 U | | | 82.6 U | | |
| ANTHRACENE | | 1300 | | | 25 J | | |
| ARAMITE | | 80.4 U | | | 82.6 U | | |
| BENZO(A)ANTHRACENE | | 3300 | | | 100 J | | |
| BENZO(A)PYRENE | | 3700 J | | | 120 J | | |
| BENZO(B)FLUORANTHENE | | 4300 J | | | 150 J | | |
| BENZO(G,H,I)PERYLENE | | 3800 J | | | 160 J | | |
| BENZO(K)FLUORANTHENE | | 1900 J | | | 89 J | | |
| BENZYL ALCOHOL | | 80.4 U | | | 82.6 U | | |
| BIS(2-CHLOROETHOXY)METHANE | | 80.4 U | | | 82.6 U | | |
| BIS(2-CHLOROETHYL)ETHER | | 80.4 U | | | 82.6 U | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | 270 J | | | 280 J | | |
| BUTYL BENZYL PHTHALATE | | 80.4 U | | | 82.6 U | | |
| CHLOROBENZILATE | | 80.4 U | | | 82.6 U | | |
| CHRYSENE | | 4100 | | | 160 J | | |
| DI-N-BUTYL PHTHALATE | | 80.4 U | | | 82.6 U | | |
| DI-N-OCTYL PHTHALATE | | 80.4 U | | | 82.6 U | | |
| DIALLATE | | 80.4 U | | | 82.6 U | | |
| DIBENZO(A,H)ANTHRACENE | | 700 J | | | 16.3 UJ | | |
| DIBENZOFURAN | | 420 | | | 82.6 U | | |
| DIETHYL PHTHALATE | | 80.4 U | | | 82.6 U | | |
| DIMETHYL PHTHALATE | | 80.4 U | | | 82.6 U | | |
| DIPHENYLAMINE | | 80.4 U | | | 82.6 U | | |
| ETHYL METHANE SULFONATE | | 80.4 U | | | 82.6 U | | |
| FLUORANTHENE | | 12000 | | | 340 | | |
| FLUORENE | | 820 | | | 20 J | | |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD006 | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD010 | 15SW/SD011 |
| SAMPLE NUMBER | 15SD0040006 | 15SD0060006 | 15SD0070006 | 15SD0080006 | 15SD0090006 | 15SD0100006 | 15SD0110006 |
| SAMPLE CODE | NO SED | NORMAL | NOT FOUND | NOT FOUND | NORMAL | NO SED | NO SED |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| HEXACHLOROBENZENE | | 80.4 U | | | 82.6 U | | |
| HEXACHLOROBUTADIENE | | 80.4 U | | | 82.6 U | | |
| HEXACHLOROCYCLOPENTADIENE | | 80.4 UJ | | | 82.6 UJ | | |
| HEXACHLOROETHANE | | 80.4 U | | | 82.6 U | | |
| HEXACHLOROPROPENE | | 80.4 U | | | 82.6 U | | |
| INDENO(1,2,3-CD)PYRENE | | 3100 J | | | 120 J | | |
| ISODRIN | | 80.4 U | | | 82.6 U | | |
| ISOPHORONE | | 80.4 U | | | 82.6 U | | |
| ISOSAFROLE | | 80.4 U | | | 82.6 U | | |
| KEPONE | | 80.4 UJ | | | 82.6 UJ | | |
| METHAPYRILENE | | 80.4 U | | | 82.6 U | | |
| METHYL METHANE SULFONATE | | 80.4 U | | | 82.6 U | | |
| N-NITROSO-DI-N-BUTYLAMINE | | 80.4 U | | | 82.6 U | | |
| N-NITROSO-DI-N-PROPYLAMINE | | 80.4 U | | | 82.6 U | | |
| N-NITROSODIETHYLAMINE | | 80.4 U | | | 82.6 U | | |
| N-NITROSODIMETHYLAMINE | | 80.4 UJ | | | 82.6 UJ | | |
| N-NITROSODIPHENYLAMINE | | 80.4 U | | | 82.6 U | | |
| N-NITROSOMETHYLETHYLAMINE | | 80.4 U | | | 82.6 U | | |
| N-NITROSOMORPHOLINE | | 80.4 U | | | 82.6 U | | |
| N-NITROSOPIPERIDINE | | 80.4 U | | | 82.6 U | | |
| N-NITROSOPYRROLIDINE | | 80.4 U | | | 82.6 U | | |
| NAPHTHALENE | | 140 | | | 16.3 U | | |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | | 80.4 U | | | 82.6 U | | |
| O-TOLUIDINE | | 80.4 U | | | 82.6 U | | |
| P-(DIMETHYLAMINO)AZOBENZENE | | 80.4 U | | | 82.6 U | | |
| PENTACHLOROBENZENE | | 80.4 U | | | 82.6 U | | |
| PENTACHLOROETHANE | | 80.4 U | | | 82.6 U | | |
| PENTACHLORONITROBENZENE | | 80.4 U | | | 82.6 U | | |
| PHENACETIN | | 80.4 U | | | 82.6 U | | |
| PHENANTHRENE | | 9100 | | | 250 | | |
| PHENOL | | 80.4 U | | | 82.6 U | | |
| PRONAMIDE | | 80.4 U | | | 82.6 U | | |
| PYRENE | | 16000 J | | | 340 J | | |
| PYRIDINE | | 80.4 U | | | 82.6 U | | |
| SAFROLE | | 80.4 U | | | 82.6 U | | |
| **Pesticides PCBs (ug/kg)** | | | | | | | |
| 4,4'-DDD | | 1.62 U | | | 1.7 J | | |
| 4,4'-DDE | | 1.62 U | | | 1.66 U | | |
| 4,4'-DDT | | 4.9 | | | 6.2 | | |
| ALDRIN | | 0.78 U | | | 0.801 U | | |
| ALPHA-BHC | | 0.78 U | | | 0.801 U | | |
| ALPHA-CHLORDANE | | 0.78 U | | | 0.801 U | | |
| AROCLOR-1016 | | 10.8 U | | | 11.1 U | | |

APPENDI. .E G-3
RESULTS FOR CHEMICALS ANALYZED ... ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD006 | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD010 | 15SW/SD011 |
| SAMPLE NUMBER | 15SD0040006 | 15SD0060006 | 15SD0070006 | 15SD0080006 | 15SD0090006 | 15SD0100006 | 15SD0110006 |
| SAMPLE CODE | NO SED | NORMAL | NOT FOUND | NOT FOUND | NORMAL | NO SED | NO SED |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| AROCLOR-1221 | | 10.8 U | | | 11.1 U | | |
| AROCLOR-1232 | | 10.8 U | | | 11.1 U | | |
| AROCLOR-1242 | | 10.8 U | | | 11.1 U | | |
| AROCLOR-1248 | | 10.8 U | | | 11.1 U | | |
| AROCLOR-1254 | | 10.8 U | | | 11.1 U | | |
| AROCLOR-1260 | | 10.8 U | | | 11.1 U | | |
| BETA-BHC | | 0.78 U | | | 0.801 U | | |
| DELTA-BHC | | 0.78 U | | | 0.801 U | | |
| DIELDRIN | | 1.62 U | | | 1.66 U | | |
| ENDOSULFAN I | | 0.78 U | | | 0.801 U | | |
| ENDOSULFAN II | | 1.62 U | | | 1.66 U | | |
| ENDOSULFAN SULFATE | | 1.62 U | | | 1.66 U | | |
| ENDRIN | | 1.62 U | | | 1.66 U | | |
| ENDRIN ALDEHYDE | | 1.62 U | | | 1.66 U | | |
| ENDRIN KETONE | | 1.62 U | | | 1.66 U | | |
| GAMMA-BHC (LINDANE) | | 0.78 U | | | 0.801 U | | |
| GAMMA-CHLORDANE | | 0.78 U | | | 0.801 U | | |
| HEPTACHLOR | | 0.78 U | | | 0.801 U | | |
| HEPTACHLOR EPOXIDE | | 0.78 U | | | 0.801 U | | |
| METHOXYCHLOR | | 7.8 U | | | 8.01 U | | |
| TOXAPHENE | | 20.4 U | | | 21 U | | |
| **Herbicides (ug/kg)** | | | | | | | |
| 2,4,5-T | | 1.62 U | | | 1.66 U | | |
| 2,4,5-TP (SILVEX) | | 1.62 U | | | 1.66 U | | |
| 2,4-D | | 1.62 U | | | 1.66 U | | |
| DINOSEB | | 1.62 U | | | 1.66 U | | |
| HEXACHLOROPHENE | | 1.02 U | | | 1.05 U | | |
| PENTACHLOROPHENOL | | 0.54 U | | | 4.9 J | | |
| **Inorganics (mg/kg)** | | | | | | | |
| ALUMINUM | | 6850 J | | | 4010 J | | |
| ANTIMONY | | 0.45 U | | | 0.29 U | | |
| ARSENIC | | 4.9 J | | | 3.6 J | | |
| BARIUM | | 60.4 J | | | 23.5 J | | |
| BERYLLIUM | | 0.32 U | | | 0.18 U | | |
| CADMIUM | | 0.42 J | | | 0.63 J | | |
| CALCIUM | | 88000 J | | | 129000 J | | |
| CHROMIUM | | 14.1 J | | | 39.6 J | | |
| COBALT | | 8 J | | | 3.8 J | | |
| COPPER | | 12.2 J | | | 8.4 J | | |
| IRON | | 11800 J | | | 9670 J | | |
| LEAD | | 39.7 J | | | 133 J | | |
| MAGNESIUM | | 9260 J | | | 14500 J | | |
| MANGANESE | | 1050 J | | | 323 J | | |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL | SEWER & OUTFALL |
| LOCATION | 15SW/SD004 | 15SW/SD006 | 15SW/SD007 | 15SW/SD008 | 15SW/SD009 | 15SW/SD010 | 15SW/SD011 |
| SAMPLE NUMBER | 15SD0040006 | 15SD0060006 | 15SD0070006 | 15SD0080006 | 15SD0090006 | 15SD0100006 | 15SD0110006 |
| SAMPLE CODE | NO SED | NORMAL | NOT FOUND | NOT FOUND | NORMAL | NO SED | NO SED |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/12/2005 | 1/12/2005 | 1/12/2005 |
| MERCURY | | 0.085 J | | | 0.015 J | | |
| NICKEL | | 10.2 J | | | 9.2 J | | |
| POTASSIUM | | 850 J | | | 589 J | | |
| SELENIUM | | 0.27 U | | | 0.13 U | | |
| SILVER | | 0.05 U | | | 0.047 U | | |
| SODIUM | | 108 U | | | 117 J | | |
| THALLIUM | | 0.08 U | | | 0.05 U | | |
| TIN | | 0.35 U | | | 0.33 U | | |
| VANADIUM | | 17 J | | | 13.5 J | | |
| ZINC | | 56.5 | | | 163 | | |
| **Miscellaneous Parameters (%)** | | | | | | | |
| CYANIDE (mg/kg) | | | | | | | |
| PERCENT SILT/CLAY | | | | | | | |
| SIEVE 1" | | | | | | | |
| SIEVE 1-1/2" | | | | | | | |
| SIEVE 2" | | | | | | | |
| SIEVE 3" | | | | | | | |
| SIEVE 3/4" | | | | | | | |
| SIEVE 3/8" | | | | | | | |
| SIEVE NO. 004 | | | | | | | |
| SIEVE NO. 010 | | | | | | | |
| SIEVE NO. 020 | | | | | | | |
| SIEVE NO. 040 | | | | | | | |
| SIEVE NO. 060 | | | | | | | |
| SIEVE NO. 140 | | | | | | | |
| SIEVE NO. 200 | | | | | | | |
| TOTAL ORGANIC CARBON (mg/kg) | | | | | | | |

APPENDI LE G-3
RESULTS FOR CHEMICALS ANALYZEL LL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 |
| LOCATION | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD015 | 15SW/SD016 | 15SW/SD017 | 15SW/SD018 | 15SW/SD019 |
| SAMPLE NUMBER | 15SD0120006 | 15SD0050006 | 15SD0050006-D | 15SD0130006 | 15SD0150006 | 15SD0160006 | 15SD0170006 | 15SD0180006 | 15SD0190006 |
| SAMPLE CODE | NOT FOUND | ORIG | DUP | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 |
| **Volatile Organics (ug/kg)** | | | | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | | 1.13 UJ | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,1,1-TRICHLOROETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,1,2,2-TETRACHLOROETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,1,2-TRICHLOROETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,1-DICHLOROETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,1-DICHLOROETHENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,2,3-TRICHLOROPROPANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,2-DIBROMO-3-CHLOROPROPANE | | 1.13 UJ | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,2-DIBROMOETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,2-DICHLOROETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 1,2-DICHLOROPROPANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 2-BUTANONE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 2-HEXANONE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 3-CHLOROPROPENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| 4-METHYL-2-PENTANONE | | 1.13 UJ | 1.02 UJ | 1.1 UJ | 1.14 UJ | 0.948 UJ | 1.13 UJ | 1.54 U | 1.3 U |
| ACETONE | | 1.13 UJ | 1.02 UJ | 1.1 UJ | 1.14 UJ | 0.948 UJ | 1.13 UJ | 2 U | 1.3 U |
| ACETONITRILE | | 45.3 UR | 40.6 UR | 43.9 UR | 45.7 UR | 37.9 UR | 45.1 UR | 61.7 UR | 51.9 UR |
| ACROLEIN | | 1.13 UR | 1.02 UR | 1.1 UR | 1.14 UR | 0.948 UR | 1.13 UR | 1.54 UR | 1.3 UR |
| ACRYLONITRILE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| BENZENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| BROMODICHLOROMETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| BROMOFORM | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| BROMOMETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CARBON DISULFIDE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CARBON TETRACHLORIDE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CHLOROBENZENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CHLORODIBROMOMETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CHLOROETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CHLOROFORM | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CHLOROMETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CHLOROPRENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CIS-1,2-DICHLOROETHENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| CIS-1,3-DICHLOROPROPENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| DIBROMOMETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| DICHLORODIFLUOROMETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| ETHYL METHACRYLATE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| ETHYLBENZENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| ISOBUTANOL | | 45.3 UR | 40.6 UR | 43.9 UR | 45.7 UR | 37.9 UR | 45.1 UR | 61.7 UR | 51.9 UR |
| METHACRYLONITRILE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| METHYL IODIDE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| METHYL METHACRYLATE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| METHYL TERT-BUTYL ETHER | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 |
| LOCATION | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD015 | 15SW/SD016 | 15SW/SD017 | 15SW/SD018 | 15SW/SD019 |
| SAMPLE NUMBER | 15SD0120006 | 15SD0050006 | 15SD0050006-D | 15SD0130006 | 15SD0150006 | 15SD0160006 | 15SD0170006 | 15SD0180006 | 15SD0190006 |
| SAMPLE CODE | NOT FOUND | ORIG | DUP | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 |
| METHYLENE CHLORIDE | | 1.13 UJ | 1.02 UJ | 1.1 UJ | 1.14 UJ | 0.948 UJ | 1.13 UJ | 6 U | 5 U |
| PROPIONITRILE | | 45.3 UR | 40.6 UR | 43.9 UR | 45.7 UR | 37.9 UR | 45.1 UR | 61.7 UR | 51.9 UR |
| STYRENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| TETRACHLOROETHENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| TOLUENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| TOTAL XYLENES | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| TRANS-1,2-DICHLOROETHENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| TRANS-1,3-DICHLOROPROPENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| TRANS-1,4-DICHLORO-2-BUTENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| TRICHLOROETHENE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| TRICHLOROFLUOROMETHANE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| VINYL ACETATE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| VINYL CHLORIDE | | 1.13 U | 1.02 U | 1.1 U | 1.14 U | 0.948 U | 1.13 U | 1.54 U | 1.3 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 1,2,4-TRICHLOROBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 1,2-DICHLOROBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 1,3-DICHLOROBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 1,4-DICHLOROBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 1,4-DIOXANE | | 115 U | 116 U | 127 U | 132 U | 118 U | 117 U | 168 UJ | 132 UJ |
| 1,4-NAPHTHOQUINONE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 1,4-PHENYLENEDIAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 1-NAPHTHYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2,3,4,6-TETRACHLOROPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2,4,5-TRICHLOROPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2,4,6-TRICHLOROPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2,4-DICHLOROPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2,4-DIMETHYLPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2,4-DINITROPHENOL | | 77.4 UJ | 77.5 UJ | 85.4 UJ | 88.7 UJ | 78.8 UJ | 78.5 UJ | 112 U | 88.6 U |
| 2,6-DICHLOROPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2-ACETYLAMINOFLUORENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2-CHLORONAPHTHALENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2-CHLOROPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2-METHYLNAPHTHALENE | | 4 J | 5 J | 10 J | 100 | 15.5 U | 15.5 U | 9 J | 4.37 U |
| 2-METHYLPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2-NAPHTHYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2-NITROANILINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2-NITROPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 2-PICOLINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 3&4-METHYLPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 3,3'-DICHLOROBENZIDINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 3,3'-DIMETHYLBENZIDINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 UJ | 88.6 UJ |

APPENDI .E G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 |
| LOCATION | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD015 | 15SW/SD016 | 15SW/SD017 | 15SW/SD018 | 15SW/SD019 |
| SAMPLE NUMBER | 15SD0120006 | 15SD0050006 | 15SD0050006-D | 15SD0130006 | 15SD0150006 | 15SD0160006 | 15SD0170006 | 15SD0180006 | 15SD0190006 |
| SAMPLE CODE | NOT FOUND | ORIG | DUP | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 |
| 3-METHYLCHOLANTHRENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 3-NITROANILINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 4,6-DINITRO-2-METHYLPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 4-AMINOBIPHENYL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 4-BROMOPHENYL PHENYL ETHER | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 4-CHLORO-3-METHYLPHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 4-CHLOROANILINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 4-CHLOROPHENYL PHENYL ETHER | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 4-NITROANILINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 4-NITROPHENOL | | 77.4 UJ | 77.5 UJ | 85.4 UJ | 88.7 UJ | 78.8 UJ | 78.5 UJ | 112 U | 88.6 U |
| 4-NITROQUINOLINE-1-OXIDE | | 77.4 UR | 77.5 UR | 85.4 UR | 88.7 UR | 78.8 UR | 78.5 UR | 112 UR | 88.6 UR |
| 5-NITRO-O-TOLUIDINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| A,A-DIMETHYLPHENETHYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| ACENAPHTHENE | | 6 J | 9 | 110 | 850 | 120 | 170 | 160 | 4.37 U |
| ACENAPHTHYLENE | | 3.81 U | 3.82 U | 30 | 8.74 U | 15.5 U | 15.5 U | 48 | 4.37 U |
| ACETOPHENONE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 UJ | 88.6 UJ |
| ANILINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| ANTHRACENE | | 18 | 22 | 220 | 1800 | 310 | 420 | 290 | 4.37 U |
| ARAMITE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| BENZO(A)ANTHRACENE | | 61 | 84 J | 610 | 3200 | 960 | 1300 | 810 | 13 |
| BENZO(A)PYRENE | | 77 | 110 J | 640 | 2800 | 1100 | 1300 | 830 | 15 |
| BENZO(B)FLUORANTHENE | | 94 | 130 J | 650 | 2900 | 1000 | 1400 | 1000 | 18 |
| BENZO(G,H,I)PERYLENE | | 120 | 140 J | 910 | 2400 | 1200 | 1600 | 800 | 16 |
| BENZO(K)FLUORANTHENE | | 56 | 67 J | 500 | 1600 | 680 | 760 | 430 | 11 |
| BENZYL ALCOHOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| BIS(2-CHLOROETHOXY)METHANE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| BIS(2-CHLOROETHYL)ETHER | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| BIS(2-ETHYLHEXYL)PHTHALATE | | 270 J | 240 J | 130 J | 88.7 U | 160 J | 130 J | 112 U | 88.6 U |
| BUTYL BENZYL PHTHALATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| CHLOROBENZILATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| CHRYSENE | | 110 | 130 J | 760 | 3600 | 1200 | 1500 | 990 | 14 |
| DI-N-BUTYL PHTHALATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 220 J |
| DI-N-OCTYL PHTHALATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| DIALLATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| DIBENZO(A,H)ANTHRACENE | | 3.81 U | 3.82 UJ | 180 | 610 | 230 | 280 | 170 | 4.37 U |
| DIBENZOFURAN | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 110 J | 89 J | 130 J | 88.6 U |
| DIETHYL PHTHALATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| DIMETHYL PHTHALATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| DIPHENYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| ETHYL METHANE SULFONATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| FLUORANTHENE | | 190 | 200 | 1200 | 7700 | 2800 | 3400 | 1800 | 25 |
| FLUORENE | | 8 | 14 | 91 | 800 | 160 | 210 | 110 | 4.37 U |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 |
| LOCATION | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD015 | 15SW/SD016 | 15SW/SD017 | 15SW/SD018 | 15SW/SD019 |
| SAMPLE NUMBER | 15SD0120006 | 15SD0050006 | 15SD0050006-D | 15SD0130006 | 15SD0150006 | 15SD0160006 | 15SD0170006 | 15SD0180006 | 15SD0190006 |
| SAMPLE CODE | NOT FOUND | ORIG | DUP | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 |
| HEXACHLOROBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 UJ | 88.6 UJ |
| HEXACHLOROBUTADIENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| HEXACHLOROCYCLOPENTADIENE | | 77.4 UR | 77.5 UJ | 85.4 UJ | 88.7 UJ | 78.8 UJ | 78.5 UJ | 112 UJ | 88.6 UJ |
| HEXACHLOROETHANE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| HEXACHLOROPROPENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| INDENO(1,2,3-CD)PYRENE | | 90 | 110 J | 730 | 2200 | 1000 | 1300 | 690 | 15 |
| ISODRIN | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| ISOPHORONE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| ISOSAFROLE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| KEPONE | | 77.4 UJ | 77.5 UJ | 85.4 UJ | 88.7 UJ | 78.8 UJ | 78.5 UJ | 112 UJ | 88.6 UJ |
| METHAPYRILENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 UJ | 88.6 UJ |
| METHYL METHANE SULFONATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| N-NITROSO-DI-N-BUTYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| N-NITROSO-DI-N-PROPYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| N-NITROSODIETHYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| N-NITROSODIMETHYLAMINE | | 77.4 UJ | 77.5 UJ | 85.4 UJ | 88.7 UJ | 78.8 UJ | 78.5 UJ | 112 UJ | 88.6 UJ |
| N-NITROSODIPHENYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| N-NITROSOMETHYLETHYLAMINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 UJ | 88.6 UJ |
| N-NITROSOMORPHOLINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| N-NITROSOPIPERIDINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| N-NITROSOPYRROLIDINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| NAPHTHALENE | | 5 J | 6 J | 20 | 370 | 30 J | 52 | 19 | 4.37 U |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| O-TOLUIDINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| P-(DIMETHYLAMINO)AZOBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| PENTACHLOROBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| PENTACHLOROETHANE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| PENTACHLORONITROBENZENE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| PHENACETIN | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| PHENANTHRENE | | 140 | 170 | 1100 | 8100 | 2500 | 3200 | 1600 | 18 |
| PHENOL | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| PRONAMIDE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| PYRENE | | 170 | 310 J | 1200 | 9900 J | 2800 | 3400 | 2700 J | 35 J |
| PYRIDINE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 UJ | 88.6 UJ |
| SAFROLE | | 77.4 U | 77.5 U | 85.4 U | 88.7 U | 78.8 U | 78.5 U | 112 U | 88.6 U |
| **Pesticides PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDD | | 1.56 J | 1.56 U | 26 | 7.5 | 1.59 U | 1.58 U | 35 | 4.9 |
| 4,4'-DDE | | 2.5 J | 1.56 U | 76 | 16 | 1.59 U | 1.58 U | 24 J | 2.5 J |
| 4,4'-DDT | | 2.3 J | 1.56 J | 40 | 12 | 2.4 J | 2.2 J | 100 | 2.1 J |
| ALDRIN | | 0.751 U | 0.752 U | 0.828 U | 0.861 U | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| ALPHA-BHC | | 0.751 U | 0.752 U | 0.828 U | 0.861 U | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| ALPHA-CHLORDANE | | 0.751 U | 0.752 U | 7.4 | 31 | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| AROCLOR-1016 | | 10.4 U | 10.4 U | 11.5 U | 11.9 U | 10.6 U | 10.6 U | 15.1 U | 11.9 U |

APPENDIX G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 |
| LOCATION | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD015 | 15SW/SD016 | 15SW/SD017 | 15SW/SD018 | 15SW/SD019 |
| SAMPLE NUMBER | 15SD0120006 | 15SD0050006 | 15SD0050006-D | 15SD0130006 | 15SD0150006 | 15SD0160006 | 15SD0170006 | 15SD0180006 | 15SD0190006 |
| SAMPLE CODE | NOT FOUND | ORIG | DUP | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 |
| AROCLOR-1221 | | 10.4 U | 10.4 U | 11.5 U | 11.9 U | 10.6 U | 10.6 U | 15.1 U | 11.9 U |
| AROCLOR-1232 | | 10.4 U | 10.4 U | 11.5 U | 11.9 U | 10.6 U | 10.6 U | 15.1 U | 11.9 U |
| AROCLOR-1242 | | 10.4 U | 10.4 U | 11.5 U | 11.9 U | 10.6 U | 10.6 U | 15.1 U | 11.9 U |
| AROCLOR-1248 | | 10.4 U | 10.4 U | 11.5 U | 11.9 U | 10.6 U | 10.6 U | 15.1 U | 11.9 U |
| AROCLOR-1254 | | 10.4 U | 10.4 U | 11.5 U | 11.9 U | 10.6 U | 10.6 U | 15.1 U | 11.9 U |
| AROCLOR-1260 | | 10.4 U | 10.4 U | 11.5 U | 330 | 10.6 U | 10.6 U | 15.1 U | 11.9 U |
| BETA-BHC | | 0.751 U | 0.752 U | 0.828 U | 0.861 U | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| DELTA-BHC | | 0.751 U | 0.752 U | 0.828 U | 0.861 U | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| DIELDRIN | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| ENDOSULFAN I | | 0.751 U | 0.752 U | 0.828 U | 0.861 U | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| ENDOSULFAN II | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| ENDOSULFAN SULFATE | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| ENDRIN | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| ENDRIN ALDEHYDE | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| ENDRIN KETONE | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| GAMMA-BHC (LINDANE) | | 0.751 U | 0.752 U | 0.828 U | 0.861 U | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| GAMMA-CHLORDANE | | 0.751 U | 0.752 U | 6 J | 28 | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| HEPTACHLOR | | 0.751 U | 0.752 U | 0.828 U | 0.861 U | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| HEPTACHLOR EPOXIDE | | 0.751 U | 0.752 U | 0.828 U | 0.861 U | 0.765 U | 0.762 U | 1.09 U | 0.86 U |
| METHOXYCHLOR | | 7.51 U | 7.52 U | 8.28 U | 8.61 U | 7.65 U | 7.62 U | 10.9 U | 8.6 U |
| TOXAPHENE | | 19.6 U | 19.7 U | 21.7 U | 22.5 U | 20 U | 19.9 U | 28.5 U | 22.5 U |
| **Herbicides (ug/kg)** | | | | | | | | | |
| 2,4,5-T | | 1.56 U | 1.56 U | 1.72 U | 6.8 J | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| 2,4,5-TP (SILVEX) | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| 2,4-D | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| DINOSEB | | 1.56 U | 1.56 U | 1.72 U | 1.79 U | 1.59 U | 1.58 U | 2.27 U | 1.79 U |
| HEXACHLOROPHENE | | 0.982 U | 0.984 U | 1.08 U | 1.13 U | 1 U | 0.996 U | 1.43 U | 1.12 U |
| PENTACHLOROPHENOL | | 2.3 | 2.8 J | 3.2 J | 1.9 J | 1.5 J | 1.6 J | 0.755 U | 0.595 U |
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | | 3760 J | 4600 J | 12000 J | 13000 J | 6190 J | 7020 J | 17700 J | 17200 J |
| ANTIMONY | | 0.19 U | 0.23 U | 1 U | 1.2 U | 0.31 U | 0.39 U | 0.45 U | 0.74 U |
| ARSENIC | | 3.9 J | 4 J | 7.7 J | 10.9 J | 8 J | 5.7 J | 10.5 J | 33.8 J |
| BARIUM | | 24.8 J | 62.8 J | 77.7 J | 131 J | 52.8 J | 49 J | 125 J | 85.9 J |
| BERYLLIUM | | 0.19 U | 0.25 U | 0.56 J | 1.2 J | 0.48 J | 0.38 J | 0.74 J | 1 J |
| CADMIUM | | 0.39 J | 0.38 J | 0.56 J | 0.48 J | 0.27 U | 0.28 U | 0.44 J | 0.33 J |
| CALCIUM | | 110000 J | 89200 J | 49300 J | 13600 J | 98900 J | 62600 J | 2800 J | 1610 J |
| CHROMIUM | | 10.4 J | 7.8 J | 20.8 J | 30.4 J | 17.2 J | 17 J | 23.6 J | 70.1 J |
| COBALT | | 4.6 J | 4.6 J | 8.2 J | 21.6 J | 13.5 J | 12.9 J | 16.9 J | 14.6 J |
| COPPER | | 4.9 J | 5 J | 17.8 J | 16.7 J | 7.2 J | 8.2 J | 13.5 J | 12 J |
| IRON | | 11700 J | 9610 J | 18100 J | 31800 J | 21000 J | 19500 J | 23100 J | 74200 J |
| LEAD | | 8.9 J | 7.5 J | 30.7 J | 32 J | 14.2 J | 11.5 J | 19 J | 20.8 J |
| MAGNESIUM | | 17400 J | 12800 J | 4270 J | 2240 J | 17200 J | 8510 J | 1800 J | 1280 J |
| MANGANESE | | 543 J | 799 J | 548 J | 1150 J | 1090 J | 938 J | 1990 J | 1360 J |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD |
|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | SEWER & OUTFALL | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 |
| LOCATION | 15SW/SD012 | 15SW/SD005 | 15SW/SD005 | 15SW/SD013 | 15SW/SD015 | 15SW/SD016 | 15SW/SD017 | 15SW/SD018 | 15SW/SD019 |
| SAMPLE NUMBER | 15SD0120006 | 15SD0050006 | 15SD0050006-D | 15SD0130006 | 15SD0150006 | 15SD0160006 | 15SD0170006 | 15SD0180006 | 15SD0190006 |
| SAMPLE CODE | NOT FOUND | ORIG | DUP | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 1/12/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/11/2005 | 1/9/2005 | 1/9/2005 |
| MERCURY | | 0.012 J | 0.022 J | 0.026 J | 0.083 J | 0.01 J | 0.02 J | 0.052 J | 0.033 J |
| NICKEL | | 8.6 J | 7.7 J | 15 J | 32.9 J | 19.1 J | 16.6 J | 14.4 J | 17.4 J |
| POTASSIUM | | 564 J | 595 J | 1260 J | 1700 J | 886 J | 777 J | 1530 J | 1070 J |
| SELENIUM | | 0.13 U | 0.23 U | 0.3 J | 0.47 J | 0.32 J | 0.32 J | 0.58 J | 0.8 J |
| SILVER | | 0.042 U | 0.07 U | 0.046 U | 0.05 U | 0.044 U | 0.045 U | 0.08 U | 0.055 U |
| SODIUM | | 123 J | 100 U | 83.4 U | 86.6 U | 111 J | 93 U | 146 U | 85.5 U |
| THALLIUM | | 0.04 U | 0.08 U | 0.13 U | 0.19 U | 0.11 U | 0.07 U | 0.3 J | 0.24 J |
| TIN | | 0.2 U | 0.21 U | 0.59 U | 10.2 J | 0.095 U | 0.15 U | 0.62 U | 0.5 U |
| VANADIUM | | 12.3 J | 10 J | 23.8 J | 26.8 J | 20.3 J | 18.4 J | 39.1 J | 83.6 J |
| ZINC | | 42.5 | 39.1 | 81.3 | 88.8 | 39.5 | 43.9 | 48.4 J | 46.1 J |
| **Miscellaneous Parameters (%)** | | | | | | | | | |
| CYANIDE (mg/kg) | | 0.289 U | 0.289 U | | | | | | |
| PERCENT SILT/CLAY | | | | | | | | | |
| SIEVE 1" | | | | | | | | | |
| SIEVE 1-1/2" | | | | | | | | | |
| SIEVE 2" | | | | | | | | | |
| SIEVE 3" | | | | | | | | | |
| SIEVE 3/4" | | | | | | | | | |
| SIEVE 3/8" | | | | | | | | | |
| SIEVE NO. 004 | | | | | | | | | |
| SIEVE NO. 010 | | | | | | | | | |
| SIEVE NO. 020 | | | | | | | | | |
| SIEVE NO. 040 | | | | | | | | | |
| SIEVE NO. 060 | | | | | | | | | |
| SIEVE NO. 140 | | | | | | | | | |
| SIEVE NO. 200 | | | | | | | | | |
| TOTAL ORGANIC CARBON (mg/kg) | | | | | | | | | |

APPENDI. LE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | | | UPGRAD |
| LOCATION | 15SW/SD023 | 15SW/SD024 | 15SW/SD025 | 15SW/SD001 | 15SW/SD002 | 15SW/SD020 | 15SW/SD021 | 15SW/SD022 | 15SW/SD003 | 15SW/SD014 | 15SW/SD026 |
| SAMPLE NUMBER | 15SD0230006 | 15SD0240006 | 15SD0250006 | 15SD0010006 | 15SD0020006 | 15SD0200006 | 15SD0210006 | 15SD0220006 | 15SD0030006 | 15SD0140006 | 15SD0260006 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | |
| 1,1,1,2-TETRACHLOROETHANE | | | | 1.11 U | 1.03 | | | | | 1.25 U | |
| 1,1,1-TRICHLOROETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,1,2,2-TETRACHLOROETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,1,2-TRICHLOROETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,1-DICHLOROETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,1-DICHLOROETHENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,2,3-TRICHLOROPROPANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,2-DIBROMO-3-CHLOROPROPANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,2-DIBROMOETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,2-DICHLOROETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 1,2-DICHLOROPROPANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 2-BUTANONE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 2-HEXANONE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 3-CHLOROPROPENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| 4-METHYL-2-PENTANONE | | | | 1.11 UJ | 1.03 UJ | | | | | 1.25 UJ | |
| ACETONE | | | | 1.11 UJ | 2 J | | | | | 1.25 UJ | |
| ACETONITRILE | | | | 44.4 UR | 41.3 UR | | | | | 50.1 UR | |
| ACROLEIN | | | | 1.11 UR | 1.03 UR | | | | | 1.25 UR | |
| ACRYLONITRILE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| BENZENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| BROMODICHLOROMETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| BROMOFORM | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| BROMOMETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CARBON DISULFIDE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CARBON TETRACHLORIDE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CHLOROBENZENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CHLORODIBROMOMETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CHLOROETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CHLOROFORM | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CHLOROMETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CHLOROPRENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CIS-1,2-DICHLOROETHENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| CIS-1,3-DICHLOROPROPENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| DIBROMOMETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| DICHLORODIFLUOROMETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| ETHYL METHACRYLATE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| ETHYLBENZENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| ISOBUTANOL | | | | 44.4 UR | 41.3 UR | | | | | 50.1 UR | |
| METHACRYLONITRILE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| METHYL IODIDE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| METHYL METHACRYLATE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| METHYL TERT-BUTYL ETHER | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | | | UPGRAD |
| LOCATION | 15SW/SD023 | 15SW/SD024 | 15SW/SD025 | 15SW/SD001 | 15SW/SD002 | 15SW/SD020 | 15SW/SD021 | 15SW/SD022 | 15SW/SD003 | 15SW/SD014 | 15SW/SD026 |
| SAMPLE NUMBER | 15SD0230006 | 15SD0240006 | 15SD0250006 | 15SD0010006 | 15SD0020006 | 15SD0200006 | 15SD0210006 | 15SD0220006 | 15SD0030006 | 15SD0140006 | 15SD0260006 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 |
| METHYLENE CHLORIDE | | | | 1.11 UJ | 1.03 UJ | | | | | 1.25 UJ | |
| PROPIONITRILE | | | | 44.4 UR | 41.3 UR | | | | | 50.1 UR | |
| STYRENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| TETRACHLOROETHENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| TOLUENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| TOTAL XYLENES | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| TRANS-1,2-DICHLOROETHENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| TRANS-1,3-DICHLOROPROPENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| TRANS-1,4-DICHLORO-2-BUTENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| TRICHLOROETHENE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| TRICHLOROFLUOROMETHANE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| VINYL ACETATE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| VINYL CHLORIDE | | | | 1.11 U | 1.03 U | | | | | 1.25 U | |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | |
| 1,2,4,5-TETRACHLOROBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 1,2,4-TRICHLOROBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 1,2-DICHLOROBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 1,3-DICHLOROBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 1,4-DICHLOROBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 1,4-DIOXANE | | | | 124 U | 126 U | | | | | 128 U | |
| 1,4-NAPHTHOQUINONE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 1,4-PHENYLENEDIAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 1-NAPHTHYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2,3,4,6-TETRACHLOROPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2,4,5-TRICHLOROPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2,4,6-TRICHLOROPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2,4-DICHLOROPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2,4-DIMETHYLPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2,4-DINITROPHENOL | | | | 83.2 UJ | 84.4 UJ | | | | | 85.7 UJ | |
| 2,6-DICHLOROPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2-ACETYLAMINOFLUORENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2-CHLORONAPHTHALENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2-CHLOROPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2-METHYLNAPHTHALENE | 10 J | 19 J | 28 J | 18 | 14 | 10 J | 11 J | 8 J | | 5 J | 4.1 U |
| 2-METHYLPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2-NAPHTHYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2-NITROANILINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2-NITROPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 2-PICOLINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 3&4-METHYLPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 3,3'-DICHLOROBENZIDINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 3,3'-DIMETHYLBENZIDINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |

APPEND LE G-3
RESULTS FOR CHEMICALS ANALYZEL . ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | | | UPGRAD |
| LOCATION | 15SW/SD023 | 15SW/SD024 | 15SW/SD025 | 15SW/SD001 | 15SW/SD002 | 15SW/SD020 | 15SW/SD021 | 15SW/SD022 | 15SW/SD003 | 15SW/SD014 | 15SW/SD026 |
| SAMPLE NUMBER | 15SD0230006 | 15SD0240006 | 15SD0250006 | 15SD0010006 | 15SD0020006 | 15SD0200006 | 15SD0210006 | 15SD0220006 | 15SD0030006 | 15SD0140006 | 15SD0260006 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 |
| 3-METHYLCHOLANTHRENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 3-NITROANILINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 4,6-DINITRO-2-METHYLPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 4-AMINOBIPHENYL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 4-BROMOPHENYL PHENYL ETHER | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 4-CHLORO-3-METHYLPHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 4-CHLOROANILINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 4-CHLOROPHENYL PHENYL ETHER | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 4-NITROANILINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 4-NITROPHENOL | | | | 83.2 UJ | 84.4 UJ | | | | | 85.7 UJ | |
| 4-NITROQUINOLINE-1-OXIDE | | | | 83.2 UR | 84.4 UR | | | | | 85.7 UR | |
| 5-NITRO-O-TOLUIDINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| A,A-DIMETHYLPHENETHYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| ACENAPHTHENE | 120 J | 280 J | 200 J | 120 | 14 | 63 J | 63 J | 110 J | | 27 | 36 |
| ACENAPHTHYLENE | 4.08 U | 6 J | 6 J | 16 J | 9 | 6 J | 3.93 U | 6 J | | 4.22 U | 4.1 U |
| ACETOPHENONE | | | | 83.2 U | 110 J | | | | | 85.7 U | |
| ANILINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| ANTHRACENE | 320 J | 810 J | 200 J | 280 | 41 | 170 J | 150 J | 270 J | | 71 | 89 |
| ARAMITE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| BENZO(A)ANTHRACENE | 860 J | 3700 J | 580 J | 740 J | 150 | 530 J | 450 J | 960 J | | 270 | 330 |
| BENZO(A)PYRENE | 1000 J | 4500 J | 590 J | 810 J | 200 | 640 J | 540 J | 1200 J | | 330 | 390 |
| BENZO(B)FLUORANTHENE | 1300 J | 6000 J | 730 J | 900 J | 280 | 710 J | 720 J | 1200 J | | 340 | 440 |
| BENZO(G,H,I)PERYLENE | 970 J | 3200 J | 460 J | 1000 J | 300 | 540 J | 520 J | 1100 J | | 400 | 200 |
| BENZO(K)FLUORANTHENE | 440 J | 2000 J | 330 J | 420 J | 130 | 450 J | 220 J | 760 J | | 190 | 310 |
| BENZYL ALCOHOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| BIS(2-CHLOROETHOXY)METHANE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| BIS(2-CHLOROETHYL)ETHER | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| BUTYL BENZYL PHTHALATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| CHLOROBENZILATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| CHRYSENE | 1100 J | 4500 J | 650 J | 880 J | 300 | 650 J | 570 J | 1200 J | | 350 | 390 |
| DI-N-BUTYL PHTHALATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| DI-N-OCTYL PHTHALATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| DIALLATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| DIBENZO(A,H)ANTHRACENE | 180 J | 620 J | 110 J | 190 J | 48 | 83 J | 96 J | 200 J | | 65 | 38 |
| DIBENZOFURAN | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| DIETHYL PHTHALATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| DIMETHYL PHTHALATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| DIPHENYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| ETHYL METHANE SULFONATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| FLUORANTHENE | 1700 J | 9800 J | 960 J | 1700 | 510 | 1300 J | 950 J | 2000 J | | 720 | 1000 |
| FLUORENE | 160 J | 380 J | 120 J | 130 | 17 | 84 J | 78 J | 150 J | | 34 | 47 |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | | | UPGRAD |
| LOCATION | 15SW/SD023 | 15SW/SD024 | 15SW/SD025 | 15SW/SD001 | 15SW/SD002 | 15SW/SD020 | 15SW/SD021 | 15SW/SD022 | 15SW/SD003 | 15SW/SD014 | 15SW/SD026 |
| SAMPLE NUMBER | 15SD0230006 | 15SD0240006 | 15SD0250006 | 15SD0010006 | 15SD0020006 | 15SD0200006 | 15SD0210006 | 15SD0220006 | 15SD0030006 | 15SD0140006 | 15SD0260006 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 |
| HEXACHLOROBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| HEXACHLOROBUTADIENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| HEXACHLOROCYCLOPENTADIENE | | | | 83.2 UJ | 84.4 UJ | | | | | 85.7 UJ | |
| HEXACHLOROETHANE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| HEXACHLOROPROPENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| INDENO(1,2,3-CD)PYRENE | 770 J | 2700 J | 430 J | 800 J | 220 | 440 J | 400 J | 870 J | | 310 | 180 |
| ISODRIN | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| ISOPHORONE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| ISOSAFROLE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| KEPONE | | | | 83.2 UJ | 84.4 UJ | | | | | 85.7 UJ | |
| METHAPYRILENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| METHYL METHANE SULFONATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| N-NITROSO-DI-N-BUTYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| N-NITROSO-DI-N-PROPYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| N-NITROSODIETHYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| N-NITROSODIMETHYLAMINE | | | | 83.2 UJ | 84.4 UJ | | | | | 85.7 UJ | |
| N-NITROSODIPHENYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| N-NITROSOMETHYLETHYLAMINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| N-NITROSOMORPHOLINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| N-NITROSOPIPERIDINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| N-NITROSOPYRROLIDINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| NAPHTHALENE | 25 J | 61 J | 120 J | 33 | 16 | 15 J | 25 J | 24 J | | 10 | 8 J |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| O-TOLUIDINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| P-(DIMETHYLAMINO)AZOBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| PENTACHLOROBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| PENTACHLOROETHANE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| PENTACHLORONITROBENZENE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| PHENACETIN | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| PHENANTHRENE | 2000 J | 7800 J | 1100 J | 1800 | 570 | 1100 J | 970 J | 2100 J | | 560 | 630 |
| PHENOL | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| PRONAMIDE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| PYRENE | 4600 J | 18000 J | 1900 J | 2100 J | 530 | 2200 J | 2000 J | 4800 J | | 690 | 960 |
| PYRIDINE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| SAFROLE | | | | 83.2 U | 84.4 U | | | | | 85.7 U | |
| **Pesticides PCBs (ug/kg)** | | | | | | | | | | | |
| 4,4'-DDD | | | | 7.6 J | 1.9 J | | | | | 1.73 U | |
| 4,4'-DDE | | | | 21 | 1.7 U | | | | | 1.73 U | |
| 4,4'-DDT | | | | 16 J | 2.5 J | | | | | 4.2 | |
| ALDRIN | | | | 0.807 U | 0.819 U | | | | | 0.831 U | |
| ALPHA-BHC | | | | 0.807 U | 0.819 U | | | | | 0.831 U | |
| ALPHA-CHLORDANE | | | | 5.3 | 0.819 U | | | | | 0.831 U | |
| AROCLOR-1016 | | | | 11.2 U | 11.3 U | | | | | 11.5 U | |

APPEND LE G-3
RESULTS FOR CHEMICALS ANALYZEL ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | | | UPGRAD |
| LOCATION | 15SW/SD023 | 15SW/SD024 | 15SW/SD025 | 15SW/SD001 | 15SW/SD002 | 15SW/SD020 | 15SW/SD021 | 15SW/SD022 | 15SW/SD003 | 15SW/SD014 | 15SW/SD026 |
| SAMPLE NUMBER | 15SD0230006 | 15SD0240006 | 15SD0250006 | 15SD0010006 | 15SD0020006 | 15SD0200006 | 15SD0210006 | 15SD0220006 | 15SD0030006 | 15SD0140006 | 15SD0260006 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 |
| AROCLOR-1221 | | | | 11.2 U | 11.3 U | | | | | 11.5 U | |
| AROCLOR-1232 | | | | 11.2 U | 11.3 U | | | | | 11.5 U | |
| AROCLOR-1242 | | | | 11.2 U | 11.3 U | | | | | 11.5 U | |
| AROCLOR-1248 | | | | 11.2 U | 11.3 U | | | | | 11.5 U | |
| AROCLOR-1254 | | | | 230 J | 54 J | | | | | 11.5 U | |
| AROCLOR-1260 | | | | 11.2 U | 11.3 U | | | | | 11.5 U | |
| BETA-BHC | | | | 0.807 U | 0.819 U | | | | | 0.831 U | |
| DELTA-BHC | | | | 0.807 U | 0.819 U | | | | | 0.831 U | |
| DIELDRIN | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| ENDOSULFAN I | | | | 0.807 U | 0.819 U | | | | | 0.831 U | |
| ENDOSULFAN II | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| ENDOSULFAN SULFATE | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| ENDRIN | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| ENDRIN ALDEHYDE | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| ENDRIN KETONE | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| GAMMA-BHC (LINDANE) | | | | 0.807 U | 0.819 U | | | | | 0.831 U | |
| GAMMA-CHLORDANE | | | | 4 J | 0.819 U | | | | | 0.831 U | |
| HEPTACHLOR | | | | 0.807 U | 0.819 U | | | | | 0.831 U | |
| HEPTACHLOR EPOXIDE | | | | 0.807 U | 0.819 U | | | | | 0.831 U | |
| METHOXYCHLOR | | | | 8.07 U | 8.19 U | | | | | 8.31 U | |
| TOXAPHENE | | | | 21.1 U | 21.4 U | | | | | 21.7 U | |
| **Herbicides (ug/kg)** | | | | | | | | | | | |
| 2,4,5-T | | | | 1.68 U | 5.7 J | | | | | 1.73 U | |
| 2,4,5-TP (SILVEX) | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| 2,4-D | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| DINOSEB | | | | 1.68 U | 1.7 U | | | | | 1.73 U | |
| HEXACHLOROPHENE | | | | 1.06 U | 1.07 U | | | | | 1.09 U | |
| PENTACHLOROPHENOL | | | | 2.4 J | 1.6 J | | | | | 1.5 J | |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| ALUMINUM | 6480 J | 8190 J | | 11300 J | 8610 J | 9010 J | | 9470 J | | 14400 J | 10100 J |
| ANTIMONY | 0.26 U | 0.27 U | | 0.64 U | 0.35 U | 0.74 J | | 1.4 J | | 1.1 U | 0.59 J |
| ARSENIC | 5.2 J | 5 J | | 10 J | 6.9 J | 9.2 J | | 7 J | | 20.9 J | 7.9 J |
| BARIUM | 50.5 J | 69.8 J | | 87.7 J | 58.5 J | 87.2 J | | 69.2 J | | 128 J | 109 J |
| BERYLLIUM | 0.71 J | 0.34 J | | 0.91 J | 0.68 J | 0.94 J | | 0.61 J | | 1.8 J | 0.86 J |
| CADMIUM | 0.18 J | 0.18 J | | 0.44 J | 0.3 U | 0.2 J | | 0.16 J | | 0.65 J | 0.2 J |
| CALCIUM | 119000 J | 97800 J | | 34900 J | 19100 J | 30900 J | | 25300 J | | 4910 J | 3800 J |
| CHROMIUM | 14.1 J | 14.7 J | | 26.9 J | 17.8 J | 27.2 J | | 18.3 J | | 46.1 J | 29.1 J |
| COBALT | 14.5 J | 9.7 J | | 36.1 J | 13.6 J | 23 J | | 18.4 J | | 85.9 J | 37.1 J |
| COPPER | 6 J | 10.1 J | | 12.7 J | 10.4 J | 11.6 J | | 10.3 J | | 17.3 J | 10.7 J |
| IRON | 16100 J | 15400 J | | 29000 J | 21700 J | 31000 J | | 23300 J | | 61000 J | 28200 J |
| LEAD | 12.6 J | 15.9 J | | 29.3 J | 14.6 J | 18 J | | 18.2 J | | 35 J | 24.7 J |
| MAGNESIUM | 13500 J | 9760 J | | 4660 J | 2980 J | 4950 J | | 3120 J | | 1780 J | 1210 J |
| MANGANESE | 1220 J | 883 J | | 1940 J | 703 J | 1450 J | | 1160 J | | 5160 J | 2160 J |

APPENDIX TABLE G-3
RESULTS FOR CHEMICALS ANALYZED IN ALL SEDIMENT SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| CLASSIFICATION | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | DOWNGRAD | UPGRAD | UPGRAD | UPGRAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STREAM ORDER | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-1/15-2 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | TRIB 15-3 | | | UPGRAD |
| LOCATION | 15SW/SD023 | 15SW/SD024 | 15SW/SD025 | 15SW/SD001 | 15SW/SD002 | 15SW/SD020 | 15SW/SD021 | 15SW/SD022 | 15SW/SD003 | 15SW/SD014 | 15SW/SD026 |
| SAMPLE NUMBER | 15SD0230006 | 15SD0240006 | 15SD0250006 | 15SD0010006 | 15SD0020006 | 15SD0200006 | 15SD0210006 | 15SD0220006 | 15SD0030006 | 15SD0140006 | 15SD0260006 |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NOT FOUND | NORMAL | NORMAL |
| DEPTH RANGE | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 |
| SAMPLE DATE | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 | 6/7/2005 | 6/7/2005 | 1/11/2005 | 1/11/2005 | 6/7/2005 |
| MERCURY | 0.007 UJ | 0.008 UJ | | 0.022 J | 0.014 J | 0.007 UJ | | 0.028 J | | 0.035 J | 0.007 UJ |
| NICKEL | 21.8 J | 13.7 J | | 35.4 J | 21.4 J | 24.1 J | | 18.6 J | | 64.5 J | 30.3 J |
| POTASSIUM | 966 | 990 | | 1470 J | 1200 J | 981 | | 1170 | | 1440 J | 993 |
| SELENIUM | 0.21 J | 0.19 J | | 0.58 J | 0.38 J | 0.41 J | | 0.33 J | | 0.96 J | 0.37 J |
| SILVER | 0.043 U | 0.048 U | | 0.05 U | 0.047 U | 0.048 U | | 0.046 U | | 0.046 U | 0.047 U |
| SODIUM | 243 J | 110 J | | 95 U | 91.2 U | 202 J | | 20.7 J | | 98.2 U | 3.58 U |
| THALLIUM | 0.1 J | 0.12 J | | 0.15 U | 0.13 U | 0.14 J | | 0.15 J | | 0.23 U | 0.22 J |
| TIN | 0.47 U | 0.42 U | | 0.25 U | 0.28 U | 0.46 U | | 0.47 U | | 0.36 U | 0.43 U |
| VANADIUM | 15.2 J | 18.7 J | | 26.5 J | 17.4 J | 28.9 J | | 21.5 J | | 42.4 J | 24.6 J |
| ZINC | 42.6 J | 45.4 J | | 76.1 | 58.7 | 51.2 J | | 48.6 J | | 161 | 57.8 J |
| **Miscellaneous Parameters (%)** | | | | | | | | | | | |
| CYANIDE (mg/kg) | | | | 0.311 U | 0.315 U | | | | | | |
| PERCENT SILT/CLAY | 3 | 18 | | | | 8 | | 28 | | | 20 |
| SIEVE 1" | 0 | 0 | | | | 0 | | 0 | | | 0 |
| SIEVE 1-1/2" | 0 | 0 | | | | 0 | | 0 | | | 0 |
| SIEVE 2" | 0 | 0 | | | | 0 | | 0 | | | 0 |
| SIEVE 3" | 0 | 0 | | | | 0 | | 0 | | | 0 |
| SIEVE 3/4" | 5 | 0 | | | | 2 | | 0 | | | 2 |
| SIEVE 3/8" | 23 | 4 | | | | 6 | | 1 | | | 1 |
| SIEVE NO. 004 | 15 | 2 | | | | 8 | | 1 | | | 1 |
| SIEVE NO. 010 | 20 | 5 | | | | 16 | | 4 | | | 4 |
| SIEVE NO. 020 | 16 | 17 | | | | 19 | | 6 | | | 9 |
| SIEVE NO. 040 | 10 | 30 | | | | 18 | | 12 | | | 9 |
| SIEVE NO. 060 | 4 | 11 | | | | 10 | | 10 | | | 12 |
| SIEVE NO. 140 | 3 | 10 | | | | 10 | | 26 | | | 30 |
| SIEVE NO. 200 | 1 | 4 | | | | 4 | | 12 | | | 12 |
| TOTAL ORGANIC CARBON (mg/kg) | 16000 J | 10000 J | | | | 10000 J | | 17000 J | | | 9200 J |

DOWNGRAD - downgradient well
UPGRAD - upgradient well
NO SED - Location was a catch basin where sediment was not found.
NOT FOUND - Area was inmpacted by new construction and no longer available for sediment collection.
Data qualifiers (e.g., U, J) are defined in section 3 of the text.
ug/kg - micrograms per kilogram
mg/kg - milligrams per kilogram

APPENDI. LE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1] | 15TW001 | 15TW002 | 15TW002 | 15TW003 | 15TW003 | 15TW004 | 15TW004 | 15TW005 | 15TW005 |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | 15GWTW001 | 15GWTW002 | 15GWTW002-F | 15GWTW003 | 15GWTW003-F | 15GWTW004 | 15GWTW004-F | 15GWTW005 | 15GWTW005-F |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DATE | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/5/2005 | 1/5/2005 |
| **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 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 | |
| 2-BUTANONE | 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 | |
| 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 UJ | | 2.5 J | | 1.6 U | |
| ACETONITRILE | 20 UR | 20 UR | | 20 UR | | 20 UR | | 20 UR | |
| 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 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 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 UJ | 0.5 UJ | | 0.5 UJ | | 0.5 UJ | | 0.5 U | |
| ETHYLBENZENE | 0.3 U | 0.3 U | | 0.3 U | | 0.3 U | | 0.3 U | |
| ISOBUTANOL | 20 UR | 20 UR | | 20 UR | | 20 UR | | 20 UR | |
| METHACRYLONITRILE | 0.3 U | 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 | | 0.5 U | |
| METHYL METHACRYLATE | 0.5 U | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | |
| METHYL TERT-BUTYL ETHER | 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 UJ | | 0.3 UJ | | 0.3 UJ | |
| PROPIONITRILE | 20 UR | 20 UR | | 20 UR | | 20 UR | | 20 UR | |
| STYRENE | 0.3 U | 0.3 U | | 0.3 U | | 0.3 U | | 0.3 U | |

APPENDIX TABLE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW001<br>15GWTW001<br>NORMAL<br>1/8/2005 | 15TW002<br>15GWTW002<br>NORMAL<br>1/8/2005 | 15TW002<br>15GWTW002-F<br>NORMAL<br>1/8/2005 | 15TW003<br>15GWTW003<br>NORMAL<br>1/8/2005 | 15TW003<br>15GWTW003-F<br>NORMAL<br>1/8/2005 | 15TW004<br>15GWTW004<br>NORMAL<br>1/8/2005 | 15TW004<br>15GWTW004-F<br>NORMAL<br>1/8/2005 | 15TW005<br>15GWTW005<br>NORMAL<br>1/5/2005 | 15TW005<br>15GWTW005-F<br>NORMAL<br>1/5/2005 |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 1.5 | 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 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 | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 1,2,4-TRICHLOROBENZENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 1,2-DICHLOROBENZENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 1,3-DICHLOROBENZENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 1,4-DICHLOROBENZENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 1,4-DIOXANE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 1,4-NAPHTHOQUINONE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 1,4-PHENYLENEDIAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 1-NAPHTHYLAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 2,3,4,6-TETRACHLOROPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2,4,5-TRICHLOROPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2,4,6-TRICHLOROPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2,4-DICHLOROPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2,4-DIMETHYLPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2,4-DINITROPHENOL | 1.04 UJ | 1.05 UR | | 10.5 UR | | 1 UJ | | 1.11 UJ | |
| 2,6-DICHLOROPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2-ACETYLAMINOFLUORENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 2-CHLORONAPHTHALENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 2-CHLOROPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2-METHYLNAPHTHALENE | 5.17 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| 2-METHYLPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2-NAPHTHYLAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 2-NITROANILINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 2-NITROPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 2-PICOLINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 3&4-METHYLPHENOL | 10 | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 3,3'-DICHLOROBENZIDINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 3,3'-DIMETHYLBENZIDINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 3-METHYLCHOLANTHRENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 3-NITROANILINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 4,6-DINITRO-2-METHYLPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| 4-AMINOBIPHENYL | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 4-BROMOPHENYL PHENYL ETHER | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 4-CHLORO-3-METHYLPHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |

APPENDI LE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1] | 15TW001 | 15TW002 | 15TW002 | 15TW003 | 15TW003 | 15TW004 | 15TW004 | 15TW005 | 15TW005 |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | 15GWTW001 | 15GWTW002 | 15GWTW002-F | 15GWTW003 | 15GWTW003-F | 15GWTW004 | 15GWTW004-F | 15GWTW005 | 15GWTW005-F |
| SAMPLE CODE | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DATE | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/8/2005 | 1/5/2005 | 1/5/2005 |
| 4-CHLOROANILINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 4-CHLOROPHENYL PHENYL ETHER | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 4-NITROANILINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 4-NITROPHENOL | 1.04 UJ | 1.05 UJ | | 10.5 UR | | 1 UJ | | 1.11 UJ | |
| 4-NITROQUINOLINE-1-OXIDE | 1.04 UR | 1.05 UR | | 10.5 UR | | 1 UR | | 1.11 UR | |
| 5-NITRO-O-TOLUIDINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| A,A-DIMETHYLPHENETHYLAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| ACENAPHTHENE | 9.91 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| ACENAPHTHYLENE | 0.31 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| ACETOPHENONE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| ANILINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| ANTHRACENE | 0.75 | 0.049 U | | 0.054 U | | 0.052 U | | 0.11 | |
| ARAMITE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| BENZO(A)ANTHRACENE | 0.07 J | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| BENZO(A)PYRENE | 0.053 U | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| BENZO(B)FLUORANTHENE | 0.053 U | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| BENZO(G,H,I)PERYLENE | 0.053 U | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| BENZO(K)FLUORANTHENE | 0.053 U | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| BENZYL ALCOHOL | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| BIS(2-CHLOROETHOXY)METHANE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| BIS(2-CHLOROETHYL)ETHER | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| BUTYL BENZYL PHTHALATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| CHLOROBENZILATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| CHRYSENE | 0.053 U | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| DI-N-BUTYL PHTHALATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| DI-N-OCTYL PHTHALATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| DIALLATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| DIBENZO(A,H)ANTHRACENE | 0.053 U | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| DIBENZOFURAN | 5 J | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| DIETHYL PHTHALATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| DIMETHYL PHTHALATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| DIPHENYLAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| ETHYL METHANE SULFONATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| FLUORANTHENE | 0.75 | 0.049 U | | 0.054 U | | 0.052 U | | 0.06 J | |
| FLUORENE | 4.73 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| HEXACHLOROBENZENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| HEXACHLOROBUTADIENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| HEXACHLOROCYCLOPENTADIENE | 1.04 UJ | 1.05 UJ | | 10.5 UJ | | 1 UJ | | 1.11 UJ | |
| HEXACHLOROETHANE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| HEXACHLOROPROPENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| INDENO(1,2,3-CD)PYRENE | 0.053 U | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| ISODRIN | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| ISOPHORONE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| ISOSAFROLE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |

APPENDIX TABLE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW001<br>15GWTW001<br>NORMAL<br>1/8/2005 | 15TW002<br>15GWTW002<br>NORMAL<br>1/8/2005 | 15TW002<br>15GWTW002-F<br>NORMAL<br>1/8/2005 | 15TW003<br>15GWTW003<br>NORMAL<br>1/8/2005 | 15TW003<br>15GWTW003-F<br>NORMAL<br>1/8/2005 | 15TW004<br>15GWTW004<br>NORMAL<br>1/8/2005 | 15TW004<br>15GWTW004-F<br>NORMAL<br>1/8/2005 | 15TW005<br>15GWTW005<br>NORMAL<br>1/5/2005 | 15TW005<br>15GWTW005-F<br>NORMAL<br>1/5/2005 |
|---|---|---|---|---|---|---|---|---|---|
| KEPONE | 1.04 UJ | 1.05 UJ | | 10.5 UJ | | 1 UJ | | 1.11 UJ | |
| METHAPYRILENE | 1.04 UJ | 1.05 UJ | | 10.5 UJ | | 1 UJ | | 1.11 UJ | |
| METHYL METHANE SULFONATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| N-NITROSO-DI-N-BUTYLAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| N-NITROSO-DI-N-PROPYLAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| N-NITROSODIETHYLAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| N-NITROSODIMETHYLAMINE | 1.04 UJ | 1.05 UJ | | 10.5 UJ | | 1 UJ | | 1.11 UJ | |
| N-NITROSODIPHENYLAMINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| N-NITROSOMETHYLETHYLAMINE | 1.04 UJ | 1.05 UJ | | 10.5 UJ | | 1 UJ | | 1.11 UJ | |
| N-NITROSOMORPHOLINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| N-NITROSOPIPERIDINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| N-NITROSOPYRROLIDINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| NAPHTHALENE | 20.6 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| O-TOLUIDINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| P-(DIMETHYLAMINO)AZOBENZENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| PENTACHLOROBENZENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| PENTACHLOROETHANE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| PENTACHLORONITROBENZENE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| PHENACETIN | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| PHENANTHRENE | 3.21 | 0.049 U | | 0.054 U | | 0.052 U | | 0.048 U | |
| PHENOL | 1.04 U | 1.05 U | | 10.5 UR | | 1 U | | 1.11 U | |
| PRONAMIDE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| PYRENE | 0.67 | 0.049 U | | 0.054 U | | 0.052 U | | 0.06 J | |
| PYRIDINE | 1.04 U | 1.05 U | | 10.5 U | | 1 U | | 1.11 U | |
| SAFROLE | 1.04 U | 1.05 U | | 10.5 U | | 1 J | | 1.11 U | |
| **Pesticides PCBs (ug/L)** | | | | | | | | | |
| 4,4'-DDD | | | | | | 0.1 U | | 0.053 UJ | |
| 4,4'-DDE | | | | | | 0.1 U | | 0.053 U | |
| 4,4'-DDT | | | | | | 0.1 U | | 0.053 U | |
| ALDRIN | | | | | | 0.05 U | | 0.026 UJ | |
| ALPHA-BHC | | | | | | 0.05 U | | 0.026 U | |
| ALPHA-CHLORDANE | | | | | | 0.05 U | | 0.026 U | |
| AROCLOR-1016 | 0.27 U | 0.265 U | | 0.258 U | | 0.5 U | | 0.262 U | |
| AROCLOR-1221 | 0.27 U | 0.265 U | | 0.258 U | | 0.5 U | | 0.262 U | |
| AROCLOR-1232 | 0.27 U | 0.265 U | | 0.258 U | | 0.5 U | | 0.262 U | |
| AROCLOR-1242 | 0.27 U | 0.265 U | | 0.258 U | | 0.5 U | | 0.262 U | |
| AROCLOR-1248 | 0.27 U | 0.265 U | | 0.258 U | | 0.5 U | | 0.262 U | |
| AROCLOR-1254 | 0.27 U | 0.265 U | | 0.258 U | | 0.5 U | | 0.262 U | |
| AROCLOR-1260 | 0.27 U | 0.265 U | | 0.258 U | | 0.5 U | | 0.262 U | |
| BETA-BHC | | | | | | 0.05 U | | 0.026 U | |
| DELTA-BHC | | | | | | 0.05 U | | 0.026 UJ | |
| DIELDRIN | | | | | | 0.1 U | | 0.053 UJ | |
| ENDOSULFAN I | | | | | | 0.05 U | | 0.026 UJ | |
| ENDOSULFAN II | | | | | | 0.1 U | | 0.053 UJ | |
| ENDOSULFAN SULFATE | | | | | | 0.1 U | | 0.053 U | |

APPEND LE G-4
RESULTS FOR CHEMICALS ANALYZED IN ..L GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW001<br>15GWTW001<br>NORMAL<br>1/8/2005 | 15TW002<br>15GWTW002<br>NORMAL<br>1/8/2005 | 15TW002<br>15GWTW002-F<br>NORMAL<br>1/8/2005 | 15TW003<br>15GWTW003<br>NORMAL<br>1/8/2005 | 15TW003<br>15GWTW003-F<br>NORMAL<br>1/8/2005 | 15TW004<br>15GWTW004<br>NORMAL<br>1/8/2005 | 15TW004<br>15GWTW004-F<br>NORMAL<br>1/8/2005 | 15TW005<br>15GWTW005<br>NORMAL<br>1/5/2005 | 15TW005<br>15GWTW005-F<br>NORMAL<br>1/5/2005 |
|---|---|---|---|---|---|---|---|---|---|
| ENDRIN | | | | | | 0.1 U | | 0.053 UJ | |
| ENDRIN ALDEHYDE | | | | | | 0.1 U | | 0.053 U | |
| ENDRIN KETONE | | | | | | 0.1 U | | 0.053 U | |
| GAMMA-BHC (LINDANE) | | | | | | 0.05 U | | 0.026 UJ | |
| GAMMA-CHLORDANE | | | | | | 0.05 U | | 0.026 U | |
| HEPTACHLOR | | | | | | 0.05 U | | 0.026 UJ | |
| HEPTACHLOR EPOXIDE | | | | | | 0.05 U | | 0.026 U | |
| METHOXYCHLOR | | | | | | 0.5 U | | 0.262 U | |
| TOXAPHENE | | | | | | 5 U | | 2.62 U | |
| **Herbicides (ug/L)** | | | | | | | | | |
| 2,4,5-T | | | | | | 0.04 U | | 0.04 U | |
| 2,4,5-TP (SILVEX) | | | | | | 0.04 U | | 0.04 U | |
| 2,4-D | | | | | | 0.04 U | | 0.04 U | |
| DINOSEB | | | | | | 0.04 U | | 0.04 U | |
| HEXACHLOROPHENE | | | | | | 0.025 U | | 0.025 U | |
| PENTACHLOROPHENOL | | | | | | 0.013 U | | 0.027 J | |
| **Total Metals (ug/L)** | | | | | | | | | |
| ALUMINUM | 81.9 U | 446 J | | 1410 J | | 21100 J | | 7210 J | |
| ANTIMONY | 0.37 U | 0.95 U | | 0.085 U | | 0.16 U | | 6.3 J | |
| ARSENIC | 0.74 U | 0.45 U | | 9.6 J | | 10.4 J | | 6.3 J | |
| BARIUM | 46.3 J | 74 J | | 96.2 J | | 174 J | | 224 J | |
| BERYLLIUM | 0.02 U | 0.03 U | | 0.05 U | | 0.81 J | | 0.47 J | |
| CADMIUM | 0.08 U | 0.11 U | | 0.09 U | | 0.26 U | | 1.1 J | |
| CALCIUM | 57300 J | 63600 J | | 74500 J | | 34100 J | | 169000 J | |
| CHROMIUM | 0.19 U | 1.4 J | | 1.5 J | | 27.4 J | | 10 J | |
| COBALT | 0.44 J | 1.2 | | 108 | | 9.4 | | 10.7 J | |
| COPPER | 0.39 U | 2 J | | 1.2 J | | 20 J | | 19.7 J | |
| IRON | 918 J | 1080 J | | 148000 J | | 30000 J | | 10900 J | |
| LEAD | 0.227 U | 5.7 J | | 1.2 J | | 26.4 J | | 34.9 J | |
| MAGNESIUM | 7060 J | 8510 J | | 96000 J | | 8310 J | | 28900 J | |
| MANGANESE | 285 J | 694 J | | 16900 J | | 335 J | | 631 J | |
| MERCURY | 0.03 U | 0.039 J | | 0.03 U | | 0.081 J | | 0.06 J | |
| NICKEL | 0.65 J | 2 | | 38 | | 17.3 | | 21.8 J | |
| POTASSIUM | 588 J | 1630 J | | 1940 J | | 4930 J | | 4840 J | |
| SELENIUM | 0.97 J | 0.46 U | | 0.094 U | | 0.36 U | | 0.93 J | |
| SILVER | 0.028 U | 0.03 U | | 0.028 U | | 0.15 U | | 0.1 U | |
| SODIUM | 1730 J | 6960 J | | 77700 J | | 1720 J | | 2650 J | |
| THALLIUM | 0.043 U | 0.05 U | | 0.043 U | | 0.2 U | | 0.16 J | |
| TIN | 0.048 U | 0.15 U | | 0.048 U | | 0.53 U | | 0.88 J | |
| VANADIUM | 1.14 U | 1.2 J | | 2.6 | | 36.4 | | 19.6 J | |
| ZINC | 5.7 U | 8.8 U | | 8.5 U | | 58.9 J | | 91 J | |
| **Dissolved Metals (ug/L)** | | | | | | | | | |
| ALUMINUM, FILTERED | | | 8.6 U | | 54.7 U | | 8.6 U | | 8.6 U |
| ANTIMONY, FILTERED | | | 0.96 U | | 0.09 U | | 0.26 U | | 10.4 J |
| ARSENIC, FILTERED | | | 0.32 U | | 10.4 J | | 2 J | | 0.36 J |
| BARIUM, FILTERED | | | 68.5 J | | 87.6 J | | 50.8 J | | 133 J |

APPENDIX TABLE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW001<br>15GWTW001<br>NORMAL<br>1/8/2005 | 15TW002<br>15GWTW002<br>NORMAL<br>1/8/2005 | 15TW002<br>15GWTW002-F<br>NORMAL<br>1/8/2005 | 15TW003<br>15GWTW003<br>NORMAL<br>1/8/2005 | 15TW003<br>15GWTW003-F<br>NORMAL<br>1/8/2005 | 15TW004<br>15GWTW004<br>NORMAL<br>1/8/2005 | 15TW004<br>15GWTW004-F<br>NORMAL<br>1/8/2005 | 15TW005<br>15GWTW005<br>NORMAL<br>1/5/2005 | 15TW005<br>15GWTW005-F<br>NORMAL<br>1/5/2005 |
|---|---|---|---|---|---|---|---|---|---|
| BERYLLIUM, FILTERED | | | 0.02 U | | 0.03 U | | 0.02 U | | 0.02 UJ |
| CADMIUM, FILTERED | | | 0.06 J | | 0.04 J | | 0.04 J | | 0.32 U |
| CALCIUM, FILTERED | | | 62600 | | 68600 | | 24600 | | 176000 |
| CHROMIUM, FILTERED | | | 0.67 U | | 0.42 U | | 0.42 U | | 0.94 U |
| COBALT, FILTERED | | | 1 J | | 92 J | | 1.6 J | | 0.43 J |
| COPPER, FILTERED | | | 1.5 J | | 1.4 J | | 0.44 J | | 3 J |
| IRON, FILTERED | | | 611 J | | 122000 J | | 2100 J | | 861 J |
| LEAD, FILTERED | | | 0.192 J | | 0.186 J | | 0.069 U | | 0.14 U |
| MAGNESIUM, FILTERED | | | 8460 J | | 92400 J | | 7020 J | | 28100 J |
| MANGANESE, FILTERED | | | 760 J | | 14400 J | | 81.9 J | | 5.2 J |
| MERCURY, FILTERED | | | 0.053 U | | 0.061 U | | 0.042 U | | 0.03 U |
| NICKEL, FILTERED | | | 4.7 J | | 39 J | | 2.2 J | | 9.8 J |
| POTASSIUM, FILTERED | | | 1470 J | | 1490 J | | 3370 J | | 5240 J |
| SELENIUM, FILTERED | | | 0.75 J | | 1.1 J | | 0.7 U | | 0.73 J |
| SILVER, FILTERED | | | 0.028 U | | 0.028 U | | 0.028 U | | 0.028 U |
| SODIUM, FILTERED | | | 7330 J | | 70500 J | | 1830 J | | 3690 J |
| THALLIUM, FILTERED | | | 0.07 J | | 0.05 J | | 0.043 U | | 0.043 U |
| TIN, FILTERED | | | 0.16 U | | 0.87 J | | 0.13 U | | 0.13 U |
| VANADIUM, FILTERED | | | 1.14 U | | 1.14 U | | 1.14 U | | 1.14 U |
| ZINC, FILTERED | | | 3.8 J | | 3.9 J | | 1.4 U | | 2.6 U |
| **Field Parameters** | | | | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | 11.51 | 8.52 | | 0.31 | | 6.62 | | 10.59 | |
| OXIDATION REDUCTION POTENTIAL (MV) | -79.4 | 46 | | -65.3 | | 118.7 | | 32.2 | |
| PH (S.U.) | 7.45 | 7.56 | | 6.13 | | 6.92 | | 8.21 | |
| SPECIFIC CONDUCTANCE (MS/CM) | 0.413 | 0.438 | | 1.258 | | 0.167 | | 1.181 | |
| TEMPERATURE ( C) | 6.53 | 7.35 | | 9.51 | | 10.76 | | 7.86 | |
| TURBIDITY (NTU) | 9.8 | 13 | | 33 | | 650 | | 1000 > | |

APPENDI. _E G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1] | 15TW006 | 15TW006 | 15TW007 | 15TW007 | 15TW008 | 15TW008 |
|---|---|---|---|---|---|---|
| SAMPLE NUMBER | 15GWTW006 | 15GWTW006-D | 15GWTW007 | 15GWTW007-F | 15GWTW008 | 15GWTW008-F |
| SAMPLE CODE | ORIG | DUP | NORMAL | NORMAL | NORMAL | NORMAL |
| SAMPLE DATE | 1/7/2005 | 1/7/2005 | 1/7/2005 | 1/7/2005 | 1/7/2005 | 1/7/2005 |
| **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 | |
| 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 UJ | 0.5 UJ | 1.2 U | | 0.5 UJ | |
| ACETONITRILE | 20 UR | 20 UR | 20 UR | | 20 UR | |
| 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 | | 0.3 U | |
| 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 U | 0.3 U | 0.3 U | | 0.3 UJ | |
| 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 UR | 20 UR | 20 UR | | 20 UR | |
| 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 | |
| METHYL METHACRYLATE | 0.5 U | 0.5 U | 0.5 U | | 0.5 U | |
| METHYL TERT-BUTYL ETHER | 0.5 U | 0.5 U | 0.5 U | | 0.5 U | |
| METHYLENE CHLORIDE | 0.3 UJ | 0.3 UJ | 0.3 UJ | | 0.3 UJ | |
| PROPIONITRILE | 20 UR | 20 UR | 20 UR | | 20 UR | |
| STYRENE | 0.3 U | 0.3 U | 0.3 U | | 0.3 U | |

APPENDIX TABLE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW006<br>15GWTW006<br>ORIG<br>1/7/2005 | 15TW006<br>15GWTW006-D<br>DUP<br>1/7/2005 | 15TW007<br>15GWTW007<br>NORMAL<br>1/7/2005 | 15TW007<br>15GWTW007-F<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008-F<br>NORMAL<br>1/7/2005 |
|---|---|---|---|---|---|---|
| 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 | 0.3 U | 0.3 U | | 0.3 U | |
| 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 | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 1,2,4-TRICHLOROBENZENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 1,2-DICHLOROBENZENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 1,3-DICHLOROBENZENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 1,4-DICHLOROBENZENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 1,4-DIOXANE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| 1,4-NAPHTHOQUINONE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 1,4-PHENYLENEDIAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 1-NAPHTHYLAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2,3,4,6-TETRACHLOROPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2,4,5-TRICHLOROPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2,4,6-TRICHLOROPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2,4-DICHLOROPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2,4-DIMETHYLPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2,4-DINITROPHENOL | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| 2,6-DICHLOROPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2-ACETYLAMINOFLUORENE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| 2-CHLORONAPHTHALENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2-CHLOROPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2-METHYLNAPHTHALENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| 2-METHYLPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2-NAPHTHYLAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2-NITROANILINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 2-NITROPHENOL | 0.96 UJ | 1.06 U | 0.96 U | | 0.96 U | |
| 2-PICOLINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 3&4-METHYLPHENOL | 0.96 UJ | 1.06 U | 1 J | | 0.96 U | |
| 3,3'-DICHLOROBENZIDINE | 0.96 UR | 1.06 U | 0.96 U | | 0.96 U | |
| 3,3'-DIMETHYLBENZIDINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 3-METHYLCHOLANTHRENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 3-NITROANILINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 4,6-DINITRO-2-METHYLPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 4-AMINOBIPHENYL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 4-BROMOPHENYL PHENYL ETHER | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 4-CHLORO-3-METHYLPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |

APPENDI: .E G-4
RESULTS FOR CHEMICALS ANALYZED IN . . . GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW006<br>15GWTW006<br>ORIG<br>1/7/2005 | 15TW006<br>15GWTW006-D<br>DUP<br>1/7/2005 | 15TW007<br>15GWTW007<br>NORMAL<br>1/7/2005 | 15TW007<br>15GWTW007-F<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008-F<br>NORMAL<br>1/7/2005 |
|---|---|---|---|---|---|---|
| 4-CHLOROANILINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 4-CHLOROPHENYL PHENYL ETHER | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 4-NITROANILINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 4-NITROPHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 4-NITROQUINOLINE-1-OXIDE | 0.96 UR | 1.06 UR | 0.96 UR | | 0.96 UR | |
| 5-NITRO-O-TOLUIDINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| 7,12-DIMETHYLBENZ(A)ANTHRACENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| A,A-DIMETHYLPHENETHYLAMINE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| ACENAPHTHENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| ACENAPHTHYLENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| ACETOPHENONE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| ANILINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| ANTHRACENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| ARAMITE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| BENZO(A)ANTHRACENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| BENZO(A)PYRENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| BENZO(B)FLUORANTHENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| BENZO(G,H,I)PERYLENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| BENZO(K)FLUORANTHENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| BENZYL ALCOHOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| BIS(2-CHLOROETHOXY)METHANE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| BIS(2-CHLOROETHYL)ETHER | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 0.96 U | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| BUTYL BENZYL PHTHALATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| CHLOROBENZILATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| CHRYSENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| DI-N-BUTYL PHTHALATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| DI-N-OCTYL PHTHALATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| DIALLATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| DIBENZO(A,H)ANTHRACENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| DIBENZOFURAN | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| DIETHYL PHTHALATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| DIMETHYL PHTHALATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| DIPHENYLAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| ETHYL METHANE SULFONATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| FLUORANTHENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| FLUORENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| HEXACHLOROBENZENE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| HEXACHLOROBUTADIENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| HEXACHLOROCYCLOPENTADIENE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| HEXACHLOROETHANE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| HEXACHLOROPROPENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| INDENO(1,2,3-CD)PYRENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| ISODRIN | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| ISOPHORONE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| ISOSAFROLE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |

APPENDIX TABLE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW006<br>15GWTW006<br>ORIG<br>1/7/2005 | 15TW006<br>15GWTW006-D<br>DUP<br>1/7/2005 | 15TW007<br>15GWTW007<br>NORMAL<br>1/7/2005 | 15TW007<br>15GWTW007-F<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008-F<br>NORMAL<br>1/7/2005 |
|---|---|---|---|---|---|---|
| KEPONE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| METHAPYRILENE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| METHYL METHANE SULFONATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| N-NITROSO-DI-N-BUTYLAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| N-NITROSO-DI-N-PROPYLAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| N-NITROSODIETHYLAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| N-NITROSODIMETHYLAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| N-NITROSODIPHENYLAMINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| N-NITROSOMETHYLETHYLAMINE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| N-NITROSOMORPHOLINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| N-NITROSOPIPERIDINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| N-NITROSOPYRROLIDINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| NAPHTHALENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| O,O,O-TRIETHYL PHOSPHOROTHIOATE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| O-TOLUIDINE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| P-(DIMETHYLAMINO)AZOBENZENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| PENTACHLOROBENZENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| PENTACHLOROETHANE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| PENTACHLORONITROBENZENE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| PHENACETIN | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| PHENANTHRENE | 0.048 U | 0.052 U | 0.048 U | | 0.048 U | |
| PHENOL | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| PRONAMIDE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| PYRENE | 0.048 U | 0.052 U | 0.55 | | 0.048 U | |
| PYRIDINE | 0.96 UJ | 1.06 UJ | 0.96 UJ | | 0.96 UJ | |
| SAFROLE | 0.96 U | 1.06 U | 0.96 U | | 0.96 U | |
| **Pesticides PCBs (ug/L)** | | | | | | |
| 4,4'-DDD | 0.048 UJ | 0.051 UJ | 0.048 UJ | | 0.049 UJ | |
| 4,4'-DDE | 0.048 U | 0.051 U | 0.048 U | | 0.049 U | |
| 4,4'-DDT | 0.048 U | 0.051 U | 0.048 U | | 0.049 U | |
| ALDRIN | 0.024 UJ | 0.026 UJ | 0.024 UJ | | 0.024 UJ | |
| ALPHA-BHC | 0.024 U | 0.026 U | 0.024 U | | 0.024 U | |
| ALPHA-CHLORDANE | 0.024 U | 0.026 U | 0.024 U | | 0.024 U | |
| AROCLOR-1016 | 0.24 U | 0.255 U | 0.242 U | | 0.245 U | |
| AROCLOR-1221 | 0.24 U | 0.255 U | 0.242 U | | 0.245 U | |
| AROCLOR-1232 | 0.24 U | 0.255 U | 0.242 U | | 0.245 U | |
| AROCLOR-1242 | 0.24 U | 0.255 U | 0.242 U | | 0.245 U | |
| AROCLOR-1248 | 0.24 U | 0.255 U | 0.242 U | | 0.245 U | |
| AROCLOR-1254 | 0.24 U | 0.255 U | 0.242 U | | 0.245 U | |
| AROCLOR-1260 | 0.24 U | 0.255 U | 0.242 U | | 0.245 U | |
| BETA-BHC | 0.024 U | 0.026 U | 0.024 U | | 0.024 U | |
| DELTA-BHC | 0.024 UJ | 0.026 UJ | 0.024 UJ | | 0.024 UJ | |
| DIELDRIN | 0.048 UJ | 0.051 UJ | 0.048 UJ | | 0.049 UJ | |
| ENDOSULFAN I | 0.024 UJ | 0.026 UJ | 0.024 UJ | | 0.024 UJ | |
| ENDOSULFAN II | 0.048 UJ | 0.051 UJ | 0.048 UJ | | 0.049 UJ | |
| ENDOSULFAN SULFATE | 0.048 U | 0.051 U | 0.048 U | | 0.049 U | |

APPENDI LE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION [1]<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW006<br>15GWTW006<br>ORIG<br>1/7/2005 | 15TW006<br>15GWTW006-D<br>DUP<br>1/7/2005 | 15TW007<br>15GWTW007<br>NORMAL<br>1/7/2005 | 15TW007<br>15GWTW007-F<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008-F<br>NORMAL<br>1/7/2005 |
|---|---|---|---|---|---|---|
| ENDRIN | 0.048 UJ | 0.051 UJ | 0.048 UJ | | 0.049 UJ | |
| ENDRIN ALDEHYDE | 0.048 U | 0.051 U | 0.048 U | | 0.049 U | |
| ENDRIN KETONE | 0.048 U | 0.051 U | 0.048 U | | 0.049 U | |
| GAMMA-BHC (LINDANE) | 0.024 UJ | 0.026 UJ | 0.024 UJ | | 0.024 UJ | |
| GAMMA-CHLORDANE | 0.024 U | 0.026 U | 0.024 U | | 0.024 U | |
| HEPTACHLOR | 0.024 UJ | 0.026 UJ | 0.024 UJ | | 0.024 UJ | |
| HEPTACHLOR EPOXIDE | 0.024 U | 0.026 U | 0.024 U | | 0.024 U | |
| METHOXYCHLOR | 0.24 U | 0.255 U | 0.242 U | | 0.245 U | |
| TOXAPHENE | 2.4 U | 2.55 U | 2.42 U | | 2.45 U | |
| **Herbicides (ug/L)** | | | | | | |
| 2,4,5-T | 0.04 U | 0.04 U | 0.04 U | | 0.04 U | |
| 2,4,5-TP (SILVEX) | 0.06 J | 0.04 U | 0.04 U | | 0.04 U | |
| 2,4-D | 0.04 U | 0.04 U | 0.04 U | | 0.04 U | |
| DINOSEB | 0.04 UR | 0.04 U | 0.04 U | | 0.04 U | |
| HEXACHLOROPHENE | 0.025 U | 0.025 U | 0.025 U | | 0.025 U | |
| PENTACHLOROPHENOL | 0.013 U | 0.013 U | 0.013 U | | 0.013 U | |
| **Total Metals (ug/L)** | | | | | | |
| ALUMINUM | 28.8 U | 40.4 U | 8020 J | | 3300 J | |
| ANTIMONY | 0.25 U | 0.15 U | 0.4 U | | 0.13 U | |
| ARSENIC | 2.5 J | 2.5 J | 5.2 J | | 1.5 J | |
| BARIUM | 431 J | 455 J | 89.9 J | | 77.3 J | |
| BERYLLIUM | 0.02 UJ | 0.02 UJ | 0.18 U | | 0.1 U | |
| CADMIUM | 0.17 U | 0.13 U | 0.61 U | | 0.82 U | |
| CALCIUM | 74400 J | 75300 J | 61100 J | | 68600 J | |
| CHROMIUM | 0.89 U | 0.86 U | 8.9 J | | 3.9 J | |
| COBALT | 41.4 J | 41.4 J | 4.6 J | | 4.9 J | |
| COPPER | 0.94 J | 0.96 J | 10.2 J | | 4 J | |
| IRON | 103000 J | 102000 J | 19600 J | | 5580 J | |
| LEAD | 0.11 U | 0.13 U | 7.5 J | | 2.4 J | |
| MAGNESIUM | 28000 J | 29400 J | 18700 J | | 16700 J | |
| MANGANESE | 14700 J | 13900 J | 898 J | | 869 J | |
| MERCURY | 0.03 UJ | 0.03 UJ | 0.039 J | | 0.03 UJ | |
| NICKEL | 6.3 J | 6.8 J | 13.1 J | | 7.7 J | |
| POTASSIUM | 4410 J | 4670 J | 2960 J | | 1160 J | |
| SELENIUM | 2.3 | 2.5 | 0.61 J | | 0.52 J | |
| SILVER | 0.09 U | 0.08 U | 0.1 U | | 0.07 U | |
| SODIUM | 32600 J | 34200 J | 20200 J | | 14200 J | |
| THALLIUM | 0.043 U | 0.043 U | 0.13 J | | 0.1 J | |
| TIN | 0.26 U | 0.21 U | 0.68 J | | 0.52 U | |
| VANADIUM | 1.14 U | 1.14 U | 17.8 J | | 8.2 J | |
| ZINC | 3.5 U | 2 U | 30.2 J | | 25.5 J | |
| **Dissolved Metals (ug/L)** | | | | | | |
| ALUMINUM, FILTERED | | | | 18.7 U | | 8.6 U |
| ANTIMONY, FILTERED | | | | 0.085 U | | 0.1 U |
| ARSENIC, FILTERED | | | | 3.6 J | | 0.18 U |
| BARIUM, FILTERED | | | | 54.8 J | | 61.8 J |

APPENDIX TABLE G-4
RESULTS FOR CHEMICALS ANALYZED IN ALL GROUNDWATER SAMPLES, ROUND 1
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE
CRANE, INDIANA


| LOCATION (1)<br>SAMPLE NUMBER<br>SAMPLE CODE<br>SAMPLE DATE | 15TW006<br>15GWTW006<br>ORIG<br>1/7/2005 | 15TW006<br>15GWTW006-D<br>DUP<br>1/7/2005 | 15TW007<br>15GWTW007<br>NORMAL<br>1/7/2005 | 15TW007<br>15GWTW007-F<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008<br>NORMAL<br>1/7/2005 | 15TW008<br>15GWTW008-F<br>NORMAL<br>1/7/2005 |
|---|---|---|---|---|---|---|
| BERYLLIUM, FILTERED | | | | 0.02 UJ | | 0.02 UJ |
| CADMIUM, FILTERED | | | | 0.35 U | | 0.12 U |
| CALCIUM, FILTERED | | | | 66800 | | 76700 |
| CHROMIUM, FILTERED | | | | 0.81 U | | 1 U |
| COBALT, FILTERED | | | | 1.4 J | | 3.6 J |
| COPPER, FILTERED | | | | 0.75 J | | 1.2 J |
| IRON, FILTERED | | | | 11600 J | | 1010 J |
| LEAD, FILTERED | | | | 0.15 J | | 0.07 U |
| MAGNESIUM, FILTERED | | | | 19900 J | | 22500 J |
| MANGANESE, FILTERED | | | | 959 J | | 860 J |
| MERCURY, FILTERED | | | | 0.03 U | | 0.03 U |
| NICKEL, FILTERED | | | | 4.2 J | | 5.2 J |
| POTASSIUM, FILTERED | | | | 2150 J | | 914 J |
| SELENIUM, FILTERED | | | | 0.39 J | | 0.48 J |
| SILVER, FILTERED | | | | 0.028 U | | 0.028 U |
| SODIUM, FILTERED | | | | 23800 J | | 19400 J |
| THALLIUM, FILTERED | | | | 0.043 U | | 0.043 U |
| TIN, FILTERED | | | | 0.15 U | | 0.13 U |
| VANADIUM, FILTERED | | | | 1.14 U | | 1.14 U |
| ZINC, FILTERED | | | | 2.6 U | | 2.9 U |
| **Field Parameters** | | | | | | |
| DISSOLVED OXYGEN - METER (mg/L) | 0.38 | | 0.61 | | 1.42 | |
| OXIDATION REDUCTION POTENTIAL (MV) | -120.3 | | -103.2 | | 72.1 | |
| PH (S.U.) | 6.55 | | 6.81 | | 6.5 | |
| SPECIFIC CONDUCTANCE (MS/CM) | 0.844 | | 0.695 | | 0.618 | |
| TEMPERATURE ( C) | 13.21 | | 11.09 | | 5.75 | |
| TURBIDITY (NTU) | 2 | | 550 | | 290 | |

(1) - All locations are downgradient, no upgradient locations could be identified.
Data qualifiers (e.g., U, J) are defined in section 3 of the text.
HHRA - human health risk assessment
ug/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
S.U. - standard units
MS/CM - milliSiemens per centimeter
C - Celsius
NTU - nephelometric turbidity units
NA - No applicable criteria

# APPENDIX H

# ANALYTICAL DATA QUALITY REVIEW

# APPENDIX H

# ANALYTICAL 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 one round. Field analytical data and sampling location coordinates 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 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 the affected 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 after adjustment for uncertainties (i.e., the blank action level) per the validation guidelines.

BJ - Indicates that the associated organic chemical was detected in the affected 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. This qualifier is used for field data only.

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as deficiencies that result in the rejection of data and qualification with UR or R data validation qualifiers. These data are not used for risk assessment decision making purposes unless they are used in a qualitative way and the use is justified and documented. Minor problems are defined as deficiencies 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 all 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 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 and matrix spikes). 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 sample 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 the December, 2004/January, 2005 samples were collected at SWMU 15, samples were also collected at NSWC Crane SWMUs 8, 18, 19, and 20. More than 90 percent of the QC samples were from SWMUs 8 and 15, therefore most of the QC data and statistics are from SMWUs 8 and 15. The sample matrices of these SWMUs (i.e., 8, 15, 18, 19, and 20) are similar enough that similar performance is expected, regardless of the SWMU from which the samples were taken. Therefore, samples of similar matrix from these SWMUs may have been grouped together for analysis. 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. Generally speaking, all aqueous samples are expected to yield similar laboratory performance; and soil and sediment samples are expected to yield similar laboratory performance. Because data sets were combined, data quality may be presented and discussed below for the combined data sets.

The data for the SWMU 15 were of generally acceptable quality. Comparability, Representativeness, and sensitivity, in particular, were satisfactory although any samples that were scheduled for collection and 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. Hexachlorophene and pentachlorophenol are not herbicides but these compounds were analyzed by an herbicide analytical method to obtain lower detection limits than could be obtained with the normally used SVOC analytical method. Therefore, thee compounds are discussed as herbicides in the following text.

**Overall Sample and Data Comparability , Completeness, and Representativeness**

The intended sample collection and data analysis methods were used, therefore comparability of this data to previously collected data (from the Interim Measures) should not be a concern.

Sample collection deviated somewhat from the proposed sampling strategy. If a sample was not collected, it was usually because the intended sampling location no longer existed, there was no surface water at or near the intended sampling location, or because refusal was encountered during installation of

a soil boring. 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. Samples that were not collected because of new construction are of no consequence to the project. The new construction has redistributed soils. Furthermore, the area that was reconstructed now drains to areas that were sampled so the samples that were collected represent the accumulation of contaminations from the area of new construction and downgradient areas. In some cases, unscheduled samples were collected. These samples may have been collected because the field crew noticed something of interest that could have been contamination or because a scheduled sample could not be collected and the unscheduled sample was designed to supplant the originally scheduled sample.

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). In addition, disparities between total and dissolved metal concentrations must be considered when interpreting the data (See Section H3.6).

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 4°C, indicating no deficiencies with regard to shipping temperature.

Whereas, individual analytes may have exhibited quality problems for particular sample batches and QC type (e.g., MS or LCS), overall data quality was acceptable for the intended uses (i.e., completion of the RFI, including human health and ecological risk assessments). Each section below addresses data quality in more detail for a particular DQI for samples of a given matrix (solid or aqueous) and analytical fraction (e.g., metals or VOCs).

Some dissolved metals concentrations exceeded total metals concentrations in the same sample. This is common when concentrations are near detection limits or when random measurement uncertainties cause the dissolved metals concentration to be slightly (e.g., 30 percent) greater than the total metals concentrations. Nickel results exhibited the most frequent and greatest percentage deviation in this regard but the deviations all occurred for results that were within approximately 5 times the maximum non-detect concentration. No discrepancies significant enough to indicate a data quality problem were identified.

**Herbicides**

The sample collection completeness goal of 90 percent was achieved for soil and groundwater but not surface water and sediment. Failure to attain the completeness goal for surface water and sediment was a result of the intended sampling locations having been disrupted or rendered missing by new construction. Hence, the samples could not be collected as intended. The hexachlorophene and pentachlorophenol results exhibit a severe to moderate low bias (approximately 20 to 62 percent recoveries in MS and MSD) in solid and aqueous. Performance was slightly better for the aqueous samples. Precision for pentachlorophenol was erratic in aqueous samples.

**Semivolatile Organic Compounds (SVOCs), Including Polycyclic Aromatic hydrocarbons (PAHs)**

Results for 19 different SVOCs were rejected in various matrices. Not all of the compounds were rejected in every matrix or sample. Minimum and maximum non-detect values exceeded the risk-based target levels for several analytes but the nominal detection and reporting limits were typically achieved. This indicates that the failure to achieve the RBTLs is not an analytical deficiency. Recoveries in LCSs and MSs, and MSDs were generally biased low in solid and aqueous matrices. The parameters exhibiting the worst recoveries were 2,4-Dimethylphenol; 2,4-dinitrophenol; 2-nitrophenol; 3,3'-dichlorobenzidine; 4,6-dinitro-2-methylphenol; 4-chloroaniline; 4-nitrophenol; and hexachlorocyclopentadiene. The results rejected for soil and sediment samples were limited to the 2,4-dimethylhenol, 3,3'-dichlorobenzidine, 4-chloroaniline, 4-nitroquinoline-1-oxide, hexachlorocyclopentadiene and kepone. For aqueous samples, the rejections were for 3,3'-dichlorobenzidine, phenol, chlorinated and nitrated phenols, and 4-nitroquinoline-1-oxide. Calibration non-compliances usually occur for target compounds that have poor analytical responses and these cases were no exceptions. Overall, the semivolatile compounds, including PAHs, generally show a slight to moderate low bias in solid matrices, with results for compounds identified above having been rejected in some samples. In soils, a high degree of uncertainty exists for 4-chloroaniline but uncertainty for other compounds is not indicated even though low matrix spikes were observed for compounds other than 4-chloroaniline.

**Total Metals and Cyanide**

Some metal percent recoveries (bias indicators) were unusually high or low for a few isolated samples but the extreme recoveries were typically associated with cases where the spiked amount of analyte was significantly less than the native analyte concentration in the unspiked sample. The mean percent recovery data indicate that metal results, overall, exhibit no bias or a slight to moderate high bias. Barium was an exception with a mean recovery in matrix spikes of 159.2 percent, or a +60 percent bias. More detail is provided in Section H.3.3. Several soil and sediment RPD results exceeded the reference point of 50 percent. The laboratory precision appeared to be comparable to or better than field duplicate

precision, as expected. This indicates that the greater proportion of uncertainty is associated with natural sample heterogeneity. Many of the RPD values that exceeded the reference ranges (30 percent for aqueous and 50 percent for solid matrices) were caused by results being comparable to detection limits. In this concentration range the relative uncertainty is greater than at higher concentrations. Nevertheless, several metals exhibited some high RPD values (e.g., greater than 100 percent) and sporadically high or low bias indicators that represents an occasional large degree of heterogeneity or infiltration of laboratory contamination. Section H.3.4 provides more detail.

**Pesticides and PCBs**

No significant analytical problems were detected with these analytes except for a slight low bias in endrin aldehyde results for solid and liquid matrices.

**Grain Size and Total Organic Carbon (TOC)**

All TOC results were generated as planned and completeness was 100 percent. No significant analytical problems were detected for this analyte.

**VOCs**

The compounds acetonitrile, acrolein, dichlorodifluoromethane, isobutanol, and propionitrile constitute all of the results rejected for the volatile analyses across all matrices. 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 A. These chemicals are of minor significance to the project. Mean recoveries averaged about 70% across all analytes in solid MSs/MSDs and about 100% across all analytes in aqueous MSs/MSDs. Individual recoveries spanned a larger range and were indicative of a slight to moderate low bias in solid samples but no significant bias in aqueous samples. Precision was generally acceptable with some exceptions associated with particular soil samples (see Section H.3.4).

### 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 SWMU 15 QAPP (TtNUS, 2004). Completeness was determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness
V = number of samples (or results) determined to be valid
T = total number of planned samples (or results)

#### H.3.1.1 Sample Collection Completeness

Table H-1 compares the samples collected and analyzed to the samples proposed for collection and analyzed. The tallies are presented for each analytical fraction and in some cases for individual parameters. The numerators represent samples for which results were generated; the denominators represent total numbers of samples that should have been analyzed, based on the QAPP (TtNUS, 2004). Discretionary samples were not included in the estimates of total planned samples. Discretionary samples included the samples located in the landfill area that were designated for collection only if debris was visible in the soil cores. No debris was evident so no samples were collected. Similarly, the total

numbers of samples do not include samples designated for analyses only if surface soil samples indicated a need to analyzed deeper soils. These samples were designated as extract and hold "E&H" in the QAPP (TtNUS, 2004). Although not designated as "E&H", subsurface soil samples from boring 15SB62 also were E&H samples. Samples not collected because the intended sampling location did not exist were included in the totals, although the fact that the sampling location was not present is not necessarily viewed as a deficiency. This approach was taken to alert data users to the absence of samples that might have been collectable under different circumstances. If, however, an intended sample could not be collected because of encountering refusal in a soil boring it was excluded from the total number of samples. Encountering refusal was taken as an indication that bedrock had been encountered and no soil is present below the deepest sample collected. Samples that were filtered because turbidity exceeded 10 nephelometric turbidity units (NTUs) were included in the collected samples tally. The 90 percent sample completeness goal was met for all analytical fractions in soil and groundwater samples and for grain size and total organic carbon in surface water and sediment samples. It was not met for total metals, dissolved metals (surface water only), cyanide (Sediment only), herbicides, pesticides, SVOCs (including PAHs), VOCs, or PCBs in surface water or in sediment. Unscheduled pesticide and herbicide analyses were performed on sample 15SW00901 and are included in the tallies of Table H-1. Unscheduled sample collections and samples that could not be collected are discussed in the field report (Section 2.0 of the RFI report text) with explanations for the observed deviations from the QAPP.

The locations (15SW/SD003, 15SW/SD007, 15SW/SD008, and 15SW/SD012) that could not be sampled for surface water and sediment are in an area of new construction. This area was reconfigured between the time of QAPP development and sampling. The original sampling locations were no longer present and were either covered by asphalt or other new construction. However, that area now drains to the locations where samples were collected. Therefore, not having collected the samples does not represent a negative impact to the project. The samples that were collectable represent an accumulation of contaminants from the area of new construction, which includes runoff from parking lots. Therefore, there is no negative impact to the project because of not having collected samples from the area of new construction.

#### H.3.1.2 Field Measurement Completeness

The percent completeness for field measurements, including well stabilization measurements, was 100.

#### H.3.1.3 Laboratory Measurement Completeness

Under ideal conditions, the laboratory completeness objective would be 100 percent. That is, 100 percent of all results would be valid for all samples analyzed. 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). Some results are rejected because of serious quality deficiencies. Laboratory completeness objective was 90 percent. This objective was satisfied for each analytical fraction, however, the analytical fraction typically comprises many analytes. Therefore, it is possible to meet this objective while the number of valid results per analyte may not meet this objective.

Several analytical results were rejected. The same organic compounds were consistently rejected in several samples across multiple matrices, although not all results for these parameters were necessarily rejected in each matrix (See Table H-3). The matrix below summarizes whether a particular compound was rejected in aqueous or solid matrices. An "X" indicates that at least one result for a parameter was rejected in the indicated matrix.

| Parameter | Aqueous | Solid |
|---|---|---|
| 2,3,4,6-TETRACHLOROPHENOL | X | |
| 2,4,5-TRICHLOROPHENOL | X | |
| 2,4,6-TRICHLOROPHENOL | X | |
| 2,4-DICHLOROPHENOL | X | |
| 2,4-DIMETHYLPHENOL | X | X |
| 2,4-DINITROPHENOL | X | |
| 2,6-DICHLOROPHENOL | X | |
| 2-CHLOROPHENOL | X | |
| 2-METHYLPHENOL | X | |
| 2-NITROPHENOL | X | |
| 3&4-METHYLPHENOL | X | |
| 3,3'-DICHLOROBENZIDINE | | X |
| 4,6-DINITRO-2-METHYLPHENOL | X | |
| 4-CHLORO-3-METHYLPHENOL | X | |
| 4-CHLOROANILINE | | X |
| 4-NITROPHENOL | X | |
| 4-NITROQUINOLINE-1-OXIDE | X | X |
| ACETONITRILE | X | X |
| ACROLEIN | X | X |
| DICHLORODIFLUOROMETHANE | | X |
| DINOSEB | X | |
| HEXACHLOROCYCLOPENTADIENE | | X |
| ISOBUTANOL | X | X |
| KEPONE | | X |
| PHENOL | X | |
| PROPIONITRILE | X | X |

Perhaps aside from the phenols, the compounds tabulated above are not of particular importance to this project and therefore represent little negative impact to the project by having been rejected. Overall, relatively few rejections were identified compared to the number of results generated. Furthermore, the completeness goal was met for all analytes in all matrices (soil, surface water, storm sewer water, sediment, and groundwater) and for all analytical fractions, despite the rejections. Table H-3 lists all

rejected results and the reasons for rejection. The matrix below shows the total number of results the number of rejections, and the percent of results rejected for aqueous and solid matrices.

| | | | SVOC | | | VOC | | |
|---|---|---|---|---|---|---|---|---|
| Fraction | Parameter | Matrix | Results | Rejections | Percent Rejected | Results | Rejections | Percent Rejected |
| SVOC | 2,3,4,6-TETRACHLOROPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 2,4,5-TRICHLOROPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 2,4,6-TRICHLOROPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 2,4-DICHLOROPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 2,4-DIMETHYLPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 2,4-DINITROPHENOL | Aqueous | 25 | 4 | 16.0 | | | |
| | 2,6-DICHLOROPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 2-CHLOROPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 2-METHYLPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 2-NITROPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 3&4-METHYLPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 4,6-DINITRO-2-METHYLPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 4-CHLORO-3-METHYLPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 4-NITROPHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| | 4-NITROQUINOLINE-1-OXIDE | Aqueous | 25 | 25 | 100 | | | |
| | | Solid | 75 | 75 | 100 | | | |
| | | Solid | 75 | 20 | 26.7 | | | |
| | PHENOL | Aqueous | 25 | 3 | 12.0 | | | |
| VOC | ACETONITRILE | Aqueous | | | | 25 | 25 | 100 |
| | | Solid | | | | 100 | 100 | 100 |
| | ACROLEIN | Aqueous | | | | 25 | 25 | 100 |
| | | Solid | | | | 100 | 100 | 100 |
| | DICHLORODIFLUOROMETHANE | Solid | | | | 100 | 17 | 17.0 |
| | ISOBUTANOL | Aqueous | | | | 25 | 25 | 100 |
| | | Solid | | | | 100 | 100 | 100 |
| | PROPIONITRILE | Aqueous | | | | 25 | 25 | 100 |
| | | Solid | | | | 100 | 100 | 100 |

This tabulation shows that although results for several parameters were rejected, most rejection percentages for a matrix type (i.e., aqueous or solid) are not much greater than 10% for about half of the rejected parameters. Nevertheless, rejections for individual matrices must be considered as data voids.

### H.3.2 Sensitivity

Tables H-4, H-5, H-6, H-7 display a comparison of the observed minimum and maximum non-detect values during laboratory analyses to the target laboratory reporting limits contained in Table 1-5 of the SWMU 15 QAPP (TtNUS, 2004) for soils, surface water, storm sewer and outfall water, sediments , and ground water, respectively.

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., PAHS, pesticides, and other potentially site-related parameters such as metals). 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 or the laboratory TV or RL. Although many analytical fractions had at least one such exceedance, most nondetected results were less than the target limits and in many cases, non-detect values that exceeded the target limits were within two or three times the limit.

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, when practicable. 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* |
|---|---|---|
| <MDL | TV (inorganics) | U |
| <TV | TV (organics) | U |
| >MDL 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. In some cases (e.g., when samples are diluted), the nominal TV may be less than the RBTL whereas the actual non-detect value exceeds the RBTL.

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, however, the inability to achieve RBTLs must be considered when using the data for risk screening and risk assessment. It is also important to understand that the RBTLs may have changed between the time the QAPP was written and this report was generated. The risk assessments are conducted on the most recent risk-based values but the data quality was assessed relative to limits that were in effect at the time the project was planned.

### 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 water 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 SWMU 15 QAPP (TtNUS, 2004). Laboratory accuracy was assessed by comparing calculated %R values to accuracy control limits specified in the SWMUs 8 and 15 QAPP (TtNUS, 2004).

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 are compiled in Tables H-8 (solid samples) and H-9 (aqueous samples). The minimum, average, and maximum percent recovery values are presented in the table for each parameter. In addition, the number of QCs represented by these statistics is provided. This count of QC values provides some insight into the magnitude of effect caused by any values that are outside the 75 to 125 percent target range. Percent recoveries that are invalid because the native sample concentration was more than four times the spike amount are excluded from the table. Data qualifiers assigned during data validation because of non-compliant bias indicators are presented in Appendix G.

**Herbicides in Soil and Sediment**

Mean recoveries for hexachlorophene were well below the reference range of 75 to 125 percent. The individual hexachlorophene recoveries ranged from 19 to 58 percent recoveries in MSs and MSDs in solid samples. Generally, the analytical performance for this compound was precise but with moderate to severe low bias in solid matrices. Individual MS and MSD recoveries ranged from 20 to 88 percent in solid matrices. The low end of this range represents a severe low bias but fortunately, this degree of bias was rather limited in scope.

**Herbicides in Surface Water**

The hexachlorophene recoveries exhibit a moderate to severe low bias (approximately 24 to 52 percent recoveries in MS/MSD) in aqueous samples. In general, analytical performance was poor but comparable to the performance in the solid matrices. An individual pentachlorophenol recovery was 19 percent but mean recoveries were would have been close to 100 percent if this single value were neglected.

**Pesticides and PCBs in Soil and Sediment**

Mean LCS recoveries for all pesticides except endrin aldehyde were within the 70 to 125 percent reference range for pesticides and PCBs. The mean endrin aldehyde recovery (72.3 percent) was slightly less than the low limit of 75 percent and represents a minor deviation.

With one exception, all mean recoveries in MS and MSDs were greater than 70 percent but several were less than 75%. This represents a very slight low bias. The exception was endrin aldehyde, which had a mean recovery of 53.8 in MSs and 50.8 in MSDs. This represents a moderate low bias. Except for endrin aldehyde, individual recoveries in MSs and MSDs did not drop below 58 percent. The lowest endrin aldehyde MS and MSD recoveries were 36 and 37 percent, respectively.

In summary, there is no significant bias for pesticide results except for a moderately low bias associated with endrin aldehyde concentrations. The degree of bias may be sensitive to concentration level.

**Pesticides and PCBs in Groundwater and Surface Water**

The mean groundwater and surface water LCS, MS, and MSD percent recoveries across all sample groups ranged from 71.4 to 115.5 percent for all pesticides and PCBs (Table H-9). This narrow recovery range represents a narrow range that is slightly less than the low end of the reference range (75 to 125 percent). Few individual recoveries were outside the 75 to 125 percent reference range (See Table H-9). The two notable exceptions were endrin aldehyde (individual recoveries ranging from 63 to 70 percent) and the surrogate compound, tetrachloro-meta-xylene (individual recoveries ranging from 55 to 76 percent). These exceptions, however, are minor. This indicates that there was no significant laboratory bias associated with the pesticide analysis process, except for a slight low bias for endrin aldehyde. The degree of bias may be sensitive to concentration level.

**Semivolatile Organic Compounds (Including PAHs) in Soil and Sediment**

The majority of semivolatile compound mean LCS, MS, and MSD recoveries were within the expected ranges (Table H-8) or were moderately outside the range on the low side. The compounds 3,3'-

dichlorobenzidine, 4-chloroaniline, and hexachlorocyclopentadiene were particularly notable exceptions with markedly low mean recoveries as compared to the rest of the group. For example, the recoveries of 4-chloroaniline in 10 MSs ranged from 0 to 24 percent and in MSDs ranged from 5 to 27 percent. The following chemicals had at least one individual recovery less than 20 percent (number of values less than 20 percent is shown in parentheses): 2,4-dimethylphenol (2 MSs and 2 MSDs), 3&4 methylphenol (1 MS), 3,3'-dichlorobenzidine (5 MSs and 5 MSDs), 4-chloroaniline (7 MSs and 7 MSDs), hexachlorocyclopentadiene (3 MSs and 3 MSDs). The analytes with the greatest number of individual low MS and MSD recoveries are the same three compounds with low mean recoveries. This performance is typical of SVOCs on soil and sediment and does not represent a significant analytical deficiency because the affected compounds are not of particular importance for this project. Several results were rejected because of the low recoveries (See Table H-3).

In summary, the semivolatile compounds generally show a slight to moderate low bias with some exceptions (See Table H-8). the following compounds exhibited a severe low bias: 3,3'-dichlorobenzidene, 4-chloroaniline, and hexachlorocyclopentadiene. The other compounds specifically identified above also exhibited very low biases in some solid matrix samples.

**Semivolatile Organic Compounds (Including PAHs) in Ground Water and Surface Water**

Percent recoveries for LCSs, MSs, and MSDs were generally higher for aqueous samples than for solid samples. Mean recoveries ranged from 24.3 to 112 percent across these samples with similar performance in all three types of samples (LCSs, MSs, and MSDs). The minimum individual MS recovery across all compounds and samples was 0 percent. This occurred for 2,4-dinitrophenol, 2-nitrophenol, 3,3-dichlorobenzidine, 4,6-dinitro-2-methylphenol, and 4-nitrophenol. The surrogate compound, 2-fluorophenol, also exhibited a very low individual recovery value of 6 percent in one of three MSs. The other MS and MSD recoveries were 33 percent to 55 percent for this compound. Several results were rejected because of poor spike recoveries or calibration non-compliances (see Table H-3). Overall, the SVOC data indicate a moderate low bias for most compounds in aqueous samples. Results for 2,4-dinitrophenol, 2-nitrophenol, 3,3-dichlorobenzidine, 4,6-dinitro-2-methylphenol, and 4-nitrophenol exhibit a moderate to severe low bias whereas most other SVOC compounds exhibit no bias or a slight to moderate low bias (See Table H-9).

**Total Metals in Soil and Sediment**

If a matrix spike did not increase the native sample concentration by at least 25 percent, the spike was considered to be invalid and is not discussed in this section. It was also removed from calculations of percent recovery statistics presented in Tables H-8 and H-9. In some cases, it was not clear by how much the matrix spike increased the native sample concentration because the spike amounts are not

reported on a per sample basis and many samples naturally contain detectable levels of metals. In those cases, the result was retained.

The mean soil and sediment LCS percent recoveries across all Round 1 and 2 sample groups ranged from 96.8 to 106.4 percent (Table H-8). The narrow LCS recovery range nearly that was nearly centered on the theoretically perfect value of 100 percent indicates that there was no significant laboratory bias associated with the metals analysis process.

Whereas the LCS recoveries were acceptable and precise, the soil and sediment sample matrix recoveries were more erratic. Barium (337 percent), copper (244.6 percent), lead (233.4 percent), magnesium (-32 and 222.4 percent), vanadium (181.3 percent), and zinc (188.3 percent), in particular, exhibited some exceptionally poor recoveries for individual matrix spikes. Individual barium and magnesium recoveries were generally erratic. There is no explanation for the erratic barium recoveries. Magnesium is not discussed further because it has little significance as an environmental contaminant. Individual copper recoveries ranged from 73.9 to 110.3 after excluding the single high value (244.6 percent). The single high value is therefore viewed to be an anomaly and not representative of typical copper recoveries. Lead recoveries ranged from and 93.9 to 114.7 percent, after excluding the single low value (41.2 percent) and the single high value (233.5 percent). After excluding the single low value (34.2 percent) and the single high value (181.3 percent), vanadium recoveries ranged from 70.2 to 101.2 percent. Thus, analytical performance for lead and vanadium analyses appears to be stable but with a potential for an occasional high bias. After excluding two high values (186.9 and 188.3 percent), the zinc recoveries ranged from 77.8 to 120.5, indicating an overall slight high bias with a tendency toward high recoveries. There is no explanation for the negative magnesium recovery.

In general, the worst recovery values (those that are furthest outside the 75 to 125 percent range) appear to represent a high bias. It is believed that a slight high bias may exist for zinc, but no significance is expected for other metals. This assertion is made, in part, based on the recovery values for aqueous samples where matrix effects are less severe. The aqueous percent recoveries are discussed below.

On average, no significant bias was exhibited for metal concentrations in soils and sediments, except for barium and manganese. Barium had a mean recovery of 159.2 percent and manganese had a mean recovery of 152.2 percent. Review of Table H-8, however, indicates that only one manganese MS sample was considered to be valid. Recoveries for nine other MS samples were excluded from the table because the spike amount did not increase the native sample concentrations by at least 25 percent. The remaining recovery represents a borderline case whereby the spike amount was only slightly greater than that needed to increase the native sample concentration by 25 percent. Therefore, the 152.2 percent recovery is not considered to be indicative of manganese recoveries for normal sample results. The

barium bias is considered to be real (all but three individual recoveries were greater than 74 percent with several greater than 150 percent).

**Total and Dissolved Metals in Ground Water and Surface Water**

If a matrix spike did not increase the native sample concentration by at least 25 percent, the spike was considered to be invalid and is not discussed in this section.

The mean groundwater and surface water LCS, MS, and MSD percent recoveries across all sample groups ranged from 78.6 to 111.3 percent for all metals (Table H-9). This narrow recovery range is within the 75 to 125 reference range. In addition, few individual recoveries were outside the 75 to 125 percent reference range (See Table H-9). This indicates that there was no significant laboratory bias associated with the metals analysis process.

**Grain Size and Total Organic Carbon in Sediment**

These parameters were measured in five of the seven samples collected for toxicity testing (See Table 2-3). No data quality problems were identified, although no duplicate samples were analyzed and no spiking was done to measure recoverability of TOC. Spiking can not be done for sieving. All sieve fractions add up to 100% and TOC results are fairly consistent across the measured locations. Results are also consistent with what is expected of sediment samples. No more detail is provided in this data quality review section for these parameters.

**Volatile Organic Compounds in Soil**

Mean LCS recoveries were within the 75 to 125 percent reference range. The lowest individual volatile compound LCS recovery was 66 percent (acetone) an the highest was 154 percent (carbon disulfide) This represents a relatively narrow range and an in control analytical process.

In MSs and MSDs, the recovery range was 51.7 to 121.0 percent across all analytes. This is a relatively narrow range. The overall mean recovery for solid samples across all analytes was 78.4 percent and for MSDs it was 67.0 percent. The individual recoveries spanned a wider range (18 to 327 percent). All but 10 individual recoveries were less than 170 percent across all analytes (2897 percent recovery values). Furthermore, the very high values were associated with a single sample, 19SS0070002MS, indicating that the matrix effects particular to that sample or poor analytical performance associated with that sample was occurring. Otherwise, the recoveries indicate no bias to a moderate bias, depending on the analyte (See Table H-8).

**Volatile Organic Compounds in Groundwater and Surface Water**

With one notable exception, mean and individual recoveries for LCSs, MSs, and MSDs were generally within the 75 to 125 percent reference range. The notable exception was bromomethane, which had mean recoveries for LCSs, MSs, and MSDs ranging from 118.3 to 132.7 percent. This indicates a slight high bias for bromomethane, however, bromomethane is not a compound of particular importance for this project which limits the significance of this bias. All other exceptions were of minor significance (See Table H-9). Therefore, no significant bias is indicated for VOCs in aqueous samples.

### 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 SWMU 15 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 20 environmental samples. 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 5 percent frequency criterion specified in the SWMU 15 QAPP (TtNUS, 2004).

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 SWMU 15 QAPP (TtNUS, 2004) 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 the RFI, laboratory precision was assessed by comparing calculated RPD values from duplicate samples to precision control limits specified in the SWMU 15 QAPP (TtNUS, 2004).

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, Tables H-10 through H-12 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. The table includes minimum, average, and maximum RPD values for each parameter that had at least one exceedance of the reference point (30 percent for aqueous samples; 50 percent for solid samples). The values that exceed these reference pints are highlighted.

**Herbicides in Soil and Sediment**

All herbicide concentrations in field duplicate samples were either less than threshold values which precluded the evaluation of RPD values, or the RPD values were within the reference range of 0 to 30 percent. This indicates that there were no particular precision problems identified for herbicide analyses.

**Herbicides in Surface Water and Ground Water**

One of five hexachlorophene precision estimates (31.0 percent RPD) exceeded the target range of 0 to 30 percent in the surface water samples. One of five pentachlorophenol precision estimates (132.0 percent RPD) exceeded the 0 to 30 percent in the surface water samples. The lone RPD exceedance for pentachlorophenol also caused the mean RPD (36.4 percent RPD) to exceed the 0 to 30 percent target range. Generally, the analytical performance for these compounds was acceptably precise. Because these compounds were not detected in any samples, there are no field precision measures for hexachlorophene and pentachlorophenol.

One sample exceeded the 0 to 30 percent RPD criteria for 2,4,5-TP (Silvex). However, because all herbicide concentrations in field duplicate samples were either less than threshold values which precluded the evaluation of RPD values, or the RPD values were within the reference range of 0 to 30 percent. This indicates that there were no particular precision problems identified for herbicide analyses.

**Miscellaneous Parameters in All Media**

Cyanide was analyzed in sediments only. The RPD for cyanide was within the reference ranges. This is an indication that the cyanide data was acceptable.

**Pesticides and PCBs in Soil and Sediment**

All pesticide concentrations in duplicate samples were either less than threshold values which precluded the evaluation of RPD values, or the RPD values were within the reference range of 0 to 30 percent. This indicates that there were no particular precision problems identified for pesticide analyses.

**Pesticides and PCBs in Groundwater and Surface Water**

All pesticide concentrations in duplicate samples were either less than threshold values which precluded the evaluation of RPD values, or the RPD values were within the reference range of 0 to 30 percent. This indicates that there were no particular precision problems identified for pesticide analyses.

**Semivolatiles (Including PAHs) in Soil and Sediment**

RPDs for many different target compounds in MS/MSDs exceeded the 50 percent reference point (Table H-12). However, the mean RPD values are generally less than 25 percent, indicating that the majority of RPD values are within the target range. The 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 4-chloroaniline RPD for samples 15SS0620002 and 08SD0070006, the 3,3'-dichlorobenzidine RPD for samples 19SS0070006 and 15SB0100206, and the hexachlorocyclopentadiene RPD for samples 15SB0480206 and 15SB0450206 (MSDs) had a RPDs of 200. These compounds have poor analytical response and had a 0 percent recovery in either the MS or MSD, see Section H.3.3. These compounds are not likely to be detected at Mine Fill A. The possibility for a typical to slightly greater than typical level of uncertainty exists for the SVOC compounds listed on Table H-12. Hexachlorocyclopentadiene, 4-chloroaniline, and 3,3'-dichlorobenzidine results are viewed to be especially uncertain.

Five field duplicate pairs had RPDs that exceeded the 50 percent reference point (Table H-10). Thirty of the forty results in exceedance of the reference point were due to all positive PAH results in the duplicate pairs of samples 15SB0060206 and 15SB0280206 exceeding 50 percent RPD. It is possible that these two samples were affected by a "hot spot" due to the heterogeneity of soil samples. However, while sample heterogeneity has an effect on precision in soil samples, there is also a perceived moderate uncertainty in the field duplicate precision.

**Semivolatiles (Including PAHs) Surface Water**

Several (20) SVOC compounds had RPDs in excess of the 30 percent reference point ranging from 31% to 200% in the MS/MSD samples. Out of 27 total results that exceeded the reference point, twelve were in sample 15SW00601 and twelve were in sample 15GWTW006. This is indicative of a matrix effect in individual samples and not an analytical deficiency at the laboratory.

**Total Metals in Soil and Sediment**

RPDs for many different target compounds in laboratory duplicates exceeded the 50 percent reference point (Table H-12). However, the mean RPD values are generally less than 25 percent, indicating that the majority of RPD values are within the target range. As expected, several metals also exceeded the field duplicate RPD range. The observed exceedances do not appear to be unusual and are interpreted to represent natural sample heterogeneity. A typical level of uncertainty was demonstrated for metals in sediment and soil replicate samples, however, the potential for occasional erratic results must be considered as evident from the matrix spike results.

**Total and Dissolved Metals in Ground Water and Surface Water**

Comparatively few RPD values for groundwater and surface water samples exceeded the reference range of 0 to 30 percent (Tables H-10 and H-11). One result for aluminum was reported with an RPD of 200%. This was likely due to turbidity because the result was in a filtered sample and the associated un-filtered sample was acceptable. In addition, several of the RPD results in excess of the 30 percent reference point were caused by results that were reported at or below the laboratory's reporting limit.

In general, the degree of heterogeneity observed for total and dissolved metals in aqueous samples appears to be normal.

**Volatiles in Soil and Sediment**

Several (21) VOC compounds had RPDs in excess of the 50 percent reference point ranging from 51% to 119% in the MS/MSD samples. However, the mean RPDs for all compounds were less than the 50% reference point with the highest (vinyl chloride) being 40%. In addition, out of 34 total results that exceeded the reference point, nineteen were in sample 08SB0120206 and twelve were in sample 19SS0070002. This is indicative of a matrix effect or poor performance associated with individual samples and not an analytical deficiency at the laboratory. An additional factor that accounts for increased RPDs is the heterogeneous nature of soil samples.

**Volatiles in Groundwater and Surface Water**

All volatile concentrations in duplicate samples were either less than threshold values which precluded the evaluation of RPD values, or the RPD values were within the reference range of 0 to 30 percent. This indicates that there were no particular precision problems identified for volatile analyses.

### 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 SWMU 15 QAPP (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-13 through H-16 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 represent the percentage of data qualified as indicated for the indicated reason. An example using an excerpt form Table H-13 is the best way to explain how to interpret the table:

| Parameter | Code | Validation Qualifier | | | | | |
|---|---|---|---|---|---|---|---|
| | | BJ | BU | J | U | UJ | UR |
| ALUMINUM | A | 0.0 | 0.0 | 72.9 | 0.0 | 0.0 | 0.0 |
| | AF | 0.0 | 0.0 | 23.7 | 0.0 | 0.0 | 0.0 |
| | AG | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |

The 72.9 in the "J" Validation Qualifier column indicates that 72.9 percent of the J-qualified data for aluminum were qualified that way because of reasons "A" (Code = A). The 23.7 in the J-qualifier column indicates that 23.7 percent of the J-qualified data were qualified that way for reasons "A" and "F" (Code AF), and the 3.4 in the J-qualifier column indicates that 3.4 percent of the J-qualified data were qualified that way for reasons "A" and "G" (Code AG). The Codes are defined at the bottom of the table. The sum of these percentages is 100, which indicates that all of the J-qualified aluminum data were qualified that way for these three reasons.

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. Ideally, for each environmental medium investigated, there would be 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. Background and upgradient data were not available for groundwater but they were available for soil, surface water, and sediment.

Data were collected from the locations specified in the SWMU 15 QAPP (TtNUS, 2004) with only minor modifications that reflect uncertainty in marking the locations in the field. The SWMU 15 QAPP (TtNUS, 2004) 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 with exceptions as noted below.

Theoretically, dissolved analyte concentration can not exceed the total metal concentration. Allowing for uncertainties in collecting, storing, preparing, and analyzing a sample, it is reasonable to expect that a dissolved metal concentration could be reported to be as much as 30% greater than the total metal concentration without cause for concern. This "rule of thumb," however does not apply if results are near the non-detect levels because of the greater analytical uncertainties in that concentration range. If the total and dissolved metals results are significantly greater than detection limits, an exceedance of 30% difference is an indication of a potential data quality problem. Some of the SWMU 15 dissolved metal results exceeded this range, however, this generally occurred when the results were near the detection limits. Nickel and copper results were affected the most in this regard. Therefore, the discrepancies between dissolved and total metals do not appear to reflect any significant data quality problems. Total and dissolved metal concentrations are provided in the tables of Section 3.0.

## References for Appendix H

TtNUS, 2004. Quality Assurance Project Plan for RCRA Facility Investigation at Building 106 Pond (SWMU 8) Roads and Grounds Area (SWMU 15) and Environmental Indicator Investigation for SWMU 18 (Load and Fill Area Buildings), SWMU 19 (Pyrotechnic Test Area), SWMU 20 (Crane Army Ammunition Activity Quality Assurance/Quality Control Test Area), and the Old Gun Tub Storage Lot, September.

U.S. EPA, 1993c. U.S. EPA Region 5 Standard Operating Procedures for Validation of Contract Laboratory Program Organic Data;

U.S. EPA, 1993d. Region 5 Standard Operating Procedures for Validation of Contract Laboratory Program Inorganic Data;

U.S. EPA, 1994a. U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review;

U.S. EPA, 1994b. U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review

## List of acronyms, Appendix H

%R Percent recovery
DQI Data quality indicator
LCS Laboratory control sample
MDL Method detection limit
MS Matrix Spike
MSD Matrix spike duplicate
NTS Nephelometric turbidity unit
PAH Polycyclic aromatic hydrocarbon
PCB Polychlorinated biphenyl
QAPP Quality assurance project plan
QC Quality control
RBTL Risk-based target level
RFI Resource Conservation and Recovery Act Facility investigation
RL Laboratory reporting limit
RPD Relative percent difference
SVOC Semivolatile organic compound

SWMU Solid Waste Management Unit

TOC Total organic carbon

TtNUS Tetra Tech NUS, Inc.

TV Threshold value

VOC Volatile organic compound

## TABLE H-1

## PERCENT COMPLETE FOR SAMPLES COLLECTED
## SWMU 15 (ROADS AND GROUNDS)
## NSWC CRANE,
## CRANE, INDIANA

| Analytical Fraction | SOIL [1] (collected/ proposed)[2] | SW (collected/ proposed)[2,3] | SD (collected/ proposed)[2] | GW (collected/ proposed)[2] |
|---|---|---|---|---|
| Grain Size | NA | NA | 5/5 (100%) | NA |
| Herbicides | 72/72 (100%) | 14/17 (82%) | 12/18 (67%) | 5/5 (100%) |
| Metals, Total | 87/87 (100%) | 15/19 (79%) | 17/24 (71%) | 8/8 (100%) |
| Metals, Filtered [4] | NA | 15/19 (79%) | NA | 6/6 (100%) |
| Cyanide | NA | NA | 3/5 (60%) | 8/8 (100%) |
| Semivolatiles except PAHs | 93/93 (100%) | 15/19 (79%) | 19/26 (73%) | 8/8 (100%) |
| 8260 Volatile Organic Compounds | 83/83 (100%) | 15/19 (79%) | 12/19 (63%) | 8/8 (100%) |
| Polycyclic Aromatic Hydrocarbons | 93/93 (100%) | 15/19 (79%) | 12/19 (63%) | 8/8 (100%) |
| Polychlorinated Biphenyls | 51/51 (100%) | 15/19 (79%) | 12/19 (63%) | 8/8 (100%) |
| Pesticides | 58/58 (100%) | 14/17 (82%) | 12/18 (67%) | 5/5 (100%) |
| Totla Organic Carbon | NA | NA | 5/5 (100%) | NA |

1 Includes both surface and subsurface soil samples. Samples not collected because of refusal are not represented in the tallies. See Section H.3.1.1 text for explanation of highlighted values.

2 Samples that were to be collected under prescribed conditions (e.g., if surface soil PAH concentrations were significant or debris was observed in soil cores in the landfill area) are not represented in these tallies if they were not collected.

3 Includes samples that could not be collected due to insufficient water at or near the specified sampling location (2 locations were affected in this manner).

4 Some aqueous samples were filtered to allow for determining whether or not the observed metals concentrations were associated with turbidity.

SD - Sediment samples

GW - Ground water samples

SW - Surface water samples

NA - Not applicable

TABLE H-2

**PERCENT COMPLETE FOR ANALYTICAL FRACTIONS**
**SWMU 15 (ROADS AND GROUNDS)**
**NSWC CRANE,**
**CRANE, INDIANA**

| Fraction | SOIL | | | | SEDIMENT | | | |
|---|---|---|---|---|---|---|---|---|
| | Non-Rejects | Rejects | Total | Pct Complete | Non-Rejects | Rejects | Total | Pct Complete |
| CYANIDE | NA | NA | NA | NA | **4** | **0** | **4** | **100** |
| FIELD PARAMETERS | NA | NA | NA | NA | NA | NA | NA | NA |
| GRAIN SIZE | NA | NA | NA | NA | 5 | 0 | 5 | 100.0 |
| HERB | 282 | 0 | 282 | 100.0 | 78 | 0 | 78 | 100.0 |
| METALS, DISSOLVED | NA | NA | NA | NA | NA | NA | NA | NA |
| METALS, TOTAL | 1410 | 0 | 1410 | 100.0 | 312 | 0 | 312 | 100.0 |
| MISCELLANEOUS | NA | NA | NA | NA | 4 | 0 | 4 | 100.0 |
| PEST/PCB | 1015 | 0 | 1015 | 100.0 | 364 | 0 | 364 | 100.0 |
| SVOC | 6662 | 91 | 6753 | 98.7 | 1377 | 14 | 1391 | 99.0 |
| TOTAL ORGANIC CARBON | NA | NA | NA | NA | 5 | 0 | 5 | 100.0 |
| VOC | 4420 | 365 | 4785 | 92.4 | 663 | 52 | 715 | 92.7 |

| Fraction | GROUNDWATER | | | | SURFACE WATER | | | |
|---|---|---|---|---|---|---|---|---|
| | Non-Rejects | Rejects | Total | Pct Complete | Non-Rejects | Rejects | Total | Pct Complete |
| FIELD PARAMETERS | 48 | 0 | 48 | 100.0 | 88 | 0 | 88 | 100.0 |
| HERB | 35 | 1 | 36 | 97.2 | 90 | 0 | 90 | 100.0 |
| METALS, DISSOLVED | 144 | 0 | 144 | 100.0 | 384 | 0 | 384 | 100.0 |
| METALS, TOTAL | 216 | 0 | 216 | 100.0 | 384 | 0 | 384 | 100.0 |
| MISCELLANEOUS | NA | NA | NA | NA | NA | NA | NA | NA |
| PEST/PCB | 189 | 0 | 189 | 100.0 | 84 | 0 | 427 | 100.0 |
| SVOC | 937 | 26 | 963 | 97.3 | 1665 | 47 | 1712 | 97.3 |
| VOC | 459 | 36 | 495 | 92.7 | 816 | 64 | 880 | 92.7 |

Tabulation is based on target compounds in normal field samples and field duplicates.

HERB = Herbicides
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds
PEST/PCB = Pesticides/polychlorinated biphenyls

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SS0620002 | SVOC | 2,4-DIMETHYLPHENOL | D |
| SO | 15SS0620002 | SVOC | 3,3'-DICHLOROBENZIDINE | D |
| SO | 15SS0620002 | SVOC | 4-CHLOROANILINE | D |
| SO | 15SS0010002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0020002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0030002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0040002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0050002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0060002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0070002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0080002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0090002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0100002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0110002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0120002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0130002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0190002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0200002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0210002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0220002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0230002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0240002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0250002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0260002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0270002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0280002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0290002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0300002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0310002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0320002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0330002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0340002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0350002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0360002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0370002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0380002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0390002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0400002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0410002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0420002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0430002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0440002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0450002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0460002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0470002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0480002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0490002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0620002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SS0620002-D | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SS0020002 | SVOC | KEPONE | C |
| SO | 15SS0030002 | SVOC | KEPONE | C |
| SO | 15SS0040002 | SVOC | KEPONE | C |
| SO | 15SS0050002 | SVOC | KEPONE | C |
| SO | 15SS0060002 | SVOC | KEPONE | C |
| SO | 15SS0190002 | SVOC | KEPONE | C |
| SO | 15SS0200002 | SVOC | KEPONE | C |
| SO | 15SS0210002 | SVOC | KEPONE | C |
| SO | 15SS0220002 | SVOC | KEPONE | C |
| SO | 15SS0230002 | SVOC | KEPONE | C |
| SO | 15SS0350002 | SVOC | KEPONE | C |
| SO | 15SS0390002 | SVOC | KEPONE | C |
| SO | 15SS0400002 | SVOC | KEPONE | C |
| SO | 15SS0420002 | SVOC | KEPONE | C |
| SO | 15SS0430002 | SVOC | KEPONE | C |
| SO | 15SS0440002 | SVOC | KEPONE | C |
| SO | 15SS0450002 | SVOC | KEPONE | C |
| SO | 15SS0460002 | SVOC | KEPONE | C |
| SO | 15SS0010002 | VOC | ACETONITRILE | C |
| SO | 15SS0020002 | VOC | ACETONITRILE | C |
| SO | 15SS0030002 | VOC | ACETONITRILE | C |
| SO | 15SS0040002 | VOC | ACETONITRILE | C |
| SO | 15SS0050002 | VOC | ACETONITRILE | C |
| SO | 15SS0060002 | VOC | ACETONITRILE | C |
| SO | 15SS0070002 | VOC | ACETONITRILE | C |
| SO | 15SS0080002 | VOC | ACETONITRILE | C |
| SO | 15SS0090002 | VOC | ACETONITRILE | C |
| SO | 15SS0100002 | VOC | ACETONITRILE | C |
| SO | 15SS0110002 | VOC | ACETONITRILE | C |
| SO | 15SS0120002 | VOC | ACETONITRILE | C |
| SO | 15SS0130002 | VOC | ACETONITRILE | C |
| SO | 15SS0190002 | VOC | ACETONITRILE | C |
| SO | 15SS0200002 | VOC | ACETONITRILE | C |
| SO | 15SS0210002 | VOC | ACETONITRILE | C |
| SO | 15SS0220002 | VOC | ACETONITRILE | C |
| SO | 15SS0230002 | VOC | ACETONITRILE | C |
| SO | 15SS0290002 | VOC | ACETONITRILE | C |
| SO | 15SS0300002 | VOC | ACETONITRILE | C |
| SO | 15SS0310002 | VOC | ACETONITRILE | C |
| SO | 15SS0320002 | VOC | ACETONITRILE | C |
| SO | 15SS0330002 | VOC | ACETONITRILE | C |
| SO | 15SS0340002 | VOC | ACETONITRILE | C |
| SO | 15SS0350002 | VOC | ACETONITRILE | C |
| SO | 15SS0360002 | VOC | ACETONITRILE | C |
| SO | 15SS0370002 | VOC | ACETONITRILE | C |
| SO | 15SS0380002 | VOC | ACETONITRILE | C |
| SO | 15SS0390002 | VOC | ACETONITRILE | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SS0400002 | VOC | ACETONITRILE | C |
| SO | 15SS0410002 | VOC | ACETONITRILE | C |
| SO | 15SS0420002 | VOC | ACETONITRILE | C |
| SO | 15SS0430002 | VOC | ACETONITRILE | C |
| SO | 15SS0440002 | VOC | ACETONITRILE | C |
| SO | 15SS0450002 | VOC | ACETONITRILE | C |
| SO | 15SS0460002 | VOC | ACETONITRILE | C |
| SO | 15SS0470002 | VOC | ACETONITRILE | C |
| SO | 15SS0480002 | VOC | ACETONITRILE | C |
| SO | 15SS0490002 | VOC | ACETONITRILE | C |
| SO | 15SS0620002 | VOC | ACETONITRILE | C |
| SO | 15SS0620002-D | VOC | ACETONITRILE | C |
| SO | 15SS0010002 | VOC | ACROLEIN | C |
| SO | 15SS0020002 | VOC | ACROLEIN | C |
| SO | 15SS0030002 | VOC | ACROLEIN | C |
| SO | 15SS0040002 | VOC | ACROLEIN | C |
| SO | 15SS0050002 | VOC | ACROLEIN | C |
| SO | 15SS0060002 | VOC | ACROLEIN | C |
| SO | 15SS0070002 | VOC | ACROLEIN | C |
| SO | 15SS0080002 | VOC | ACROLEIN | C |
| SO | 15SS0090002 | VOC | ACROLEIN | C |
| SO | 15SS0100002 | VOC | ACROLEIN | C |
| SO | 15SS0110002 | VOC | ACROLEIN | C |
| SO | 15SS0120002 | VOC | ACROLEIN | C |
| SO | 15SS0130002 | VOC | ACROLEIN | C |
| SO | 15SS0190002 | VOC | ACROLEIN | C |
| SO | 15SS0200002 | VOC | ACROLEIN | C |
| SO | 15SS0210002 | VOC | ACROLEIN | C |
| SO | 15SS0220002 | VOC | ACROLEIN | C |
| SO | 15SS0230002 | VOC | ACROLEIN | C |
| SO | 15SS0290002 | VOC | ACROLEIN | C |
| SO | 15SS0300002 | VOC | ACROLEIN | C |
| SO | 15SS0310002 | VOC | ACROLEIN | C |
| SO | 15SS0320002 | VOC | ACROLEIN | C |
| SO | 15SS0330002 | VOC | ACROLEIN | C |
| SO | 15SS0340002 | VOC | ACROLEIN | C |
| SO | 15SS0350002 | VOC | ACROLEIN | C |
| SO | 15SS0360002 | VOC | ACROLEIN | C |
| SO | 15SS0370002 | VOC | ACROLEIN | C |
| SO | 15SS0380002 | VOC | ACROLEIN | C |
| SO | 15SS0390002 | VOC | ACROLEIN | C |
| SO | 15SS0400002 | VOC | ACROLEIN | C |
| SO | 15SS0410002 | VOC | ACROLEIN | C |
| SO | 15SS0420002 | VOC | ACROLEIN | C |
| SO | 15SS0430002 | VOC | ACROLEIN | C |
| SO | 15SS0440002 | VOC | ACROLEIN | C |
| SO | 15SS0450002 | VOC | ACROLEIN | C |
| SO | 15SS0460002 | VOC | ACROLEIN | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SS0470002 | VOC | ACROLEIN | C |
| SO | 15SS0480002 | VOC | ACROLEIN | C |
| SO | 15SS0490002 | VOC | ACROLEIN | C |
| SO | 15SS0620002 | VOC | ACROLEIN | C |
| SO | 15SS0620002-D | VOC | ACROLEIN | C |
| SO | 15SS0010002 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SS0030002 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SS0040002 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SS0470002 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SS0480002 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SS0010002 | VOC | ISOBUTANOL | C |
| SO | 15SS0020002 | VOC | ISOBUTANOL | C |
| SO | 15SS0030002 | VOC | ISOBUTANOL | C |
| SO | 15SS0040002 | VOC | ISOBUTANOL | C |
| SO | 15SS0050002 | VOC | ISOBUTANOL | C |
| SO | 15SS0060002 | VOC | ISOBUTANOL | C |
| SO | 15SS0070002 | VOC | ISOBUTANOL | C |
| SO | 15SS0080002 | VOC | ISOBUTANOL | C |
| SO | 15SS0090002 | VOC | ISOBUTANOL | C |
| SO | 15SS0100002 | VOC | ISOBUTANOL | C |
| SO | 15SS0110002 | VOC | ISOBUTANOL | C |
| SO | 15SS0120002 | VOC | ISOBUTANOL | C |
| SO | 15SS0130002 | VOC | ISOBUTANOL | C |
| SO | 15SS0190002 | VOC | ISOBUTANOL | C |
| SO | 15SS0200002 | VOC | ISOBUTANOL | C |
| SO | 15SS0210002 | VOC | ISOBUTANOL | C |
| SO | 15SS0220002 | VOC | ISOBUTANOL | C |
| SO | 15SS0230002 | VOC | ISOBUTANOL | C |
| SO | 15SS0290002 | VOC | ISOBUTANOL | C |
| SO | 15SS0300002 | VOC | ISOBUTANOL | C |
| SO | 15SS0310002 | VOC | ISOBUTANOL | C |
| SO | 15SS0320002 | VOC | ISOBUTANOL | C |
| SO | 15SS0330002 | VOC | ISOBUTANOL | C |
| SO | 15SS0340002 | VOC | ISOBUTANOL | C |
| SO | 15SS0350002 | VOC | ISOBUTANOL | C |
| SO | 15SS0360002 | VOC | ISOBUTANOL | C |
| SO | 15SS0370002 | VOC | ISOBUTANOL | C |
| SO | 15SS0380002 | VOC | ISOBUTANOL | C |
| SO | 15SS0390002 | VOC | ISOBUTANOL | C |
| SO | 15SS0400002 | VOC | ISOBUTANOL | C |
| SO | 15SS0410002 | VOC | ISOBUTANOL | C |
| SO | 15SS0420002 | VOC | ISOBUTANOL | C |
| SO | 15SS0430002 | VOC | ISOBUTANOL | C |
| SO | 15SS0440002 | VOC | ISOBUTANOL | C |
| SO | 15SS0450002 | VOC | ISOBUTANOL | C |
| SO | 15SS0460002 | VOC | ISOBUTANOL | C |
| SO | 15SS0470002 | VOC | ISOBUTANOL | C |
| SO | 15SS0480002 | VOC | ISOBUTANOL | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SS0490002 | VOC | ISOBUTANOL | C |
| SO | 15SS0620002 | VOC | ISOBUTANOL | C |
| SO | 15SS0620002-D | VOC | ISOBUTANOL | C |
| SO | 15SS0010002 | VOC | PROPIONITRILE | C |
| SO | 15SS0020002 | VOC | PROPIONITRILE | C |
| SO | 15SS0030002 | VOC | PROPIONITRILE | C |
| SO | 15SS0040002 | VOC | PROPIONITRILE | C |
| SO | 15SS0050002 | VOC | PROPIONITRILE | C |
| SO | 15SS0060002 | VOC | PROPIONITRILE | C |
| SO | 15SS0070002 | VOC | PROPIONITRILE | C |
| SO | 15SS0080002 | VOC | PROPIONITRILE | C |
| SO | 15SS0090002 | VOC | PROPIONITRILE | C |
| SO | 15SS0100002 | VOC | PROPIONITRILE | C |
| SO | 15SS0110002 | VOC | PROPIONITRILE | C |
| SO | 15SS0120002 | VOC | PROPIONITRILE | C |
| SO | 15SS0130002 | VOC | PROPIONITRILE | C |
| SO | 15SS0190002 | VOC | PROPIONITRILE | C |
| SO | 15SS0200002 | VOC | PROPIONITRILE | C |
| SO | 15SS0210002 | VOC | PROPIONITRILE | C |
| SO | 15SS0220002 | VOC | PROPIONITRILE | C |
| SO | 15SS0230002 | VOC | PROPIONITRILE | C |
| SO | 15SS0290002 | VOC | PROPIONITRILE | C |
| SO | 15SS0300002 | VOC | PROPIONITRILE | C |
| SO | 15SS0310002 | VOC | PROPIONITRILE | C |
| SO | 15SS0320002 | VOC | PROPIONITRILE | C |
| SO | 15SS0330002 | VOC | PROPIONITRILE | C |
| SO | 15SS0340002 | VOC | PROPIONITRILE | C |
| SO | 15SS0350002 | VOC | PROPIONITRILE | C |
| SO | 15SS0360002 | VOC | PROPIONITRILE | C |
| SO | 15SS0370002 | VOC | PROPIONITRILE | C |
| SO | 15SS0380002 | VOC | PROPIONITRILE | C |
| SO | 15SS0390002 | VOC | PROPIONITRILE | C |
| SO | 15SS0400002 | VOC | PROPIONITRILE | C |
| SO | 15SS0410002 | VOC | PROPIONITRILE | C |
| SO | 15SS0420002 | VOC | PROPIONITRILE | C |
| SO | 15SS0430002 | VOC | PROPIONITRILE | C |
| SO | 15SS0440002 | VOC | PROPIONITRILE | C |
| SO | 15SS0450002 | VOC | PROPIONITRILE | C |
| SO | 15SS0460002 | VOC | PROPIONITRILE | C |
| SO | 15SS0470002 | VOC | PROPIONITRILE | C |
| SO | 15SS0480002 | VOC | PROPIONITRILE | C |
| SO | 15SS0490002 | VOC | PROPIONITRILE | C |
| SO | 15SS0620002 | VOC | PROPIONITRILE | C |
| SO | 15SS0620002-D | VOC | PROPIONITRILE | C |
| SO | 15SB0100206 | SVOC | 3,3'-DICHLOROBENZIDINE | D |
| SO | 15SB0230206 | SVOC | 4-CHLOROANILINE | D |
| SO | 15SB0060206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0060206-D | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SB0080206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0080610 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0090206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0090610 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0100206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0100610 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0230206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0230206-D | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0280206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0280206-D | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0450206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0460206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0480206 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0480206-D | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SO | 15SB0100206 | SVOC | HEXACHLOROCYCLOPENTADIEN | D |
| SO | 15SB0230206 | SVOC | HEXACHLOROCYCLOPENTADIEN | C |
| SO | 15SB0450206 | SVOC | HEXACHLOROCYCLOPENTADIEN | D |
| SO | 15SB0480206 | SVOC | HEXACHLOROCYCLOPENTADIEN | D |
| SO | 15SB0450206 | SVOC | KEPONE | C |
| SO | 15SB0460206 | SVOC | KEPONE | C |
| SO | 15SB0010206 | VOC | ACETONITRILE | C |
| SO | 15SB0020206 | VOC | ACETONITRILE | C |
| SO | 15SB0030206 | VOC | ACETONITRILE | C |
| SO | 15SB0040206 | VOC | ACETONITRILE | C |
| SO | 15SB0050206 | VOC | ACETONITRILE | C |
| SO | 15SB0060206 | VOC | ACETONITRILE | C |
| SO | 15SB0060206-D | VOC | ACETONITRILE | C |
| SO | 15SB0070206 | VOC | ACETONITRILE | C |
| SO | 15SB0080206 | VOC | ACETONITRILE | C |
| SO | 15SB0080610 | VOC | ACETONITRILE | C |
| SO | 15SB0090206 | VOC | ACETONITRILE | C |
| SO | 15SB0090610 | VOC | ACETONITRILE | C |
| SO | 15SB0100206 | VOC | ACETONITRILE | C |
| SO | 15SB0100610 | VOC | ACETONITRILE | C |
| SO | 15SB0110206 | VOC | ACETONITRILE | C |
| SO | 15SB0120206 | VOC | ACETONITRILE | C |
| SO | 15SB0130206 | VOC | ACETONITRILE | C |
| SO | 15SB0190206 | VOC | ACETONITRILE | C |
| SO | 15SB0200206 | VOC | ACETONITRILE | C |
| SO | 15SB0210206 | VOC | ACETONITRILE | C |
| SO | 15SB0220206 | VOC | ACETONITRILE | C |
| SO | 15SB0230206 | VOC | ACETONITRILE | C |
| SO | 15SB0230206-D | VOC | ACETONITRILE | C |
| SO | 15SB0290206 | VOC | ACETONITRILE | C |
| SO | 15SB0300206 | VOC | ACETONITRILE | C |
| SO | 15SB0310206 | VOC | ACETONITRILE | C |
| SO | 15SB0310610 | VOC | ACETONITRILE | C |
| SO | 15SB0311014 | VOC | ACETONITRILE | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SB0320206 | VOC | ACETONITRILE | C |
| SO | 15SB0350206 | VOC | ACETONITRILE | C |
| SO | 15SB0370206 | VOC | ACETONITRILE | C |
| SO | 15SB0400206 | VOC | ACETONITRILE | C |
| SO | 15SB0420206 | VOC | ACETONITRILE | C |
| SO | 15SB0430206 | VOC | ACETONITRILE | C |
| SO | 15SB0440206 | VOC | ACETONITRILE | C |
| SO | 15SB0450206 | VOC | ACETONITRILE | C |
| SO | 15SB0450610 | VOC | ACETONITRILE | C |
| SO | 15SB0451012 | VOC | ACETONITRILE | C |
| SO | 15SB0460206 | VOC | ACETONITRILE | C |
| SO | 15SB0460610 | VOC | ACETONITRILE | C |
| SO | 15SB0461020 | VOC | ACETONITRILE | C |
| SO | 15SB0480206 | VOC | ACETONITRILE | C |
| SO | 15SB0480206-D | VOC | ACETONITRILE | C |
| SO | 15SB0480610 | VOC | ACETONITRILE | C |
| SO | 15SB0481015 | VOC | ACETONITRILE | C |
| SO | 15SB0620206 | VOC | ACETONITRILE | C |
| SO | 15SB0010206 | VOC | ACROLEIN | C |
| SO | 15SB0020206 | VOC | ACROLEIN | C |
| SO | 15SB0030206 | VOC | ACROLEIN | C |
| SO | 15SB0040206 | VOC | ACROLEIN | C |
| SO | 15SB0050206 | VOC | ACROLEIN | C |
| SO | 15SB0060206 | VOC | ACROLEIN | C |
| SO | 15SB0060206-D | VOC | ACROLEIN | C |
| SO | 15SB0070206 | VOC | ACROLEIN | C |
| SO | 15SB0080206 | VOC | ACROLEIN | C |
| SO | 15SB0080610 | VOC | ACROLEIN | C |
| SO | 15SB0090206 | VOC | ACROLEIN | C |
| SO | 15SB0090610 | VOC | ACROLEIN | C |
| SO | 15SB0100206 | VOC | ACROLEIN | C |
| SO | 15SB0100610 | VOC | ACROLEIN | C |
| SO | 15SB0110206 | VOC | ACROLEIN | C |
| SO | 15SB0120206 | VOC | ACROLEIN | C |
| SO | 15SB0130206 | VOC | ACROLEIN | C |
| SO | 15SB0190206 | VOC | ACROLEIN | C |
| SO | 15SB0200206 | VOC | ACROLEIN | C |
| SO | 15SB0210206 | VOC | ACROLEIN | C |
| SO | 15SB0220206 | VOC | ACROLEIN | C |
| SO | 15SB0230206 | VOC | ACROLEIN | C |
| SO | 15SB0230206-D | VOC | ACROLEIN | C |
| SO | 15SB0290206 | VOC | ACROLEIN | C |
| SO | 15SB0300206 | VOC | ACROLEIN | C |
| SO | 15SB0310206 | VOC | ACROLEIN | C |
| SO | 15SB0310610 | VOC | ACROLEIN | C |
| SO | 15SB0311014 | VOC | ACROLEIN | C |
| SO | 15SB0320206 | VOC | ACROLEIN | C |
| SO | 15SB0350206 | VOC | ACROLEIN | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SB0370206 | VOC | ACROLEIN | C |
| SO | 15SB0400206 | VOC | ACROLEIN | C |
| SO | 15SB0420206 | VOC | ACROLEIN | C |
| SO | 15SB0430206 | VOC | ACROLEIN | C |
| SO | 15SB0440206 | VOC | ACROLEIN | C |
| SO | 15SB0450206 | VOC | ACROLEIN | C |
| SO | 15SB0450610 | VOC | ACROLEIN | C |
| SO | 15SB0451012 | VOC | ACROLEIN | C |
| SO | 15SB0460206 | VOC | ACROLEIN | C |
| SO | 15SB0460610 | VOC | ACROLEIN | C |
| SO | 15SB0461020 | VOC | ACROLEIN | C |
| SO | 15SB0480206 | VOC | ACROLEIN | C |
| SO | 15SB0480206-D | VOC | ACROLEIN | C |
| SO | 15SB0480610 | VOC | ACROLEIN | C |
| SO | 15SB0481015 | VOC | ACROLEIN | C |
| SO | 15SB0620206 | VOC | ACROLEIN | C |
| SO | 15SB0010206 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0030206 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0100610 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0290206 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0310206 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0310610 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0311014 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0320206 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0350206 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0370206 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0480206 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0480610 | VOC | DICHLORODIFLUOROMETHANE | C |
| SO | 15SB0010206 | VOC | ISOBUTANOL | C |
| SO | 15SB0020206 | VOC | ISOBUTANOL | C |
| SO | 15SB0030206 | VOC | ISOBUTANOL | C |
| SO | 15SB0040206 | VOC | ISOBUTANOL | C |
| SO | 15SB0050206 | VOC | ISOBUTANOL | C |
| SO | 15SB0060206 | VOC | ISOBUTANOL | C |
| SO | 15SB0060206-D | VOC | ISOBUTANOL | C |
| SO | 15SB0070206 | VOC | ISOBUTANOL | C |
| SO | 15SB0080206 | VOC | ISOBUTANOL | C |
| SO | 15SB0080610 | VOC | ISOBUTANOL | C |
| SO | 15SB0090206 | VOC | ISOBUTANOL | C |
| SO | 15SB0090610 | VOC | ISOBUTANOL | C |
| SO | 15SB0100206 | VOC | ISOBUTANOL | C |
| SO | 15SB0100610 | VOC | ISOBUTANOL | C |
| SO | 15SB0110206 | VOC | ISOBUTANOL | C |
| SO | 15SB0120206 | VOC | ISOBUTANOL | C |
| SO | 15SB0130206 | VOC | ISOBUTANOL | C |
| SO | 15SB0190206 | VOC | ISOBUTANOL | C |
| SO | 15SB0200206 | VOC | ISOBUTANOL | C |
| SO | 15SB0210206 | VOC | ISOBUTANOL | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SB0220206 | VOC | ISOBUTANOL | C |
| SO | 15SB0230206 | VOC | ISOBUTANOL | C |
| SO | 15SB0230206-D | VOC | ISOBUTANOL | C |
| SO | 15SB0290206 | VOC | ISOBUTANOL | C |
| SO | 15SB0300206 | VOC | ISOBUTANOL | C |
| SO | 15SB0310206 | VOC | ISOBUTANOL | C |
| SO | 15SB0310610 | VOC | ISOBUTANOL | C |
| SO | 15SB0311014 | VOC | ISOBUTANOL | C |
| SO | 15SB0320206 | VOC | ISOBUTANOL | C |
| SO | 15SB0350206 | VOC | ISOBUTANOL | C |
| SO | 15SB0370206 | VOC | ISOBUTANOL | C |
| SO | 15SB0400206 | VOC | ISOBUTANOL | C |
| SO | 15SB0420206 | VOC | ISOBUTANOL | C |
| SO | 15SB0430206 | VOC | ISOBUTANOL | C |
| SO | 15SB0440206 | VOC | ISOBUTANOL | C |
| SO | 15SB0450206 | VOC | ISOBUTANOL | C |
| SO | 15SB0450610 | VOC | ISOBUTANOL | C |
| SO | 15SB0451012 | VOC | ISOBUTANOL | C |
| SO | 15SB0460206 | VOC | ISOBUTANOL | C |
| SO | 15SB0460610 | VOC | ISOBUTANOL | C |
| SO | 15SB0461020 | VOC | ISOBUTANOL | C |
| SO | 15SB0480206 | VOC | ISOBUTANOL | C |
| SO | 15SB0480206-D | VOC | ISOBUTANOL | C |
| SO | 15SB0480610 | VOC | ISOBUTANOL | C |
| SO | 15SB0481015 | VOC | ISOBUTANOL | C |
| SO | 15SB0620206 | VOC | ISOBUTANOL | C |
| SO | 15SB0010206 | VOC | PROPIONITRILE | C |
| SO | 15SB0020206 | VOC | PROPIONITRILE | C |
| SO | 15SB0030206 | VOC | PROPIONITRILE | C |
| SO | 15SB0040206 | VOC | PROPIONITRILE | C |
| SO | 15SB0050206 | VOC | PROPIONITRILE | C |
| SO | 15SB0060206 | VOC | PROPIONITRILE | C |
| SO | 15SB0060206-D | VOC | PROPIONITRILE | C |
| SO | 15SB0070206 | VOC | PROPIONITRILE | C |
| SO | 15SB0080206 | VOC | PROPIONITRILE | C |
| SO | 15SB0080610 | VOC | PROPIONITRILE | C |
| SO | 15SB0090206 | VOC | PROPIONITRILE | C |
| SO | 15SB0090610 | VOC | PROPIONITRILE | C |
| SO | 15SB0100206 | VOC | PROPIONITRILE | C |
| SO | 15SB0100610 | VOC | PROPIONITRILE | C |
| SO | 15SB0110206 | VOC | PROPIONITRILE | C |
| SO | 15SB0120206 | VOC | PROPIONITRILE | C |
| SO | 15SB0130206 | VOC | PROPIONITRILE | C |
| SO | 15SB0190206 | VOC | PROPIONITRILE | C |
| SO | 15SB0200206 | VOC | PROPIONITRILE | C |
| SO | 15SB0210206 | VOC | PROPIONITRILE | C |
| SO | 15SB0220206 | VOC | PROPIONITRILE | C |
| SO | 15SB0230206 | VOC | PROPIONITRILE | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SO | 15SB0230206-D | VOC | PROPIONITRILE | C |
| SO | 15SB0290206 | VOC | PROPIONITRILE | C |
| SO | 15SB0300206 | VOC | PROPIONITRILE | C |
| SO | 15SB0310206 | VOC | PROPIONITRILE | C |
| SO | 15SB0310610 | VOC | PROPIONITRILE | C |
| SO | 15SB0311014 | VOC | PROPIONITRILE | C |
| SO | 15SB0320206 | VOC | PROPIONITRILE | C |
| SO | 15SB0350206 | VOC | PROPIONITRILE | C |
| SO | 15SB0370206 | VOC | PROPIONITRILE | C |
| SO | 15SB0400206 | VOC | PROPIONITRILE | C |
| SO | 15SB0420206 | VOC | PROPIONITRILE | C |
| SO | 15SB0430206 | VOC | PROPIONITRILE | C |
| SO | 15SB0440206 | VOC | PROPIONITRILE | C |
| SO | 15SB0450206 | VOC | PROPIONITRILE | C |
| SO | 15SB0450610 | VOC | PROPIONITRILE | C |
| SO | 15SB0451012 | VOC | PROPIONITRILE | C |
| SO | 15SB0460206 | VOC | PROPIONITRILE | C |
| SO | 15SB0460610 | VOC | PROPIONITRILE | C |
| SO | 15SB0461020 | VOC | PROPIONITRILE | C |
| SO | 15SB0480206 | VOC | PROPIONITRILE | C |
| SO | 15SB0480206-D | VOC | PROPIONITRILE | C |
| SO | 15SB0480610 | VOC | PROPIONITRILE | C |
| SO | 15SB0481015 | VOC | PROPIONITRILE | C |
| SO | 15SB0620206 | VOC | PROPIONITRILE | C |
| SW | 15SW01101 | SVOC | 2,3,4,6-TETRACHLOROPHENOL | R |
| SW | 15SW01501 | SVOC | 2,3,4,6-TETRACHLOROPHENOL | R |
| SW | 15SW01101 | SVOC | 2,4,5-TRICHLOROPHENOL | R |
| SW | 15SW01501 | SVOC | 2,4,5-TRICHLOROPHENOL | R |
| SW | 15SW01101 | SVOC | 2,4,6-TRICHLOROPHENOL | R |
| SW | 15SW01501 | SVOC | 2,4,6-TRICHLOROPHENOL | R |
| SW | 15SW01101 | SVOC | 2,4-DICHLOROPHENOL | R |
| SW | 15SW01501 | SVOC | 2,4-DICHLOROPHENOL | R |
| SW | 15SW01101 | SVOC | 2,4-DIMETHYLPHENOL | R |
| SW | 15SW01501 | SVOC | 2,4-DIMETHYLPHENOL | R |
| SW | 15SW01101 | SVOC | 2,4-DINITROPHENOL | R |
| SW | 15SW01501 | SVOC | 2,4-DINITROPHENOL | R |
| SW | 15SW01101 | SVOC | 2,6-DICHLOROPHENOL | R |
| SW | 15SW01501 | SVOC | 2,6-DICHLOROPHENOL | R |
| SW | 15SW01101 | SVOC | 2-CHLOROPHENOL | R |
| SW | 15SW01501 | SVOC | 2-CHLOROPHENOL | R |
| SW | 15SW01101 | SVOC | 2-METHYLPHENOL | R |
| SW | 15SW01501 | SVOC | 2-METHYLPHENOL | R |
| SW | 15SW01101 | SVOC | 2-NITROPHENOL | R |
| SW | 15SW01501 | SVOC | 2-NITROPHENOL | R |
| SW | 15SW01101 | SVOC | 3&4-METHYLPHENOL | R |
| SW | 15SW01501 | SVOC | 3&4-METHYLPHENOL | R |
| SW | 15SW00601 | SVOC | 3,3'-DICHLOROBENZIDINE | D |
| SW | 15SW01101 | SVOC | 4,6-DINITRO-2-METHYLPHENOL | R |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SW | 15SW01501 | SVOC | 4,6-DINITRO-2-METHYLPHENOL | R |
| SW | 15SW01101 | SVOC | 4-CHLORO-3-METHYLPHENOL | R |
| SW | 15SW01501 | SVOC | 4-CHLORO-3-METHYLPHENOL | R |
| SW | 15SW01101 | SVOC | 4-NITROPHENOL | R |
| SW | 15SW01501 | SVOC | 4-NITROPHENOL | R |
| SW | 15SW00401 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01001 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01101 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW00101 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW00201 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW00501 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW00601 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW00601-D | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW00901 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01301 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01401 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01501 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01601 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01701 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01801 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW01901 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SW | 15SW00401 | VOC | ACETONITRILE | C |
| SW | 15SW01001 | VOC | ACETONITRILE | C |
| SW | 15SW01101 | VOC | ACETONITRILE | C |
| SW | 15SW00101 | VOC | ACETONITRILE | C |
| SW | 15SW00201 | VOC | ACETONITRILE | C |
| SW | 15SW00501 | VOC | ACETONITRILE | C |
| SW | 15SW00601 | VOC | ACETONITRILE | C |
| SW | 15SW00601-D | VOC | ACETONITRILE | C |
| SW | 15SW00901 | VOC | ACETONITRILE | C |
| SW | 15SW01301 | VOC | ACETONITRILE | C |
| SW | 15SW01401 | VOC | ACETONITRILE | C |
| SW | 15SW01501 | VOC | ACETONITRILE | C |
| SW | 15SW01601 | VOC | ACETONITRILE | C |
| SW | 15SW01701 | VOC | ACETONITRILE | C |
| SW | 15SW01801 | VOC | ACETONITRILE | C |
| SW | 15SW01901 | VOC | ACETONITRILE | C |
| SW | 15SW00401 | VOC | ACROLEIN | C |
| SW | 15SW01001 | VOC | ACROLEIN | C |
| SW | 15SW01101 | VOC | ACROLEIN | C |
| SW | 15SW00101 | VOC | ACROLEIN | C |
| SW | 15SW00201 | VOC | ACROLEIN | C |
| SW | 15SW00501 | VOC | ACROLEIN | C |
| SW | 15SW00601 | VOC | ACROLEIN | C |
| SW | 15SW00601-D | VOC | ACROLEIN | C |
| SW | 15SW00901 | VOC | ACROLEIN | C |
| SW | 15SW01301 | VOC | ACROLEIN | C |
| SW | 15SW01401 | VOC | ACROLEIN | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SW | 15SW01501 | VOC | ACROLEIN | C |
| SW | 15SW01601 | VOC | ACROLEIN | C |
| SW | 15SW01701 | VOC | ACROLEIN | C |
| SW | 15SW01801 | VOC | ACROLEIN | C |
| SW | 15SW01901 | VOC | ACROLEIN | C |
| SW | 15SW00401 | VOC | ISOBUTANOL | C |
| SW | 15SW01001 | VOC | ISOBUTANOL | C |
| SW | 15SW01101 | VOC | ISOBUTANOL | C |
| SW | 15SW00101 | VOC | ISOBUTANOL | C |
| SW | 15SW00201 | VOC | ISOBUTANOL | C |
| SW | 15SW00501 | VOC | ISOBUTANOL | C |
| SW | 15SW00601 | VOC | ISOBUTANOL | C |
| SW | 15SW00601-D | VOC | ISOBUTANOL | C |
| SW | 15SW00901 | VOC | ISOBUTANOL | C |
| SW | 15SW01301 | VOC | ISOBUTANOL | C |
| SW | 15SW01401 | VOC | ISOBUTANOL | C |
| SW | 15SW01501 | VOC | ISOBUTANOL | C |
| SW | 15SW01601 | VOC | ISOBUTANOL | C |
| SW | 15SW01701 | VOC | ISOBUTANOL | C |
| SW | 15SW01801 | VOC | ISOBUTANOL | C |
| SW | 15SW01901 | VOC | ISOBUTANOL | C |
| SW | 15SW01101 | SVOC | PHENOL | R |
| SW | 15SW01501 | SVOC | PHENOL | R |
| SW | 15SW00401 | VOC | PROPIONITRILE | C |
| SW | 15SW01001 | VOC | PROPIONITRILE | C |
| SW | 15SW01101 | VOC | PROPIONITRILE | C |
| SW | 15SW00101 | VOC | PROPIONITRILE | C |
| SW | 15SW00201 | VOC | PROPIONITRILE | C |
| SW | 15SW00501 | VOC | PROPIONITRILE | C |
| SW | 15SW00601 | VOC | PROPIONITRILE | C |
| SW | 15SW00601-D | VOC | PROPIONITRILE | C |
| SW | 15SW00901 | VOC | PROPIONITRILE | C |
| SW | 15SW01301 | VOC | PROPIONITRILE | C |
| SW | 15SW01401 | VOC | PROPIONITRILE | C |
| SW | 15SW01501 | VOC | PROPIONITRILE | C |
| SW | 15SW01601 | VOC | PROPIONITRILE | C |
| SW | 15SW01701 | VOC | PROPIONITRILE | C |
| SW | 15SW01801 | VOC | PROPIONITRILE | C |
| SW | 15SW01901 | VOC | PROPIONITRILE | C |
| SD | 15SD0010006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0020006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0050006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0050006-D | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0060006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0090006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0130006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0140006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0150006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SD | 15SD0160006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0170006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0180006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0190006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| SD | 15SD0050006 | SVOC | HEXACHLOROCYCLOPENTADIEN | D |
| SD | 15SD0010006 | VOC | ACETONITRILE | C |
| SD | 15SD0020006 | VOC | ACETONITRILE | C |
| SD | 15SD0050006 | VOC | ACETONITRILE | C |
| SD | 15SD0050006-D | VOC | ACETONITRILE | C |
| SD | 15SD0060006 | VOC | ACETONITRILE | C |
| SD | 15SD0090006 | VOC | ACETONITRILE | C |
| SD | 15SD0130006 | VOC | ACETONITRILE | C |
| SD | 15SD0140006 | VOC | ACETONITRILE | C |
| SD | 15SD0150006 | VOC | ACETONITRILE | C |
| SD | 15SD0160006 | VOC | ACETONITRILE | C |
| SD | 15SD0170006 | VOC | ACETONITRILE | C |
| SD | 15SD0180006 | VOC | ACETONITRILE | C |
| SD | 15SD0190006 | VOC | ACETONITRILE | C |
| SD | 15SD0010006 | VOC | ACROLEIN | C |
| SD | 15SD0020006 | VOC | ACROLEIN | C |
| SD | 15SD0050006 | VOC | ACROLEIN | C |
| SD | 15SD0050006-D | VOC | ACROLEIN | C |
| SD | 15SD0060006 | VOC | ACROLEIN | C |
| SD | 15SD0090006 | VOC | ACROLEIN | C |
| SD | 15SD0130006 | VOC | ACROLEIN | C |
| SD | 15SD0140006 | VOC | ACROLEIN | C |
| SD | 15SD0150006 | VOC | ACROLEIN | C |
| SD | 15SD0160006 | VOC | ACROLEIN | C |
| SD | 15SD0170006 | VOC | ACROLEIN | C |
| SD | 15SD0180006 | VOC | ACROLEIN | C |
| SD | 15SD0190006 | VOC | ACROLEIN | C |
| SD | 15SD0010006 | VOC | ISOBUTANOL | C |
| SD | 15SD0020006 | VOC | ISOBUTANOL | C |
| SD | 15SD0050006 | VOC | ISOBUTANOL | C |
| SD | 15SD0050006-D | VOC | ISOBUTANOL | C |
| SD | 15SD0060006 | VOC | ISOBUTANOL | C |
| SD | 15SD0090006 | VOC | ISOBUTANOL | C |
| SD | 15SD0130006 | VOC | ISOBUTANOL | C |
| SD | 15SD0140006 | VOC | ISOBUTANOL | C |
| SD | 15SD0150006 | VOC | ISOBUTANOL | C |
| SD | 15SD0160006 | VOC | ISOBUTANOL | C |
| SD | 15SD0170006 | VOC | ISOBUTANOL | C |
| SD | 15SD0180006 | VOC | ISOBUTANOL | C |
| SD | 15SD0190006 | VOC | ISOBUTANOL | C |
| SD | 15SD0010006 | VOC | PROPIONITRILE | C |
| SD | 15SD0020006 | VOC | PROPIONITRILE | C |
| SD | 15SD0050006 | VOC | PROPIONITRILE | C |
| SD | 15SD0050006-D | VOC | PROPIONITRILE | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| SD | 15SD0060006 | VOC | PROPIONITRILE | C |
| SD | 15SD0090006 | VOC | PROPIONITRILE | C |
| SD | 15SD0130006 | VOC | PROPIONITRILE | C |
| SD | 15SD0140006 | VOC | PROPIONITRILE | C |
| SD | 15SD0150006 | VOC | PROPIONITRILE | C |
| SD | 15SD0160006 | VOC | PROPIONITRILE | C |
| SD | 15SD0170006 | VOC | PROPIONITRILE | C |
| SD | 15SD0180006 | VOC | PROPIONITRILE | C |
| SD | 15SD0190006 | VOC | PROPIONITRILE | C |
| GW | 15GWTW006 | HERB | DINOSEB | D |
| GW | 15GWTW003 | SVOC | 2,3,4,6-TETRACHLOROPHENOL | R |
| GW | 15GWTW003 | SVOC | 2,4,5-TRICHLOROPHENOL | R |
| GW | 15GWTW003 | SVOC | 2,4,6-TRICHLOROPHENOL | R |
| GW | 15GWTW003 | SVOC | 2,4-DICHLOROPHENOL | R |
| GW | 15GWTW003 | SVOC | 2,4-DIMETHYLPHENOL | R |
| GW | 15GWTW002 | SVOC | 2,4-DINITROPHENOL | C |
| GW | 15GWTW003 | SVOC | 2,4-DINITROPHENOL | R |
| GW | 15GWTW003 | SVOC | 2,6-DICHLOROPHENOL | R |
| GW | 15GWTW003 | SVOC | 2-CHLOROPHENOL | R |
| GW | 15GWTW003 | SVOC | 2-METHYLPHENOL | R |
| GW | 15GWTW003 | SVOC | 2-NITROPHENOL | R |
| GW | 15GWTW003 | SVOC | 3&4-METHYLPHENOL | R |
| GW | 15GWTW006 | SVOC | 3,3'-DICHLOROBENZIDINE | D |
| GW | 15GWTW003 | SVOC | 4,6-DINITRO-2-METHYLPHENOL | R |
| GW | 15GWTW003 | SVOC | 4-CHLORO-3-METHYLPHENOL | R |
| GW | 15GWTW003 | SVOC | 4-NITROPHENOL | R |
| GW | 15GWTW001 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW002 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW003 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW004 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW005 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW006 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW006-D | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW007 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW008 | SVOC | 4-NITROQUINOLINE-1-OXIDE | C |
| GW | 15GWTW003 | SVOC | PHENOL | C |
| GW | 15GWTW001 | VOC | ACETONITRILE | C |
| GW | 15GWTW002 | VOC | ACETONITRILE | C |
| GW | 15GWTW003 | VOC | ACETONITRILE | C |
| GW | 15GWTW004 | VOC | ACETONITRILE | C |
| GW | 15GWTW005 | VOC | ACETONITRILE | C |
| GW | 15GWTW006 | VOC | ACETONITRILE | C |
| GW | 15GWTW006-D | VOC | ACETONITRILE | C |
| GW | 15GWTW007 | VOC | ACETONITRILE | C |
| GW | 15GWTW008 | VOC | ACETONITRILE | C |
| GW | 15GWTW001 | VOC | ACROLEIN | C |
| GW | 15GWTW002 | VOC | ACROLEIN | C |
| GW | 15GWTW003 | VOC | ACROLEIN | C |

TABLE H-3

REJECTED RESULTS FOR ALL SAMPLE MATRICES
SWMU 15 (ROADS AND GROUNDS)



| Matrix | Sample | Fraction | Parameter | Reason for Rejection |
|---|---|---|---|---|
| GW | 15GWTW004 | VOC | ACROLEIN | C |
| GW | 15GWTW005 | VOC | ACROLEIN | C |
| GW | 15GWTW006 | VOC | ACROLEIN | C |
| GW | 15GWTW006-D | VOC | ACROLEIN | C |
| GW | 15GWTW007 | VOC | ACROLEIN | C |
| GW | 15GWTW008 | VOC | ACROLEIN | C |
| GW | 15GWTW001 | VOC | ISOBUTANOL | C |
| GW | 15GWTW002 | VOC | ISOBUTANOL | C |
| GW | 15GWTW003 | VOC | ISOBUTANOL | C |
| GW | 15GWTW004 | VOC | ISOBUTANOL | C |
| GW | 15GWTW005 | VOC | ISOBUTANOL | C |
| GW | 15GWTW006 | VOC | ISOBUTANOL | C |
| GW | 15GWTW006-D | VOC | ISOBUTANOL | C |
| GW | 15GWTW007 | VOC | ISOBUTANOL | C |
| GW | 15GWTW008 | VOC | ISOBUTANOL | C |
| GW | 15GWTW001 | VOC | PROPIONITRILE | C |
| GW | 15GWTW002 | VOC | PROPIONITRILE | C |
| GW | 15GWTW003 | VOC | PROPIONITRILE | C |
| GW | 15GWTW004 | VOC | PROPIONITRILE | C |
| GW | 15GWTW005 | VOC | PROPIONITRILE | C |
| GW | 15GWTW006 | VOC | PROPIONITRILE | C |
| GW | 15GWTW006-D | VOC | PROPIONITRILE | C |
| GW | 15GWTW007 | VOC | PROPIONITRILE | C |
| GW | 15GWTW008 | VOC | PROPIONITRILE | C |

Table includes Field duplicate and Normal environmental sample types.

Only rejected data are shown; data with the following validation qualifiers are excluded: >, BJ, BU, J, U, UJ, (blank).

C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)

D = MS/MSD Recovery Noncompliance

GW = Groundwater

HERB = Herbicides

R = Surrogates Recovery Noncompliance

SD = Sediment

SO = Soil

SVOC = Semivolatile organic compounds

SW = Surface water

VOC = Volatile organic compounds

TABL 4

SOIL MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| HERB | 2,4,5-T | UG/KG | 1.45 | 11.4 | 1.34 | 2.67 | 596 |
| | 2,4,5-TP (SILVEX) | UG/KG | 1.45 | 11.4 | 1.34 | 2.67 | 109 |
| | 2,4-D | UG/KG | 1.45 | 11.4 | 1.34 | 2.67 | 27.2 |
| | DINOSEB | UG/KG | 1.45 | 11.4 | 1.34 | 2.67 | 21.8 |
| | HEXACHLOROPHENE | UG/KG | 0.91 | 7.17 | 0.45 | 0.9 | 199 |
| | PENTACHLOROPHENOL | UG/KG | 0.482 | 3.8 | 0.85 | 1.7 | 119 |
| Metals. Total | ANTIMONY | MG/KG | 0.022 | 1.2 | 0.05 | 0.5 | 0.142 |
| | BERYLLIUM | MG/KG | 0.1 | 0.22 | 0.05 | 0.5 | 1.06 |
| | CADMIUM | MG/KG | 0.16 | 0.34 | 0.35 | 0.5 | 0.00222 |
| | CALCIUM | MG/KG | 301 | 5680 | 1.35 | 50 | --[4] |
| | MERCURY | MG/KG | 0.006 | 0.007 | 0.02 | 0.1 | 0.1 |
| | SELENIUM | MG/KG | 0.06 | 0.5 | 0.2 | 0.5 | 0.0276 |
| | SILVER | MG/KG | 0.041 | 0.35 | 0.05 | 0.5 | 4.04 |
| | SODIUM | MG/KG | 35.3 | 121 | 0.8 | 50 | --[4] |
| | THALLIUM | MG/KG | 0.06 | 0.49 | 0.05 | 0.5 | 0.0569 |
| | TIN | MG/KG | 0.21 | 1.2 | 0.05 | 5 | 7.62 |
| | ZINC | MG/KG | 64.7 | 64.7 | 0.25 | 5 | 6.62 |
| SVOC | 1,2,4,5-TETRACHLOROBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 2020 |
| | 1,2,4-TRICHLOROBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 11100 |
| | 1,2-DICHLOROBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 2960 |
| | 1,3-DICHLOROBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 200 |
| | 1,4-DICHLOROBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 546 |
| | 1,4-DIOXANE | UG/KG | 107 | 450 | 100 | 200 | 2050 |
| | 1,4-NAPHTHOQUINONE | UG/KG | 71.7 | 301 | 67 | 330 | 1670 |
| | 1,4-PHENYLENEDIAMINE | UG/KG | 71.7 | 301 | 67 | 670 | 6160 |
| | 1-NAPHTHYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 9340 |
| | 2,2'-OXYBIS(1-CHLOROPROPANE) | UG/KG | 71.7 | 301 | 67 | 330 | 27 |
| | 2,3,4,6-TETRACHLOROPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 199 |
| | 2,4,5-TRICHLOROPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 14100 |
| | 2,4,6-TRICHLOROPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 70 |
| | 2,4-DICHLOROPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 111000 |
| | 2,4-DIMETHYLPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 10 |

TABLE H-4

SOIL MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | 2,4-DINITROPHENOL | UG/KG | 71.7 | 301 | 67 | 670 | 60.9 |
| | 2,6-DICHLOROPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 1170 |
| | 2-ACETYLAMINOFLUORENE | UG/KG | 71.7 | 301 | 67 | 330 | 596 |
| | 2-CHLORONAPHTHALENE | UG/KG | 71.7 | 301 | 67 | 330 | 12.2 |
| | 2-CHLOROPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 243 |
| | 2-METHYLNAPHTHALENE | UG/KG | 3.63 | 111 | 0.25 | 6.7 | 3240 |
| | 2-METHYLPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 40400 |
| | 2-NAPHTHYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 3030 |
| | 2-NITROANILINE | UG/KG | 71.7 | 301 | 67 | 330 | 1700 |
| | 2-NITROPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 1600 |
| | 2-PICOLINE | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | 3&4-METHYLPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 3,490 |
| | 3,3'-DICHLOROBENZIDINE | UG/KG | 71.7 | 301 | 67 | 330 | 646 |
| | 3,3'-DIMETHYLBENZIDINE | UG/KG | 71.7 | 301 | 67 | 330 | 53 |
| | 3-METHYLCHOLANTHRENE | UG/KG | 71.7 | 301 | 67 | 330 | 77.9 |
| | 3-NITROANILINE | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | 4,6-DINITRO-2-METHYLPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 144 |
| | 4-AMINOBIPHENYL | UG/KG | 71.7 | 301 | 67 | 330 | 3.05 |
| | 4-BROMOPHENYL PHENYL ETHER | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | 4-CHLORO-3-METHYLPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 7950 |
| | 4-CHLOROANILINE | UG/KG | 71.7 | 301 | 67 | 330 | 1100 |
| | 4-CHLOROPHENYL PHENYL ETHER | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | 4-NITROANILINE | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | 4-NITROPHENOL | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | 4-NITROQUINOLINE-1-OXIDE | UG/KG | 71.7 | 301 | 67 | 330 | 122 |
| | 5-NITRO-O-TOLUIDINE | UG/KG | 71.7 | 301 | 67 | 330 | 8730 |
| | 7,12-DIMETHYLBENZ(A)ANTHRACENE | UG/KG | 71.7 | 301 | 67 | 330 | 16300 |
| | A,A-DIMETHYLPHENETHYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 61000 |
| | ACENAPHTHENE | UG/KG | 3.63 | 111 | 0.25 | 6.7 | 130000 |
| | ACENAPHTHYLENE | UG/KG | 3.58 | 27.5 | 0.25 | 6.7 | 130000 |
| | ACETOPHENONE | UG/KG | 71.7 | 310 | 67 | 330 | 300000 |
| | ANILINE | UG/KG | 71.7 | 301 | 67 | 330 | 56.8 |

TABL 1

SOIL MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | ANTHRACENE | UG/KG | 3.63 | 15.6 | 0.25 | 6.7 | 51000 |
| | ARAMITE | UG/KG | 71.7 | 301 | 67 | 330 | 19000 |
| | BENZO(A)ANTHRACENE | UG/KG | 3.63 | 15.6 | 0.25 | 6.7 | 620 |
| | BENZO(A)PYRENE | UG/KG | 3.63 | 27.5 | 0.25 | 6.7 | 62 |
| | BENZO(B)FLUORANTHENE | UG/KG | 3.63 | 27.5 | 0.25 | 6.7 | 620 |
| | BENZO(G,H,I)PERYLENE | UG/KG | 3.63 | 27.5 | 0.25 | 6.7 | 119000 |
| | BENZO(K)FLUORANTHENE | UG/KG | 3.63 | 27.5 | 0.25 | 6.7 | 380 |
| | BENZYL ALCOHOL | UG/KG | 71.7 | 301 | 67 | 330 | 48000 |
| | BIS(2-CHLOROETHOXY)METHANE | UG/KG | 71.7 | 301 | 67 | 330 | 302 |
| | BIS(2-CHLOROETHYL)ETHER | UG/KG | 71.7 | 301 | 67 | 670 | 0.7 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | UG/KG | 71.7 | 301 | 67 | 330 | 925 |
| | BUTYL BENZYL PHTHALATE | UG/KG | 71.7 | 301 | 67 | 330 | 239 |
| | CHLOROBENZILATE | UG/KG | 71.7 | 301 | 67 | 330 | 1800 |
| | CHRYSENE | UG/KG | 3.63 | 14.1 | 0.25 | 6.7 | 4730 |
| | DIALLATE | UG/KG | 71.7 | 301 | 67 | 330 | 452 |
| | DIBENZO(A,H)ANTHRACENE | UG/KG | 3.59 | 111 | 0.25 | 6.7 | 62 |
| | DIBENZOFURAN | UG/KG | 71.7 | 301 | 67 | 330 | 4900 |
| | DIETHYL PHTHALATE | UG/KG | 71.7 | 301 | 67 | 330 | 24800 |
| | DIMETHYL PHTHALATE | UG/KG | 71.7 | 301 | 67 | 330 | 734000 |
| | DI-N-BUTYL PHTHALATE | UG/KG | 71.7 | 301 | 67 | 330 | 150 |
| | DI-N-OCTYL PHTHALATE | UG/KG | 71.7 | 301 | 67 | 330 | 709000 |
| | DIPHENYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 1,010 |
| | ETHYL METHANE SULFONATE | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | FLUORANTHENE | UG/KG | 3.7 | 4.3 | 0.25 | 6.7 | 122000 |
| | FLUORENE | UG/KG | 3.63 | 111 | 0.25 | 6.7 | 122000 |
| | HEXACHLOROBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 199 |
| | HEXACHLOROBUTADIENE | UG/KG | 71.7 | 301 | 67 | 330 | 39.8 |
| | HEXACHLOROCYCLOPENTADIENE | UG/KG | 71.7 | 301 | 67 | 330 | 755 |
| | HEXACHLOROETHANE | UG/KG | 71.7 | 301 | 67 | 330 | 596 |
| | HEXACHLOROPROPENE | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | INDENO(1,2,3-CD)PYRENE | UG/KG | 3.63 | 27.5 | 0.25 | 6.7 | 620 |
| | ISODRIN | UG/KG | 71.7 | 301 | 67 | 330 | 3.32 |

TABLE H-4

SOIL MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | ISOPHORONE | UG/KG | 71.7 | 301 | 67 | 330 | 5300 |
| | ISOSAFROLE | UG/KG | 71.7 | 301 | 67 | 330 | 9940 |
| | KEPONE | UG/KG | 71.7 | 301 | 67 | 330 | 32.7 |
| | METHAPYRILENE | UG/KG | 71.7 | 301 | 67 | 330 | 2780 |
| | METHYL METHANE SULFONATE | UG/KG | 71.7 | 301 | 67 | 330 | 315 |
| | NAPHTHALENE | UG/KG | 3.63 | 111 | 0.25 | 6.7 | 99.4 |
| | N-NITROSODIETHYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 3.2 |
| | N-NITROSODIMETHYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 0.0321 |
| | N-NITROSO-DI-N-BUTYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 240 |
| | N-NITROSO-DI-N-PROPYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 69 |
| | N-NITROSODIPHENYLAMINE | UG/KG | 71.7 | 301 | NA | NA | NA |
| | N-NITROSOMETHYLETHYLAMINE | UG/KG | 71.7 | 301 | 67 | 330 | 0.0321 |
| | N-NITROSOMORPHOLINE | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | N-NITROSOPIPERIDINE | UG/KG | 71.7 | 301 | 67 | 330 | 6.65 |
| | N-NITROSOPYRROLIDINE | UG/KG | 71.7 | 301 | 67 | 330 | 12.6 |
| | O,O,O-TRIETHYL PHOSPHOROTHIOATE | UG/KG | 71.7 | 301 | 67 | 330 | 152 |
| | O-TOLUIDINE | UG/KG | 71.7 | 301 | 67 | 330 | 2000 |
| | P-(DIMETHYLAMINO)AZOBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 40 |
| | PENTACHLOROBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 497 |
| | PENTACHLOROETHANE | UG/KG | 71.7 | 301 | 67 | 330 | --[4] |
| | PENTACHLORONITROBENZENE | UG/KG | 71.7 | 301 | 67 | 330 | 1900 |
| | PHENACETIN | UG/KG | 71.7 | 301 | 67 | 330 | 11700 |
| | PHENANTHRENE | UG/KG | 3.7 | 4.3 | 0.25 | 6.7 | 13000 |
| | PHENOL | UG/KG | 71.7 | 301 | 67 | 330 | 56000 |
| | PRONAMIDE | UG/KG | 71.7 | 301 | 67 | 330 | 13.6 |
| | PYRENE | UG/KG | 3.7 | 4.3 | 0.25 | 6.7 | 78500 |
| | PYRIDINE | UG/KG | 71.7 | 301 | 67 | 330 | 1030 |
| | SAFROLE | UG/KG | 71.7 | 301 | 67 | 330 | 404 |
| VOC | 1,1,1,2-TETRACHLOROETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 53 |
| | 1,1,1-TRICHLOROETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 1900 |
| | 1,1,2,2-TETRACHLOROETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 7 |
| | 1,1,2-TRICHLOROETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 30 |

TABL 1

SOIL MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | 1,1-DICHLOROETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 5600 |
| | 1,1-DICHLOROETHENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 58 |
| | 1,2,3-TRICHLOROPROPANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 5 |
| | 1,2-DIBROMO-3-CHLOROPROPANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 19 |
| | 1,2-DIBROMOETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 6.9 |
| | 1,2-DICHLOROETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 24 |
| | 1,2-DICHLOROPROPANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 30 |
| | 2-BUTANONE | UG/KG | 0.8 | 1.48 | 1 | 10 | 35000 |
| | 2-HEXANONE | UG/KG | 0.796 | 1.48 | 1 | 10 | 12600 |
| | 3-CHLOROPROPENE | UG/KG | 0.796 | 1.48 | 1 | 10 | 13.4 |
| | 4-METHYL-2-PENTANONE | UG/KG | 0.796 | 1.48 | 1 | 10 | 20000 |
| | ACETONE | UG/KG | 0.8 | 42 | 1 | 10 | 2500 |
| | ACETONITRILE | UG/KG | 31.8 | 59.4 | 40 | 80 | 1370 |
| | ACROLEIN | UG/KG | 0.796 | 1.48 | 1 | 10 | 0.27 |
| | ACRYLONITRILE | UG/KG | 0.796 | 1.48 | 1 | 10 | 23.9 |
| | BENZENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 34 |
| | BROMODICHLOROMETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 510 |
| | BROMOFORM | UG/KG | 0.796 | 1.48 | 1 | 3 | 15900 |
| | BROMOMETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 235 |
| | CARBON DISULFIDE | UG/KG | 0.796 | 1.48 | 1 | 3 | 94.1 |
| | CARBON TETRACHLORIDE | UG/KG | 0.796 | 1.48 | 1 | 3 | 66 |
| | CHLOROBENZENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 1300 |
| | CHLORODIBROMOMETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 1,100 |
| | CHLOROETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 650 |
| | CHLOROFORM | UG/KG | 0.796 | 1.48 | 1 | 3 | 470 |
| | CHLOROMETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 1200 |
| | CHLOROPRENE | UG/KG | 0.796 | 1.48 | NA | NA | NA |
| | CIS-1,2-DICHLOROETHENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 400 |
| | CIS-1,3-DICHLOROPROPENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 780 |
| | DIBROMOMETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 65000 |
| | DICHLORODIFLUOROMETHANE | UG/KG | 0.796 | 1.48 | 1 | 3 | 39500 |
| | ETHYL METHACRYLATE | UG/KG | 0.796 | 1.48 | 1 | 10 | 30000 |
| | ETHYLBENZENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 5160 |

TABLE H-4

SOIL MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | ISOBUTANOL | UG/KG | 31.8 | 59.4 | 40 | 80 | 20800 |
| | METHACRYLONITRILE | UG/KG | 0.796 | 1.48 | 1 | 10 | 57 |
| | METHYL IODIDE | UG/KG | 0.796 | 1.48 | 1 | 10 | 1230 |
| | METHYL METHACRYLATE | UG/KG | 0.796 | 1.48 | 1 | 10 | 984000 |
| | METHYL TERT-BUTYL ETHER | UG/KG | 0.796 | 1.48 | 1 | 3 | 180 |
| | METHYLENE CHLORIDE | UG/KG | 0.891 | 10 | 1 | 3 | 23 |
| | PROPIONITRILE | UG/KG | 31.8 | 59.4 | 40 | 80 | 49.8 |
| | STYRENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 3500 |
| | TETRACHLOROETHENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 58 |
| | TOLUENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 5450 |
| | TOTAL XYLENES | UG/KG | 0.796 | 1.48 | 1 | 3 | 10000 |
| | TRANS-1,2-DICHLOROETHENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 680 |
| | TRANS-1,3-DICHLOROPROPENE | UG/KG | 0.796 | 1.48 | 1 | 3 | 780 |
| | TRANS-1,4-DICHLORO-2-BUTENE | UG/KG | 0.796 | 1.48 | NA | NA | NA |
| | TRICHLOROETHENE | UG/KG | 0.796 | 1.48 | NA | NA | NA |
| | TRICHLOROFLUOROMETHANE | UG/KG | 0.8 | 1.48 | 1 | 3 | 16400 |
| | VINYL ACETATE | UG/KG | 0.796 | 1.48 | 1 | 10 | 2300 |
| | VINYL CHLORIDE | UG/KG | 0.796 | 1.48 | 1 | 3 | 13 |
| PEST/PCB | 4,4'-DDD | UG/KG | 1.51 | 1.75 | 1.65 | 3.3 | 758 |
| | 4,4'-DDE | UG/KG | 1.51 | 1.75 | 1.65 | 3.3 | 596 |
| | 4,4'-DDT | UG/KG | 1.51 | 1.75 | 1.65 | 3.3 | 3.5 |
| | ALDRIN | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 3.32 |
| | ALPHA-BHC | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 7.2 |
| | ALPHA-CHLORDANE | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 224 |
| | AROCLOR-1016 | UG/KG | 10.1 | 11.7 | 250 | 16.6 | 0.332 |
| | AROCLOR-1221 | UG/KG | 10.1 | 11.7 | 250 | 16.6 | 0.332 |
| | AROCLOR-1232 | UG/KG | 10.1 | 11.7 | 250 | 16.6 | 0.332 |
| | AROCLOR-1242 | UG/KG | 10.1 | 11.7 | 250 | 16.6 | 0.332 |
| | AROCLOR-1248 | UG/KG | 10.1 | 11.7 | 250 | 16.6 | 0.332 |
| | AROCLOR-1254 | UG/KG | 10.1 | 11.7 | 250 | 16.6 | 0.332 |
| | AROCLOR-1260 | UG/KG | 10.1 | 11.7 | 250 | 16.6 | 0.332 |
| | BETA-BHC | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 3.98 |
| | DELTA-BHC | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 90 |

TABL 1

SOIL MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | DIELDRIN | UG/KG | 1.51 | 1.75 | 1.65 | 3.3 | 2.38 |
| | ENDOSULFAN I | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 119 |
| | ENDOSULFAN II | UG/KG | 1.51 | 1.75 | 1.65 | 3.3 | 119 |
| | ENDOSULFAN SULFATE | UG/KG | 1.51 | 1.75 | 1.7 | 3.3 | 119 |
| | ENDRIN | UG/KG | 1.51 | 1.75 | 1.7 | 3.3 | 10.1 |
| | ENDRIN ALDEHYDE | UG/KG | 1.51 | 1.75 | 1.65 | 3.3 | 10.5 |
| | ENDRIN KETONE | UG/KG | 1.51 | 1.75 | 1.7 | 3.3 | 10.1 |
| | GAMMA-BHC (LINDANE) | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 5 |
| | GAMMA-CHLORDANE | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 224 |
| | HEPTACHLOR | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 5.98 |
| | HEPTACHLOR EPOXIDE | UG/KG | 0.729 | 0.843 | 0.85 | 1.7 | 53 |
| | METHOXYCHLOR | UG/KG | 7.29 | 8.43 | 8.5 | 17 | 19.9 |
| | TOXAPHENE | UG/KG | 19.1 | 22 | 85 | 170 | 119 |

1 Only results with validation qualifiers that contain a "U" are tallied.
2 Highlighted values (yellow when reproduced in color and gray when reproduced in black and white) exceed laboratory RBTLs.
3 Risk-based target levels are taken from Table 1-5 of the SWMUs 8, 15, 18, 19, 20,and OGTSL QAPP (TtNUS, 2004) and are subject to change.
4 Risk-based target level is not provided because human health or ecological risk-based criteria were not available for this compound.

HERB = Herbicides
M = Metals, total
MG/KG = milligrams per kilogram
NA = Not applicable
PEST/PCB = Pesticides/polychlorinated biphenyls
SVOC = Semivolatile organic compounds
UG/KG = micrograms per kilogram
VOC = Volatile organic compounds

TABL 5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| HERB | 2,4,5-T | UG/L | 0.04 | 0.04 | 0.04 | 0.08 | 360 |
| | 2,4,5-TP (SILVEX) | UG/L | 0.04 | 0.04 | 0.04 | 0.08 | 30 |
| | 2,4-D | UG/L | 0.04 | 0.04 | 0.04 | 0.08 | 220 |
| | DINOSEB | UG/L | 0.04 | 0.04 | 0.04 | 0.08 | 0.48 |
| | HEXACHLOROPHENE | UG/L | 0.025 | 0.025 | 0.013 | 0.027 | 0.228 |
| | PENTACHLOROPHENOL | UG/L | 0.013 | 0.013 | 0.25 | 0.5 | 0.56 |
| Metasl, Total | ALUMINUM | UG/L | 41.6 | 41.6 | 2.6 | 50 | 36000 |
| | ANTIMONY | UG/L | 0.19 | 0.59 | 0.1 | 1 | 6 |
| | ARSENIC | UG/L | 0.26 | 1.2 | 0.2 | 1 | 0.045 |
| | BERYLLIUM | UG/L | 0.02 | 0.2 | 0.1 | 1 | 3.6 |
| | CADMIUM | UG/L | 0.06 | 0.5 | 0.7 | 1 | 0.15 |
| | CHROMIUM | UG/L | 0.42 | 1 | 0.1 | 1 | 42 |
| | COBALT | UG/L | 0.16 | 1.2 | 0.1 | 1 | 24 |
| | COPPER | UG/L | 1.1 | 1.1 | 0.1 | 2 | 1.58 |
| | IRON | UG/L | 41 | 49.9 | 3.9 | 50 | 11000 |
| | LEAD | UG/L | 0.279 | 0.633 | 0.1 | 1 | 1.17 |
| | MERCURY | UG/L | 0.03 | 0.052 | 0.1 | 0.2 | 0.0013 |
| | NICKEL | UG/L | 0.88 | 0.88 | 0.1 | 1 | 730 |
| | SELENIUM | UG/L | 0.14 | 0.75 | 0.4 | 1 | 5 |
| | SILVER | UG/L | 0.028 | 0.21 | 0.1 | 1 | 0.12 |
| | THALLIUM | UG/L | 0.043 | 0.12 | 0.1 | 1 | 2 |
| | TIN | UG/L | 0.048 | 0.42 | 0.1 | 10 | 180 |
| | VANADIUM | UG/L | 1.14 | 1.14 | 0.1 | 2 | 12 |
| | ZINC | UG/L | 3.5 | 10.6 | 0.5 | 10 | 65.7 |
| Metals, Dissolved | ALUMINUM | UG/L | 8.35 | 10.6 | 2.6 | 50 | 36000 |
| | ANTIMONY | UG/L | 0.085 | 1.8 | 0.1 | 1 | 6 |
| | ARSENIC | UG/L | 0.047 | 0.33 | 0.2 | 1 | 0.045 |
| | BERYLLIUM | UG/L | 0.02 | 0.14 | 0.1 | 1 | 3.6 |

TABLE H-5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | CADMIUM | UG/L | 0.039 | 0.33 | 0.7 | 1 | 0.15 |
| | CHROMIUM | UG/L | 0.32 | 1.3 | 0.1 | 1 | 42 |
| | IRON | UG/L | 103 | 210 | 3.9 | 50 | 11000 |
| | LEAD | UG/L | 0.069 | 0.486 | 0.1 | 1 | 1.17 |
| | MERCURY | UG/L | 0.03 | 0.22 | 0.1 | 0.2 | 0.0013 |
| | SELENIUM | UG/L | 0.12 | 0.55 | 0.4 | 1 | 5 |
| | SILVER | UG/L | 0.028 | 0.15 | 0.1 | 1 | 0.12 |
| | THALLIUM | UG/L | 0.043 | 0.13 | 0.1 | 1 | 2 |
| | TIN | UG/L | 0.048 | 0.56 | 0.1 | 10 | 180 |
| | VANADIUM | UG/L | 1.14 | 1.14 | 0.1 | 2 | 12 |
| | ZINC | UG/L | 3.4 | 3.4 | 0.5 | 10 | 65.7 |
| SVOC | 1,2,4,5-TETRACHLOROBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 3 |
| | 1,2,4-TRICHLOROBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 30 |
| | 1,2-DICHLOROBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 14 |
| | 1,3-DICHLOROBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 5.5 |
| | 1,4-DICHLOROBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.5 |
| | 1,4-DIOXANE | UG/L | 0.952 | 1.06 | 50 | 100 | 6.1 |
| | 1,4-NAPHTHOQUINONE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 1,4-PHENYLENEDIAMINE | UG/L | 0.952 | 1.06 | 1 | 10 | 6900 |
| | 1-NAPHTHYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 2,2'-OXYBIS(1-CHLOROPROPANE) | UG/L | 0.952 | 1.06 | 1 | 5 | 0.27 |
| | 2,3,4,6-TETRACHLOROPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 1.2 |
| | 2,4,5-TRICHLOROPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 3600 |
| | 2,4,6-TRICHLOROPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 0.96 |
| | 2,4-DICHLOROPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 11 |
| | 2,4-DIMETHYLPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 100 |
| | 2,4-DINITROPHENOL | UG/L | 0.952 | 1.06 | 1 | 10 | 19 |
| | 2,6-DICHLOROPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |

TABL 5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | 2-ACETYLAMINOFLUORENE | UG/L | 0.952 | 1.06 | 1 | 5 | 535 |
| | 2-CHLORONAPHTHALENE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.396 |
| | 2-CHLOROPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 24 |
| | 2-METHYLNAPHTHALENE | UG/L | 0.048 | 0.056 | 0.05 | 0.1 | 5 |
| | 2-METHYLPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 67 |
| | 2-NAPHTHYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 2-NITROANILINE | UG/L | 0.952 | 1.06 | 1 | 5 | 1 |
| | 2-NITROPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 2-PICOLINE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 3&4-METHYLPHENOL | UG/L | 0.952 | 1.06 | 2.5 | 5 | 25 |
| | 3,3'-DICHLOROBENZIDINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.15 |
| | 3,3'-DIMETHYLBENZIDINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.0073 |
| | 3-METHYLCHOLANTHRENE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.0891 |
| | 3-NITROANILINE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 4,6-DINITRO-2-METHYLPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 23 |
| | 4-AMINOBIPHENYL | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 4-BROMOPHENYL PHENYL ETHER | UG/L | 0.952 | 1.06 | 1 | 5 | 1.5 |
| | 4-CHLORO-3-METHYLPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 34.8 |
| | 4-CHLOROANILINE | UG/L | 0.952 | 1.06 | 1 | 5 | 150 |
| | 4-CHLOROPHENYL PHENYL ETHER | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 4-NITROANILINE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 4-NITROPHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 4-NITROQUINOLINE-1-OXIDE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | 5-NITRO-O-TOLUIDINE | UG/L | 0.952 | 1.06 | 1 | 5 | 2 |
| | 7,12-DIMETHYLBENZ(A)ANTHRACENE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.548 |
| | A,A-DIMETHYLPHENETHYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | 36 |
| | ACENAPHTHENE | UG/L | 0.048 | 0.056 | 0.05 | 0.1 | 38 |

TABLE H-5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | ACENAPHTHYLENE | UG/L | 0.048 | 0.056 | 0.05 | 0.1 | 370 |
| | ACETOPHENONE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | ANILINE | UG/L | 0.952 | 1.06 | 1 | 5 | 4.1 |
| | ANTHRACENE | UG/L | 0.048 | 0.056 | 0.05 | 0.1 | 0.035 |
| | ARAMITE | UG/L | 0.952 | 1.06 | 1 | 10 | 2.7 |
| | BENZO(A)ANTHRACENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 0.025 |
| | BENZO(A)PYRENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 0.0092 |
| | BENZO(B)FLUORANTHENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 0.092 |
| | BENZO(G,H,I)PERYLENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 0.26 |
| | BENZO(K)FLUORANTHENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 0.8 |
| | BENZYL ALCOHOL | UG/L | 0.952 | 1.06 | 1 | 5 | 8.6 |
| | BIS(2-CHLOROETHOXY)METHANE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | BIS(2-CHLOROETHYL)ETHER | UG/L | 0.952 | 1.06 | 0.9 | 5 | 0.0098 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.3 |
| | BUTYL BENZYL PHTHALATE | UG/L | 0.952 | 1.06 | 1 | 5 | 23 |
| | CHLOROBENZILATE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.25 |
| | CHRYSENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 1.6 |
| | DIALLATE | UG/L | 0.952 | 1.06 | 1 | 5 | 1.1 |
| | DIBENZO(A,H)ANTHRACENE | UG/L | 0.048 | 0.056 | 0.05 | 0.1 | 0.0092 |
| | DIBENZOFURAN | UG/L | 0.952 | 1.06 | 1 | 5 | 4 |
| | DIETHYL PHTHALATE | UG/L | 0.952 | 1.06 | 1 | 5 | 110 |
| | DIMETHYL PHTHALATE | UG/L | 0.952 | 1.06 | 1 | 5 | 360000 |
| | DI-N-BUTYL PHTHALATE | UG/L | 0.952 | 1.06 | 1 | 5 | 9.7 |
| | DI-N-OCTYL PHTHALATE | UG/L | 0.952 | 1.06 | 1 | 5 | 20 |
| | DIPHENYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | 412 |
| | ETHYL METHANE SULFONATE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | FLUORANTHENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 1.9 |
| | FLUORENE | UG/L | 0.048 | 0.056 | 0.05 | 0.1 | 19 |

TABL 5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | HEXACHLOROBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.0003 |
| | HEXACHLOROBUTADIENE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.053 |
| | HEXACHLOROCYCLOPENTADIENE | UG/L | 0.952 | 1.06 | 1 | 5 | 50 |
| | HEXACHLOROETHANE | UG/L | 0.952 | 1.06 | 1 | 5 | 4.8 |
| | HEXACHLOROPROPENE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | INDENO(1,2,3-CD)PYRENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 0.022 |
| | ISODRIN | UG/L | 0.952 | 1.06 | 1 | 5 | 0.0309 |
| | ISOPHORONE | UG/L | 0.952 | 1.06 | 1 | 5 | 71 |
| | ISOSAFROLE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | KEPONE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.0084 |
| | METHAPYRILENE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | METHYL METHANE SULFONATE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | NAPHTHALENE | UG/L | 0.048 | 0.056 | 0.05 | 0.1 | 6.2 |
| | N-NITROSODIETHYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.00045 |
| | N-NITROSODIMETHYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.0013 |
| | N-NITROSO-DI-N-BUTYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.002 |
| | N-NITROSO-DI-N-PROPYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.0096 |
| | N-NITROSODIPHENYLAMINE | UG/L | 0.952 | 1.06 | NA | NA | NA |
| | N-NITROSOMETHYLETHYLAMINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.0013 |
| | N-NITROSOMORPHOLINE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | N-NITROSOPIPERIDINE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | N-NITROSOPYRROLIDINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.032 |
| | O,O,O-TRIETHYL PHOSPHOROTHIOATE | UG/L | 0.952 | 1.06 | 2.5 | 5 | 0.0038 |
| | O-TOLUIDINE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.28 |
| | P-(DIMETHYLAMINO)AZOBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 1.65 |
| | PENTACHLOROBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.019 |
| | PENTACHLOROETHANE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |

TABLE H-5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | PENTACHLORONITROBENZENE | UG/L | 0.952 | 1.06 | 1 | 5 | 0.26 |
| | PHENACETIN | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| | PHENANTHRENE | UG/L | 0.048 | 0.052 | 0.05 | 0.1 | 3.6 |
| | PHENOL | UG/L | 0.952 | 1.06 | 1 | 5 | 180 |
| | PRONAMIDE | UG/L | 0.952 | 1.06 | 1 | 5 | 2700 |
| | PYRENE | UG/L | 0.049 | 0.052 | 0.05 | 0.1 | 0.3 |
| | PYRIDINE | UG/L | 0.952 | 1.06 | 1 | 5 | 36 |
| | SAFROLE | UG/L | 0.952 | 1.06 | 1 | 5 | --[4] |
| VOC | 1,1,1,2-TETRACHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.43 |
| | 1,1,1-TRICHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 76 |
| | 1,1,2,2-TETRACHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.055 |
| | 1,1,2-TRICHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.2 |
| | 1,1-DICHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 47 |
| | 1,1-DICHLOROETHENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 7 |
| | 1,2,3-TRICHLOROPROPANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.0056 |
| | 1,2-DIBROMO-3-CHLOROPROPANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.0016 |
| | 1,2-DIBROMOETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.00076 |
| | 1,2-DICHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.12 |
| | 1,2-DICHLOROPROPANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.16 |
| | 2-BUTANONE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 1900 |
| | 2-HEXANONE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 99 |
| | 3-CHLOROPROPENE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 1800 |
| | 4-METHYL-2-PENTANONE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 160 |
| | ACETONE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 610 |
| | ACETONITRILE | UG/L | 20 | 20 | 20 | 40 | 100 |
| | ACROLEIN | UG/L | 0.5 | 0.5 | 0.5 | 5 | 0.042 |
| | ACRYLONITRILE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 0.039 |
| | BENZENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.34 |

TAB' ·5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | BROMODICHLOROMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.18 |
| | BROMOFORM | UG/L | 0.3 | 0.3 | 0.3 | 1 | 8.5 |
| | BROMOMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 8.7 |
| | CARBON DISULFIDE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 15 |
| | CARBON TETRACHLORIDE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.17 |
| | CHLOROBENZENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 47 |
| | CHLORODIBROMOMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.13 |
| | CHLOROETHANE | UG/L | 0.5 | 0.5 | 0.3 | 1 | 4.6 |
| | CHLOROFORM | UG/L | 0.3 | 0.3 | 0.3 | 1 | 6.2 |
| | CHLOROMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 1.5 |
| | CHLOROPRENE | UG/L | 0.5 | 0.5 | NA | NA | NA |
| | CIS-1,2-DICHLOROETHENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 61 |
| | CIS-1,3-DICHLOROPROPENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.4 |
| | DIBROMOMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 61 |
| | DICHLORODIFLUOROMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 390 |
| | ETHYL METHACRYLATE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 550 |
| | ETHYLBENZENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 2.9 |
| | ISOBUTANOL | UG/L | 20 | 20 | 20 | 40 | 1800 |
| | METHACRYLONITRILE | UG/L | 0.3 | 0.3 | 0.5 | 5 | 1 |
| | METHYL IODIDE | UG/L | 0.5 | 0.5 | 0.5 | 5 | --[4] |
| | METHYL METHACRYLATE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 1400 |
| | METHYL TERT-BUTYL ETHER | UG/L | 0.5 | 0.5 | 0.5 | 1 | 13 |
| | METHYLENE CHLORIDE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 4.3 |
| | PROPIONITRILE | UG/L | 20 | 20 | 20 | 40 | --[4] |
| | STYRENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 32 |
| | TETRACHLOROETHENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.66 |
| | TOLUENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 253 |
| | TOTAL XYLENES | UG/L | 0.3 | 0.3 | 0.3 | 1 | 27 |

TABLE H-5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | TRANS-1,2-DICHLOROETHENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 100 |
| | TRANS-1,3-DICHLOROPROPENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.4 |
| | TRANS-1,4-DICHLORO-2-BUTENE | UG/L | 0.5 | 0.5 | NA | NA | NA |
| | TRICHLOROETHENE | UG/L | 0.3 | 0.3 | NA | NA | NA |
| | TRICHLOROFLUOROMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 1300 |
| | VINYL ACETATE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 410 |
| | VINYL CHLORIDE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 2 |
| PEST/PCB | 4,4'-DDD | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 0.28 |
| | 4,4'-DDE | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 4.5E-09 |
| | 4,4'-DDT | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 1.1E-05 |
| | ALDRIN | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.004 |
| | ALPHA-BHC | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.011 |
| | ALPHA-CHLORDANE | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.0043 |
| | AROCLOR-1016 | UG/L | 0.24 | 0.285 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1221 | UG/L | 0.24 | 0.285 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1232 | UG/L | 0.24 | 0.285 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1242 | UG/L | 0.24 | 0.285 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1248 | UG/L | 0.24 | 0.285 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1254 | UG/L | 0.24 | 0.285 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1260 | UG/L | 0.24 | 0.285 | 0.25 | 0.5 | 0.00012 |
| | BETA-BHC | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.037 |
| | DELTA-BHC | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.011 |
| | DIELDRIN | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 7.1E-05 |
| | ENDOSULFAN I | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.056 |
| | ENDOSULFAN II | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 0.056 |
| | ENDOSULFAN SULFATE | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 0.056 |
| | ENDRIN | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 0.036 |
| | ENDRIN ALDEHYDE | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 0.15 |

TABL -5

SURFACE WATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE,
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | ENDRIN KETONE | UG/L | 0.048 | 0.057 | 0.05 | 0.1 | 0.036 |
| | GAMMA-BHC (LINDANE) | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.026 |
| | GAMMA-CHLORDANE | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.0043 |
| | HEPTACHLOR | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.0038 |
| | HEPTACHLOR EPOXIDE | UG/L | 0.024 | 0.028 | 0.025 | 0.05 | 0.0038 |
| | METHOXYCHLOR | UG/L | 0.24 | 0.285 | 0.25 | 0.5 | 0.019 |
| | TOXAPHENE | UG/L | 2.4 | 2.85 | 2.5 | 5 | 0.00014 |

1 Only results with validation qualifiers that contain a "U" are tallied.
2 Highlighted values (yellow when reproduced in color and gray when reproduced in black and white) exceed laboratory RBTLs.
3 Risk-based target levels are taken from Table 1-5 of the SWMUs 8, 15, 18, 19, 20,and OGTSL QAPP (TtNUS, 2004) and are subject to change.
4 Risk-based target level is not provided because human health or ecological risk-based criteria were not available for this compound.

HERB = Herbicides
M = Metals, total
MF = Metals, dissolved
NA = Not applicable
PEST/PCB = Pesticides/polychlorinated biphenyls
SVOC = Semivolatile organic compounds
UG/L = micrograms per Liter
VOC = Volatile organic compounds

TABL 6

SEDIMENT MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| HERB | 2,4,5-T | UG/KG | 1.56 | 2.27 | 1.34 | 2.67 | 58700 |
| | 2,4,5-TP (SILVEX) | UG/KG | 1.56 | 2.27 | 1.34 | 2.67 | 675 |
| | 2,4-D | UG/KG | 1.56 | 2.27 | 1.34 | 2.67 | 1273 |
| | DINOSEB | UG/KG | 1.56 | 2.27 | 1.34 | 2.67 | 14.5 |
| | HEXACHLOROPHENE | UG/KG | 0.982 | 1.43 | 0.45 | 0.9 | 18000 |
| | PENTACHLOROPHENOL | UG/KG | 0.54 | 0.755 | 0.85 | 1.7 | 3000 |
| Metals, Total | ANTIMONY | MG/KG | 0.19 | 1.2 | 0.05 | 0.5 | 31 |
| | BERYLLIUM | MG/KG | 0.18 | 0.32 | 0.05 | 0.5 | 150 |
| | CADMIUM | MG/KG | 0.27 | 0.3 | 0.35 | 0.5 | 0.99 |
| | SELENIUM | MG/KG | 0.13 | 0.27 | 0.2 | 0.5 | 390 |
| | SILVER | MG/KG | 0.042 | 0.08 | 0.05 | 0.5 | 0.5 |
| | SODIUM | MG/KG | 83.4 | 146 | 0.8 | 50 | --[4] |
| | THALLIUM | MG/KG | 0.04 | 0.23 | 0.05 | 0.5 | 5.2 |
| | TIN | MG/KG | 0.095 | 0.62 | 0.05 | 5 | -- |
| MISC | CYANIDE | MG/KG | 0.289 | 0.315 | NA | NA | NA |
| SVOC | 1,2,4,5-TETRACHLOROBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 1252 |
| | 1,2,4-TRICHLOROBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 5062 |
| | 1,2-DICHLOROBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 294 |
| | 1,3-DICHLOROBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 1315 |
| | 1,4-DICHLOROBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 318 |
| | 1,4-DIOXANE | UG/KG | 115 | 168 | 100 | 200 | 119 |
| | 1,4-NAPHTHOQUINONE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 1,4-PHENYLENEDIAMINE | UG/KG | 77.4 | 112 | 67 | 670 | 12000000 |
| | 1-NAPHTHYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 2,2'-OXYBIS(1-CHLOROPROPANE) | UG/KG | 77.4 | 112 | 67 | 330 | 2900 |
| | 2,3,4,6-TETRACHLOROPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 129 |
| | 2,4,5-TRICHLOROPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 6100000 |

TABLE H-6

SEDIMENT MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | 2,4,6-TRICHLOROPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 208 |
| | 2,4-DICHLOROPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 81.7 |
| | 2,4-DIMETHYLPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 304 |
| | 2,4-DINITROPHENOL | UG/KG | 77.4 | 112 | 67 | 670 | 6.21 |
| | 2,6-DICHLOROPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 2-ACETYLAMINOFLUORENE | UG/KG | 77.4 | 112 | 67 | 330 | 15.3 |
| | 2-CHLORONAPHTHALENE | UG/KG | 77.4 | 112 | 67 | 330 | 417 |
| | 2-CHLOROPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 31.9 |
| | 2-METHYLNAPHTHALENE | UG/KG | 4.37 | 16.3 | 0.25 | 6.7 | 20.2 |
| | 2-METHYLPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 55.4 |
| | 2-NAPHTHYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 2-NITROANILINE | UG/KG | 77.4 | 112 | 67 | 330 | 1700 |
| | 2-NITROPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 2-PICOLINE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 3&4-METHYLPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 52.4 |
| | 3,3'-DICHLOROBENZIDINE | UG/KG | 77.4 | 112 | 67 | 330 | 127 |
| | 3,3'-DIMETHYLBENZIDINE | UG/KG | 77.4 | 112 | 67 | 330 | 53 |
| | 3-METHYLCHOLANTHRENE | UG/KG | 77.4 | 112 | 67 | 330 | 8190000 |
| | 3-NITROANILINE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 4,6-DINITRO-2-METHYLPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 104 |
| | 4-AMINOBIPHENYL | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 4-BROMOPHENYL PHENYL ETHER | UG/KG | 77.4 | 112 | 67 | 330 | 1550 |
| | 4-CHLORO-3-METHYLPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 388 |
| | 4-CHLOROANILINE | UG/KG | 77.4 | 112 | 67 | 330 | 146 |
| | 4-CHLOROPHENYL PHENYL ETHER | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 4-NITROANILINE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |

TABL 6

SEDIMENT MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | 4-NITROPHENOL | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 4-NITROQUINOLINE-1-OXIDE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | 5-NITRO-O-TOLUIDINE | UG/KG | 77.4 | 112 | 67 | 330 | 15000 |
| | 7,12-DIMETHYLBENZ(A)ANTHRACENE | UG/KG | 77.4 | 112 | 67 | 330 | 66400 |
| | A,A-DIMETHYLPHENETHYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | 61000 |
| | ACENAPHTHENE | UG/KG | 4.37 | 4.37 | 0.25 | 6.7 | 6.71 |
| | ACENAPHTHYLENE | UG/KG | 3.81 | 16.3 | 0.25 | 6.7 | 5.87 |
| | ACETOPHENONE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | ANILINE | UG/KG | 77.4 | 112 | 67 | 330 | 0.31 |
| | ANTHRACENE | UG/KG | 4.37 | 4.37 | 0.25 | 6.7 | 57.2 |
| | ARAMITE | UG/KG | 77.4 | 112 | 67 | 330 | 19000 |
| | BENZYL ALCOHOL | UG/KG | 77.4 | 112 | 67 | 330 | 1.04 |
| | BIS(2-CHLOROETHOXY)METHANE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | BIS(2-CHLOROETHYL)ETHER | UG/KG | 77.4 | 112 | 67 | 670 | 210 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | UG/KG | 83.2 | 112 | 67 | 330 | 182 |
| | BUTYL BENZYL PHTHALATE | UG/KG | 77.4 | 112 | 67 | 330 | 1970 |
| | CHLOROBENZILATE | UG/KG | 77.4 | 112 | 67 | 330 | 860 |
| | DIALLATE | UG/KG | 77.4 | 112 | 67 | 330 | 8000 |
| | DIBENZO(A,H)ANTHRACENE | UG/KG | 3.81 | 16.3 | 0.25 | 6.7 | 33 |
| | DIBENZOFURAN | UG/KG | 77.4 | 88.7 | 67 | 330 | 449 |
| | DIETHYL PHTHALATE | UG/KG | 77.4 | 112 | 67 | 330 | 295 |
| | DIMETHYL PHTHALATE | UG/KG | 77.4 | 112 | 67 | 330 | 1E+08 |
| | DI-N-BUTYL PHTHALATE | UG/KG | 77.4 | 112 | 67 | 330 | 1114 |
| | DI-N-OCTYL PHTHALATE | UG/KG | 77.4 | 112 | 67 | 330 | 40600 |
| | DIPHENYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | 34.6 |
| | ETHYL METHANE SULFONATE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |

TABLE H-6

SEDIMENT MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | FLUORENE | UG/KG | 4.37 | 4.37 | 0.25 | 6.7 | 77.4 |
| | HEXACHLOROBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 20 |
| | HEXACHLOROBUTADIENE | UG/KG | 77.4 | 112 | 67 | 330 | 26.5 |
| | HEXACHLOROCYCLOPENTADIENE | UG/KG | 77.4 | 112 | 67 | 330 | 901 |
| | HEXACHLOROETHANE | UG/KG | 77.4 | 112 | 67 | 330 | 584 |
| | HEXACHLOROPROPENE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | ISODRIN | UG/KG | 77.4 | 112 | 67 | 330 | 55.2 |
| | ISOPHORONE | UG/KG | 77.4 | 112 | 67 | 330 | 432 |
| | ISOSAFROLE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | KEPONE | UG/KG | 77.4 | 112 | 67 | 330 | 3.31 |
| | METHAPYRILENE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | METHYL METHANE SULFONATE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | NAPHTHALENE | UG/KG | 4.37 | 16.3 | 0.25 | 6.7 | 176 |
| | N-NITROSODIETHYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | 3.2 |
| | N-NITROSODIMETHYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | 9.5 |
| | N-NITROSO-DI-N-BUTYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | 24 |
| | N-NITROSO-DI-N-PROPYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | 69 |
| | N-NITROSODIPHENYLAMINE | UG/KG | 77.4 | 112 | NA | NA | NA |
| | N-NITROSOMETHYLETHYLAMINE | UG/KG | 77.4 | 112 | 67 | 330 | 9.5 |
| | N-NITROSOMORPHOLINE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | N-NITROSOPIPERIDINE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | N-NITROSOPYRROLIDINE | UG/KG | 77.4 | 112 | 67 | 330 | 230 |
| | O,O,O-TRIETHYL PHOSPHOROTHIOATE | UG/KG | 77.4 | 112 | 67 | 330 | 2.47 |
| | O-TOLUIDINE | UG/KG | 77.4 | 112 | 67 | 330 | 2000 |
| | P-(DIMETHYLAMINO)AZOBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 318 |
| | PENTACHLOROBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 24 |

TABL 6

SEDIMENT MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | PENTACHLOROETHANE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | PENTACHLORONITROBENZENE | UG/KG | 77.4 | 112 | 67 | 330 | 1900 |
| | PHENACETIN | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| | PHENOL | UG/KG | 77.4 | 112 | 67 | 330 | 49.1 |
| | PRONAMIDE | UG/KG | 77.4 | 112 | 67 | 330 | 4600000 |
| | PYRIDINE | UG/KG | 77.4 | 112 | 67 | 330 | 106 |
| | SAFROLE | UG/KG | 77.4 | 112 | 67 | 330 | --[4] |
| VOC | 1,1,1,2-TETRACHLOROETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 3200 |
| | 1,1,1-TRICHLOROETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 213 |
| | 1,1,2,2-TETRACHLOROETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 410 |
| | 1,1,2-TRICHLOROETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 730 |
| | 1,1-DICHLOROETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 0.575 |
| | 1,1-DICHLOROETHENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 19.4 |
| | 1,2,3-TRICHLOROPROPANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 5 |
| | 1,2-DIBROMO-3-CHLOROPROPANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 19 |
| | 1,2-DIBROMOETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 6.9 |
| | 1,2-DICHLOROETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 280 |
| | 1,2-DICHLOROPROPANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 333 |
| | 2-BUTANONE | UG/KG | 0.948 | 1.54 | 1 | 10 | 42.4 |
| | 2-HEXANONE | UG/KG | 0.948 | 1.54 | 1 | 10 | 58.2 |
| | 3-CHLOROPROPENE | UG/KG | 0.948 | 1.54 | 1 | 10 | 3.00E+06 |
| | 4-METHYL-2-PENTANONE | UG/KG | 0.948 | 1.54 | 1 | 10 | 25.1 |
| | ACETONE | UG/KG | 0.948 | 2 | 1 | 10 | 9.9 |
| | ACETONITRILE | UG/KG | 37.9 | 61.7 | 40 | 80 | 56 |
| | ACROLEIN | UG/KG | 0.948 | 1.54 | 1 | 10 | 0.00152 |
| | ACRYLONITRILE | UG/KG | 0.948 | 1.54 | 1 | 10 | 1.2 |
| | BENZENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 142 |

TABLE H-6

SEDIMENT MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | BROMODICHLOROMETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 820 |
| | BROMOFORM | UG/KG | 0.948 | 1.54 | 1 | 3 | 492 |
| | BROMOMETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 1.37 |
| | CARBON DISULFIDE | UG/KG | 0.948 | 1.54 | 1 | 3 | 23.9 |
| | CARBON TETRACHLORIDE | UG/KG | 0.948 | 1.54 | 1 | 3 | 250 |
| | CHLOROBENZENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 291 |
| | CHLORODIBROMOMETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 1100 |
| | CHLOROETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 3000 |
| | CHLOROFORM | UG/KG | 0.948 | 1.54 | 1 | 3 | 121 |
| | CHLOROMETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 1200 |
| | CHLOROPRENE | UG/KG | 0.948 | 1.54 | NA | NA | NA |
| | CIS-1,2-DICHLOROETHENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 43000 |
| | CIS-1,3-DICHLOROPROPENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 780 |
| | DIBROMOMETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 67000 |
| | DICHLORODIFLUOROMETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 94000 |
| | ETHYL METHACRYLATE | UG/KG | 0.948 | 1.54 | 1 | 10 | 140000 |
| | ETHYLBENZENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 175 |
| | ISOBUTANOL | UG/KG | 37.9 | 61.7 | 40 | 80 | 13000000 |
| | METHACRYLONITRILE | UG/KG | 0.948 | 1.54 | 1 | 10 | 2100 |
| | METHYL IODIDE | UG/KG | 0.948 | 1.54 | 1 | 10 | --[4] |
| | METHYL METHACRYLATE | UG/KG | 0.948 | 1.54 | 1 | 10 | 168 |
| | METHYL TERT-BUTYL ETHER | UG/KG | 0.948 | 1.54 | 1 | 3 | 62000 |
| | METHYLENE CHLORIDE | UG/KG | 0.948 | 6 | 1 | 3 | 9100 |
| | PROPIONITRILE | UG/KG | 37.9 | 61.7 | 40 | 80 | --[4] |
| | STYRENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 254 |
| | TETRACHLOROETHENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 990 |
| | TOLUENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 1220 |

TABL -6

SEDIMENT MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | TOTAL XYLENES | UG/KG | 0.948 | 1.54 | 1 | 3 | 433 |
| | TRANS-1,2-DICHLOROETHENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 654 |
| | TRANS-1,3-DICHLOROPROPENE | UG/KG | 0.948 | 1.54 | 1 | 3 | 780 |
| | TRANS-1,4-DICHLORO-2-BUTENE | UG/KG | 0.948 | 1.54 | NA | NA | NA |
| | TRICHLOROETHENE | UG/KG | 0.948 | 1.54 | NA | NA | NA |
| | TRICHLOROFLUOROMETHANE | UG/KG | 0.948 | 1.54 | 1 | 3 | 390000 |
| | VINYL ACETATE | UG/KG | 0.948 | 1.54 | 1 | 10 | 430000 |
| | VINYL CHLORIDE | UG/KG | 0.948 | 1.54 | 1 | 3 | 202 |
| PEST/PCB | 4,4'-DDD | UG/KG | 1.56 | 1.73 | 1.65 | 3.3 | 4.88 |
| | 4,4'-DDE | UG/KG | 1.56 | 1.73 | 1.65 | 3.3 | 3.16 |
| | ALDRIN | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 2 |
| | ALPHA-BHC | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 6 |
| | ALPHA-CHLORDANE | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 3.24 |
| | AROCLOR-1016 | UG/KG | 10.4 | 15.1 | 250 | 16.6 | 59.8 |
| | AROCLOR-1221 | UG/KG | 10.4 | 15.1 | 250 | 16.6 | 59.8 |
| | AROCLOR-1232 | UG/KG | 10.4 | 15.1 | 250 | 16.6 | 59.8 |
| | AROCLOR-1242 | UG/KG | 10.4 | 15.1 | 250 | 16.6 | 59.8 |
| | AROCLOR-1248 | UG/KG | 10.4 | 15.1 | 250 | 16.6 | 59.8 |
| | AROCLOR-1254 | UG/KG | 10.4 | 15.1 | 250 | 16.6 | 59.8 |
| | AROCLOR-1260 | UG/KG | 10.4 | 15.1 | 250 | 16.6 | 59.8 |
| | BETA-BHC | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 5 |
| | DELTA-BHC | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 90 |
| | DIELDRIN | UG/KG | 1.56 | 2.27 | 1.65 | 3.3 | 1.9 |
| | ENDOSULFAN I | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 3.26 |
| | ENDOSULFAN II | UG/KG | 1.56 | 2.27 | 1.65 | 3.3 | 1.94 |
| | ENDOSULFAN SULFATE | UG/KG | 1.56 | 2.27 | 1.7 | 3.3 | 3.26 |
| | ENDRIN | UG/KG | 1.56 | 2.27 | 1.7 | 3.3 | 2.22 |

TABLE H-6

SEDIMENT MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | ENDRIN ALDEHYDE | UG/KG | 1.56 | 2.27 | 1.65 | 3.3 | 480 |
| | ENDRIN KETONE | UG/KG | 1.56 | 2.27 | 1.7 | 3.3 | 2.22 |
| | GAMMA-BHC (LINDANE) | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 2.37 |
| | GAMMA-CHLORDANE | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 3.24 |
| | HEPTACHLOR | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 0.6 |
| | HEPTACHLOR EPOXIDE | UG/KG | 0.751 | 1.09 | 0.85 | 1.7 | 2.47 |
| | METHOXYCHLOR | UG/KG | 7.51 | 10.9 | 8.5 | 17 | 13.6 |
| | TOXAPHENE | UG/KG | 19.6 | 28.5 | 85 | 170 | 0.077 |

1 Only results with validation qualifiers that contain a "U" are tallied.
2 Highlighted values (yellow when reproduced in color and gray when reproduced in black and white) exceed laboratory RBTLs.
3 Risk-based target levels are taken from Table 1-5 of the SWMUs 8, 15, 18, 19, 20,and OGTSL QAPP (TtNUS, 2004) and are subject to change.
4 Risk-based target level is not provided because human health or ecological risk-based criteria were not available for this compound.

HERB = Herbicides
M = Metals, total
MG/KG = milligrams per kilogram
MISC = Miscellaneous parameters
NA = Not applicable
PEST/PCB = Pesticides/polychlorinated biphenyls
SVOC = Semivolatile organic compounds
UG/KG = micrograms per kilogram
VOC = Volatile organic compounds

TABL 7

GROUNDWATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| HERB | 2,4,5-T | UG/L | 0.04 | 0.04 | 0.04 | 0.08 | 360 |
| | 2,4,5-TP (SILVEX) | UG/L | 0.04 | 0.04 | 0.04 | 0.08 | 30 |
| | 2,4-D | UG/L | 0.04 | 0.04 | 0.04 | 0.08 | 220 |
| | DINOSEB | UG/L | 0.04 | 0.04 | 0.04 | 0.08 | 0.48 |
| | HEXACHLOROPHENE | UG/L | 0.025 | 0.025 | 0.013 | 0.027 | 0.228 |
| | PENTACHLOROPHENOL | UG/L | 0.013 | 0.013 | 0.25 | 0.5 | 0.56 |
| Metals, Total | ALUMINUM | UG/L | 28.8 | 81.9 | 2.6 | 50 | 36000 |
| | ANTIMONY | UG/L | 0.085 | 0.95 | 0.1 | 1 | 6 |
| | ARSENIC | UG/L | 0.45 | 0.74 | 0.2 | 1 | 0.045 |
| | BERYLLIUM | UG/L | 0.02 | 0.18 | 0.1 | 1 | 3.6 |
| | CADMIUM | UG/L | 0.08 | 0.82 | 0.7 | 1 | 0.15 |
| | CHROMIUM | UG/L | 0.19 | 0.89 | 0.1 | 1 | 42 |
| | COPPER | UG/L | 0.39 | 0.39 | 0.1 | 2 | 1.58 |
| | LEAD | UG/L | 0.11 | 0.227 | 0.1 | 1 | 1.17 |
| | MERCURY | UG/L | 0.03 | 0.03 | 0.1 | 0.2 | 0.0013 |
| | SELENIUM | UG/L | 0.094 | 0.46 | 0.4 | 1 | 5 |
| | SILVER | UG/L | 0.028 | 0.15 | 0.1 | 1 | 0.12 |
| | THALLIUM | UG/L | 0.043 | 0.2 | 0.1 | 1 | 2 |
| | TIN | UG/L | 0.048 | 0.53 | 0.1 | 10 | 180 |
| | VANADIUM | UG/L | 1.14 | 1.14 | 0.1 | 2 | 12 |
| | ZINC | UG/L | 2 | 8.8 | 0.5 | 10 | 65.7 |
| Metals, Dissolved | ALUMINUM | UG/L | 8.6 | 54.7 | 2.6 | 50 | 36000 |
| | ANTIMONY | UG/L | 0.085 | 0.96 | 0.1 | 1 | 6 |
| | ARSENIC | UG/L | 0.18 | 0.32 | 0.2 | 1 | 0.045 |
| | BERYLLIUM | UG/L | 0.02 | 0.03 | 0.1 | 1 | 3.6 |
| | CADMIUM | UG/L | 0.12 | 0.35 | 0.7 | 1 | 0.15 |
| | CHROMIUM | UG/L | 0.42 | 1 | 0.1 | 1 | 42 |
| | LEAD | UG/L | 0.069 | 0.14 | 0.1 | 1 | 1.17 |
| | MERCURY | UG/L | 0.03 | 0.061 | 0.1 | 0.2 | 0.0013 |
| | SELENIUM | UG/L | 0.7 | 0.7 | 0.4 | 1 | 5 |
| | SILVER | UG/L | 0.028 | 0.028 | 0.1 | 1 | 0.12 |
| | THALLIUM | UG/L | 0.043 | 0.043 | 0.1 | 1 | 2 |

TABLE H-7

GROUNDWATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | TIN | UG/L | 0.13 | 0.16 | 0.1 | 10 | 180 |
| | VANADIUM | UG/L | 1.14 | 1.14 | 0.1 | 2 | 12 |
| | ZINC | UG/L | 1.4 | 2.9 | 0.5 | 10 | 65.7 |
| SVOC | 1,2,4,5-TETRACHLOROBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 3 |
| | 1,2,4-TRICHLOROBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 30 |
| | 1,2-DICHLOROBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 14 |
| | 1,3-DICHLOROBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 5.5 |
| | 1,4-DICHLOROBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.5 |
| | 1,4-DIOXANE | UG/L | 0.96 | 10.5 | 50 | 100 | 6.1 |
| | 1,4-NAPHTHOQUINONE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 1,4-PHENYLENEDIAMINE | UG/L | 0.96 | 10.5 | 1 | 10 | 6900 |
| | 1-NAPHTHYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 2,2'-OXYBIS(1-CHLOROPROPANE) | UG/L | 0.96 | 10.5 | 1 | 5 | 0.27 |
| | 2,3,4,6-TETRACHLOROPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 1.2 |
| | 2,4,5-TRICHLOROPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 3600 |
| | 2,4,6-TRICHLOROPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 0.96 |
| | 2,4-DICHLOROPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 11 |
| | 2,4-DIMETHYLPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 100 |
| | 2,4-DINITROPHENOL | UG/L | 0.96 | 10.5 | 1 | 10 | 19 |
| | 2,6-DICHLOROPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 2-ACETYLAMINOFLUORENE | UG/L | 0.96 | 10.5 | 1 | 5 | 535 |
| | 2-CHLORONAPHTHALENE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.396 |
| | 2-CHLOROPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 24 |
| | 2-METHYLNAPHTHALENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 5 |
| | 2-METHYLPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 67 |
| | 2-NAPHTHYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 2-NITROANILINE | UG/L | 0.96 | 10.5 | 1 | 5 | 1 |
| | 2-NITROPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 2-PICOLINE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 3&4-METHYLPHENOL | UG/L | 0.96 | 10.5 | 2.5 | 5 | 25 |
| | 3,3'-DICHLOROBENZIDINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.15 |

TABL

GROUNDWATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | 3,3'-DIMETHYLBENZIDINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.0073 |
| | 3-METHYLCHOLANTHRENE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.0891 |
| | 3-NITROANILINE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 4,6-DINITRO-2-METHYLPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 23 |
| | 4-AMINOBIPHENYL | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 4-BROMOPHENYL PHENYL ETHER | UG/L | 0.96 | 10.5 | 1 | 5 | 1.5 |
| | 4-CHLORO-3-METHYLPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 34.8 |
| | 4-CHLOROANILINE | UG/L | 0.96 | 10.5 | 1 | 5 | 150 |
| | 4-CHLOROPHENYL PHENYL ETHER | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 4-NITROANILINE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 4-NITROPHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 4-NITROQUINOLINE-1-OXIDE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | 5-NITRO-O-TOLUIDINE | UG/L | 0.96 | 10.5 | 1 | 5 | 2 |
| | 7,12-DIMETHYLBENZ(A)ANTHRACENE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.548 |
| | A,A-DIMETHYLPHENETHYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | 36 |
| | ACENAPHTHENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 38 |
| | ACENAPHTHYLENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 370 |
| | ACETOPHENONE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | ANILINE | UG/L | 0.96 | 10.5 | 1 | 5 | 4.1 |
| | ANTHRACENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.035 |
| | ARAMITE | UG/L | 0.96 | 10.5 | 1 | 10 | 2.7 |
| | BENZO(A)ANTHRACENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.025 |
| | BENZO(A)PYRENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.0092 |
| | BENZO(B)FLUORANTHENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.092 |
| | BENZO(G,H,I)PERYLENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.26 |
| | BENZO(K)FLUORANTHENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.8 |
| | BENZYL ALCOHOL | UG/L | 0.96 | 10.5 | 1 | 5 | 8.6 |
| | BIS(2-CHLOROETHOXY)METHANE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | BIS(2-CHLOROETHYL)ETHER | UG/L | 0.96 | 10.5 | 0.9 | 5 | 0.0098 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.3 |
| | BUTYL BENZYL PHTHALATE | UG/L | 0.96 | 10.5 | 1 | 5 | 23 |

TABLE H-7

GROUNDWATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | CHLOROBENZILATE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.25 |
| | CHRYSENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 1.6 |
| | DIALLATE | UG/L | 0.96 | 10.5 | 1 | 5 | 1.1 |
| | DIBENZO(A,H)ANTHRACENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.0092 |
| | DIBENZOFURAN | UG/L | 0.96 | 10.5 | 1 | 5 | 4 |
| | DIETHYL PHTHALATE | UG/L | 0.96 | 10.5 | 1 | 5 | 110 |
| | DIMETHYL PHTHALATE | UG/L | 0.96 | 10.5 | 1 | 5 | 360000 |
| | DI-N-BUTYL PHTHALATE | UG/L | 0.96 | 10.5 | 1 | 5 | 9.7 |
| | DI-N-OCTYL PHTHALATE | UG/L | 0.96 | 10.5 | 1 | 5 | 20 |
| | DIPHENYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | 412 |
| | ETHYL METHANE SULFONATE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | FLUORANTHENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 1.9 |
| | FLUORENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 19 |
| | HEXACHLOROBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.0003 |
| | HEXACHLOROBUTADIENE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.053 |
| | HEXACHLOROCYCLOPENTADIENE | UG/L | 0.96 | 10.5 | 1 | 5 | 50 |
| | HEXACHLOROETHANE | UG/L | 0.96 | 10.5 | 1 | 5 | 4.8 |
| | HEXACHLOROPROPENE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | INDENO(1,2,3-CD)PYRENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.022 |
| | ISODRIN | UG/L | 0.96 | 10.5 | 1 | 5 | 0.0309 |
| | ISOPHORONE | UG/L | 0.96 | 10.5 | 1 | 5 | 71 |
| | ISOSAFROLE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | KEPONE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.0084 |
| | METHAPYRILENE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | METHYL METHANE SULFONATE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | NAPHTHALENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 6.2 |
| | N-NITROSODIETHYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.00045 |
| | N-NITROSODIMETHYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.0013 |
| | N-NITROSO-DI-N-BUTYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.002 |
| | N-NITROSO-DI-N-PROPYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.0096 |
| | N-NITROSODIPHENYLAMINE | UG/L | 0.96 | 10.5 | NA | NA | NA |

TABL /

GROUNDWATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | N-NITROSOMETHYLETHYLAMINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.0013 |
| | N-NITROSOMORPHOLINE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | N-NITROSOPIPERIDINE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | N-NITROSOPYRROLIDINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.032 |
| | O,O,O-TRIETHYL PHOSPHOROTHIOATE | UG/L | 0.96 | 10.5 | 2.5 | 5 | 0.0038 |
| | O-TOLUIDINE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.28 |
| | P-(DIMETHYLAMINO)AZOBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 1.65 |
| | PENTACHLOROBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.019 |
| | PENTACHLOROETHANE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | PENTACHLORONITROBENZENE | UG/L | 0.96 | 10.5 | 1 | 5 | 0.26 |
| | PHENACETIN | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| | PHENANTHRENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 3.6 |
| | PHENOL | UG/L | 0.96 | 10.5 | 1 | 5 | 180 |
| | PRONAMIDE | UG/L | 0.96 | 10.5 | 1 | 5 | 2700 |
| | PYRENE | UG/L | 0.048 | 0.054 | 0.05 | 0.1 | 0.3 |
| | PYRIDINE | UG/L | 0.96 | 10.5 | 1 | 5 | 36 |
| | SAFROLE | UG/L | 0.96 | 10.5 | 1 | 5 | --[4] |
| VOC | 1,1,1,2-TETRACHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.43 |
| | 1,1,1-TRICHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 76 |
| | 1,1,2,2-TETRACHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.055 |
| | 1,1,2-TRICHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.2 |
| | 1,1-DICHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 47 |
| | 1,1-DICHLOROETHENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 7 |
| | 1,2,3-TRICHLOROPROPANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.0056 |
| | 1,2-DIBROMO-3-CHLOROPROPANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.0016 |
| | 1,2-DIBROMOETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.00076 |
| | 1,2-DICHLOROETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.12 |
| | 1,2-DICHLOROPROPANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.16 |
| | 2-BUTANONE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 1900 |
| | 2-HEXANONE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 99 |
| | 3-CHLOROPROPENE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 1800 |

TABLE H-7

GROUNDWATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | 4-METHYL-2-PENTANONE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 160 |
| | ACETONE | UG/L | 0.5 | 1.6 | 0.5 | 5 | 610 |
| | ACETONITRILE | UG/L | 20 | 20 | 20 | 40 | 100 |
| | ACROLEIN | UG/L | 0.5 | 0.5 | 0.5 | 5 | 0.042 |
| | ACRYLONITRILE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 0.039 |
| | BENZENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.34 |
| | BROMODICHLOROMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.18 |
| | BROMOFORM | UG/L | 0.3 | 0.3 | 0.3 | 1 | 8.5 |
| | BROMOMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 8.7 |
| | CARBON DISULFIDE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 15 |
| | CARBON TETRACHLORIDE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.17 |
| | CHLOROBENZENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 47 |
| | CHLORODIBROMOMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.13 |
| | CHLOROETHANE | UG/L | 0.5 | 0.5 | 0.3 | 1 | 4.6 |
| | CHLOROFORM | UG/L | 0.3 | 0.3 | 0.3 | 1 | 6.2 |
| | CHLOROMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 1.5 |
| | CHLOROPRENE | UG/L | 0.5 | 0.5 | NA | NA | NA |
| | CIS-1,2-DICHLOROETHENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 61 |
| | CIS-1,3-DICHLOROPROPENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.4 |
| | DIBROMOMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 61 |
| | DICHLORODIFLUOROMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 390 |
| | ETHYL METHACRYLATE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 550 |
| | ETHYLBENZENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 2.9 |
| | ISOBUTANOL | UG/L | 20 | 20 | 20 | 40 | 1800 |
| | METHACRYLONITRILE | UG/L | 0.3 | 0.3 | 0.5 | 5 | 1 |
| | METHYL IODIDE | UG/L | 0.5 | 0.5 | 0.5 | 5 | --[4] |
| | METHYL METHACRYLATE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 1400 |
| | METHYL TERT-BUTYL ETHER | UG/L | 0.5 | 0.5 | 0.5 | 1 | 13 |
| | METHYLENE CHLORIDE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 4.3 |
| | PROPIONITRILE | UG/L | 20 | 20 | 20 | 40 | --[4] |
| | STYRENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 32 |
| | TETRACHLOROETHENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.66 |

TAB. -7

GROUNDWATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | TOLUENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 253 |
| | TOTAL XYLENES | UG/L | 0.3 | 0.3 | 0.3 | 1 | 27 |
| | TRANS-1,2-DICHLOROETHENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 100 |
| | TRANS-1,3-DICHLOROPROPENE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 0.4 |
| | TRANS-1,4-DICHLORO-2-BUTENE | UG/L | 0.5 | 0.5 | NA | NA | NA |
| | TRICHLOROETHENE | UG/L | 0.3 | 0.3 | NA | NA | NA |
| | TRICHLOROFLUOROMETHANE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 1300 |
| | VINYL ACETATE | UG/L | 0.5 | 0.5 | 0.5 | 5 | 410 |
| | VINYL CHLORIDE | UG/L | 0.3 | 0.3 | 0.3 | 1 | 2 |
| PEST/PCB | 4,4'-DDD | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 0.28 |
| | 4,4'-DDE | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 4.51E-09 |
| | 4,4'-DDT | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 0.000011 |
| | ALDRIN | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.004 |
| | ALPHA-BHC | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.011 |
| | ALPHA-CHLORDANE | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.0043 |
| | AROCLOR-1016 | UG/L | 0.24 | 0.5 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1221 | UG/L | 0.24 | 0.5 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1232 | UG/L | 0.24 | 0.5 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1242 | UG/L | 0.24 | 0.5 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1248 | UG/L | 0.24 | 0.5 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1254 | UG/L | 0.24 | 0.5 | 0.25 | 0.5 | 0.00012 |
| | AROCLOR-1260 | UG/L | 0.24 | 0.5 | 0.25 | 0.5 | 0.00012 |
| | BETA-BHC | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.037 |
| | DELTA-BHC | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.011 |
| | DIELDRIN | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 0.000071 |
| | ENDOSULFAN I | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.056 |
| | ENDOSULFAN II | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 0.056 |
| | ENDOSULFAN SULFATE | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 0.056 |
| | ENDRIN | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 0.036 |
| | ENDRIN ALDEHYDE | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 0.15 |
| | ENDRIN KETONE | UG/L | 0.048 | 0.1 | 0.05 | 0.1 | 0.036 |
| | GAMMA-BHC (LINDANE) | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.026 |

TABLE H-7

GROUNDWATER MINIMUM AND MAXIMUM NON-DETECT VALUES
SWMU 15 (ROADS AND GROUNDS) [1,2]
NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Units | Minimum Non-detect Concentration[2] | Maximum Non-detect Concentration[2] | Laboratory TV | Laboratory RL | Risk-Based Target Level[3] |
|---|---|---|---|---|---|---|---|
| | GAMMA-CHLORDANE | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.0043 |
| | HEPTACHLOR | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.0038 |
| | HEPTACHLOR EPOXIDE | UG/L | 0.024 | 0.05 | 0.025 | 0.05 | 0.0038 |
| | METHOXYCHLOR | UG/L | 0.24 | 0.5 | 0.25 | 0.5 | 0.019 |
| | TOXAPHENE | UG/L | 2.4 | 5 | 2.5 | 5 | 0.00014 |

1 Only results with validation qualifiers that contain a "U" are tallied.
2 Highlighted values (yellow when reproduced in color and gray when reproduced in black and white) exceed laboratory RBTLs.
3 Risk-based target levels are taken from Table 1-5 of the SWMUs 8, 15, 18, 19, 20,and OGTSL QAPP (TtNUS, 2004) and are subject to change.
4 Risk-based target level is not provided because human health or ecological risk-based criteria were not available for this compound.

HERB = Herbicides
M = Metals, total
MF = Metals, dissolved
NA = Not applicable
PEST/PCB = Pesticides/polychlorinated biphenyls
SVOC = Semivolatile organic compounds
UG/L = micrograms per Liter
VOC = Volatile organic compounds

TAB

SOIL DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| EXP | 1,3,5-TRINITROBENZENE | 102 | 103.5 | 106 | 4 | 100 | 100.0 | 100 | 4 | 100 | 103.3 | 106 | 4 |
| | 1,3-DINITROBENZENE | 102 | 104.3 | 107 | 4 | 100 | 101.0 | 102 | 4 | 102 | 104.8 | 108 | 4 |
| | 2,4,6-TRINITROTOLUENE | 101 | 102.3 | 104 | 4 | 98 | 98.5 | 100 | 4 | 99 | 102.3 | 105 | 4 |
| | 2,4-DINITROTOLUENE | 97 | 99.0 | 102 | 4 | 68 | 86.3 | 96 | 4 | 64 | 87.8 | 102 | 4 |
| | 2,6-DINITROTOLUENE | 101 | 103.3 | 106 | 4 | 64 | 85.0 | 101 | 4 | 61 | 86.5 | 107 | 4 |
| | 2-AMINO-4,6-DINITROTOLUENE | 89 | 95.3 | 98 | 4 | 83 | 95.0 | 107 | 4 | 88 | 98.0 | 114 | 4 |
| | 2-NITROTOLUENE | 102 | 102.8 | 105 | 4 | 100 | 101.5 | 104 | 4 | 104 | 106.0 | 108 | 4 |
| | 3,4-DINITROTOLUENE (SURR) | 99 | 108.0 | 114 | 4 | 105 | 107.3 | 110 | 4 | 101 | 106.8 | 109 | 4 |
| | 3-NITROTOLUENE | 103 | 104.0 | 106 | 4 | 100 | 102.0 | 105 | 4 | 103 | 105.3 | 108 | 4 |
| | 4-AMINO-2,6-DINITROTOLUENE | 93 | 96.8 | 106 | 4 | 89 | 91.3 | 93 | 4 | 91 | 94.5 | 99 | 4 |
| | 4-NITROTOLUENE | 106 | 106.8 | 109 | 4 | 103 | 105.0 | 108 | 4 | 105 | 108.0 | 111 | 4 |
| | HMX | 97 | 98.8 | 102 | 4 | 93 | 95.3 | 98 | 4 | 95 | 97.3 | 99 | 4 |
| | NITROBENZENE | 106 | 106.8 | 109 | 4 | 61 | 86.0 | 105 | 4 | 67 | 87.3 | 108 | 4 |
| | RDX | 99 | 100.3 | 102 | 4 | 80 | 89.5 | 96 | 4 | 81 | 89.5 | 96 | 4 |
| | TETRYL | 81 | 91.3 | 96 | 4 | 42 | 66.0 | 78 | 4 | 38 | 67.3 | 83 | 4 |
| HERB | 2,4,5-T | 86 | 97.6 | 108 | 8 | 64 | 76.7 | 86 | 6 | 55 | 75.3 | 91 | 6 |
| | 2,4,5-TP (SILVEX) | 93 | 104.0 | 114 | 8 | 65 | 80.3 | 95 | 6 | 57 | 78.7 | 97 | 6 |
| | 2,4-D | 107 | 119.4 | 132 | 8 | 76 | 92.3 | 112 | 6 | 69 | 95.2 | 117 | 6 |
| | 2,4-DICHLOROPHENYLACETIC ACID (SURR) | 112 | 125.8 | 140 | 13 | 71 | 154.1 | 288 | 10 | 85 | 153.8 | 293 | 10 |
| | DINOSEB | 70 | 75.3 | 81 | 8 | 36 | 45.8 | 58 | 6 | 33 | 42.5 | 57 | 6 |
| | HEXACHLOROPHENE | 48 | 60.4 | 82 | 13 | 20 | 35.1 | 51 | 10 | 19 | 37.1 | 58 | 10 |
| | PENTACHLOROPHENOL | 91 | 116.5 | 133 | 13 | 35 | 62.3 | 84 | 10 | 20 | 62.0 | 88 | 10 |
| Metals, Total | ALUMINUM | 88.3 | 101.9 | 107.8 | 9 | 93.4 | 118.7 | 140.8 | 3 | -- | -- | -- | -- |
| | ANTIMONY | 79.6 | 107.6 | 138.8 | 9 | 94.8 | 105.6 | 137.8 | 10 | -- | -- | -- | -- |
| | ARSENIC | 95.6 | 100.3 | 113.2 | 9 | 81.7 | 100.6 | 114.9 | 10 | -- | -- | -- | -- |
| | BARIUM | 85.2 | 99.3 | 108 | 9 | 36.8 | 159.2 | 337 | 10 | -- | -- | -- | -- |
| | BERYLLIUM | 98 | 104.0 | 117.2 | 9 | 85.8 | 101.3 | 118.1 | 10 | -- | -- | -- | -- |
| | CADMIUM | 95.6 | 101.6 | 116 | 9 | 92.9 | 99.8 | 113.3 | 10 | -- | -- | -- | -- |
| | CALCIUM | 88.8 | 101.6 | 108.1 | 9 | 52.2 | 83.3 | 104.4 | 7 | -- | -- | -- | -- |
| | CHROMIUM | 86.8 | 101.1 | 107.2 | 9 | 66.3 | 95.4 | 125.4 | 10 | -- | -- | -- | -- |
| | COBALT | 87.2 | 102.4 | 109.6 | 9 | 83.2 | 90.2 | 98 | 10 | -- | -- | -- | -- |
| | COPPER | 92.4 | 103.0 | 113.2 | 9 | 66.8 | 104.7 | 244.6 | 10 | -- | -- | -- | -- |
| | IRON | 89.2 | 102.1 | 110.1 | 9 | -- | -- | -- | -- | -- | -- | -- | -- |
| | LEAD | 91.2 | 100.8 | 108 | 9 | 41.2 | 110.5 | 233.4 | 10 | -- | -- | -- | -- |
| | LITHIUM | 102.8 | 102.8 | 102.8 | 1 | 103.6 | 103.6 | 103.6 | 1 | -- | -- | -- | -- |
| | MAGNESIUM | 88.1 | 101.9 | 108.8 | 9 | -32 | 107.1 | 222.4 | 10 | -- | -- | -- | -- |
| | MANGANESE | 88.8 | 100.7 | 106.4 | 9 | 152.2 | 152.2 | 152.2 | 1 | -- | -- | -- | -- |
| | MERCURY | 68.3 | 96.9 | 105.7 | 10 | 57.4 | 95.7 | 119.1 | 10 | -- | -- | -- | -- |
| | NICKEL | 90.4 | 106.9 | 142.4 | 9 | 68.4 | 96.4 | 119.3 | 10 | -- | -- | -- | -- |
| | POTASSIUM | 93.9 | 103.4 | 109.1 | 9 | 63.5 | 99.2 | 167.5 | 10 | -- | -- | -- | -- |
| | SELENIUM | 93.6 | 103.7 | 116.4 | 9 | 87.8 | 101.1 | 111.4 | 10 | -- | -- | -- | -- |

TABLE H-8

SOIL DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | SILVER | 89.6 | 98.4 | 105.6 | 9 | 86.8 | 93.7 | 101.2 | 10 | -- | -- | -- | -- |
| | SODIUM | 89.4 | 100.6 | 107.1 | 9 | 75.3 | 90.2 | 98.2 | 10 | -- | -- | -- | -- |
| | STRONTIUM | 96.8 | 96.8 | 96.8 | 1 | 89.5 | 89.5 | 89.5 | 1 | -- | -- | -- | -- |
| | THALLIUM | 98.4 | 107.2 | 120.8 | 9 | 91.3 | 105.4 | 114.7 | 10 | -- | -- | -- | -- |
| | TIN | 72.8 | 97.4 | 107.6 | 9 | 92 | 96.0 | 107.8 | 10 | -- | -- | -- | -- |
| | VANADIUM | 83.6 | 97.7 | 103.6 | 9 | 34.2 | 95.4 | 181.3 | 10 | -- | -- | -- | -- |
| | ZINC | 93.2 | 106.4 | 130 | 9 | 77.8 | 118.2 | 188.3 | 9 | -- | -- | -- | -- |
| MISC | CYANIDE | 90 | 94.0 | 98 | 2 | 82 | 82.0 | 82 | 1 | 80 | 80.0 | 80 | 1 |
| | TOTAL ORGANIC CARBON | 100 | 100.0 | 100 | 1 | 99 | 99.0 | 99 | 1 | 93 | 93.0 | 93 | 1 |
| SVOC | 1,2,4-TRICHLOROBENZENE | 58 | 76.9 | 92 | 12 | 56 | 72.0 | 84 | 10 | 63 | 75.6 | 90 | 10 |
| | 1,2-DICHLOROBENZENE | 58 | 77.0 | 92 | 12 | 58 | 71.3 | 87 | 10 | 52 | 71.8 | 86 | 10 |
| | 1,3-DICHLOROBENZENE | 53 | 73.3 | 92 | 12 | 49 | 67.0 | 87 | 10 | 42 | 67.3 | 84 | 10 |
| | 1,4-DICHLOROBENZENE | 55 | 73.8 | 85 | 12 | 53 | 66.5 | 83 | 10 | 45 | 67.6 | 82 | 10 |
| | 1-FLUORONAPHTHALENE (SURR) | 0 | 66.4 | 86 | 13 | 37 | 60.8 | 90 | 12 | 41 | 61.0 | 78 | 12 |
| | 2,2'-OXYBIS(1-CHLOROPROPANE) | 61 | 85.8 | 108 | 12 | 67 | 82.0 | 104 | 10 | 71 | 84.3 | 106 | 10 |
| | 2,4,5-TRICHLOROPHENOL | 66 | 84.4 | 100 | 12 | 67 | 80.4 | 91 | 10 | 70 | 85.2 | 98 | 10 |
| | 2,4,6-TRIBROMOPHENOL (SURR) | 70 | 86.5 | 101 | 12 | 42 | 81.8 | 101 | 10 | 38 | 85.9 | 106 | 10 |
| | 2,4,6-TRICHLOROPHENOL | 64 | 82.9 | 100 | 12 | 48 | 77.4 | 95 | 10 | 54 | 82.0 | 100 | 10 |
| | 2,4-DICHLOROPHENOL | 63 | 78.8 | 92 | 12 | 57 | 73.4 | 87 | 10 | 61 | 77.1 | 90 | 10 |
| | 2,4-DIMETHYLPHENOL | 26 | 59.6 | 85 | 12 | 0 | 46.0 | 82 | 10 | 0 | 46.7 | 83 | 10 |
| | 2,4-DINITROPHENOL | 17 | 52.6 | 71 | 12 | 22 | 54.4 | 73 | 10 | 22 | 58.4 | 86 | 10 |
| | 2-CHLORONAPHTHALENE | 49 | 63.9 | 77 | 12 | 52 | 62.8 | 76 | 10 | 56 | 64.8 | 78 | 10 |
| | 2-CHLOROPHENOL | 63 | 83.9 | 100 | 12 | 63 | 77.5 | 93 | 10 | 69 | 80.4 | 94 | 10 |
| | 2-FLUOROBIPHENYL (SURR) | 53 | 66.3 | 80 | 12 | 51 | 66.4 | 82 | 10 | 55 | 69.2 | 85 | 10 |
| | 2-FLUOROPHENOL (SURR) | 64 | 77.2 | 95 | 12 | 46 | 70.4 | 85 | 10 | 49 | 73.0 | 94 | 10 |
| | 2-METHYLNAPHTHALENE | 0 | 54.7 | 66 | 13 | 35 | 54.4 | 72 | 12 | 41 | 57.3 | 68 | 12 |
| | 2-METHYLPHENOL | 63 | 82.0 | 115 | 12 | 19 | 67.2 | 83 | 10 | 23 | 69.8 | 87 | 10 |
| | 2-NITROANILINE | 65 | 85.0 | 100 | 12 | 68 | 82.0 | 94 | 10 | 66 | 86.8 | 101 | 10 |
| | 2-NITROPHENOL | 54 | 76.7 | 85 | 12 | 60 | 72.7 | 85 | 10 | 66 | 76.8 | 89 | 10 |
| | 3&4-METHYLPHENOL | 60 | 79.0 | 115 | 12 | 17 | 65.6 | 85 | 10 | 25 | 67.2 | 87 | 10 |
| | 3,3'-DICHLOROBENZIDINE | 30 | 48.1 | 61 | 12 | 0 | 15.0 | 38 | 10 | 0 | 19.7 | 52 | 10 |
| | 3-NITROANILINE | 43 | 64.9 | 77 | 12 | 24 | 40.5 | 54 | 10 | 32 | 47.3 | 67 | 10 |
| | 4,6-DINITRO-2-METHYLPHENOL | 29 | 71.3 | 85 | 12 | 41 | 65.5 | 86 | 10 | 40 | 68.3 | 90 | 10 |
| | 4-BROMOPHENYL PHENYL ETHER | 66 | 86.8 | 100 | 12 | 78 | 88.4 | 105 | 10 | 78 | 92.5 | 117 | 10 |
| | 4-CHLORO-3-METHYLPHENOL | 65 | 89.2 | 115 | 12 | 70 | 81.3 | 93 | 10 | 69 | 86.1 | 101 | 10 |
| | 4-CHLOROANILINE | 33 | 43.2 | 63 | 12 | 0 | 14.1 | 24 | 10 | 5 | 16.4 | 27 | 10 |
| | 4-CHLOROPHENYL PHENYL ETHER | 75 | 90.7 | 100 | 12 | 74 | 85.3 | 96 | 10 | 71 | 88.6 | 101 | 10 |
| | 4-NITROANILINE | 55 | 83.2 | 100 | 12 | 39 | 52.8 | 72 | 10 | 43 | 59.2 | 78 | 10 |
| | 4-NITROPHENOL | 38 | 72.0 | 92 | 12 | 39 | 69.0 | 92 | 10 | 51 | 73.0 | 95 | 10 |
| | ACENAPHTHENE | 25 | 62.1 | 76 | 13 | 40 | 66.4 | 80 | 12 | 54 | 69.8 | 80 | 12 |
| | ACENAPHTHYLENE | 20 | 62.0 | 77 | 13 | 42 | 64.6 | 85 | 12 | 50 | 69.2 | 93 | 12 |

TAE 3

SOIL DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | ANTHRACENE | 63 | 69.3 | 82 | 13 | 48 | 68.6 | 81 | 12 | 62 | 74.4 | 86 | 12 |
| | BENZO(A)ANTHRACENE | 59 | 70.8 | 84 | 13 | 46 | 69.0 | 84 | 12 | 38 | 75.8 | 122 | 12 |
| | BENZO(A)PYRENE | 57 | 67.1 | 78 | 13 | 46 | 64.5 | 78 | 12 | 46 | 75.6 | 163 | 12 |
| | BENZO(B)FLUORANTHENE | 54 | 65.2 | 74 | 13 | 44 | 62.5 | 86 | 12 | 37 | 71.8 | 151 | 12 |
| | BENZO(G,H,I)PERYLENE | 51 | 79.8 | 95 | 13 | 60 | 88.3 | 121 | 12 | 60 | 101.9 | 228 | 12 |
| | BENZO(K)FLUORANTHENE | 49 | 57.2 | 72 | 13 | 48 | 62.8 | 75 | 12 | 43 | 65.9 | 95 | 12 |
| | BENZYL ALCOHOL | 68 | 88.6 | 115 | 12 | 73 | 84.6 | 96 | 10 | 77 | 88.1 | 101 | 10 |
| | BIS(2-CHLOROETHOXY)METHANE | 48 | 62.3 | 72 | 12 | 51 | 59.3 | 68 | 10 | 54 | 61.9 | 72 | 10 |
| | BIS(2-CHLOROETHYL)ETHER | 65 | 83.2 | 100 | 12 | 64 | 78.6 | 95 | 10 | 74 | 81.2 | 92 | 10 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | 55 | 89.8 | 123 | 12 | 73 | 101.9 | 132 | 10 | 74 | 107.8 | 145 | 10 |
| | BUTYL BENZYL PHTHALATE | 61 | 85.5 | 115 | 12 | 78 | 94.1 | 122 | 10 | 80 | 98.4 | 119 | 10 |
| | CHRYSENE | 63 | 73.6 | 84 | 13 | 50 | 70.8 | 86 | 12 | 46 | 79.1 | 133 | 12 |
| | DIBENZO(A,H)ANTHRACENE | 53 | 77.8 | 94 | 13 | 58 | 89.1 | 122 | 12 | 69 | 98.2 | 142 | 12 |
| | DIBENZOFURAN | 69 | 83.4 | 92 | 12 | 71 | 79.2 | 88 | 10 | 71 | 82.8 | 95 | 10 |
| | DIETHYL PHTHALATE | 65 | 90.3 | 115 | 12 | 72 | 83.2 | 95 | 10 | 68 | 86.7 | 99 | 10 |
| | DIMETHYL PHTHALATE | 67 | 80.8 | 92 | 12 | 70 | 78.1 | 86 | 10 | 67 | 82.1 | 96 | 10 |
| | DI-N-BUTYL PHTHALATE | 69 | 90.6 | 115 | 12 | 73 | 89.9 | 111 | 10 | 72 | 93.1 | 120 | 10 |
| | DI-N-OCTYL PHTHALATE | 74 | 100.0 | 162 | 12 | 77 | 102.7 | 149 | 10 | 79 | 108.1 | 161 | 10 |
| | DIPHENYLAMINE | 54 | 70.7 | 85 | 12 | 22 | 65.0 | 98 | 10 | 39 | 68.6 | 106 | 10 |
| | FLUORANTHENE | 55 | 71.1 | 82 | 13 | 36 | 68.6 | 148 | 12 | 26 | 73.3 | 142 | 12 |
| | FLUORENE | 43 | 62.2 | 73 | 13 | 43 | 65.5 | 80 | 12 | 61 | 70.7 | 81 | 12 |
| | FLUORENE-D10 (SURR) | 54 | 74.5 | 88 | 13 | 49 | 75.0 | 103 | 12 | 70 | 77.0 | 90 | 12 |
| | HEXACHLOROBENZENE | 76 | 96.1 | 115 | 12 | 84 | 97.9 | 111 | 10 | 88 | 102.5 | 119 | 10 |
| | HEXACHLOROBUTADIENE | 54 | 75.8 | 92 | 12 | 52 | 72.4 | 90 | 10 | 56 | 75.1 | 92 | 10 |
| | HEXACHLOROCYCLOPENTADIENE | 40 | 53.9 | 77 | 12 | 0 | 23.8 | 45 | 10 | 0 | 23.2 | 42 | 10 |
| | HEXACHLOROETHANE | 55 | 77.7 | 92 | 12 | 50 | 67.4 | 87 | 10 | 41 | 69.0 | 83 | 10 |
| | INDENO(1,2,3-CD)PYRENE | 52 | 78.5 | 93 | 13 | 60 | 85.4 | 111 | 12 | 64 | 98.5 | 198 | 12 |
| | ISOPHORONE | 45 | 62.3 | 92 | 12 | 45 | 61.6 | 92 | 10 | 45 | 63.5 | 95 | 10 |
| | NAPHTHALENE | 0 | 55.7 | 67 | 13 | 29 | 52.1 | 70 | 12 | 38 | 55.7 | 68 | 12 |
| | NITROBENZENE-D5 (SURR) | 54 | 71.5 | 86 | 12 | 50 | 68.3 | 81 | 10 | 57 | 72.4 | 85 | 10 |
| | N-NITROSODIMETHYLAMINE | 57 | 73.9 | 85 | 12 | 64 | 78.4 | 110 | 10 | 65 | 80.3 | 103 | 10 |
| | N-NITROSO-DI-N-PROPYLAMINE | 71 | 88.3 | 108 | 12 | 72 | 86.9 | 101 | 10 | 80 | 89.9 | 99 | 10 |
| | PHENANTHRENE | 61 | 70.8 | 84 | 13 | 50 | 72.8 | 87 | 12 | 64 | 77.0 | 86 | 12 |
| | PHENOL | 63 | 80.4 | 100 | 12 | 68 | 76.3 | 89 | 10 | 69 | 78.4 | 91 | 10 |
| | PHENOL-D5 (SURR) | 65 | 75.8 | 92 | 12 | 57 | 72.6 | 89 | 10 | 58 | 74.6 | 86 | 10 |
| | PYRENE | 55 | 74.6 | 120 | 13 | 52 | 79.0 | 112 | 12 | 48 | 90.7 | 186 | 12 |
| | PYRENE-D10 (SURR) | 66 | 85.9 | 132 | 13 | 67 | 88.8 | 133 | 12 | 68 | 96.3 | 144 | 12 |
| | TERPHENYL-D14 (SURR) | 62 | 81.7 | 98 | 12 | 61 | 85.4 | 108 | 10 | 73 | 94.8 | 118 | 10 |
| VOC | 1,1,1,2-TETRACHLOROETHANE | 86 | 99.9 | 110 | 22 | 55 | 69.1 | 94 | 7 | 51 | 62.7 | 77 | 7 |
| | 1,1,1-TRICHLOROETHANE | 84 | 99.5 | 116 | 22 | 73 | 93.7 | 170 | 7 | 43 | 74.6 | 92 | 7 |
| | 1,1,2,2-TETRACHLOROETHANE | 76 | 102.0 | 116 | 22 | 41 | 69.4 | 89 | 7 | 43 | 63.0 | 77 | 7 |

TABLE H-8

SOIL DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | 1,1,2-TRICHLOROETHANE | 84 | 97.0 | 106 | 22 | 66 | 70.9 | 83 | 7 | 58 | 66.9 | 77 | 7 |
| | 1,1-DICHLOROETHANE | 86 | 101.5 | 122 | 22 | 76 | 86.3 | 127 | 7 | 45 | 73.1 | 91 | 7 |
| | 1,1-DICHLOROETHENE | 78 | 100.0 | 118 | 22 | 67 | 84.0 | 161 | 7 | 41 | 66.7 | 80 | 7 |
| | 1,2,3-TRICHLOROPROPANE | 90 | 101.6 | 114 | 22 | 63 | 72.4 | 87 | 7 | 61 | 67.6 | 85 | 7 |
| | 1,2-DIBROMO-3-CHLOROPROPANE | 74 | 91.3 | 112 | 22 | 43 | 56.3 | 72 | 7 | 41 | 53.6 | 65 | 7 |
| | 1,2-DIBROMOETHANE | 84 | 100.8 | 110 | 22 | 57 | 68.0 | 77 | 7 | 58 | 64.6 | 75 | 7 |
| | 1,2-DICHLOROETHANE | 86 | 99.5 | 118 | 22 | 67 | 85.6 | 129 | 7 | 56 | 75.1 | 107 | 7 |
| | 1,2-DICHLOROETHANE-D4 (SURR) | 95 | 101.8 | 107 | 22 | 91 | 121.0 | 191 | 7 | 90 | 110.0 | 141 | 7 |
| | 1,2-DICHLOROPROPANE | 86 | 100.2 | 116 | 22 | 70 | 79.1 | 107 | 7 | 48 | 69.0 | 82 | 7 |
| | 2-BUTANONE | 72 | 93.5 | 122 | 22 | 47 | 66.3 | 84 | 7 | 52 | 62.3 | 75 | 7 |
| | 2-HEXANONE | 88 | 106.6 | 128 | 22 | 30 | 56.6 | 78 | 7 | 36 | 56.3 | 76 | 7 |
| | 4-BROMOFLUOROBENZENE (SURR) | 97 | 100.8 | 106 | 22 | 89 | 98.7 | 103 | 7 | 88 | 98.0 | 103 | 7 |
| | 4-METHYL-2-PENTANONE | 86 | 107.0 | 138 | 22 | 55 | 78.3 | 105 | 7 | 64 | 71.6 | 80 | 7 |
| | ACETONE | 66 | 85.2 | 120 | 22 | 47 | 80.0 | 189 | 7 | 52 | 58.7 | 67 | 7 |
| | BENZENE | 82 | 96.9 | 112 | 22 | 63 | 74.3 | 96 | 7 | 41 | 65.1 | 79 | 7 |
| | BROMODICHLOROMETHANE | 76 | 89.3 | 102 | 22 | 57 | 71.1 | 109 | 7 | 43 | 62.0 | 88 | 7 |
| | BROMOFORM | 84 | 101.7 | 112 | 22 | 39 | 62.4 | 83 | 7 | 39 | 56.9 | 74 | 7 |
| | BROMOMETHANE | 84 | 99.4 | 118 | 22 | 41 | 94.1 | 274 | 7 | 38 | 57.7 | 73 | 7 |
| | CARBON DISULFIDE | 76 | 106.4 | 154 | 22 | 57 | 83.4 | 152 | 7 | 37 | 62.4 | 86 | 7 |
| | CARBON TETRACHLORIDE | 84 | 99.6 | 114 | 22 | 65 | 86.6 | 176 | 7 | 38 | 67.9 | 91 | 7 |
| | CHLOROBENZENE | 86 | 99.7 | 112 | 22 | 50 | 60.1 | 73 | 7 | 43 | 56.7 | 71 | 7 |
| | CHLORODIBROMOMETHANE | 80 | 96.5 | 106 | 22 | 49 | 63.9 | 82 | 7 | 50 | 59.1 | 76 | 7 |
| | CHLOROETHANE | 94 | 107.0 | 124 | 22 | 68 | 108.1 | 270 | 7 | 40 | 71.1 | 84 | 7 |
| | CHLOROFORM | 84 | 98.7 | 114 | 22 | 67 | 83.7 | 135 | 7 | 47 | 71.4 | 94 | 7 |
| | CHLOROMETHANE | 86 | 100.9 | 116 | 22 | 58 | 95.6 | 222 | 7 | 30 | 65.4 | 85 | 7 |
| | CIS-1,2-DICHLOROETHENE | 76 | 96.8 | 112 | 22 | 66 | 77.1 | 96 | 7 | 44 | 67.6 | 84 | 7 |
| | CIS-1,3-DICHLOROPROPENE | 86 | 103.5 | 118 | 22 | 37 | 59.0 | 77 | 7 | 38 | 53.9 | 66 | 7 |
| | DIBROMOFLUOROMETHANE (SURR) | 95 | 102.6 | 107 | 22 | 93 | 111.3 | 158 | 7 | 92 | 105.9 | 119 | 7 |
| | DIBROMOMETHANE | 84 | 100.8 | 116 | 22 | 71 | 84.0 | 130 | 7 | 62 | 75.3 | 97 | 7 |
| | DICHLORODIFLUOROMETHANE | 72 | 107.8 | 144 | 22 | 49 | 110.0 | 327 | 7 | 38 | 71.0 | 119 | 7 |
| | ETHYLBENZENE | 90 | 101.5 | 112 | 22 | 51 | 62.4 | 74 | 7 | 39 | 58.9 | 72 | 7 |
| | METHYL TERT-BUTYL ETHER | 71.1 | 88.4 | 108 | 22 | 45 | 68.5 | 88 | 7 | 45 | 62.8 | 83 | 7 |
| | METHYLENE CHLORIDE | 90 | 100.6 | 122 | 22 | 18 | 80.4 | 164 | 7 | 30 | 63.3 | 88 | 7 |
| | STYRENE | 92 | 103.5 | 112 | 22 | 45 | 54.9 | 74 | 7 | 39 | 52.7 | 70 | 7 |
| | TETRACHLOROETHENE | 74 | 89.2 | 102 | 22 | 46 | 57.7 | 79 | 7 | 35 | 51.7 | 64 | 7 |
| | TOLUENE | 84 | 97.5 | 110 | 22 | 55 | 64.7 | 74 | 7 | 41 | 61.0 | 71 | 7 |
| | TOLUENE-D8 (SURR) | 92 | 101.5 | 109 | 22 | 86 | 96.3 | 103 | 7 | 93 | 100.4 | 107 | 7 |
| | TOTAL XYLENES | 93 | 104.7 | 113 | 22 | 49 | 62.1 | 77 | 7 | 40 | 58.3 | 73 | 7 |
| | TRANS-1,2-DICHLOROETHENE | 78 | 96.8 | 112 | 22 | 65 | 74.3 | 105 | 7 | 38 | 64.7 | 79 | 7 |
| | TRANS-1,3-DICHLOROPROPENE | 86 | 101.7 | 114 | 22 | 38 | 56.0 | 72 | 7 | 38 | 53.3 | 67 | 7 |
| | TRICHLOROETHENE | 76 | 99.4 | 128 | 22 | 61 | 74.3 | 100 | 6 | 41 | 64.5 | 78 | 6 |

TAB

SOIL DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | TRICHLOROFLUOROMETHANE | 80 | 92.5 | 116 | 22 | 53 | 86.7 | 216 | 7 | 28 | 57.9 | 80 | 7 |
| | VINYL CHLORIDE | 84 | 99.8 | 124 | 22 | 61 | 105.3 | 303 | 7 | 28 | 67.3 | 86 | 7 |
| PEST/PCB | 4,4'-DDD | 85 | 101.3 | 118 | 6 | 84 | 94.8 | 117 | 4 | 80 | 86.0 | 91 | 4 |
| | 4,4'-DDE | 83 | 99.0 | 113 | 6 | 72 | 90.3 | 113 | 4 | 72 | 82.3 | 89 | 4 |
| | 4,4'-DDT | 84 | 100.0 | 116 | 6 | 73 | 89.8 | 109 | 4 | 70 | 82.3 | 88 | 4 |
| | ALDRIN | 74 | 87.8 | 105 | 6 | 70 | 75.8 | 81 | 4 | 68 | 70.8 | 73 | 4 |
| | ALPHA-BHC | 73 | 86.5 | 100 | 6 | 69 | 79.8 | 98 | 4 | 67 | 71.5 | 74 | 4 |
| | ALPHA-CHLORDANE | 78 | 90.2 | 106 | 6 | 81 | 84.8 | 90 | 4 | 75 | 76.5 | 77 | 4 |
| | AROCLOR-1016 | 86 | 96.0 | 119 | 8 | 86 | 101.1 | 117 | 7 | 73 | 97.3 | 121 | 7 |
| | AROCLOR-1260 | 91 | 101.6 | 118 | 8 | 92 | 106.6 | 124 | 7 | 76 | 101.6 | 125 | 7 |
| | BETA-BHC | 73 | 85.2 | 98 | 6 | 72 | 80.3 | 93 | 4 | 74 | 75.0 | 77 | 4 |
| | DECACHLOROBIPHENYL (SURR) | 75 | 91.4 | 111 | 14 | 63 | 89.6 | 124 | 11 | 63 | 86.5 | 113 | 11 |
| | DELTA-BHC | 78 | 84.8 | 93 | 6 | 67 | 77.5 | 88 | 4 | 65 | 73.8 | 79 | 4 |
| | DIELDRIN | 78 | 90.7 | 106 | 6 | 70 | 81.5 | 96 | 4 | 72 | 74.5 | 78 | 4 |
| | ENDOSULFAN I | 75 | 89.2 | 106 | 6 | 71 | 79.8 | 96 | 4 | 70 | 71.8 | 74 | 4 |
| | ENDOSULFAN II | 79 | 90.3 | 105 | 6 | 71 | 79.8 | 92 | 4 | 69 | 73.0 | 76 | 4 |
| | ENDOSULFAN SULFATE | 80 | 89.8 | 103 | 6 | 72 | 79.5 | 91 | 4 | 70 | 72.8 | 74 | 4 |
| | ENDRIN | 83 | 95.7 | 111 | 6 | 74 | 84.5 | 102 | 4 | 72 | 78.5 | 83 | 4 |
| | ENDRIN ALDEHYDE | 63 | 72.3 | 86 | 6 | 36 | 53.8 | 63 | 4 | 37 | 50.0 | 58 | 4 |
| | ENDRIN KETONE | 80 | 91.8 | 108 | 6 | 71 | 79.3 | 92 | 4 | 70 | 73.8 | 76 | 4 |
| | GAMMA-BHC (LINDANE) | 78 | 88.0 | 101 | 6 | 72 | 81.8 | 97 | 4 | 68 | 73.5 | 77 | 4 |
| | GAMMA-CHLORDANE | 73 | 86.0 | 101 | 6 | 68 | 79.0 | 90 | 4 | 70 | 73.5 | 78 | 4 |
| | HEPTACHLOR | 76 | 88.8 | 104 | 6 | 73 | 80.3 | 93 | 4 | 70 | 73.8 | 78 | 4 |
| | HEPTACHLOR EPOXIDE | 76 | 88.7 | 103 | 6 | 71 | 79.3 | 89 | 4 | 72 | 73.8 | 76 | 4 |
| | METHOXYCHLOR | 88 | 103.0 | 119 | 6 | 84 | 95.3 | 111 | 4 | 84 | 87.5 | 91 | 4 |
| | TETRACHLORO-M-XYLENE (SURR) | 70 | 84.3 | 103 | 14 | 61 | 83.3 | 112 | 11 | 58 | 76.2 | 105 | 11 |

1 Minimum values less than 75 percent and maximum values greater than 125 percent are highlighted.

EXP = Explosives
HERB = Herbicides
M = Metals, total
MISC = Miscellaneous parameters
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds
PEST/PCB = Pesticides/polychlorinated biphenyls

TABL

WATER DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| EXP | 1,3,5-TRINITROBENZENE | 85 | 95.3 | 105 | 4 | 97 | 99.0 | 101 | 2 | 96 | 97.5 | 99 | 2 |
| | 1,3-DINITROBENZENE | 87 | 96.5 | 107 | 4 | 98 | 100.5 | 103 | 2 | 97 | 98.5 | 100 | 2 |
| | 2,4,6-TRINITROTOLUENE | 84 | 93.8 | 103 | 4 | 96 | 98.0 | 100 | 2 | 95 | 96.5 | 98 | 2 |
| | 2,4-DINITROTOLUENE | 78 | 88.5 | 102 | 4 | 62 | 78.5 | 95 | 2 | 74 | 81.0 | 88 | 2 |
| | 2,6-DINITROTOLUENE | 82 | 93.5 | 108 | 4 | 78 | 89.0 | 100 | 2 | 80 | 86.0 | 92 | 2 |
| | 2-AMINO-4,6-DINITROTOLUENE | 84 | 94.5 | 108 | 4 | 95 | 97.5 | 100 | 2 | 93 | 94.5 | 96 | 2 |
| | 2-NITROTOLUENE | 76 | 87.0 | 100 | 4 | 88 | 91.5 | 95 | 2 | 87 | 88.5 | 90 | 2 |
| | 3,4-DINITROTOLUENE (SURR) | 96 | 104.5 | 120 | 4 | 110 | 111.5 | 113 | 2 | 104 | 104.5 | 105 | 2 |
| | 3-NITROTOLUENE | 74 | 85.3 | 97 | 4 | 87 | 91.0 | 95 | 2 | 87 | 88.0 | 89 | 2 |
| | 4-AMINO-2,6-DINITROTOLUENE | 81 | 92.3 | 108 | 4 | 93 | 95.0 | 97 | 2 | 91 | 92.5 | 94 | 2 |
| | 4-NITROTOLUENE | 79 | 89.8 | 103 | 4 | 92 | 95.0 | 98 | 2 | 89 | 91.0 | 93 | 2 |
| | HMX | 90 | 94.8 | 98 | 4 | 96 | 96.5 | 97 | 2 | 99 | 100.5 | 102 | 2 |
| | NITROBENZENE | 88 | 96.3 | 105 | 4 | 86 | 94.5 | 103 | 2 | 78 | 87.5 | 97 | 2 |
| | RDX | 96 | 100.3 | 104 | 4 | 102 | 102.5 | 103 | 2 | 105 | 106.0 | 107 | 2 |
| | TETRYL | 81 | 91.5 | 105 | 4 | 90 | 92.5 | 95 | 2 | 89 | 90.0 | 91 | 2 |
| HERB | 2,4,5-T | 74 | 79.3 | 84 | 4 | 69 | 76.5 | 85 | 4 | 70 | 78.3 | 86 | 4 |
| | 2,4,5-TP (SILVEX) | 71 | 82.0 | 99 | 4 | 70 | 76.3 | 83 | 4 | 75 | 80.5 | 89 | 4 |
| | 2,4-D | 92 | 99.0 | 107 | 4 | 84 | 95.5 | 110 | 4 | 83 | 100.0 | 109 | 4 |
| | 2,4-DICHLOROPHENYLACETIC ACID (SURR) | 84 | 98.4 | 116 | 5 | 90 | 101.8 | 121 | 5 | 91 | 97.8 | 108 | 5 |
| | DINOSEB | 59 | 63.0 | 72 | 4 | 0 | 47.8 | 70 | 4 | 0 | 49.5 | 67 | 4 |
| | HEXACHLOROPHENE | 33 | 40.4 | 47 | 5 | 24 | 38.4 | 52 | 5 | 28 | 37.6 | 44 | 5 |
| | PENTACHLOROPHENOL | 78 | 89.0 | 105 | 5 | 19 | 75.8 | 110 | 5 | 70 | 81.8 | 96 | 5 |
| Metals, Total | ALUMINUM | 95.6 | 103.1 | 106.6 | 4 | 96.1 | 99.5 | 109.1 | 4 | -- | -- | -- | -- |
| | ANTIMONY | 93.2 | 97.8 | 101.5 | 4 | 88.8 | 98.1 | 104.3 | 4 | -- | -- | -- | -- |
| | ARSENIC | 85.3 | 93.1 | 109.4 | 4 | 90.7 | 102.0 | 115.8 | 4 | -- | -- | -- | -- |
| | BARIUM | 102.5 | 106.2 | 111.2 | 4 | 87.5 | 95.5 | 101 | 3 | -- | -- | -- | -- |
| | BERYLLIUM | 89.3 | 97.1 | 106 | 4 | 72.8 | 97.4 | 112.7 | 4 | -- | -- | -- | -- |
| | CADMIUM | 94.1 | 100.0 | 107.1 | 4 | 90.9 | 101.1 | 111.9 | 4 | -- | -- | -- | -- |
| | CALCIUM | 100.2 | 111.3 | 131.6 | 4 | 109.8 | 109.8 | 109.8 | 1 | -- | -- | -- | -- |
| | CHROMIUM | 100.4 | 101.8 | 103.3 | 4 | 93.9 | 100.4 | 109.7 | 4 | -- | -- | -- | -- |
| | COBALT | 102.1 | 104.7 | 108.5 | 4 | 97.8 | 104.0 | 111.6 | 4 | -- | -- | -- | -- |
| | COPPER | 103 | 104.9 | 105.7 | 4 | 97.9 | 101.8 | 109.8 | 4 | -- | -- | -- | -- |
| | IRON | 103.4 | 105.6 | 110.3 | 4 | 95 | 100.5 | 108 | 3 | -- | -- | -- | -- |
| | LEAD | 94.4 | 104.5 | 108.6 | 4 | 99.6 | 106.7 | 113.5 | 4 | -- | -- | -- | -- |
| | MAGNESIUM | 96.4 | 103.4 | 107.1 | 4 | 96.4 | 103.6 | 110.7 | 2 | -- | -- | -- | -- |
| | MANGANESE | 101.7 | 106.4 | 113.9 | 4 | 94 | 100.5 | 106.9 | 2 | -- | -- | -- | -- |
| | MERCURY | 98 | 101.3 | 105.4 | 4 | 48.3 | 85.2 | 105.4 | 4 | -- | -- | -- | -- |
| | NICKEL | 102 | 105.0 | 108.4 | 4 | 96.3 | 102.9 | 111.2 | 4 | -- | -- | -- | -- |
| | POTASSIUM | 95.1 | 101.4 | 105.4 | 4 | 94.8 | 100.7 | 109.4 | 4 | -- | -- | -- | -- |
| | SELENIUM | 90.5 | 96.8 | 114.3 | 4 | 89.6 | 101.0 | 119.9 | 4 | -- | -- | -- | -- |
| | SILVER | 99.1 | 102.4 | 107.5 | 4 | 56.1 | 78.6 | 106 | 4 | -- | -- | -- | -- |
| | SODIUM | 98.3 | 106.8 | 113.1 | 4 | 94.1 | 101.1 | 108.1 | 2 | -- | -- | -- | -- |
| | THALLIUM | 95.6 | 103.3 | 109.7 | 4 | 98.8 | 111.1 | 125 | 4 | -- | -- | -- | -- |
| | TIN | 97.7 | 102.3 | 109.3 | 4 | 91.5 | 98.6 | 106.1 | 4 | -- | -- | -- | -- |
| | VANADIUM | 98.9 | 102.7 | 109.1 | 4 | 97.8 | 103.3 | 109 | 4 | -- | -- | -- | -- |

TABLE H-9

WATER DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | ZINC | 86.3 | 93.4 | 98.4 | 4 | 84.4 | 93.1 | 103 | 4 | -- | -- | -- | -- |
| Metals, Dissolved | ALUMINUM | 102.9 | 103.8 | 104.7 | 2 | 96.1 | 101.7 | 109.9 | 3 | -- | -- | -- | -- |
| | ANTIMONY | 98.2 | 101.4 | 104.6 | 2 | 95.9 | 103.1 | 108.4 | 3 | -- | -- | -- | -- |
| | ARSENIC | 95.1 | 97.1 | 99 | 2 | 97.3 | 99.3 | 103.2 | 3 | -- | -- | -- | -- |
| | BARIUM | 106.6 | 109.0 | 111.4 | 2 | 103.7 | 110.2 | 116.9 | 3 | -- | -- | -- | -- |
| | BERYLLIUM | 101.1 | 101.8 | 102.4 | 2 | 70.4 | 87.3 | 97.8 | 3 | -- | -- | -- | -- |
| | CADMIUM | 101 | 103.3 | 105.5 | 2 | 97.6 | 100.1 | 102.5 | 3 | -- | -- | -- | -- |
| | CALCIUM | 106.3 | 107.4 | 108.4 | 2 | -- | -- | -- | -- | -- | -- | -- | -- |
| | CHROMIUM | 107.6 | 107.9 | 108.2 | 2 | 90.4 | 105.3 | 119.1 | 3 | -- | -- | -- | -- |
| | COBALT | 107.1 | 107.5 | 107.8 | 2 | 103 | 111.2 | 116.2 | 3 | -- | -- | -- | -- |
| | COPPER | 105.8 | 106.6 | 107.4 | 2 | 102.2 | 104.0 | 106.8 | 3 | -- | -- | -- | -- |
| | IRON | 107.8 | 109.7 | 111.5 | 2 | 107.7 | 118.7 | 126.8 | 3 | -- | -- | -- | -- |
| | LEAD | 111.5 | 113.1 | 114.6 | 2 | 107.4 | 111.4 | 118.2 | 3 | -- | -- | -- | -- |
| | MAGNESIUM | 102.8 | 105.1 | 107.4 | 2 | 109.4 | 114.0 | 118.6 | 2 | -- | -- | -- | -- |
| | MANGANESE | 107.9 | 109.7 | 111.4 | 2 | 107.7 | 112.0 | 116.3 | 2 | -- | -- | -- | -- |
| | MERCURY | 101.9 | 102.7 | 103.4 | 2 | 98.2 | 98.5 | 98.7 | 2 | -- | -- | -- | -- |
| | NICKEL | 103.4 | 104.6 | 105.7 | 2 | 100.7 | 107.1 | 110.5 | 3 | -- | -- | -- | -- |
| | POTASSIUM | 100.8 | 101.5 | 102.2 | 2 | 98.6 | 107.3 | 124.3 | 3 | -- | -- | -- | -- |
| | SELENIUM | 94.6 | 95.0 | 95.3 | 2 | 94.3 | 95.3 | 96.8 | 3 | -- | -- | -- | -- |
| | SILVER | 103.2 | 103.2 | 103.2 | 2 | 60 | 88.0 | 102.5 | 3 | -- | -- | -- | -- |
| | SODIUM | 104.1 | 105.3 | 106.5 | 2 | 97.6 | 100.7 | 103.8 | 2 | -- | -- | -- | -- |
| | THALLIUM | 113.3 | 114.4 | 115.5 | 2 | 109.1 | 113.3 | 118.9 | 3 | -- | -- | -- | -- |
| | TIN | 103.9 | 106.4 | 108.9 | 2 | 104.3 | 106.6 | 107.9 | 3 | -- | -- | -- | -- |
| | VANADIUM | 107.2 | 108.8 | 110.4 | 2 | 109.8 | 117.5 | 122.6 | 3 | -- | -- | -- | -- |
| | ZINC | 97.2 | 97.5 | 97.7 | 2 | 92.2 | 95.8 | 98.2 | 3 | -- | -- | -- | -- |
| MISC | TOTAL ORGANIC CARBON | 106 | 106.0 | 106 | 1 | -- | -- | -- | -- | -- | -- | -- | -- |
| SVOC | 1,2,4-TRICHLOROBENZENE | 50 | 64.0 | 75 | 5 | 45 | 50.7 | 58 | 3 | 48 | 51.7 | 55 | 3 |
| | 1,2-DICHLOROBENZENE | 46 | 61.2 | 70 | 5 | 49 | 53.0 | 60 | 3 | 46 | 52.3 | 59 | 3 |
| | 1,3-DICHLOROBENZENE | 38 | 56.4 | 65 | 5 | 48 | 50.7 | 56 | 3 | 43 | 50.7 | 61 | 3 |
| | 1,4-DICHLOROBENZENE | 42 | 57.4 | 70 | 5 | 47 | 50.3 | 55 | 3 | 43 | 49.7 | 56 | 3 |
| | 1-FLUORONAPHTHALENE (SURR) | 52 | 55.0 | 59 | 4 | 49 | 54.0 | 59 | 3 | 52 | 58.3 | 66 | 3 |
| | 2,2'-OXYBIS(1-CHLOROPROPANE) | 80 | 94.0 | 105 | 5 | 82 | 90.3 | 96 | 3 | 88 | 91.7 | 98 | 3 |
| | 2,4,5-TRICHLOROPHENOL | 65 | 78.0 | 90 | 5 | 24 | 44.0 | 77 | 3 | 42 | 65.7 | 82 | 3 |
| | 2,4,6-TRIBROMOPHENOL (SURR) | 77 | 90.0 | 100 | 5 | 37 | 59.3 | 92 | 3 | 66 | 84.7 | 95 | 3 |
| | 2,4,6-TRICHLOROPHENOL | 65 | 76.0 | 90 | 5 | 20 | 43.3 | 74 | 3 | 45 | 67.0 | 79 | 3 |
| | 2,4-DICHLOROPHENOL | 60 | 71.0 | 80 | 5 | 23 | 44.7 | 72 | 3 | 48 | 64.0 | 73 | 3 |
| | 2,4-DIMETHYLPHENOL | 50 | 69.0 | 90 | 5 | 63 | 73.7 | 87 | 3 | 59 | 76.7 | 89 | 3 |
| | 2,4-DINITROPHENOL | 34 | 51.4 | 65 | 5 | 0 | 25.0 | 61 | 3 | 16 | 29.0 | 53 | 3 |
| | 2-CHLORONAPHTHALENE | 55 | 64.0 | 70 | 5 | 54 | 57.3 | 62 | 3 | 59 | 60.7 | 63 | 3 |
| | 2-CHLOROPHENOL | 50 | 73.0 | 90 | 5 | 25 | 51.0 | 71 | 3 | 59 | 68.0 | 79 | 3 |
| | 2-FLUOROBIPHENYL (SURR) | 65 | 68.6 | 71 | 5 | 55 | 60.3 | 65 | 3 | 61 | 62.7 | 66 | 3 |
| | 2-FLUOROPHENOL (SURR) | 22 | 51.6 | 70 | 5 | 6 | 28.0 | 43 | 3 | 33 | 42.7 | 55 | 3 |
| | 2-METHYLNAPHTHALENE | 44 | 51.3 | 58 | 4 | 42 | 44.7 | 50 | 3 | 42 | 44.7 | 50 | 3 |
| | 2-METHYLPHENOL | 65 | 81.0 | 95 | 5 | 63 | 74.0 | 80 | 3 | 77 | 78.0 | 79 | 3 |
| | 2-NITROANILINE | 75 | 88.0 | 95 | 5 | 70 | 77.7 | 85 | 3 | 73 | 82.0 | 88 | 3 |

TABL

WATER DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | 2-NITROPHENOL | 55 | 74.0 | 90 | 5 | 0 | 32.0 | 80 | 3 | 21 | 47.3 | 67 | 3 |
| | 3&4-METHYLPHENOL | 75 | 85.0 | 100 | 5 | 57 | 70.7 | 80 | 3 | 75 | 78.3 | 80 | 3 |
| | 3,3'-DICHLOROBENZIDINE | 9 | 54.8 | 80 | 5 | 7 | 40.7 | 81 | 3 | 0 | 38.7 | 77 | 3 |
| | 3-NITROANILINE | 50 | 75.0 | 100 | 5 | 55 | 71.0 | 87 | 3 | 67 | 72.7 | 82 | 3 |
| | 4,6-DINITRO-2-METHYLPHENOL | 60 | 70.0 | 95 | 5 | 0 | 26.0 | 67 | 3 | 12 | 34.3 | 74 | 3 |
| | 4-BROMOPHENYL PHENYL ETHER | 80 | 94.0 | 105 | 5 | 86 | 97.0 | 105 | 3 | 88 | 98.3 | 104 | 3 |
| | 4-CHLORO-3-METHYLPHENOL | 75 | 84.0 | 95 | 5 | 60 | 67.0 | 72 | 3 | 70 | 76.7 | 82 | 3 |
| | 4-CHLOROANILINE | 35 | 57.8 | 75 | 5 | 46 | 55.3 | 62 | 3 | 43 | 57.7 | 74 | 3 |
| | 4-CHLOROPHENYL PHENYL ETHER | 75 | 90.0 | 100 | 5 | 76 | 87.7 | 97 | 3 | 79 | 91.3 | 100 | 3 |
| | 4-NITROANILINE | 60 | 79.0 | 105 | 5 | 46 | 67.7 | 81 | 3 | 54 | 69.7 | 84 | 3 |
| | 4-NITROPHENOL | 50 | 61.0 | 75 | 5 | 0 | 19.3 | 58 | 3 | 0 | 38.7 | 65 | 3 |
| | ACENAPHTHENE | 57 | 61.5 | 68 | 4 | 50 | 55.7 | 67 | 3 | 50 | 55.7 | 67 | 3 |
| | ACENAPHTHYLENE | 57 | 61.3 | 72 | 4 | 58 | 61.0 | 67 | 3 | 58 | 63.7 | 75 | 3 |
| | ANTHRACENE | 58 | 65.8 | 73 | 4 | 67 | 72.3 | 83 | 3 | 67 | 67.7 | 69 | 3 |
| | BENZO(A)ANTHRACENE | 73 | 74.8 | 77 | 4 | 67 | 80.7 | 108 | 3 | 67 | 68.3 | 71 | 3 |
| | BENZO(A)PYRENE | 54 | 61.3 | 70 | 4 | 58 | 72.0 | 100 | 3 | 55 | 60.0 | 67 | 3 |
| | BENZO(B)FLUORANTHENE | 68 | 75.8 | 83 | 4 | 67 | 91.7 | 125 | 3 | 67 | 73.3 | 78 | 3 |
| | BENZO(G,H,I)PERYLENE | 64 | 82.5 | 100 | 4 | 58 | 75.0 | 100 | 3 | 58 | 71.0 | 83 | 3 |
| | BENZO(K)FLUORANTHENE | 63 | 72.8 | 78 | 4 | 67 | 80.7 | 100 | 3 | 67 | 72.7 | 76 | 3 |
| | BENZYL ALCOHOL | 75 | 90.0 | 110 | 5 | 80 | 83.0 | 86 | 3 | 82 | 88.0 | 94 | 3 |
| | BIS(2-CHLOROETHOXY)METHANE | 41 | 63.2 | 75 | 5 | 58 | 62.3 | 68 | 3 | 63 | 65.3 | 68 | 3 |
| | BIS(2-CHLOROETHYL)ETHER | 70 | 86.0 | 100 | 5 | 82 | 88.3 | 94 | 3 | 84 | 89.3 | 94 | 3 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | 70 | 94.0 | 115 | 5 | 93 | 112.0 | 122 | 3 | 91 | 110.0 | 121 | 3 |
| | BUTYL BENZYL PHTHALATE | 65 | 85.0 | 100 | 5 | 75 | 87.3 | 94 | 3 | 73 | 88.3 | 98 | 3 |
| | CHRYSENE | 76 | 80.5 | 83 | 4 | 67 | 83.3 | 108 | 3 | 67 | 70.0 | 75 | 3 |
| | DIBENZO(A,H)ANTHRACENE | 63 | 80.3 | 92 | 4 | 58 | 69.3 | 83 | 3 | 67 | 77.7 | 83 | 3 |
| | DIBENZOFURAN | 80 | 85.0 | 90 | 5 | 77 | 81.7 | 89 | 3 | 81 | 85.7 | 88 | 3 |
| | DIETHYL PHTHALATE | 70 | 89.0 | 105 | 5 | 70 | 87.0 | 97 | 3 | 73 | 87.7 | 98 | 3 |
| | DIMETHYL PHTHALATE | 75 | 85.0 | 95 | 5 | 71 | 80.3 | 88 | 3 | 74 | 82.3 | 88 | 3 |
| | DI-N-BUTYL PHTHALATE | 70 | 96.0 | 115 | 5 | 69 | 94.7 | 111 | 3 | 70 | 97.0 | 111 | 3 |
| | DI-N-OCTYL PHTHALATE | 75 | 97.0 | 120 | 5 | 84 | 103.7 | 118 | 3 | 84 | 104.0 | 115 | 3 |
| | DIPHENYLAMINE | 49 | 73.8 | 90 | 5 | 58 | 78.3 | 90 | 3 | 60 | 76.0 | 84 | 3 |
| | FLUORANTHENE | 68 | 79.3 | 83 | 4 | 67 | 97.3 | 150 | 3 | 65 | 66.3 | 67 | 3 |
| | FLUORENE | 58 | 63.5 | 70 | 4 | 67 | 72.3 | 83 | 3 | 58 | 66.7 | 75 | 3 |
| | FLUORENE-D10 (SURR) | 64 | 70.0 | 75 | 4 | 74 | 79.0 | 84 | 3 | 77 | 84.0 | 96 | 3 |
| | HEXACHLOROBENZENE | 90 | 109.0 | 125 | 5 | 96 | 110.3 | 120 | 3 | 93 | 108.7 | 118 | 3 |
| | HEXACHLOROBUTADIENE | 45 | 57.0 | 65 | 5 | 43 | 45.0 | 49 | 3 | 39 | 44.3 | 52 | 3 |
| | HEXACHLOROCYCLOPENTADIENE | 22 | 30.6 | 44 | 5 | 22 | 24.3 | 29 | 3 | 22 | 26.0 | 30 | 3 |
| | HEXACHLOROETHANE | 44 | 59.8 | 70 | 5 | 47 | 48.7 | 51 | 3 | 44 | 48.7 | 56 | 3 |
| | INDENO(1,2,3-CD)PYRENE | 61 | 77.0 | 83 | 4 | 58 | 72.3 | 92 | 3 | 67 | 74.7 | 83 | 3 |
| | ISOPHORONE | 55 | 70.0 | 90 | 5 | 44 | 58.3 | 79 | 3 | 50 | 62.0 | 82 | 3 |
| | NAPHTHALENE | 48 | 53.3 | 60 | 4 | 42 | 50.0 | 58 | 3 | 42 | 47.3 | 58 | 3 |
| | NITROBENZENE-D5 (SURR) | 71 | 78.4 | 83 | 5 | 59 | 67.0 | 73 | 3 | 64 | 69.3 | 76 | 3 |
| | N-NITROSODIMETHYLAMINE | 75 | 89.0 | 100 | 5 | 73 | 82.0 | 92 | 3 | 76 | 87.3 | 96 | 3 |
| | N-NITROSO-DI-N-PROPYLAMINE | 95 | 96.0 | 100 | 5 | 75 | 85.3 | 95 | 3 | 81 | 89.3 | 97 | 3 |

TABLE H-9

WATER DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | PHENANTHRENE | 69 | 74.8 | 79 | 4 | 67 | 97.3 | 150 | 3 | 69 | 73.0 | 75 | 3 |
| | PHENOL | 50 | 70.0 | 80 | 5 | 37 | 55.3 | 70 | 3 | 65 | 67.7 | 71 | 3 |
| | PHENOL-D5 (SURR) | 47 | 68.2 | 82 | 5 | 35 | 56.0 | 73 | 3 | 63 | 67.7 | 75 | 3 |
| | PYRENE | 72 | 83.8 | 100 | 4 | 75 | 111.0 | 175 | 3 | 72 | 82.3 | 92 | 3 |
| | PYRENE-D10 (SURR) | 70 | 88.0 | 100 | 4 | 86 | 97.7 | 116 | 3 | 89 | 101.7 | 120 | 3 |
| | TERPHENYL-D14 (SURR) | 79 | 88.2 | 102 | 5 | 78 | 80.0 | 82 | 3 | 68 | 76.0 | 83 | 3 |
| VOC | 1,1,1,2-TETRACHLOROETHANE | 90 | 99.3 | 104 | 6 | 98 | 99.7 | 102 | 3 | 98 | 98.7 | 99 | 3 |
| | 1,1,1-TRICHLOROETHANE | 90 | 101.3 | 112 | 6 | 101 | 103.7 | 106 | 3 | 100 | 101.7 | 103 | 3 |
| | 1,1,2,2-TETRACHLOROETHANE | 90 | 98.3 | 104 | 6 | 105 | 106.3 | 109 | 3 | 104 | 106.3 | 109 | 3 |
| | 1,1,2-TRICHLOROETHANE | 88 | 97.3 | 106 | 6 | 99 | 101.3 | 105 | 3 | 97 | 101.3 | 105 | 3 |
| | 1,1-DICHLOROETHANE | 90 | 101.0 | 108 | 6 | 104 | 107.7 | 114 | 3 | 103 | 105.3 | 108 | 3 |
| | 1,1-DICHLOROETHENE | 76 | 94.0 | 104 | 6 | 94 | 99.7 | 108 | 3 | 93 | 99.7 | 110 | 3 |
| | 1,2,3-TRICHLOROPROPANE | 86 | 96.3 | 102 | 6 | 99 | 100.0 | 102 | 3 | 100 | 100.7 | 102 | 3 |
| | 1,2-DIBROMO-3-CHLOROPROPANE | 86 | 98.0 | 104 | 6 | 93 | 96.7 | 101 | 3 | 97 | 99.7 | 105 | 3 |
| | 1,2-DIBROMOETHANE | 90 | 98.7 | 104 | 6 | 99 | 101.3 | 103 | 3 | 100 | 101.7 | 104 | 3 |
| | 1,2-DICHLOROETHANE | 94 | 98.3 | 102 | 6 | 102 | 105.0 | 110 | 3 | 100 | 103.3 | 107 | 3 |
| | 1,2-DICHLOROETHANE-D4 (SURR) | 81 | 93.3 | 99 | 6 | 88 | 96.0 | 101 | 3 | 89 | 95.7 | 100 | 3 |
| | 1,2-DICHLOROPROPANE | 96 | 101.0 | 110 | 6 | 105 | 108.0 | 111 | 3 | 104 | 107.0 | 110 | 3 |
| | 2-BUTANONE | 76 | 91.3 | 114 | 6 | 92 | 99.0 | 110 | 3 | 89 | 98.7 | 115 | 3 |
| | 2-HEXANONE | 80 | 96.7 | 106 | 6 | 94 | 101.0 | 110 | 3 | 95 | 101.3 | 111 | 3 |
| | 4-BROMOFLUOROBENZENE (SURR) | 89 | 95.8 | 98 | 6 | 94 | 96.7 | 100 | 3 | 97 | 97.3 | 98 | 3 |
| | 4-METHYL-2-PENTANONE | 84 | 103.0 | 118 | 6 | 108 | 112.0 | 119 | 3 | 110 | 115.0 | 124 | 3 |
| | ACETONE | 66 | 82.0 | 110 | 6 | 72 | 84.0 | 107 | 3 | 72 | 89.0 | 121 | 3 |
| | BENZENE | 90 | 97.7 | 104 | 6 | 100 | 104.7 | 109 | 3 | 96 | 101.7 | 105 | 3 |
| | BROMODICHLOROMETHANE | 88 | 92.0 | 96 | 6 | 95 | 96.7 | 99 | 3 | 94 | 95.3 | 97 | 3 |
| | BROMOFORM | 80 | 93.0 | 102 | 6 | 88 | 91.0 | 95 | 3 | 86 | 91.3 | 98 | 3 |
| | BROMOMETHANE | 94 | 118.3 | 160 | 6 | 101 | 132.7 | 163 | 3 | 99 | 126.0 | 147 | 3 |
| | CARBON DISULFIDE | 84 | 97.3 | 102 | 6 | 88 | 98.0 | 108 | 3 | 83 | 95.7 | 105 | 3 |
| | CARBON TETRACHLORIDE | 94 | 101.3 | 112 | 6 | 101 | 104.3 | 109 | 3 | 100 | 101.3 | 103 | 3 |
| | CHLOROBENZENE | 88 | 95.7 | 102 | 6 | 97 | 98.3 | 100 | 3 | 96 | 97.3 | 100 | 3 |
| | CHLORODIBROMOMETHANE | 90 | 95.7 | 102 | 6 | 97 | 99.3 | 102 | 3 | 97 | 99.3 | 101 | 3 |
| | CHLOROETHANE | 94 | 102.0 | 110 | 6 | 104 | 110.0 | 118 | 3 | 100 | 105.3 | 110 | 3 |
| | CHLOROFORM | 92 | 99.7 | 106 | 6 | 103 | 105.7 | 110 | 3 | 100 | 103.7 | 108 | 3 |
| | CHLOROMETHANE | 82 | 96.3 | 118 | 6 | 96 | 107.7 | 128 | 3 | 93 | 104.0 | 119 | 3 |
| | CIS-1,2-DICHLOROETHENE | 92 | 100.3 | 108 | 6 | 99 | 104.3 | 108 | 3 | 99 | 103.3 | 108 | 3 |
| | CIS-1,3-DICHLOROPROPENE | 98 | 107.3 | 116 | 6 | 102 | 106.7 | 110 | 3 | 102 | 107.0 | 111 | 3 |
| | DIBROMOFLUOROMETHANE (SURR) | 91 | 96.8 | 101 | 6 | 95 | 97.7 | 100 | 3 | 95 | 97.3 | 99 | 3 |
| | DIBROMOMETHANE | 96 | 102.3 | 110 | 6 | 102 | 107.0 | 110 | 3 | 101 | 106.3 | 113 | 3 |
| | DICHLORODIFLUOROMETHANE | 94 | 117.7 | 158 | 6 | 97 | 120.3 | 142 | 3 | 97 | 120.7 | 147 | 3 |
| | ETHYLBENZENE | 90 | 97.7 | 106 | 6 | 101 | 102.7 | 105 | 3 | 96 | 99.7 | 104 | 3 |
| | METHYL TERT-BUTYL ETHER | 84.1 | 99.0 | 104 | 6 | 100 | 101.3 | 102 | 3 | 101 | 103.3 | 105 | 3 |
| | METHYLENE CHLORIDE | 88 | 96.7 | 102 | 6 | 96 | 101.0 | 108 | 3 | 97 | 100.7 | 106 | 3 |
| | STYRENE | 98 | 103.7 | 108 | 6 | 106 | 109.3 | 112 | 3 | 106 | 107.3 | 109 | 3 |
| | TETRACHLOROETHENE | 80 | 87.3 | 92 | 6 | 85 | 87.0 | 89 | 3 | 85 | 85.7 | 87 | 3 |
| | TOLUENE | 88 | 96.3 | 106 | 6 | 99 | 100.7 | 103 | 3 | 96 | 98.3 | 102 | 3 |

TABL

WATER DATA PERCENT RECOVERY STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | LABORATORY CONTROL SAMPLE | | | | MATRIX SPIKE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | TOLUENE-D8 (SURR) | 91 | 95.5 | 99 | 6 | 95 | 96.3 | 98 | 3 | 93 | 96.0 | 99 | 3 |
| | TOTAL XYLENES | 93 | 102.2 | 113 | 6 | 101 | 104.7 | 111 | 3 | 99 | 102.7 | 110 | 3 |
| | TRANS-1,2-DICHLOROETHENE | 84 | 95.7 | 106 | 6 | 96 | 100.0 | 106 | 3 | 94 | 99.0 | 103 | 3 |
| | TRANS-1,3-DICHLOROPROPENE | 96 | 101.3 | 106 | 6 | 100 | 100.3 | 101 | 3 | 99 | 99.7 | 100 | 3 |
| | TRICHLOROETHENE | 90 | 100.3 | 106 | 6 | 99 | 100.7 | 102 | 3 | 98 | 100.0 | 102 | 3 |
| | TRICHLOROFLUOROMETHANE | 92 | 99.3 | 108 | 6 | 90 | 100.3 | 112 | 3 | 90 | 98.3 | 108 | 3 |
| | VINYL CHLORIDE | 98 | 106.0 | 122 | 6 | 102 | 111.7 | 126 | 3 | 103 | 109.7 | 121 | 3 |
| PEST/PCB | 4,4'-DDD | 105 | 112.8 | 127 | 4 | 111 | 114.5 | 118 | 2 | 105 | 115.5 | 126 | 2 |
| | 4,4'-DDE | 108 | 114.3 | 122 | 4 | 111 | 112.0 | 113 | 2 | 106 | 111.0 | 116 | 2 |
| | 4,4'-DDT | 105 | 114.5 | 120 | 4 | 104 | 111.5 | 119 | 2 | 112 | 112.0 | 112 | 2 |
| | ALDRIN | 90 | 93.8 | 103 | 4 | 88 | 93.0 | 98 | 2 | 84 | 88.5 | 93 | 2 |
| | ALPHA-BHC | 96 | 100.5 | 103 | 4 | 95 | 96.5 | 98 | 2 | 90 | 95.5 | 101 | 2 |
| | ALPHA-CHLORDANE | 101 | 105.8 | 110 | 4 | 96 | 97.0 | 98 | 2 | 95 | 97.5 | 100 | 2 |
| | AROCLOR-1016 | 89 | 94.0 | 99 | 4 | 91 | 93.3 | 97 | 3 | 90 | 94.7 | 100 | 3 |
| | AROCLOR-1260 | 97 | 105.0 | 119 | 4 | 95 | 101.3 | 112 | 3 | 96 | 103.7 | 118 | 3 |
| | BETA-BHC | 94 | 99.5 | 102 | 4 | 82 | 87.0 | 92 | 2 | 85 | 91.5 | 98 | 2 |
| | DECACHLOROBIPHENYL (SURR) | 85 | 94.4 | 114 | 8 | 78 | 83.0 | 91 | 5 | 80 | 82.2 | 86 | 5 |
| | DELTA-BHC | 90 | 96.5 | 102 | 4 | 87 | 90.5 | 94 | 2 | 87 | 90.5 | 94 | 2 |
| | DIELDRIN | 108 | 111.3 | 114 | 4 | 102 | 103.0 | 104 | 2 | 101 | 104.5 | 108 | 2 |
| | ENDOSULFAN I | 105 | 108.8 | 112 | 4 | 101 | 102.5 | 104 | 2 | 100 | 102.0 | 104 | 2 |
| | ENDOSULFAN II | 105 | 111.8 | 116 | 4 | 103 | 103.0 | 103 | 2 | 101 | 105.0 | 109 | 2 |
| | ENDOSULFAN SULFATE | 102 | 107.5 | 110 | 4 | 98 | 99.0 | 100 | 2 | 96 | 101.0 | 106 | 2 |
| | ENDRIN | 112 | 116.8 | 122 | 4 | 107 | 109.0 | 111 | 2 | 106 | 109.5 | 113 | 2 |
| | ENDRIN ALDEHYDE | 86 | 89.0 | 95 | 4 | 63 | 66.5 | 70 | 2 | 61 | 71.0 | 81 | 2 |
| | ENDRIN KETONE | 106 | 111.0 | 113 | 4 | 105 | 105.5 | 106 | 2 | 99 | 105.0 | 111 | 2 |
| | GAMMA-BHC (LINDANE) | 99 | 104.3 | 107 | 4 | 100 | 100.5 | 101 | 2 | 96 | 98.5 | 101 | 2 |
| | GAMMA-CHLORDANE | 101 | 105.3 | 109 | 4 | 96 | 98.5 | 101 | 2 | 97 | 98.5 | 100 | 2 |
| | HEPTACHLOR | 93 | 96.5 | 103 | 4 | 89 | 94.5 | 100 | 2 | 88 | 90.5 | 93 | 2 |
| | HEPTACHLOR EPOXIDE | 104 | 108.3 | 111 | 4 | 100 | 101.0 | 102 | 2 | 100 | 103.5 | 107 | 2 |
| | METHOXYCHLOR | 109 | 113.0 | 121 | 4 | 111 | 115.0 | 119 | 2 | 111 | 115.0 | 119 | 2 |
| | TETRACHLORO-M-XYLENE (SURR) | 60 | 71.6 | 81 | 8 | 55 | 65.6 | 76 | 5 | 55 | 61.4 | 66 | 5 |

1 Minimum values less than 75 percent and maximum values greater than 125 percent are highlighted. Compounds with severe low bias are also highlighted.

HERB = Herbicides
M = Metals, total
MF = Metals, dissolved
MISC = Miscellaneous parameters
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds

# FIELD DUPLICATE PRECISION SUMMARY
## SWMU 15 (ROADS AND GROUNDS)

## NSWC CRANE
## CRANE, INDIANA



| Fraction | Sample | Parameter | GROUND WATER RPD > 30% | SEDIMENT RPD > 50% | SOIL RPD > 50% | SURFACE WATER RPD > 30% |
|---|---|---|---|---|---|---|
| HERB | 15GWTW006 | 2,4,5-TP (SILVEX) | 40.0 | -- | -- | -- |
| Metals, Total | 15GWTW006 | ALUMINUM | 33.5 | -- | -- | -- |
| | | ANTIMONY | 50.0 | -- | -- | -- |
| | | ZINC | 54.5 | -- | -- | -- |
| | 15SB0060206 | BARIUM | -- | -- | 70.0 | -- |
| | | CADMIUM | -- | -- | 63.0 | -- |
| | | CALCIUM | -- | -- | 106.0 | -- |
| | | LEAD | -- | -- | 50.2 | -- |
| | | MANGANESE | -- | -- | 68.1 | -- |
| | | SELENIUM | -- | -- | 62.3 | -- |
| | | SILVER | -- | -- | 52.0 | -- |
| | | THALLIUM | -- | -- | 52.6 | -- |
| | 15SB0140206 | ALUMINUM | -- | -- | 62.9 | -- |
| | | ANTIMONY | -- | -- | 84.3 | -- |
| | | BERYLLIUM | -- | -- | 54.5 | -- |
| | | IRON | -- | -- | 91.8 | -- |
| | | MAGNESIUM | -- | -- | 80.8 | -- |
| | | THALLIUM | -- | -- | 70.0 | -- |
| | 15SB0480206 | ANTIMONY | -- | -- | 73.7 | -- |
| | | ARSENIC | -- | -- | 94.1 | -- |
| | | CALCIUM | -- | -- | 81.4 | -- |
| | | COBALT | -- | -- | 63.5 | -- |
| | | MANGANESE | -- | -- | 91.5 | -- |
| | | MERCURY | -- | -- | 75.0 | -- |
| | 15SD0050006 | BARIUM | -- | 86.8 | -- | -- |
| | | MERCURY | -- | 58.8 | -- | -- |
| | | SELENIUM | -- | 55.6 | -- | -- |
| | | SILVER | -- | 50.0 | -- | -- |
| | | THALLIUM | -- | 66.7 | -- | -- |
| | 15SS0620002 | ANTIMONY | -- | -- | 54.5 | -- |
| | 15SW00601 | ANTIMONY | -- | -- | -- | 91.4 |
| | | BERYLLIUM | -- | -- | -- | 147.8 |

TABLE H-10

FIELD DUPLICATE PRECISION SUMMARY
SWMU 15 (ROADS AND GROUNDS)

NSWC CRANE
CRANE, INDIANA



| | | | | | | |
|---|---|---|---|---|---|---|
| | | CADMIUM | -- | -- | -- | 91.9 |
| | | SILVER | -- | -- | -- | 152.9 |
| | | THALLIUM | -- | -- | -- | 40.0 |
| | | TIN | -- | -- | -- | 128.4 |
| Metals, Dissolved | 15SW00601-F | ANTIMONY | -- | -- | -- | 139.8 |
| | | ARSENIC | -- | -- | -- | 56.4 |
| | | CADMIUM | -- | -- | -- | 42.4 |
| | | IRON | -- | -- | -- | 52.4 |
| | | LEAD | -- | -- | -- | 84.0 |
| | | SILVER | -- | -- | -- | 137.1 |
| SVOC | 15SB0060206 | 2-METHYLNAPHTHALENE | -- | -- | 72.7 | -- |
| | | ANTHRACENE | -- | -- | 94.7 | -- |
| | | BENZO(A)ANTHRACENE | -- | -- | 100.0 | -- |
| | | BENZO(A)PYRENE | -- | -- | 95.1 | -- |
| | | BENZO(B)FLUORANTHENE | -- | -- | 118.8 | -- |
| | | BENZO(G,H,I)PERYLENE | -- | -- | 103.4 | -- |
| | | BENZO(K)FLUORANTHENE | -- | -- | 72.7 | -- |
| | | CHRYSENE | -- | -- | 98.9 | -- |
| | | DIBENZO(A,H)ANTHRACENE | -- | -- | 100.2 | -- |
| | | FLUORANTHENE | -- | -- | 105.1 | -- |
| | | INDENO(1,2,3-CD)PYRENE | -- | -- | 110.2 | -- |
| | | NAPHTHALENE | -- | -- | 73.7 | -- |
| | | PHENANTHRENE | -- | -- | 98.1 | -- |
| | | PYRENE | -- | -- | 107.7 | -- |
| | 15SB0230206 | BIS(2-ETHYLHEXYL)PHTHALATE | -- | -- | 197.5 | -- |
| | | PHENANTHRENE | -- | -- | 79.1 | -- |
| | 15SB0280206 | 2-METHYLNAPHTHALENE | -- | -- | 100.0 | -- |
| | | ACENAPHTHENE | -- | -- | 110.2 | -- |
| | | ANTHRACENE | -- | -- | 126.4 | -- |
| | | BENZO(A)ANTHRACENE | -- | -- | 133.3 | -- |
| | | BENZO(A)PYRENE | -- | -- | 122.1 | -- |
| | | BENZO(B)FLUORANTHENE | -- | -- | 110.1 | -- |
| | | BENZO(G,H,I)PERYLENE | -- | -- | 101.9 | -- |
| | | BENZO(K)FLUORANTHENE | -- | -- | 144.0 | -- |
| | | CHRYSENE | -- | -- | 122.1 | -- |

TABL 10

FIELD DUPLICATE PRECISiON SUMMARY
SWMU 15 (ROADS AND GROUNDS)

NSWC CRANE
CRANE, INDIANA



| | | | | | | |
|---|---|---|---|---|---|---|
| | | DIBENZO(A,H)ANTHRACENE | -- | -- | 158.5 | -- |
| | | FLUORANTHENE | -- | -- | 127.0 | -- |
| | | FLUORENE | -- | -- | 117.2 | -- |
| | | INDENO(1,2,3-CD)PYRENE | -- | -- | 100.9 | -- |
| | | NAPHTHALENE | -- | -- | 90.9 | -- |
| | | PHENANTHRENE | -- | -- | 126.4 | -- |
| | | PYRENE | -- | -- | 145.1 | -- |
| | 15SB0480206 | BENZO(A)ANTHRACENE | -- | -- | 72.3 | -- |
| | | BENZO(A)PYRENE | -- | -- | 72.3 | -- |
| | | BENZO(B)FLUORANTHENE | -- | -- | 90.9 | -- |
| | | CHRYSENE | -- | -- | 82.4 | -- |
| | | FLUORANTHENE | -- | -- | 110.4 | -- |
| | | PHENANTHRENE | -- | -- | 127.3 | -- |
| | 15SD0050006 | FLUORENE | -- | 54.5 | -- | -- |
| | | PYRENE | -- | 58.3 | -- | -- |
| | 15SW00601 | ANTHRACENE | -- | -- | -- | 35.3 |
| | | BENZO(K)FLUORANTHENE | -- | -- | -- | 41.7 |
| VOC | 15SB0060206 | 2-BUTANONE | -- | -- | 75.3 | -- |
| | | ACETONE | -- | -- | 60.9 | -- |
| | 15SB0230206 | 2-BUTANONE | -- | -- | 100.0 | -- |
| | | ACETONE | -- | -- | 97.4 | -- |
| | | METHYLENE CHLORIDE | -- | -- | 182.7 | -- |
| | | TRICHLOROFLUOROMETHANE | -- | -- | 71.3 | -- |
| | 15SB0480206 | CARBON DISULFIDE | -- | -- | 64.9 | -- |
| | 15SS0620002 | ACETONE | -- | -- | 58.9 | -- |

HERB = Herbicides
M = Metals, total
MF = Metals, dissolved
RPD = Relative percent difference
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds

TABL. 1

WATER DATA RELATIVE PERCENT DIFFERENCE STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | units | LABORATORY DUPLICATE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| HERB | HEXACHLOROPHENE | UG/L | -- | -- | -- | -- | 2 | 13.4 | 31 | 5 |
| | PENTACHLOROPHENOL | UG/L | -- | -- | -- | -- | 0 | 36.4 | 132 | 5 |
| Metals, Total | ALUMINUM | UG/L | 2.1 | 12.9 | 30.8 | 4 | -- | -- | -- | -- |
| | ANTIMONY | UG/L | 4 | 36.8 | 74.1 | 4 | -- | -- | -- | -- |
| | BARIUM | UG/L | 3.1 | 24.3 | 58.3 | 3 | -- | -- | -- | -- |
| | CADMIUM | UG/L | 0 | 25.3 | 62.7 | 4 | -- | -- | -- | -- |
| | CALCIUM | UG/L | 1.1 | 53.4 | 105.7 | 2 | -- | -- | -- | -- |
| | COPPER | UG/L | 0.4 | 17.7 | 65.6 | 4 | -- | -- | -- | -- |
| | LEAD | UG/L | 0.6 | 10.2 | 35.6 | 4 | -- | -- | -- | -- |
| | MANGANESE | UG/L | 39 | 51.4 | 63.7 | 2 | -- | -- | -- | -- |
| | NICKEL | UG/L | 4.8 | 19.4 | 58.6 | 4 | -- | -- | -- | -- |
| | SILVER | UG/L | 0 | 22.6 | 90.4 | 4 | -- | -- | -- | -- |
| | TIN | UG/L | 0 | 28.4 | 62.1 | 4 | -- | -- | -- | -- |
| Metals, Dissolved | ALUMINUM | UG/L | 0 | 66.7 | 200 | 3 | -- | -- | -- | -- |
| | ARSENIC | UG/L | 5.8 | 23.0 | 36.6 | 3 | -- | -- | -- | -- |
| | CADMIUM | UG/L | 29.2 | 45.9 | 67.2 | 3 | -- | -- | -- | -- |
| | CHROMIUM | UG/L | 4.9 | 42.0 | 86.2 | 3 | -- | -- | -- | -- |
| | LEAD | UG/L | 27.2 | 36.3 | 47.6 | 3 | -- | -- | -- | -- |
| | ZINC | UG/L | 2.9 | 29.4 | 52.6 | 3 | -- | -- | -- | -- |
| SVOC | 2,4,5-TRICHLOROPHENOL | UG/L | -- | -- | -- | -- | 5 | 48.0 | 109 | 3 |
| | 2,4,6-TRICHLOROPHENOL | UG/L | -- | -- | -- | -- | 4 | 48.3 | 119 | 3 |
| | 2,4-DICHLOROPHENOL | UG/L | -- | -- | -- | -- | 1 | 41.3 | 102 | 3 |
| | 2,4-DINITROPHENOL | UG/L | -- | -- | -- | -- | 109 | 141.7 | 200 | 3 |
| | 2-CHLOROPHENOL | UG/L | -- | -- | -- | -- | 3 | 34.7 | 90 | 3 |
| | 2-NITROPHENOL | UG/L | -- | -- | -- | -- | 39 | 120.7 | 200 | 3 |
| | 3&4-METHYLPHENOL | UG/L | -- | -- | -- | -- | 0 | 11.3 | 34 | 3 |
| | 3,3'-DICHLOROBENZIDINE | UG/L | -- | -- | -- | -- | 5 | 114.7 | 200 | 3 |
| | 4,6-DINITRO-2-METHYLPHENOL | UG/L | -- | -- | -- | -- | 119 | 155.7 | 200 | 3 |

TABLE H-11

WATER DATA RELATIVE PERCENT DIFFERENCE STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | units | LABORATORY DUPLICATE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | 4-CHLORO-3-METHYLPHENOL | UG/L | -- | -- | -- | -- | 1 | 13.3 | 31 | 3 |
| | 4-NITROPHENOL | UG/L | -- | -- | -- | -- | 0 | 71.0 | 200 | 3 |
| | BENZO(A)ANTHRACENE | UG/L | -- | -- | -- | -- | 0 | 13.7 | 41 | 3 |
| | BENZO(A)PYRENE | UG/L | -- | -- | -- | -- | 0 | 24.0 | 58 | 3 |
| | BENZO(B)FLUORANTHENE | UG/L | -- | -- | -- | -- | 11 | 26.0 | 46 | 3 |
| | BENZO(G,H,I)PERYLENE | UG/L | -- | -- | -- | -- | 0 | 18.0 | 33 | 3 |
| | CHRYSENE | UG/L | -- | -- | -- | -- | 11 | 22.3 | 45 | 3 |
| | FLUORANTHENE | UG/L | -- | -- | -- | -- | 0 | 30.0 | 79 | 3 |
| | PHENANTHRENE | UG/L | -- | -- | -- | -- | 0 | 28.3 | 74 | 3 |
| | PHENOL | UG/L | -- | -- | -- | -- | 1 | 23.0 | 58 | 3 |
| | PYRENE | UG/L | -- | -- | -- | -- | 10 | 34.3 | 83 | 3 |

1 Relative Percent Difference values that exceed 30 percent are highlighted.

HERB = Herbicides
MG/L = milligrams per Liter
SVOC = Semivolatile organic compounds
UG/L = micrograms per Liter

TABL .2

SOIL DATA RELATIVE PERCENT DIFFERENCE STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | units | LABORATORY DUPLICATE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| Metals, Total | ANTIMONY | MG/KG | 2.2 | 21.8 | 61.4 | 10 | -- | -- | -- | -- |
| | ARSENIC | MG/KG | 1.0 | 32.7 | 96.3 | 10 | -- | -- | -- | -- |
| | CADMIUM | MG/KG | 2.3 | 17.4 | 54.1 | 10 | -- | -- | -- | -- |
| | CALCIUM | MG/KG | 1.3 | 17.2 | 58.2 | 7 | -- | -- | -- | -- |
| | CHROMIUM | MG/KG | 0.9 | 26.1 | 95.3 | 10 | -- | -- | -- | -- |
| | COPPER | MG/KG | 0.5 | 19.0 | 77.8 | 10 | -- | -- | -- | -- |
| | LEAD | MG/KG | 1.0 | 30.9 | 76.0 | 10 | -- | -- | -- | -- |
| | MERCURY | MG/KG | 0.0 | 17.1 | 69.7 | 10 | -- | -- | -- | -- |
| | NICKEL | MG/KG | 0.6 | 15.2 | 50.7 | 10 | -- | -- | -- | -- |
| | SELENIUM | MG/KG | 1.1 | 22.4 | 59.6 | 10 | -- | -- | -- | -- |
| | SILVER | MG/KG | 4.8 | 33.1 | 92.6 | 10 | -- | -- | -- | -- |
| | THALLIUM | MG/KG | 0.7 | 17.2 | 63.2 | 10 | -- | -- | -- | -- |
| | TIN | MG/KG | 0.3 | 24.8 | 98.6 | 10 | -- | -- | -- | -- |
| | VANADIUM | MG/KG | 0.0 | 19.6 | 74.8 | 10 | -- | -- | -- | -- |
| | ZINC | MG/KG | 0.1 | 18.6 | 67.8 | 9 | -- | -- | -- | -- |
| SVOC | 2-METHYLNAPHTHALENE | UG/KG | -- | -- | -- | -- | 2.0 | 14.5 | 51.0 | 12 |
| | 3,3'-DICHLOROBENZIDINE | UG/KG | -- | -- | -- | -- | 0.0 | 50.9 | 200.0 | 10 |
| | 4-CHLOROANILINE | UG/KG | -- | -- | -- | -- | 5.0 | 54.1 | 200.0 | 10 |
| | ACENAPHTHENE | UG/KG | -- | -- | -- | -- | 0.0 | 11.0 | 57.0 | 12 |
| | ACENAPHTHYLENE | UG/KG | -- | -- | -- | -- | 0.0 | 10.4 | 55.0 | 12 |
| | BENZO(A)PYRENE | UG/KG | -- | -- | -- | -- | 0.0 | 17.1 | 71.0 | 12 |
| | BENZO(B)FLUORANTHENE | UG/KG | -- | -- | -- | -- | 0.0 | 16.0 | 55.0 | 12 |
| | BENZO(G,H,I)PERYLENE | UG/KG | -- | -- | -- | -- | 0.0 | 15.0 | 64.0 | 12 |
| | DIBENZO(A,H)ANTHRACENE | UG/KG | -- | -- | -- | -- | 3.0 | 15.0 | 53.0 | 12 |
| | DIPHENYLAMINE | UG/KG | -- | -- | -- | -- | 0.0 | 8.8 | 56.0 | 10 |
| | FLUORENE | UG/KG | -- | -- | -- | -- | 0.0 | 11.1 | 55.0 | 12 |
| | HEXACHLOROCYCLOPENTADIENE | UG/KG | -- | -- | -- | -- | 0.0 | 44.5 | 200.0 | 10 |
| | INDENO(1,2,3-CD)PYRENE | UG/KG | -- | -- | -- | -- | 0.0 | 13.8 | 65.0 | 12 |
| | NAPHTHALENE | UG/KG | -- | -- | -- | -- | 2.0 | 15.2 | 54.0 | 12 |
| VOC | 1,1,1-TRICHLOROETHANE | UG/KG | -- | -- | -- | -- | 1.0 | 22.9 | 60.0 | 7 |

TABLE H-12

SOIL DATA RELATIVE PERCENT DIFFERENCE STATISTICS
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | units | LABORATORY DUPLICATE | | | | MATRIX SPIKE DUPLICATE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum | Average | Maximum | Count | Minimum | Average | Maximum | Count |
| | 1,1-DICHLOROETHANE | UG/KG | -- | -- | -- | -- | 1.0 | 18.1 | 51.0 | 7 |
| | 1,1-DICHLOROETHENE | UG/KG | -- | -- | -- | -- | 0.0 | 22.4 | 67.0 | 7 |
| | ACETONE | UG/KG | -- | -- | -- | -- | 2.0 | 28.3 | 98.0 | 7 |
| | BENZENE | UG/KG | -- | -- | -- | -- | 1.0 | 16.1 | 55.0 | 7 |
| | BROMOMETHANE | UG/KG | -- | -- | -- | -- | 1.0 | 34.0 | 119.0 | 7 |
| | CARBON DISULFIDE | UG/KG | -- | -- | -- | -- | 0.0 | 26.1 | 74.0 | 7 |
| | CARBON TETRACHLORIDE | UG/KG | -- | -- | -- | -- | 3.0 | 22.7 | 69.0 | 7 |
| | CHLOROETHANE | UG/KG | -- | -- | -- | -- | 0.0 | 36.1 | 105.0 | 7 |
| | CHLOROMETHANE | UG/KG | -- | -- | -- | -- | 2.0 | 38.6 | 94.0 | 7 |
| | CIS-1,2-DICHLOROETHENE | UG/KG | -- | -- | -- | -- | 3.0 | 15.0 | 52.0 | 7 |
| | DICHLORODIFLUOROMETHANE | UG/KG | -- | -- | -- | -- | 3.0 | 36.1 | 93.0 | 7 |
| | ETHYLBENZENE | UG/KG | -- | -- | -- | -- | 2.0 | 14.1 | 57.0 | 7 |
| | METHYLENE CHLORIDE | UG/KG | -- | -- | -- | -- | 3.0 | 27.9 | 60.0 | 7 |
| | TETRACHLOROETHENE | UG/KG | -- | -- | -- | -- | 2.0 | 18.6 | 61.0 | 7 |
| | TOLUENE | UG/KG | -- | -- | -- | -- | 2.0 | 12.6 | 54.0 | 7 |
| | TOTAL XYLENES | UG/KG | -- | -- | -- | -- | 2.0 | 13.9 | 55.0 | 7 |
| | TRANS-1,2-DICHLOROETHENE | UG/KG | -- | -- | -- | -- | 0.0 | 17.3 | 62.0 | 7 |
| | TRICHLOROETHENE | UG/KG | -- | -- | -- | -- | 1.0 | 18.7 | 56.0 | 6 |
| | TRICHLOROFLUOROMETHANE | UG/KG | -- | -- | -- | -- | 1.0 | 39.1 | 92.0 | 7 |
| | VINYL CHLORIDE | UG/KG | -- | -- | -- | -- | 3.0 | 40.0 | 112.0 | 7 |

1 Relative Percent Difference values that exceed 50 percent are highlighted.

MG/KG = milligrams per kilogram
SVOC = Semivolatile organic compounds
UG/KG = micrograms per kilogram
VOC = Volatile organic compounds

TABLE H-13

SOIL DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | BJ | BU | J | U | UJ | UR |
| HERB | 2,4,5-T | H | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2,4,5-TP (SILVEX) | H | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2,4-D | H | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | DINOSEB | H | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | HEXACHLOROPHENE | H | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | PENTACHLOROPHENOL | H | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | | R | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| Metals, Total | ALUMINUM | A | 0.0 | 0.0 | 72.9 | 0.0 | 0.0 | 0.0 |
| | | AF | 0.0 | 0.0 | 23.7 | 0.0 | 0.0 | 0.0 |
| | | AG | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | ANTIMONY | A | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AF | 0.0 | 0.0 | 50.0 | 0.0 | 0.0 | 0.0 |
| | | AK | 0.0 | 0.0 | 50.0 | 0.0 | 0.0 | 0.0 |
| | ARSENIC | A | 0.0 | 0.0 | 35.6 | 0.0 | 0.0 | 0.0 |
| | | AF | 0.0 | 0.0 | 61.0 | 0.0 | 0.0 | 0.0 |
| | | AG | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | BARIUM | A | 0.0 | 0.0 | 37.3 | 0.0 | 0.0 | 0.0 |
| | | AD | 0.0 | 0.0 | 6.8 | 0.0 | 0.0 | 0.0 |
| | | ADG | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | | ADI | 0.0 | 0.0 | 28.8 | 0.0 | 0.0 | 0.0 |
| | | DF | 0.0 | 0.0 | 23.7 | 0.0 | 0.0 | 0.0 |
| | BERYLLIUM | A | 0.0 | 0.0 | 71.4 | 100.0 | 0.0 | 0.0 |
| | | AG | 0.0 | 0.0 | 7.1 | 0.0 | 0.0 | 0.0 |
| | | AP | 0.0 | 0.0 | 7.1 | 0.0 | 0.0 | 0.0 |
| | | I | 0.0 | 0.0 | 7.1 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 7.1 | 0.0 | 0.0 | 0.0 |
| | CADMIUM | A | 0.0 | 0.0 | 23.5 | 100.0 | 0.0 | 0.0 |
| | | AP | 0.0 | 0.0 | 19.6 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 56.9 | 0.0 | 0.0 | 0.0 |
| | CALCIUM | A | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| | | ADF | 0.0 | 0.0 | 7.1 | 0.0 | 0.0 | 0.0 |
| | | ADFG | 0.0 | 0.0 | 1.8 | 0.0 | 0.0 | 0.0 |
| | | ADI | 0.0 | 0.0 | 25.0 | 0.0 | 0.0 | 0.0 |
| | | AFG | 0.0 | 0.0 | 3.6 | 0.0 | 0.0 | 0.0 |
| | | AI | 0.0 | 0.0 | 62.5 | 0.0 | 0.0 | 0.0 |
| | CHROMIUM | A | 0.0 | 0.0 | 28.8 | 0.0 | 0.0 | 0.0 |
| | | AD | 0.0 | 0.0 | 10.2 | 0.0 | 0.0 | 0.0 |
| | | ADI | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 |
| | | AF | 0.0 | 0.0 | 20.3 | 0.0 | 0.0 | 0.0 |
| | | AFK | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 |
| | | AI | 0.0 | 0.0 | 23.7 | 0.0 | 0.0 | 0.0 |
| | COBALT | A | 0.0 | 0.0 | 28.8 | 0.0 | 0.0 | 0.0 |
| | | AFI | 0.0 | 0.0 | 10.2 | 0.0 | 0.0 | 0.0 |
| | | AI | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 |
| | | G | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | | I | 0.0 | 0.0 | 49.2 | 0.0 | 0.0 | 0.0 |
| | COPPER | A | 0.0 | 0.0 | 64.4 | 0.0 | 0.0 | 0.0 |
| | | AD | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | | ADI | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 |
| | | AF | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 0.0 |
| | | AFI | 0.0 | 0.0 | 22.0 | 0.0 | 0.0 | 0.0 |

TABLE H-13

SOIL DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | BJ | BU | J | U | UJ | UR |
| | IRON | A | 0.0 | 0.0 | 66.1 | 0.0 | 0.0 | 0.0 |
| | | AF | 0.0 | 0.0 | 30.5 | 0.0 | 0.0 | 0.0 |
| | | AFG | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | LEAD | A | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | | AD | 0.0 | 0.0 | 6.8 | 0.0 | 0.0 | 0.0 |
| | | ADFI | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 |
| | | ADG | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | | AF | 0.0 | 0.0 | 23.7 | 0.0 | 0.0 | 0.0 |
| | | AFI | 0.0 | 0.0 | 20.3 | 0.0 | 0.0 | 0.0 |
| | | AFIK | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 |
| | | AI | 0.0 | 0.0 | 25.4 | 0.0 | 0.0 | 0.0 |
| | MAGNESIUM | A | 0.0 | 0.0 | 27.1 | 0.0 | 0.0 | 0.0 |
| | | AC | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 0.0 |
| | | ADF | 0.0 | 0.0 | 30.5 | 0.0 | 0.0 | 0.0 |
| | | ADFG | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | | ADI | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 |
| | | DI | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 |
| | | I | 0.0 | 0.0 | 25.4 | 0.0 | 0.0 | 0.0 |
| | MANGANESE | A | 0.0 | 0.0 | 75.6 | 0.0 | 0.0 | 0.0 |
| | | AFG | 0.0 | 0.0 | 4.4 | 0.0 | 0.0 | 0.0 |
| | | AG | 0.0 | 0.0 | 4.4 | 0.0 | 0.0 | 0.0 |
| | | AK | 0.0 | 0.0 | 15.6 | 0.0 | 0.0 | 0.0 |
| | MERCURY | P | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| | NICKEL | A | 0.0 | 0.0 | 57.6 | 0.0 | 0.0 | 0.0 |
| | | ADF | 0.0 | 0.0 | 10.2 | 0.0 | 0.0 | 0.0 |
| | | AEIK | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 |
| | | AF | 0.0 | 0.0 | 23.7 | 0.0 | 0.0 | 0.0 |
| | POTASSIUM | A | 0.0 | 0.0 | 28.8 | 0.0 | 0.0 | 0.0 |
| | | ADFI | 0.0 | 0.0 | 23.7 | 0.0 | 0.0 | 0.0 |
| | | ADI | 0.0 | 0.0 | 18.6 | 0.0 | 0.0 | 0.0 |
| | | AI | 0.0 | 0.0 | 28.8 | 0.0 | 0.0 | 0.0 |
| | SELENIUM | A | 0.0 | 0.0 | 10.0 | 100.0 | 0.0 | 0.0 |
| | | AP | 0.0 | 0.0 | 35.0 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 55.0 | 0.0 | 0.0 | 0.0 |
| | SILVER | A | 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 |
| | SODIUM | A | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 | 0.0 |
| | THALLIUM | A | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| | | ACEP | 0.0 | 0.0 | 81.0 | 0.0 | 0.0 | 0.0 |
| | | ACIP | 0.0 | 0.0 | 19.0 | 0.0 | 0.0 | 0.0 |
| | TIN | A | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AIP | 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 |
| | VANADIUM | A | 0.0 | 0.0 | 54.8 | 0.0 | 0.0 | 0.0 |
| | | ADI | 0.0 | 0.0 | 11.9 | 0.0 | 0.0 | 0.0 |
| | | DFI | 0.0 | 0.0 | 33.3 | 0.0 | 0.0 | 0.0 |
| | ZINC | A | 0.0 | 0.0 | 9.8 | 100.0 | 0.0 | 0.0 |
| | | ADI | 0.0 | 0.0 | 3.9 | 0.0 | 0.0 | 0.0 |
| | | ADIK | 0.0 | 0.0 | 5.9 | 0.0 | 0.0 | 0.0 |
| | | AI | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 |
| | | AIK | 0.0 | 0.0 | 31.4 | 0.0 | 0.0 | 0.0 |

TABLE H-13

SOIL DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | BJ | BU | J | U | UJ | UR |
| | | DF | 0.0 | 0.0 | 27.5 | 0.0 | 0.0 | 0.0 |
| | | K | 0.0 | 0.0 | 19.6 | 0.0 | 0.0 | 0.0 |
| SVOC | 1,4-PHENYLENEDIAMINE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2,2'-OXYBIS(1-CHLOROPROPANE) | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2,4-DIMETHYLPHENOL | D | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4-DINITROPHENOL | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2-ACETYLAMINOFLUORENE | C | 0.0 | 0.0 | 0.0 | 0.0 | 73.3 | 0.0 |
| | | CN | 0.0 | 0.0 | 0.0 | 0.0 | 26.7 | 0.0 |
| | 2-CHLORONAPHTHALENE | D | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2-METHYLNAPHTHALENE | E | 0.0 | 0.0 | 11.8 | 0.0 | 100.0 | 0.0 |
| | | EP | 0.0 | 0.0 | 5.9 | 0.0 | 0.0 | 0.0 |
| | | ER | 0.0 | 0.0 | 5.9 | 0.0 | 0.0 | 0.0 |
| | | G | 0.0 | 0.0 | 5.9 | 0.0 | 0.0 | 0.0 |
| | | GP | 0.0 | 0.0 | 11.8 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 58.8 | 0.0 | 0.0 | 0.0 |
| | 2-METHYLPHENOL | D | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 3&4-METHYLPHENOL | D | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 3,3'-DICHLOROBENZIDINE | D | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 3,3'-DIMETHYLBENZIDINE | C | 0.0 | 0.0 | 0.0 | 0.0 | 87.9 | 0.0 |
| | | CN | 0.0 | 0.0 | 0.0 | 0.0 | 12.1 | 0.0 |
| | 4,6-DINITRO-2-METHYLPHENOL | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 4-AMINOBIPHENYL | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 4-BROMOPHENYL PHENYL ETHER | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 4-CHLOROANILINE | D | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| | 4-NITROQUINOLINE-1-OXIDE | C | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| | A,A-DIMETHYLPHENETHYLAMINE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | ACENAPHTHENE | E | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | | ER | 0.0 | 0.0 | 14.3 | 0.0 | 0.0 | 0.0 |
| | | G | 0.0 | 0.0 | 14.3 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 71.4 | 0.0 | 0.0 | 0.0 |
| | ACENAPHTHYLENE | E | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | | EP | 0.0 | 0.0 | 42.9 | 0.0 | 0.0 | 0.0 |
| | | ER | 0.0 | 0.0 | 14.3 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 42.9 | 0.0 | 0.0 | 0.0 |
| | ACETOPHENONE | A | 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 |
| | ANTHRACENE | G | 0.0 | 0.0 | 13.3 | 0.0 | 0.0 | 0.0 |
| | | GP | 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 |
| | | R | 0.0 | 0.0 | 6.7 | 0.0 | 0.0 | 0.0 |
| | ARAMITE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | BENZO(A)ANTHRACENE | E | 0.0 | 0.0 | 11.8 | 0.0 | 57.1 | 0.0 |
| | | EG | 0.0 | 0.0 | 11.8 | 0.0 | 0.0 | 0.0 |
| | | G | 0.0 | 0.0 | 5.9 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 29.4 | 0.0 | 42.9 | 0.0 |
| | | P | 0.0 | 0.0 | 35.3 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 5.9 | 0.0 | 0.0 | 0.0 |
| | BENZO(A)PYRENE | G | 0.0 | 0.0 | 37.5 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 37.5 | 0.0 | 100.0 | 0.0 |
| | | P | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |

TABLE H-13

SOIL DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | BJ | BU | J | U | UJ | UR |
| | | R | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| | BENZO(B)FLUORANTHENE | G | 0.0 | 0.0 | 37.5 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 37.5 | 0.0 | 100.0 | 0.0 |
| | | P | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| | BENZO(G,H,I)PERYLENE | G | 0.0 | 0.0 | 37.5 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 37.5 | 0.0 | 100.0 | 0.0 |
| | | P | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| | BENZO(K)FLUORANTHENE | G | 0.0 | 0.0 | 33.3 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 33.3 | 0.0 | 100.0 | 0.0 |
| | | P | 0.0 | 0.0 | 22.2 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 11.1 | 0.0 | 0.0 | 0.0 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | G | 0.0 | 0.0 | 0.0 | 0.0 | 33.3 | 0.0 |
| | | GH | 0.0 | 0.0 | 8.3 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 66.7 | 0.0 |
| | | NP | 0.0 | 0.0 | 16.7 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 75.0 | 0.0 | 0.0 | 0.0 |
| | BUTYL BENZYL PHTHALATE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CHLOROBENZILATE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CHRYSENE | G | 0.0 | 0.0 | 23.1 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 38.5 | 0.0 | 100.0 | 0.0 |
| | | P | 0.0 | 0.0 | 30.8 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 7.7 | 0.0 | 0.0 | 0.0 |
| | DIALLATE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | DIBENZO(A,H)ANTHRACENE | G | 0.0 | 0.0 | 33.3 | 0.0 | 22.2 | 0.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 77.8 | 0.0 |
| | | P | 0.0 | 0.0 | 33.3 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 33.3 | 0.0 | 0.0 | 0.0 |
| | DIBENZOFURAN | P | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| | DI-N-BUTYL PHTHALATE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | | P | 0.0 | 0.0 | 87.5 | 0.0 | 0.0 | 0.0 |
| | | PE | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| | DI-N-OCTYL PHTHALATE | E | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| | DIPHENYLAMINE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | FLUORANTHENE | G | 0.0 | 0.0 | 25.0 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 66.7 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 8.3 | 0.0 | 0.0 | 0.0 |
| | FLUORENE | E | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | | ER | 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 |
| | HEXACHLOROBENZENE | C | 0.0 | 0.0 | 0.0 | 0.0 | 85.7 | 0.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 14.3 | 0.0 |
| | HEXACHLOROCYCLOPENTADIENE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 25.0 |
| | | D | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 75.0 |
| | INDENO(1,2,3-CD)PYRENE | G | 0.0 | 0.0 | 37.5 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 37.5 | 0.0 | 100.0 | 0.0 |
| | | P | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| | ISODRIN | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | ISOPHORONE | DE | 0.0 | 0.0 | 0.0 | 0.0 | 50.0 | 0.0 |

TABLE H-13

SOIL DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | BJ | BU | J | U | UJ | UR |
| | | E | 0.0 | 0.0 | 0.0 | 0.0 | 50.0 | 0.0 |
| | KEPONE | C | 0.0 | 0.0 | 0.0 | 0.0 | 90.5 | 100.0 |
| | | CN | 0.0 | 0.0 | 0.0 | 0.0 | 9.5 | 0.0 |
| | METHAPYRILENE | C | 0.0 | 0.0 | 0.0 | 0.0 | 98.3 | 0.0 |
| | | CN | 0.0 | 0.0 | 0.0 | 0.0 | 1.7 | 0.0 |
| | NAPHTHALENE | E | 0.0 | 0.0 | 7.7 | 0.0 | 100.0 | 0.0 |
| | | EP | 0.0 | 0.0 | 15.4 | 0.0 | 0.0 | 0.0 |
| | | ER | 0.0 | 0.0 | 7.7 | 0.0 | 0.0 | 0.0 |
| | | G | 0.0 | 0.0 | 15.4 | 0.0 | 0.0 | 0.0 |
| | | GP | 0.0 | 0.0 | 7.7 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 46.2 | 0.0 | 0.0 | 0.0 |
| | N-NITROSODIMETHYLAMINE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSO-DI-N-PROPYLAMINE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSODIPHENYLAMINE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSOMORPHOLINE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSOPIPERIDINE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSOPYRROLIDINE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | P-(DIMETHYLAMINO)AZOBENZENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | PENTACHLORONITROBENZENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | PHENACETIN | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | PHENANTHRENE | G | 0.0 | 0.0 | 37.5 | 0.0 | 0.0 | 0.0 |
| | | GP | 0.0 | 0.0 | 6.3 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 50.0 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 6.3 | 0.0 | 0.0 | 0.0 |
| | PRONAMIDE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | PYRENE | G | 0.0 | 0.0 | 20.0 | 0.0 | 0.0 | 0.0 |
| | | N | 0.0 | 0.0 | 40.0 | 0.0 | 100.0 | 0.0 |
| | | NP | 0.0 | 0.0 | 6.7 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 26.7 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 6.7 | 0.0 | 0.0 | 0.0 |
| VOC | 1,1,1,2-TETRACHLOROETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 1,1,1-TRICHLOROETHANE | N | 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 | 100.0 | 0.0 |
| | 1,1,2-TRICHLOROETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 1,1-DICHLOROETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 1,1-DICHLOROETHENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 1,2,3-TRICHLOROPROPANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 1,2-DIBROMO-3-CHLOROPROPANE | D | 0.0 | 0.0 | 0.0 | 0.0 | 50.0 | 0.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 50.0 | 0.0 |
| | 1,2-DIBROMOETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 1,2-DICHLOROETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 1,2-DICHLOROPROPANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2-BUTANONE | A | 0.0 | 0.0 | 3.6 | 0.0 | 0.0 | 0.0 |
| | | AP | 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 | 71.4 | 0.0 | 0.0 | 0.0 |
| | 2-HEXANONE | 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 |
| | 3-CHLOROPROPENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | 4-METHYL-2-PENTANONE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | ACETONE | A | 100.0 | 100.0 | 0.0 | 100.0 | 0.0 | 0.0 |

TABLE H-13

SOIL DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | BJ | BU | J | U | UJ | UR |
| | | AC | 0.0 | 0.0 | 60.0 | 0.0 | 0.0 | 0.0 |
| | | ACE | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 |
| | | ACG | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 |
| | | ACP | 0.0 | 0.0 | 24.0 | 0.0 | 0.0 | 0.0 |
| | | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | ACETONITRILE | C | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| | ACROLEIN | C | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| | ACRYLONITRILE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | BENZENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | BROMODICHLOROMETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | BROMOFORM | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | BROMOMETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CARBON DISULFIDE | C | 0.0 | 0.0 | 0.0 | 0.0 | 91.7 | 0.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 8.3 | 0.0 |
| | | P | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| | CARBON TETRACHLORIDE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CHLOROBENZENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CHLORODIBROMOMETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CHLOROETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CHLOROFORM | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CHLOROMETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CHLOROPRENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | CIS-1,2-DICHLOROETHENE | 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 |
| | CIS-1,3-DICHLOROPROPENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | DIBROMOMETHANE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | DICHLORODIFLUOROMETHANE | A | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 | 0.0 |
| | | C | 0.0 | 0.0 | 0.0 | 0.0 | 85.7 | 100.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 | 0.0 |
| | ETHYL METHACRYLATE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | ETHYLBENZENE | N | 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 |
| | METHACRYLONITRILE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | METHYL IODIDE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | METHYL METHACRYLATE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | METHYL TERT-BUTYL ETHER | D | 0.0 | 0.0 | 0.0 | 0.0 | 50.0 | 0.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 50.0 | 0.0 |
| | METHYLENE CHLORIDE | A | 0.0 | 0.0 | 16.2 | 100.0 | 0.0 | 0.0 |
| | | AC | 0.0 | 0.0 | 66.2 | 0.0 | 0.0 | 0.0 |
| | | ACG | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 |
| | | ACP | 0.0 | 0.0 | 4.4 | 0.0 | 0.0 | 0.0 |
| | | AP | 0.0 | 0.0 | 10.3 | 0.0 | 0.0 | 0.0 |
| | | C | 0.0 | 0.0 | 0.0 | 0.0 | 83.3 | 0.0 |
| | | CAN | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 |
| | | CG | 0.0 | 0.0 | 0.0 | 0.0 | 16.7 | 0.0 |
| | PROPIONITRILE | C | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| | STYRENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | TETRACHLOROETHENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | TOLUENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | TOTAL XYLENES | 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 |

TABLE H-13

SOIL DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | BJ | BU | J | U | UJ | UR |
| | TRANS-1,2-DICHLOROETHENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | TRANS-1,3-DICHLOROPROPENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | TRANS-1,4-DICHLORO-2-BUTENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | TRICHLOROETHENE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | TRICHLOROFLUOROMETHANE | DP | 0.0 | 0.0 | 4.3 | 0.0 | 0.0 | 0.0 |
| | | NP | 0.0 | 0.0 | 4.3 | 0.0 | 0.0 | 0.0 |
| | | P | 0.0 | 0.0 | 91.3 | 0.0 | 0.0 | 0.0 |
| | VINYL ACETATE | C | 0.0 | 0.0 | 0.0 | 0.0 | 91.7 | 0.0 |
| | | N | 0.0 | 0.0 | 0.0 | 0.0 | 8.3 | 0.0 |
| | VINYL CHLORIDE | N | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| PEST/PCB | 4,4'-DDD | 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 |
| | 4,4'-DDE | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | | PU | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| | 4,4'-DDT | P | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| | ALPHA-CHLORDANE | CP | 0.0 | 0.0 | 50.0 | 0.0 | 0.0 | 0.0 |
| | | U | 0.0 | 0.0 | 50.0 | 0.0 | 0.0 | 0.0 |
| | AROCLOR-1016 | E | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | DELTA-BHC | C | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 |
| | GAMMA-CHLORDANE | CP | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |

1 Normal non-detect values (U qualifier) are excluded from this tally because they are not deficiencies.

HERB = Herbicides
M = Metals, total
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds
PEST/PCB = Pesticides/polychlorinated biphenyls

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

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
I = ICP Serial Dilution Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
N = Internal Standard Noncompliance
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
R = Surrogates Recovery Noncompliance
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE H-14

SURFACE WATER DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| HERB | PENTACHLOROPHENOL | PQ | 7.7 | 0.0 | 0.0 | 0.0 |
| | | Q | 92.3 | 0.0 | 0.0 | 0.0 |
| Metals, Total | ALUMINUM | A | 86.7 | 100.0 | 0.0 | 0.0 |
| | | AF | 13.3 | 0.0 | 0.0 | 0.0 |
| | ANTIMONY | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | ARSENIC | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | BARIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | BERYLLIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | CADMIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | CALCIUM | A | 12.5 | 0.0 | 0.0 | 0.0 |
| | | AE | 87.5 | 0.0 | 0.0 | 0.0 |
| | CHROMIUM | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | COBALT | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | COPPER | A | 46.7 | 100.0 | 0.0 | 0.0 |
| | | AP | 53.3 | 0.0 | 0.0 | 0.0 |
| | IRON | A | 14.3 | 100.0 | 0.0 | 0.0 |
| | | AI | 85.7 | 0.0 | 0.0 | 0.0 |
| | LEAD | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | MAGNESIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | MANGANESE | A | 50.0 | 0.0 | 0.0 | 0.0 |
| | | K | 50.0 | 0.0 | 0.0 | 0.0 |
| | MERCURY | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | NICKEL | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | POTASSIUM | A | 12.5 | 0.0 | 0.0 | 0.0 |
| | | AI | 87.5 | 0.0 | 0.0 | 0.0 |
| | SELENIUM | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | SILVER | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | D | 0.0 | 0.0 | 100.0 | 0.0 |
| | SODIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | THALLIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | TIN | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | VANADIUM | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | ZINC | A | 21.4 | 100.0 | 0.0 | 0.0 |
| | | AK | 57.1 | 0.0 | 0.0 | 0.0 |
| | | AKP | 21.4 | 0.0 | 0.0 | 0.0 |
| Metals, Dissolved | ALUMINUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | ANTIMONY | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | ARSENIC | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | BARIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | BERYLLIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | CADMIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | CALCIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |

TABLE H-14

SURFACE WATER DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]



| | | | | | | |
|---|---|---|---|---|---|---|
| | CHROMIUM | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | COBALT | AP | 22.2 | 0.0 | 0.0 | 0.0 |
| | | P | 77.8 | 0.0 | 0.0 | 0.0 |
| | COPPER | A | 31.3 | 0.0 | 0.0 | 0.0 |
| | | AP | 56.3 | 0.0 | 0.0 | 0.0 |
| | | IP | 12.5 | 0.0 | 0.0 | 0.0 |
| | IRON | A | 20.0 | 100.0 | 0.0 | 0.0 |
| | | AG | 80.0 | 0.0 | 0.0 | 0.0 |
| | LEAD | A | 33.3 | 100.0 | 0.0 | 0.0 |
| | | AP | 66.7 | 0.0 | 0.0 | 0.0 |
| | MAGNESIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | MANGANESE | AI | 50.0 | 0.0 | 0.0 | 0.0 |
| | | K | 25.0 | 0.0 | 0.0 | 0.0 |
| | | KP | 25.0 | 0.0 | 0.0 | 0.0 |
| | MERCURY | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | NICKEL | A | 87.5 | 0.0 | 0.0 | 0.0 |
| | | K | 12.5 | 0.0 | 0.0 | 0.0 |
| | POTASSIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | SELENIUM | A | 50.0 | 100.0 | 0.0 | 0.0 |
| | | AP | 50.0 | 0.0 | 0.0 | 0.0 |
| | SILVER | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | D | 0.0 | 0.0 | 100.0 | 0.0 |
| | SODIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | THALLIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AP | 100.0 | 0.0 | 0.0 | 0.0 |
| | TIN | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | ZINC | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AIKP | 7.1 | 0.0 | 0.0 | 0.0 |
| | | K | 42.9 | 0.0 | 0.0 | 0.0 |
| | | KP | 50.0 | 0.0 | 0.0 | 0.0 |
| SVOC | 1,4-DIOXANE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2,2'-OXYBIS(1-CHLOROPROPANE) | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2,3,4,6-TETRACHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4,5-TRICHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4,6-TRICHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4-DICHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4-DIMETHYLPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4-DINITROPHENOL | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,6-DICHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2-ACETYLAMINOFLUORENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2-CHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2-METHYLPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2-NITROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 3&4-METHYLPHENOL | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 3,3'-DICHLOROBENZIDINE | D | 0.0 | 0.0 | 0.0 | 100.0 |
| | 3,3'-DIMETHYLBENZIDINE | C | 0.0 | 0.0 | 100.0 | 0.0 |

TABLE H-14

SURFACE WATER DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]



| | | | | | | |
|---|---|---|---|---|---|---|
| | 4,6-DINITRO-2-METHYLPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 4-CHLORO-3-METHYLPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 4-NITROPHENOL | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 4-NITROQUINOLINE-1-OXIDE | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | A,A-DIMETHYLPHENETHYLAMINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ACENAPHTHENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | ACENAPHTHYLENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | ACETOPHENONE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ANTHRACENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | BENZO(A)ANTHRACENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | BENZO(K)FLUORANTHENE | G | 66.7 | 0.0 | 0.0 | 0.0 |
| | | P | 33.3 | 0.0 | 0.0 | 0.0 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | DI-N-OCTYL PHTHALATE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ETHYL METHANE SULFONATE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | FLUORENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | HEXACHLOROBENZENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | HEXACHLOROCYCLOPENTADIENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | INDENO(1,2,3-CD)PYRENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | KEPONE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | METHAPYRILENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | NAPHTHALENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | N-NITROSODIMETHYLAMINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSO-DI-N-PROPYLAMINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSOMORPHOLINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSOPIPERIDINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | PHENANTHRENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | PHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | PYRENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | PYRIDINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| VOC | 1,1-DICHLOROETHENE | E | 0.0 | 0.0 | 100.0 | 0.0 |
| | 3-CHLOROPROPENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ACETONE | AP | 100.0 | 0.0 | 0.0 | 0.0 |
| | | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ACETONITRILE | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | ACROLEIN | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | BROMOMETHANE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ETHYL METHACRYLATE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ISOBUTANOL | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | METHYLENE CHLORIDE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | PROPIONITRILE | C | 0.0 | 0.0 | 0.0 | 100.0 |

1 Normal non-detect values (U qualifier) are excluded from this tally because they are not deficiencies.

HERB = Herbicides
M = Metals, total
MF = Metals, dissolved

## TABLE H-14

## SURFACE WATER DATA QUALIFICATION RATES
## SWMU 15 (ROADS AND GROUNDS) [1]



SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds

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

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
I = ICP Serial Dilution Noncompliance
K = ICP Interference - includes ICS % R 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

# TABLE H-15
## SEDIMENT DATA QUALIFICATION RATES
## SWMU 15 (ROADS AND GROUNDS) [1]

## NSWC CRANE
## CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| HERB | 2,4,5-T | U | 100.0 | 0.0 | 0.0 | 0.0 |
| | PENTACHLOROPHENOL | R | 55.6 | 0.0 | 0.0 | 0.0 |
| | | U | 44.4 | 0.0 | 0.0 | 0.0 |
| Metals, Total | ALUMINUM | AF | 15.4 | 0.0 | 0.0 | 0.0 |
| | | D | 84.6 | 0.0 | 0.0 | 0.0 |
| | ANTIMONY | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | ARSENIC | AFI | 92.3 | 0.0 | 0.0 | 0.0 |
| | | AFIK | 7.7 | 0.0 | 0.0 | 0.0 |
| | BARIUM | AD | 15.4 | 0.0 | 0.0 | 0.0 |
| | | DG | 84.6 | 0.0 | 0.0 | 0.0 |
| | BERYLLIUM | A | 66.7 | 100.0 | 0.0 | 0.0 |
| | | AFI | 22.2 | 0.0 | 0.0 | 0.0 |
| | | AP | 11.1 | 0.0 | 0.0 | 0.0 |
| | CADMIUM | A | 30.0 | 100.0 | 0.0 | 0.0 |
| | | AP | 70.0 | 0.0 | 0.0 | 0.0 |
| | CALCIUM | AFI | 15.4 | 0.0 | 0.0 | 0.0 |
| | | AI | 84.6 | 0.0 | 0.0 | 0.0 |
| | CHROMIUM | ADFI | 15.4 | 0.0 | 0.0 | 0.0 |
| | | AF | 84.6 | 0.0 | 0.0 | 0.0 |
| | COBALT | A | 84.6 | 0.0 | 0.0 | 0.0 |
| | | AFI | 7.7 | 0.0 | 0.0 | 0.0 |
| | | AFIK | 7.7 | 0.0 | 0.0 | 0.0 |
| | COPPER | A | 84.6 | 0.0 | 0.0 | 0.0 |
| | | AFIK | 15.4 | 0.0 | 0.0 | 0.0 |
| | IRON | A | 84.6 | 0.0 | 0.0 | 0.0 |
| | | AF | 15.4 | 0.0 | 0.0 | 0.0 |
| | LEAD | AF | 15.4 | 0.0 | 0.0 | 0.0 |
| | | AI | 84.6 | 0.0 | 0.0 | 0.0 |
| | MAGNESIUM | AF | 84.6 | 0.0 | 0.0 | 0.0 |
| | | AI | 15.4 | 0.0 | 0.0 | 0.0 |
| | MANGANESE | A | 84.6 | 0.0 | 0.0 | 0.0 |
| | | AF | 15.4 | 0.0 | 0.0 | 0.0 |
| | MERCURY | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | NICKEL | A | 84.6 | 0.0 | 0.0 | 0.0 |
| | | ADFI | 7.7 | 0.0 | 0.0 | 0.0 |
| | | ADFIK | 7.7 | 0.0 | 0.0 | 0.0 |
| | POTASSIUM | A | 84.6 | 0.0 | 0.0 | 0.0 |
| | | ADI | 15.4 | 0.0 | 0.0 | 0.0 |
| | SELENIUM | A | 22.2 | 100.0 | 0.0 | 0.0 |
| | | AF | 22.2 | 0.0 | 0.0 | 0.0 |
| | | AP | 55.6 | 0.0 | 0.0 | 0.0 |
| | SILVER | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | SODIUM | A | 100.0 | 100.0 | 0.0 | 0.0 |

# TABLE H-15
## SEDIMENT DATA QUALIFICATION RATES
## SWMU 15 (ROADS AND GROUNDS) [1]

## NSWC CRANE
## CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| | THALLIUM | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | TIN | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | VANADIUM | A | 84.6 | 0.0 | 0.0 | 0.0 |
| | | ADFI | 15.4 | 0.0 | 0.0 | 0.0 |
| | ZINC | AFI | 50.0 | 0.0 | 0.0 | 0.0 |
| | | AFIK | 50.0 | 0.0 | 0.0 | 0.0 |
| SVOC | 1,4-DIOXANE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2,4-DINITROPHENOL | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2-METHYLNAPHTHALENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | 3,3'-DIMETHYLBENZIDINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 4-NITROPHENOL | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 4-NITROQUINOLINE-1-OXIDE | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | ACENAPHTHENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | ACENAPHTHYLENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | ACETOPHENONE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | ANTHRACENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | BENZO(A)ANTHRACENE | N | 100.0 | 0.0 | 0.0 | 0.0 |
| | BENZO(A)PYRENE | N | 100.0 | 0.0 | 0.0 | 0.0 |
| | BENZO(B)FLUORANTHENE | N | 100.0 | 0.0 | 0.0 | 0.0 |
| | BENZO(G,H,I)PERYLENE | N | 100.0 | 0.0 | 0.0 | 0.0 |
| | BENZO(K)FLUORANTHENE | N | 100.0 | 0.0 | 0.0 | 0.0 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | CHRYSENE | N | 100.0 | 0.0 | 0.0 | 0.0 |
| | DIBENZO(A,H)ANTHRACENE | N | 100.0 | 0.0 | 100.0 | 0.0 |
| | DIBENZOFURAN | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | DI-N-BUTYL PHTHALATE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | FLUORENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | HEXACHLOROBENZENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | HEXACHLOROCYCLOPENTADIENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | D | 0.0 | 0.0 | 0.0 | 100.0 |
| | INDENO(1,2,3-CD)PYRENE | N | 100.0 | 0.0 | 0.0 | 0.0 |
| | KEPONE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | METHAPYRILENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | NAPHTHALENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | N-NITROSODIMETHYLAMINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSOMETHYLETHYLAMINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | PYRENE | E | 28.6 | 0.0 | 0.0 | 0.0 |
| | | N | 71.4 | 0.0 | 0.0 | 0.0 |
| | PYRIDINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| VOC | 1,1,1,2-TETRACHLOROETHANE | D | 0.0 | 0.0 | 100.0 | 0.0 |
| | 1,2-DIBROMO-3-CHLOROPROPANE | D | 0.0 | 0.0 | 100.0 | 0.0 |
| | 4-METHYL-2-PENTANONE | C | 0.0 | 0.0 | 100.0 | 0.0 |

# TABLE H-15
## SEDIMENT DATA QUALIFICATION RATES
## SWMU 15 (ROADS AND GROUNDS) [1]

## NSWC CRANE
## CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| | ACETONE | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | CP | 100.0 | 0.0 | 0.0 | 0.0 |
| | ACETONITRILE | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | ACROLEIN | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | ISOBUTANOL | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | METHYLENE CHLORIDE | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | PROPIONITRILE | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | VINYL ACETATE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| PEST/PCB | 4,4'-DDD | P | 50.0 | 0.0 | 0.0 | 0.0 |
| | | PU | 25.0 | 0.0 | 0.0 | 0.0 |
| | | U | 25.0 | 0.0 | 0.0 | 0.0 |
| | 4,4'-DDE | P | 33.3 | 0.0 | 0.0 | 0.0 |
| | | PU | 33.3 | 0.0 | 0.0 | 0.0 |
| | | U | 33.3 | 0.0 | 0.0 | 0.0 |
| | 4,4'-DDT | P | 57.1 | 0.0 | 0.0 | 0.0 |
| | | PU | 28.6 | 0.0 | 0.0 | 0.0 |
| | | U | 14.3 | 0.0 | 0.0 | 0.0 |
| | AROCLOR-1254 | U | 100.0 | 0.0 | 0.0 | 0.0 |
| | GAMMA-CHLORDANE | U | 100.0 | 0.0 | 0.0 | 0.0 |

1 Normal non-detect values (U qualifier) are excluded from this tally because they are not deficiencies.

HERB = Herbicides
M = Metals, total
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds
PEST/PCB = Pesticides/polychlorinated biphenyls

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

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
I = ICP Serial Dilution Noncompliance
K = ICP Interference - includes ICS % R Noncompliance

# TABLE H-15
## SEDIMENT DATA QUALIFICATION RATES
## SWMU 15 (ROADS AND GROUNDS) [1]

## NSWC CRANE
## CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| N = Internal Standard Noncompliance | | | | | | |
| P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics) | | | | | | |
| R = Surrogates Recovery Noncompliance | | | | | | |
| U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC | | | | | | |

TABLE H-16

GROUNDWATER DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| HERB | 2,4,5-TP (SILVEX) | PU | 100.0 | 0.0 | 0.0 | 0.0 |
| | DINOSEB | D | 0.0 | 0.0 | 0.0 | 100.0 |
| | PENTACHLOROPHENOL | U | 100.0 | 0.0 | 0.0 | 0.0 |
| Metals, Total | ALUMINUM | A | 50.0 | 100.0 | 0.0 | 0.0 |
| | | AF | 50.0 | 0.0 | 0.0 | 0.0 |
| | ANTIMONY | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | ARSENIC | A | 28.6 | 100.0 | 0.0 | 0.0 |
| | | AI | 71.4 | 0.0 | 0.0 | 0.0 |
| | BARIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | BERYLLIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | ADP | 50.0 | 0.0 | 0.0 | 0.0 |
| | | AP | 50.0 | 0.0 | 0.0 | 0.0 |
| | | D | 0.0 | 0.0 | 100.0 | 0.0 |
| | CADMIUM | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | CALCIUM | A | 44.4 | 0.0 | 0.0 | 0.0 |
| | | I | 55.6 | 0.0 | 0.0 | 0.0 |
| | CHROMIUM | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | COBALT | A | 83.3 | 0.0 | 0.0 | 0.0 |
| | | P | 16.7 | 0.0 | 0.0 | 0.0 |
| | COPPER | A | 12.5 | 100.0 | 0.0 | 0.0 |
| | | AI | 37.5 | 0.0 | 0.0 | 0.0 |
| | | AIP | 25.0 | 0.0 | 0.0 | 0.0 |
| | | AP | 25.0 | 0.0 | 0.0 | 0.0 |
| | IRON | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | LEAD | A | 50.0 | 100.0 | 0.0 | 0.0 |
| | | AI | 50.0 | 0.0 | 0.0 | 0.0 |
| | MAGNESIUM | A | 44.4 | 0.0 | 0.0 | 0.0 |
| | | AI | 55.6 | 0.0 | 0.0 | 0.0 |
| | MANGANESE | A | 44.4 | 0.0 | 0.0 | 0.0 |
| | | AI | 55.6 | 0.0 | 0.0 | 0.0 |
| | MERCURY | D | 0.0 | 0.0 | 100.0 | 0.0 |
| | | DP | 50.0 | 0.0 | 0.0 | 0.0 |
| | | P | 50.0 | 0.0 | 0.0 | 0.0 |
| | NICKEL | K | 83.3 | 0.0 | 0.0 | 0.0 |
| | | P | 16.7 | 0.0 | 0.0 | 0.0 |
| | POTASSIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | SELENIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AP | 25.0 | 0.0 | 0.0 | 0.0 |
| | | P | 75.0 | 0.0 | 0.0 | 0.0 |
| | SILVER | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | SODIUM | A | 44.4 | 0.0 | 0.0 | 0.0 |
| | | AI | 55.6 | 0.0 | 0.0 | 0.0 |
| | THALLIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |

TABLE H-16

GROUNDWATER DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| | | IP | 100.0 | 0.0 | 0.0 | 0.0 |
| | TIN | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AP | 100.0 | 0.0 | 0.0 | 0.0 |
| | VANADIUM | A | 75.0 | 0.0 | 0.0 | 0.0 |
| | | P | 25.0 | 0.0 | 0.0 | 0.0 |
| | ZINC | A | 25.0 | 100.0 | 0.0 | 0.0 |
| | | AIK | 75.0 | 0.0 | 0.0 | 0.0 |
| Metals, Dissolved | ALUMINUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | ANTIMONY | A | 100.0 | 100.0 | 0.0 | 0.0 |
| | ARSENIC | A | 75.0 | 100.0 | 0.0 | 0.0 |
| | | AP | 25.0 | 0.0 | 0.0 | 0.0 |
| | BARIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | BERYLLIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | D | 0.0 | 0.0 | 100.0 | 0.0 |
| | CADMIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | CHROMIUM | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | COBALT | A | 83.3 | 0.0 | 0.0 | 0.0 |
| | | AP | 16.7 | 0.0 | 0.0 | 0.0 |
| | COPPER | AI | 16.7 | 0.0 | 0.0 | 0.0 |
| | | AIP | 33.3 | 0.0 | 0.0 | 0.0 |
| | | IP | 50.0 | 0.0 | 0.0 | 0.0 |
| | IRON | A | 50.0 | 0.0 | 0.0 | 0.0 |
| | | ADI | 50.0 | 0.0 | 0.0 | 0.0 |
| | LEAD | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AIP | 33.3 | 0.0 | 0.0 | 0.0 |
| | | AP | 66.7 | 0.0 | 0.0 | 0.0 |
| | MAGNESIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | MANGANESE | AI | 83.3 | 0.0 | 0.0 | 0.0 |
| | | AIK | 16.7 | 0.0 | 0.0 | 0.0 |
| | MERCURY | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | NICKEL | K | 100.0 | 0.0 | 0.0 | 0.0 |
| | POTASSIUM | A | 100.0 | 0.0 | 0.0 | 0.0 |
| | SELENIUM | A | 20.0 | 100.0 | 0.0 | 0.0 |
| | | AP | 20.0 | 0.0 | 0.0 | 0.0 |
| | | P | 60.0 | 0.0 | 0.0 | 0.0 |
| | SODIUM | A | 50.0 | 0.0 | 0.0 | 0.0 |
| | | AI | 50.0 | 0.0 | 0.0 | 0.0 |
| | THALLIUM | AP | 100.0 | 0.0 | 0.0 | 0.0 |
| | TIN | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AKP | 100.0 | 0.0 | 0.0 | 0.0 |
| | ZINC | A | 0.0 | 100.0 | 0.0 | 0.0 |
| | | AIKP | 100.0 | 0.0 | 0.0 | 0.0 |

TABLE H-16

GROUNDWATER DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| SVOC | 1,4-DIOXANE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2,3,4,6-TETRACHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4,5-TRICHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4,6-TRICHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4-DICHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4-DIMETHYLPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2,4-DINITROPHENOL | C | 0.0 | 0.0 | 100.0 | 50.0 |
| | | R | 0.0 | 0.0 | 0.0 | 50.0 |
| | 2,6-DICHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2-ACETYLAMINOFLUORENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | 2-CHLOROPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2-METHYLPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 2-NITROPHENOL | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 3&4-METHYLPHENOL | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 3,3'-DICHLOROBENZIDINE | D | 0.0 | 0.0 | 0.0 | 100.0 |
| | 4,6-DINITRO-2-METHYLPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 4-CHLORO-3-METHYLPHENOL | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 4-NITROPHENOL | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | | R | 0.0 | 0.0 | 0.0 | 100.0 |
| | 4-NITROQUINOLINE-1-OXIDE | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | A,A-DIMETHYLPHENETHYLAMINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | BENZO(A)ANTHRACENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | BIS(2-ETHYLHEXYL)PHTHALATE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | DIBENZOFURAN | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | FLUORANTHENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | HEXACHLOROBENZENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | HEXACHLOROCYCLOPENTADIENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | KEPONE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | METHAPYRILENE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSODIMETHYLAMINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | N-NITROSOMETHYLETHYLAMINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | PHENOL | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | PYRENE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| | PYRIDINE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | SAFROLE | P | 100.0 | 0.0 | 0.0 | 0.0 |
| VOC | ACETONE | ACP | 100.0 | 0.0 | 0.0 | 0.0 |
| | | B | 0.0 | 100.0 | 0.0 | 0.0 |
| | | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ACETONITRILE | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | ACROLEIN | C | 0.0 | 0.0 | 0.0 | 100.0 |

TABLE H-16

GROUNDWATER DATA QUALIFICATION RATES
SWMU 15 (ROADS AND GROUNDS) [1]

NSWC CRANE
CRANE, INDIANA



| Fraction | Parameter | Qual Code | Validation Qualifier | | | |
|---|---|---|---|---|---|---|
| | | | J | U | UJ | UR |
| | DICHLORODIFLUOROMETHANE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ETHYL METHACRYLATE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ISOBUTANOL | C | 0.0 | 0.0 | 0.0 | 100.0 |
| | METHYLENE CHLORIDE | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | PROPIONITRILE | C | 0.0 | 0.0 | 0.0 | 100.0 |
| PEST/PCB | 4,4'-DDD | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ALDRIN | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | DELTA-BHC | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | DIELDRIN | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ENDOSULFAN I | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ENDOSULFAN II | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | ENDRIN | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | GAMMA-BHC (LINDANE) | C | 0.0 | 0.0 | 100.0 | 0.0 |
| | HEPTACHLOR | C | 0.0 | 0.0 | 100.0 | 0.0 |

1 Normal non-detect values (U qualifier) are excluded from this tally because they are not deficiencies.

HERB = Herbicides
M = Metals, total
MF = Metals, dissolved
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds
PEST/PCB = Pesticides/polychlorinated biphenyls

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

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
D = MS/MSD Recovery Noncompliance
F = Lab Duplicate Imprecision
I = ICP Serial Dilution Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
R = Surrogates Recovery Noncompliance
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC

# APPENDIX I

## SWMU 12
## SUPPORT DOCUMENTATION FOR THE HUMAN HEALTH RISK ASSESSMENT

**TABLE 4.1**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CONSTRUCTION WORKERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface / Subsurface Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 330 | U.S. EPA, December 2002 | 165 | Professional Judgement | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 150 | Professional Judgement | 150 | Professional Judgement | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 1 | Professional Judgement | 1 | Professional Judgement | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 365 | U.S. EPA, December 1989 | 365 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | U.S. EPA, December 2002 | 3,300 | U.S. EPA, December 2002 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.3 | U.S. EPA, December 2002 | 0.1 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 150 | Professional Judgement | 150 | Professional Judgement | |
| | ED | Exposure Duration | years | 1 | Professional Judgement | 1 | Professional Judgement | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 365 | U.S. EPA, December 1989 | 365 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.77E-08
Noncancer Ingestion Intake - RME = 1.94E-06

Cancer Ingestion Intake - CTE = 1.38E-08
Noncancer Ingestion Intake - CTE = 9.69E-07

Cancer Dermal Intake - RME = 8.30E-08
Noncancer Dermal Intake - RME = 5.81E-06

Cancer Dermal Intake - CTE = 2.77E-08
Noncancer Dermal Intake - CTE = 1.94E-06

**TABLE 5.1**
**NON-CANCER TOXICITY DATA -- ORAL/DERMAL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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) |
| **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 |
| Benzo(k)fluoranthene | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chrysene | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 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 |
| **Pesticides PCBs** | | | | | | | | | | |
| Aroclor-1254 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Aroclor-1260 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **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 | 9/23/2005 |
| Arsenic | Chronic | 3.0E-04 | mg/kg/day | 1 | 3.0E-04 | mg/kg/day | Skin, CVS | 3/1 | IRIS | 9/23/2005 |
| Cadmium[3] | Chronic | 5.0E-04 | mg/kg/day | 0.05 | 2.5E-05 | mg/kg/day | Kidney | 10/1 | IRIS | 9/23/2005 |
| Iron | Chronic | 3.0E-01 | mg/kg/day | 1 | 3.0E-01 | mg/kg/day | NA | 1 | 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 | 9/23/2005 |
| Manganese (Water) | Chronic | 2.4E-02 | mg/kg/day | 0.04 | 9.6E-04 | mg/kg/day | CNS | 3/1 | IRIS | 9/23/2005 |
| Vanadium | Chronic | 1.0E-03 | mg/kg/day | 0.026 | 2.6E-05 | mg/kg/day | Kidney | 300 | NCEA | 10/19/2004 |

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.

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
IRIS = Integrated Risk Information System
NA = Not Applicable

TABLE 3.4
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 |
| SWMU 15 | Benzo(a)anthracene | mg/kg | 1.08 | 1.85 (G) | 3.7 J | 1.85 | mg/kg | Approximate Gamma 95% UCL | A-D, K-S (1) |
| | Benzo(a)pyrene | mg/kg | 1.18 | 2.00 (G) | 4.5 J | 2.00 | mg/kg | Approximate Gamma 95% UCL | A-D, K-S (1) |
| | Benzo(b)fluoranthene | mg/kg | 1.37 | 2.33 (G) | 6 J | 2.33 | mg/kg | Approximate Gamma 95% UCL | A-D, K-S (1) |
| | Dibenzo(a,h)anthracene | mg/kg | 0.218 | 0.39 (G) | 0.7 J | 0.390 | mg/kg | Approximate Gamma 95% UCL | A-D, K-S (1) |
| | Indeno(1,2,3-cd)pyrene | mg/kg | 0.934 | 1.52 (G) | 3.1 J | 1.52 | mg/kg | Approximate Gamma 95% UCL | A-D, K-S (1) |
| | Aroclor-1254 | mg/kg | 0.031 | 0.234 (NP) | 0.23 J | 0.158 | mg/kg | 97.5% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (2) |
| | Aroclor-1260 | mg/kg | 0.035 | 0.329 (NP) | 0.33 | 0.329 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (3) |
| | Aluminum | mg/kg | 9386 | 11297 (N) | 17700 J | 11297 | mg/kg | Student-t | W-Test (4) |
| | Arsenic | mg/kg | 8.82 | 11.8 (G) | 33.8 J | 11.8 | mg/kg | Approximate Gamma 95% UCL | A-D, K-S (1) |
| | Iron | mg/kg | 23825 | 30793 (G) | 74200 J | 30793 | mg/kg | Approximate Gamma 95% UCL | A-D, K-S (1) |
| | Manganese | mg/kg | 1090 | 1306 (N) | 1990 J | 1306 | mg/kg | Student-t | W-Test (4) |
| | Vanadium | mg/kg | 25.5 | 32.9 (G) | 83.6 J | 32.9 | 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.
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, Anderson-Darling, and Kolmogorov-Smirnov tests indicate that the data is non-parametric. Based on a review of the frequnecy of detection, mean, and detection limits the 97.5% Chebyshev(Mean, Std) UCL was selected 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 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 3.3
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 |
| SWMU 15 | Benzo(a)anthracene | ug/L | 0.271 | 1.66 (NP) | 1.84 | 1.66 | ug/L | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Benzo(a)pyrene | ug/L | 0.353 | 2.26 (NP) | 2.38 | 2.26 | ug/L | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Benzo(b)fluoranthene | ug/L | 0.799 | 5.38 (NP) | 5.83 | 5.38 | ug/L | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Benzo(k)fluoranthene | ug/L | 0.250 | 1.55 (NP) | 1.72 | 1.55 | ug/L | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Chrysene | ug/L | 0.632 | 4.12 (NP) | 4.46 | 4.12 | ug/L | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Dibenzo(a,h)anthracene | ug/L | 0.076 | 0.23 (NP) | 0.46 | 0.23 | ug/L | 95% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (2) |
| | Indeno(1,2,3-cd)pyrene | ug/L | 0.311 | 2.02 (NP) | 2.09 | 2.02 | ug/L | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Antimony | ug/L | 0.323 | 1.06 (NP) | 2.5 J | 1.06 | ug/L | 95% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (2) |
| | Arsenic | ug/L | 0.408 | 0.556 (G) | 1.4 J | 1.4 | ug/L | Maximum Detection | A-D, K-S (3) |
| | Iron | ug/L | 1272 | 1773 (N) | 3330 J | 1773 | ug/L | Student-t | W-Test (4) |
| | Manganese | ug/L | 283 | 515 (G) | 1230 | 515 | ug/L | Approximate Gamma 95% UCL | A-D, K-S (5) |
| | Vanadium | ug/L | 1.78 | 3.69 (NP) | 6.1 | 3.69 | ug/L | 95% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (2) |

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.
N - Normal distribution.
NP - Non-parmetric 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.
2 - 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.
3 - Anderson-Darling (A-D) and Kolmogorov Smirnov (K-S) test indicates that the data follows a gamma distribution, but because of the low frequency of detection the maximum detected concentration is 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 - 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.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.2
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 15 | Benzo(a)anthracene | mg/kg | 0.146 | 0.617 (NP) | 4.6 J | 0.6 | mg/kg | 97.5% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Benzo(a)pyrene | mg/kg | 0.241 | 1.81 (NP) | 10 | 2 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (2) |
| | Benzo(b)fluoranthene | mg/kg | 0.294 | 2.19 (NP) | 12 | 2 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (2) |
| | Dibenzo(a,h)anthracene | mg/kg | 0.071 | 0.387 (NP) | 3.2 | 0.4 | mg/kg | 97.5% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Indeno(1,2,3-cd)pyrene | mg/kg | 0.264 | 2.00 (NP) | 11 | 2 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (2) |
| | Aroclor-1260 | mg/kg | 0.050 | 0.423 (NP) | 1.2 | 0.42 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (2) |
| | Aluminum | mg/kg | 17819 | 19335 (N) | 31100 J | 19335 | mg/kg | Student-t | W-Test (3) |
| | Arsenic | mg/kg | 8.26 | 10.6 (NP) | 20.7 J | 10.6 | mg/kg | 95% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (4) |
| | Cadmium | mg/kg | 0.514 | 1.08 (NP) | 6.9 J | 1.1 | mg/kg | 95% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (4) |
| | Iron | mg/kg | 24818 | 27442 (N) | 57600 J | 27442 | mg/kg | Student-t | W-Test (3) |
| | Manganese | mg/kg | 499 | 635 (L) | 4400 J | 635 | mg/kg | H-UCL | W-Test (5) |
| | Vanadium | mg/kg | 32.4 | 34.5 (N) | 57.4 | 34.5 | mg/kg | Student-t | W-Test (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.
L = Lognormal
N = Normal
NP = Non-parametric
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 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 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.
4 - 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.
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.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.1
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: 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 15 | Benzo(a)anthracene | mg/kg | 0.199 | 1.26 (NP) | 4.6 J | 1.26 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Benzo(a)pyrene | mg/kg | 0.334 | 2.56 (NP) | 10 | 2.56 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Benzo(b)fluoranthene | mg/kg | 0.407 | 3.10 (NP) | 12 | 3.10 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Dibenzo(a,h)anthracene | mg/kg | 0.099 | 0.814 (NP) | 3.2 | 0.814 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Indeno(1,2,3-cd)pyrene | mg/kg | 0.370 | 2.83 (NP) | 11 | 2.83 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Aroclor-1260 | mg/kg | 0.058 | 0.500 (NP) | 1.2 | 0.500 | mg/kg | 99% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (1) |
| | Aluminum | mg/kg | 17008 | 18825 (N) | 29900 J | 18825 | mg/kg | Student-t | W-Test (2) |
| | Arsenic | mg/kg | 8.26 | 11.0 (NP) | 20.7 J | 11.0 | mg/kg | 95% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (3) |
| | Cadmium | mg/kg | 0.545 | 1.26 (NP) | 6.9 J | 1.26 | mg/kg | 95% Chebyshev(Mean, Std) UCL | W-, A-D, & K-S Test (3) |
| | Iron | mg/kg | 24621 | 27910 (N) | 57600 J | 27910 | mg/kg | Student-t | W-Test (2) |
| | Manganese | mg/kg | 432 | 570 (L) | 4400 J | 570 | mg/kg | H-UCL | W-Test (4) |
| | Vanadium | mg/kg | 31.9 | 34.5 (N) | 57.4 | 34.5 | mg/kg | Student-t | W-Test (2) |

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.
L = Lognormal
N = Normal
NP = Non-parametric
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.
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 95% 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.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

**TABLE 2.6**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - GULLIES**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SWMU 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 630-20-6 | 1,1,1,2-Tetrachloroethane | 1.03 | 1.03 | ug/kg | 15SD0020006 | 1/11 | 0.948 - 1.54 | 1.03 | NA | 3200 C | 39000 | IDEM | No | BSL |
| | 67-64-1 | Acetone | 2 J | 8 J | ug/kg | 15SD0090006 | 3/11 | 0.948 - 2 | 8 | NA | 1400000 N | 4800000 | IDEM | No | BSL |
| | **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 4 J | 100 | ug/kg | 15SD0150006 | 13/17 | 4.37 - 16.3 | 100 | 5 J | 5600 N[8] | 3200000 | IDEM | No | BSL |
| | 83-32-9 | Acenaphthene | 6 J | 850 | ug/kg | 15SD0150006 | 16/17 | 4.37 - 4.37 | 850 | 27 - 36 | 370000 N | 9500000 | IDEM | No | BSL |
| | 208-96-8 | Acenaphthylene | 6 J | 48 | ug/kg | 15SD0180006 | 8/17 | 3.81 - 16.3 | 48 | NA | 370000 N[9] | 1100000 | IDEM | No | BSL |
| | 98-86-2 | Acetophenone | 110 J | 110 J | ug/kg | 15SD0020006 | 1/11 | 77.4 - 112 | 110 | NA | NA | NA | NA | No | NTX |
| | 120-12-7 | Anthracene | 18 | 1800 | ug/kg | 15SD0150006 | 16/17 | 4.37 - 4.37 | 1800 | 71 - 89 | 2200000 N | 47000000 | IDEM | No | BSL |
| | 56-55-3 | **Benzo(a)anthracene** | 13 | 3700 J | ug/kg | 15SD0240006 | 17/17 | --- | 3700 | 270 - 330 | **620 C** | 5000 | IDEM | **Yes** | ASL |
| | 50-32-8 | **Benzo(a)pyrene** | 15 | 4500 J | ug/kg | 15SD0240006 | 17/17 | --- | 4500 | 330 - 390 | **62 C** | **500** | IDEM | **Yes** | ASL |
| | 205-99-2 | **Benzo(b)fluoranthene** | 18 | 6000 J | ug/kg | 15SD0240006 | 17/17 | --- | 6000 | 340 - 440 | **620 C** | **5000** | IDEM | **Yes** | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 16 | 3800 J | ug/kg | 15SD0060006 | 17/17 | --- | 3800 | 200 - 400 | 230000 N[10] | 50000 | IDEM | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 11 | 2000 J | ug/kg | 15SD0240006 | 17/17 | --- | 2000 | 190 - 310 | 6200 C | 50000 | IDEM | No | BSL |
| | 117-81-7 | Bis(2-Ethylhexyl)Phthalate | 130 J | 280 J | ug/kg | 15SD0090006 | 6/11 | 83.2 - 112 | 280 | | 35000 C | 300000 | IDEM | No | BSL |
| | 218-01-9 | Chrysene | 14 | 4500 J | ug/kg | 15SD0240006 | 17/17 | --- | 4500 | 350 - 390 | 62000 C | 500000 | IDEM | No | BSL |
| | 84-74-2 | di-n-Butyl Phthalate | 220 J | 220 J | ug/kg | 15SD0190006 | 1/11 | 77.4 - 112 | 220 | NA | 610000 N | 18000000 | IDEM | No | BSL |
| | 53-70-3 | **Dibenzo(a,h)anthracene** | 48 | 700 J | ug/kg | 15SD0060006 | 14/17 | 3.81 - 16.3 | 700 | 38 - 65 | **62 C** | **500** | IDEM | **Yes** | ASL |
| | 132-64-9 | Dibenzofuran | 89 J | 420 | ug/kg | 15SD0060006 | 4/11 | 77.4 - 88.7 | 420 | | 15000 N | 370000 | IDEM | No | BSL |
| | 206-44-0 | Fluoranthene | 25 | 12000 | ug/kg | 15SD0060006 | 17/17 | --- | 12000 | 720 - 1000 | 230000 N | 6300000 | IDEM | No | BSL |
| | 86-73-7 | Fluorene | 8 | 820 | ug/kg | 15SD0060006 | 16/17 | 4.37 - 4.37 | 820 | 34 - 47 | 270000 N | 6300000 | IDEM | No | BSL |
| | 193-39-5 | **Indeno(1,2,3-cd)pyrene** | 15 | 3100 J | ug/kg | 15SD0060006 | 17/17 | --- | 3100 | 180 - 310 | **620 C** | 5000 | IDEM | **Yes** | ASL |
| | 91-20-3 | Naphthalene | 5 J | 370 | ug/kg | 15SD0150006 | 15/17 | 4.37 - 16.3 | 370 | 8 J - 10 | 5600 N | 3200000 | IDEM | No | BSL |
| | 85-01-8 | Phenanthrene | 18 | 9100 | ug/kg | 15SD0060006 | 17/17 | --- | 9100 | 560 - 630 | 230000 N[10] | 470000 | IDEM | No | BSL |
| | 129-00-0 | Pyrene | 35 J | 18000 J | ug/kg | 15SD0240006 | 17/17 | --- | 18000 | 690 | 230000 N | 4700000 | IDEM | No | BSL |
| | **Pesticides/PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 1.56 J | 35 | ug/kg | 15SD0180006 | 8/11 | 1.58 - 1.62 | 35 | NA | 2400 C | 28000 | IDEM | No | BSL |
| | 72-55-9 | 4,4'-DDE | 2.5 J | 76 | ug/kg | 15SD0130006 | 6/11 | 1.58 - 1.7 | 76 | NA | 1700 C | 20000 | IDEM | No | BSL |
| | 50-29-3 | 4,4'-DDT | 2.1 J | 100 | ug/kg | 15SD0180006 | 11/11 | --- | 100 | 4.2 | 1700 C | 20000 | IDEM | No | BSL |
| | 5103-71-9 | Alpha-Chlordane | 5.3 | 31 | ug/kg | 15SD0150006 | 3/11 | 0.751 - 1.09 | 31 | NA | 1600 C[11] | 17000 | IDEM[11] | No | BSL |
| | 11097-69-1 | **Aroclor-1254** | 54 J | 230 J | ug/kg | 15SD0010006 | 2/11 | 10.4 - 15.1 | 230 | NA | **110 N[12]** | 1800 | IDEM | **Yes** | ASL |
| | 11096-82-5 | **Aroclor-1260** | 330 | 330 | ug/kg | 15SD0150006 | 1/11 | 10.4 - 15.1 | 330 | NA | **110 N[12]** | 1800 | IDEM | **Yes** | ASL |
| | 5103-74-2 | Gamma-Chlordane | 4 J | 28 | ug/kg | 15SD0150006 | 3/11 | 0.751 - 1.09 | 28 | NA | 1600 C[11] | 17000 | IDEM[11] | No | BSL |
| | **Herbicides** | | | | | | | | | | | | | | |
| | 93-76-5 | 2,4,5-T | 5.7 J | 6.8 J | ug/kg | 15SD0150006 | 2/11 | 1.56 - 2.27 | 6.8 | NA | 61000 N | 1800 | IDEM | No | BSL |
| | 87-86-5 | Pentachlorophenol | 1.5 J | 4.9 J | ug/kg | 15SD0090006 | 8/11 | 0.54 - 0.755 | 4.9 | 1.5 J | 3000 C | 20000 | IDEM | No | BSL |
| | **Inorganics** | | | | | | | | | | | | | | |
| | 7429-90-5 | **Aluminum** | 3760 J | 17700 J | mg/kg | 15SD0180006 | 15/15 | --- | 17700 | 10100 J - 14400 J | **7600 N** | NA | NA | **Yes** | ASL |
| | 7440-36-0 | Antimony | 0.74 J | 1.4 J | mg/kg | 15SD0220006 | 2/15 | 0.19 - 1.2 | 1.4 | 0.59 J | 3.1 N | 140 | IDEM | No | BSL |
| | 7440-38-2 | **Arsenic** | 3.6 J | 33.8 J | mg/kg | 15SD0190006 | 15/15 | --- | 33.8 | 7.9 J - 20.9 J | **0.39 C** | **3.9** | IDEM | **Yes** | ASL |
| | 7440-39-3 | Barium | 23.5 J | 131 J | mg/kg | 15SD0150006 | 15/15 | --- | 131 | 109 J - 128 J | 540 N | 23000 | IDEM | No | BSL |
| | 7440-41-7 | Beryllium | 0.34 J | 1.2 J | mg/kg | 15SD0150006 | 12/15 | 0.18 - 0.32 | 1.2 | 0.86 J - 1.8 J | 15 N | 680 | IDEM | No | BSL |
| | 7440-43-9 | Cadmium | 0.16 J | 0.63 J | mg/kg | 15SD0090006 | 12/15 | 0.27 - 0.3 | 0.63 | 0.2 J - 0.65 J | 3.7 N | 12 | IDEM | No | BSL |
| | 7440-70-2 | Calcium | 1610 J | 129000 J | mg/kg | 15SD0090006 | 15/15 | --- | 129000 | 3800 J - 4910 J | NA | NA | NA | No | NUT |
| | 7440-47-3 | Chromium | 10.4 J | 70.1 J | mg/kg | 15SD0190006 | 15/15 | --- | 70.1 | 29.1 J - 46.1 J | 210 C[13] | 430[14] | IDEM | No | BSL |
| | 7440-48-4 | Cobalt | 3.8 J | 36.1 J | mg/kg | 15SD0010006 | 15/15 | --- | 36.1 | 37.1 J - 85.9 J | 140 N[12] | NA | NA | No | BSL |
| | 7440-50-8 | Copper | 4.9 J | 17.8 J | mg/kg | 15SD0130006 | 15/15 | --- | 17.8 | 10.7 J - 17.3 J | 310 N | 13000 | IDEM | No | BSL |
| | 7439-89-6 | **Iron** | 9670 J | 74200 J | mg/kg | 15SD0190006 | 15/15 | --- | 74200 | 28200 J - 61000 J | **2300 N** | NA | NA | **Yes** | ASL |

**TABLE 2.6**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - GULLIES**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7439-92-1 | Lead | 8.9 J | 133 J | mg/kg | 15SD0090006 | 15/15 | --- | 133 | 24.7 J - 35 J | 400 | 400 | IDEM | No | BSL |
| | 7439-95-4 | Magnesium | 1280 J | 17400 J | mg/kg | 15SD0050006 | 15/15 | --- | 17400 | 1210 J - 1780 J | NA | NA | NA | No | NUT |
| | 7439-96-5 | **Manganese** | 323 J | 1990 J | mg/kg | 15SD0180006 | 15/15 | --- | 1990 | 2160 J - 5160 J | **180 N** | NA | NA | **Yes** | ASL |
| | 7439-97-6 | Mercury | 0.01 J | 0.085 J | mg/kg | 15SD0060006 | 12/15 | 0.007 - 0.008 | 0.085 | 0.035 J | 2.3 N | 100 | IDEM | No | BSL |
| | 7440-02-0 | Nickel | 8.6 J | 35.4 J | mg/kg | 15SD0010006 | 15/15 | --- | 35.4 | 30.3 J - 64.5 J | 160 N | 6900 | IDEM | No | BSL |
| | 7440-09-7 | Potassium | 564 J | 1700 J | mg/kg | 15SD0150006 | 15/15 | --- | 1700 | 993 - 1440 J | NA | NA | NA | No | NUT |
| | 7782-49-2 | Selenium | 0.19 J | 0.8 J | mg/kg | 15SD0190006 | 12/15 | 0.13 - 0.27 | 0.8 | 0.37 J - 0.96 J | 39 N | 1700 | IDEM | No | BSL |
| | 7440-23-5 | Sodium | 20.7 J | 243 J | mg/kg | 15SD0230006 | 7/15 | 83.4 - 146 | 243 | NA | NA | NA | NA | No | NUT |
| | 7440-31-5 | Tin | 0.1 J | 0.3 J | mg/kg | 15SD0180006 | 6/15 | 0.04 - 0.19 | 0.3 | NA | 4700 N | NA | NA | No | BSL |
| | 7440-32-6 | Titanium | 10.2 J | 10.2 J | mg/kg | 15SD0150006 | 1/15 | 0.095 - 0.62 | 10.2 | NA | 31000 N(15) | NA | NA | No | BSL |
| | 7440-62-2 | **Vanadium** | 12.3 J | 83.6 J | mg/kg | 15SD0190006 | 15/15 | --- | 83.6 | 24.6 J - 42.4 J | **7.8 N** | NA | NA | **Yes** | ASL |
| | 7440-66-6 | Zinc | 39.5 | 163 | mg/kg | 15SD0090006 | 15/15 | --- | 163 | 57.8 J - 161 | 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 samples are from locations 15SW/SD014 and 15SW/SD026.
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.
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 - Chlordane is used as a surrogate for alpha- and gamma-chlordane.
12 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented in the electronic version of the PRG table.
13 - The PRG for residential land use for total chromium is presented.
14 - Value is for hexavalent chromium.
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
PRG = Preliminary Remediation Goal

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

**Associated Samples**

| | |
|---|---|
| 15SD0060006 | 15SD0230006 |
| 15SD0090006 | 15SD0240006 |
| 15SD0050006 | 15SD0250006 |
| 15SD0130006 | 15SD0010006 |
| 15SD0150006 | 15SD0020006 |
| 15SD0160006 | 15SD0200006 |
| 15SD0170006 | 15SD0210006 |
| 15SD0180006 | 15SD0220006 |
| 15SD0190006 | |

**TABLE 2.5**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SWMU 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 67-64-1 | Acetone | 3.1 J | 4 J | ug/L | 15SW/SD002 | 2/14 | 0.5 | 4 | NA | 550 N | NA<br>950 | NA<br>IDEM | No | BSL |
| | **Semivolatile Organic Compounds** | | | | | | | | | | | | | | |
| | 83-32-9 | Acenaphthene | 0.06 J | 0.33 | ug/L | 15SW/SD010 | 2/14 | 0.048 - 0.056 | 0.33 | NA | 37 N | NA<br>460 | NA<br>IDEM | No | BSL |
| | 208-96-8 | Acenaphthylene | 0.43 | 0.43 | ug/L | 15SW/SD010 | 1/14 | 0.048 - 0.056 | 0.43 | NA | 37 N[8] | NA<br>71 | NA<br>IDEM | No | BSL |
| | 120-12-7 | Anthracene | 0.05 J | 0.36 | ug/L | 15SW/SD010 | 4/14 | 0.048 - 0.056 | 0.36 | NA | 180 N | NA<br>43 | NA<br>IDEM | No | BSL |
| | 56-55-3 | **Benzo(a)anthracene** | 0.09 J | 1.84 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 1.84 | 0.12 | **0.092 C** | NA<br>**1.2** | NA<br>IDEM | **Yes** | ASL |
| | 50-32-8 | **Benzo(a)pyrene** | 0.1 | 2.38 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 2.38 | 0.1 | **0.0092 C** | **0.2**<br>**0.2** | FED-MCL<br>IDEM | **Yes** | ASL |
| | 205-99-2 | **Benzo(b)fluoranthene** | 0.21 | 5.83 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 5.83 | 0.2 | **0.092 C** | NA<br>**1.2** | NA<br>IDEM | **Yes** | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 0.1 | 2.46 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 2.46 | 0.11 | 18 N[9] | NA<br>12 | NA<br>IDEM | No | BSL |
| | 207-08-9 | **Benzo(k)fluoranthene** | 0.08 J | 1.72 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 1.72 | 0.1 | **0.92 C** | NA<br>**0.8** | NA<br>IDEM | **Yes** | ASL |
| | 117-81-7 | Bis(2-ethylhexyl)phthalate | 1.01 J | 1.01 J | ug/L | 15SW/SD010 | 1/14 | 0.952 - 1.06 | 1.01 | NA | 4.8 C | 6<br>6 | FED-MCL<br>IDEM | No | BSL |
| | 218-01-9 | **Chrysene** | 0.2 | 4.46 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 4.46 | 0.18 | 9.2 C | NA<br>**1.6** | NA<br>IDEM | **Yes** | ASL |
| | 53-70-3 | **Dibenzo(a,h)anthracene** | 0.3 | 0.46 | ug/L | 15SW/SD010 | 2/14 | 0.048 - 0.056 | 0.46 | NA | **0.0092 C** | NA<br>**0.12** | NA<br>IDEM | **Yes** | ASL |
| | 206-44-0 | Fluoranthene | 0.1 | 11.9 | ug/L | 15SW/SD010 | 9/14 | 0.048 - 0.052 | 11.9 | 0.49 | 150 N | NA<br>210 | NA<br>IDEM | No | BSL |
| | 86-73-7 | Fluorene | 0.08 J | 0.34 | ug/L | 15SW/SD010 | 2/14 | 0.048 - 0.056 | 0.34 | NA | 24 N | NA<br>310 | NA<br>IDEM | No | BSL |
| | 193-39-5 | **Indeno(1,2,3-cd)pyrene** | 0.08 J | 2.09 | ug/L | 15SW/SD010 | 7/14 | 0.048 - 0.052 | 2.09 | 0.09 J | **0.092 C** | NA<br>**0.022** | NA<br>IDEM | **Yes** | ASL |
| | 91-20-3 | Naphthalene | 0.05 J | 0.12 | ug/L | 15SW/SD010 | 2/14 | 0.048 - 0.056 | 0.12 | NA | 6.2 N | NA<br>8.3 | NA<br>IDEM | No | BSL |
| | 85-01-8 | Phenanthrene | 0.06 J | 4.73 | ug/L | 15SW/SD010 | 9/14 | 0.048 - 0.052 | 4.73 | 0.32 | 18 N[9] | NA<br>23 | NA<br>IDEM | No | BSL |
| | 129-00-0 | Pyrene | 0.05 J | 8.61 | ug/L | 15SW/SD010 | 11/14 | 0.049 - 0.052 | 8.61 | 0.42 | 18 N | NA<br>140 | NA<br>IDEM | No | BSL |
| | 87-86-5 | Pentachlorophenol | 0.022 J | 0.075 J | ug/L | 15SW/SD006 | 11/13 | 0.013 - 0.013 | 0.075 | 0.037 J | 0.56 C | 1<br>1 | FED-MCL<br>IDEM | No | BSL |
| | **Total Metals** | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum | 54.6 J | 3020 J | ug/L | 15SW/SD018 | 13/14 | 41.6 | 3020 | 421 J | 3600 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-36-0 | **Antimony** | 2.5 J | 2.5 J | ug/L | 15SW/SD013 | 1/14 | 0.19 - 0.49 | 2.5 | NA | **1.5 N** | 6<br>6 | FED-MCL<br>IDEM | **Yes** | ASL |
| | 7440-38-2 | **Arsenic** | 1.4 J | 1.4 J | ug/L | 15SW/SD018 | 1/14 | 0.26 - 1.2 | 1.4 | NA | **0.045 C** | 10<br>50 | FED-MCL<br>IDEM | **Yes** | ASL |
| | 7440-39-3 | Barium | 25.4 J | 162 J | ug/L | 15SW/SD013 | 14/14 | - | 162 | 40.7 J | 260 N | 2000<br>2000 | FED-MCL<br>IDEM | No | BSL |

**TABLE 2.5**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7440-70-2 | Calcium | 30400 J | 96900 J | ug/L | 15SW/SD013 | 14/14 | - | 96900 | 40600 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7440-47-3 | Chromium | 1.3 J | 3.6 J | ug/L | 15SW/SD011,<br>15SW/SD018 | 7/14 | 0.42 - 1 | 3.6 | NA | 11 N(10) | 100<br>110 | FED-MCL<br>IDEM(10) | No | BSL |
| | 7440-48-4 | Cobalt | 1.4 J | 5.8 J | ug/L | 15SW/SD006 | 8/14 | 0.16 - 0.91 | 5.8 | NA | 73 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-50-8 | Copper | 1.3 J | 8.1 J | ug/L | 15SW/SD011 | 13/14 | 1.1 - 1.1 | 8.1 | 1.5 J | 150 N | 1300<br>1300 | FED-MCL(11)<br>IDEM | No | BSL |
| | 7439-89-6 | **Iron** | 306 J | 3330 J | ug/L | 15SW/SD018 | 12/14 | 41 - 49.9 | 3330 | 411 J | **1100 N** | NA<br>NA | NA<br>NA | **Yes** | ASL |
| | 7439-92-1 | Lead | 1.1 J | 2.9 J | ug/L | 15SW/SD018 | 8/14 | 0.279 - 0.633 | 2.9 | NA | NA | 15<br>15 | FED-MCL(11)<br>IDEM | No | BSL |
| | 7439-95-4 | Magnesium | 6630 J | 18900 J | ug/L | 15SW/SD011 | 14/14 | - | 18900 | 9810 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7439-96-5 | **Manganese** | 6.4 J | 1230 | ug/L | 15SW/SD006 | 14/14 | - | 1230 | 69 | **88 N** | NA<br>NA | NA<br>NA | **Yes** | ASL |
| | 7440-02-0 | Nickel | 1.4 J | 8 J | ug/L | 15SW/SD017 | 13/14 | 0.88 | 8 | 3.8 J | 73 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-09-7 | Potassium | 757 J | 6500 J | ug/L | 15SW/SD011 | 14/14 | - - - | 6500 | 1610 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7782-49-2 | Selenium | 1.3 J | 1.3 J | ug/L | 15SW/SD004 | 1/14 | 0.14 - 0.75 | 1.3 | NA | 18 N | 50<br>50 | FED-MCL<br>IDEM | No | BSL |
| | 7440-23-5 | Sodium | 15600 J | 135000 J | ug/L | 15SW/SD011 | 14/14 | - | 135000 | 23000 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7440-62-2 | **Vanadium** | 1.2 J | 6.1 | ug/L | 15SW/SD018 | 8/14 | 1.14 | 6.1 | NA | **3.6 N** | NA<br>NA | NA<br>NA | **Yes** | ASL |
| | 7440-66-6 | Zinc | 5.2 J | 102 J | ug/L | 15SW/SD004 | 12/14 | 3.5 - 10.6 | 102 | 7.5 J | 1100 N | NA<br>11000 | NA<br>IDEM | No | BSL |
| **Dissolved Metals** | | | | | | | | | | | | | | | |
| | 7429-90-5 | Aluminum, Filtered | 10.1 J | 2090 | ug/L | 15SW/SD002 | 7/14 | 8.35 - 10.6 | 2090 | 48.8 J | 3600 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-38-2 | **Arsenic, Filtered** | 1 J | 17 J | ug/L | 15SW/SD001 | 2/14 | 0.047 - 0.33 | 17 | NA | **0.045 C** | **10**<br>50 | FED-MCL<br>IDEM | **Yes** | ASL |
| | 7440-39-3 | Barium, Filtered | 18.7 J | 149 J | ug/L | 15SW/SD013 | 14/14 | - | 149 | 33 J | 260 N | 2000<br>2000 | FED-MCL<br>IDEM | No | BSL |
| | 7440-43-9 | Cadmium, Filtered | 0.09 J | 0.36 J | ug/L | 15SW/SD018 | 2/14 | 0.039 - 0.33 | 0.36 | NA | 1.8 N | 5<br>5 | FED-MCL<br>IDEM | No | BSL |
| | 7440-70-2 | Calcium, Filtered | 25200 J | 99600 J | ug/L | 15SW/SD011,<br>15SW/SD013 | 14/14 | - | 99600 | 40400 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7440-47-3 | Chromium, Filtered | 3.4 J | 4.1 J | ug/L | 15SW/SD002 | 2/14 | 0.32 - 1.3 | 4.1 | NA | 11 N(10) | 100<br>110 | FED-MCL<br>IDEM(10) | No | BSL |
| | 7440-48-4 | Cobalt, Filtered | 0.26 J | 6.1 | ug/L | 15SW/SD006 | 14/14 | - | 6.1 | 0.86 J | 73 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-50-8 | Copper, Filtered | 1 J | 5.2 J | ug/L | 15SW/SD002 | 14/14 | - | 5.2 | 1.2 J | 150 N | 1300<br>1300 | FED-MCL(11)<br>IDEM | No | BSL |
| | 7439-89-6 | **Iron, Filtered** | 299 J | 2860 J | ug/L | 15SW/SD002 | 9/14 | 120 - 210 | 2860 | NA | **1100 N** | NA<br>NA | NA<br>NA | **Yes** | ASL |
| | 7439-92-1 | Lead, Filtered | 0.192 J | 3.1 J | ug/L | 15SW/SD002 | 3/14 | 0.069 - 0.486 | 3.1 | NA | NA | 15<br>15 | FED-MCL(11)<br>IDEM | No | BSL |

**TABLE 2.5**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER - GULLIES**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7439-95-4 | Magnesium, Filtered | 6410 J | 21700 | ug/L | 15SW/SD011 | 14/14 | - | 21700 | 11000 | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7439-96-5 | **Manganese, Filtered** | 4.7 J | 1230 | ug/L | 15SW/SD006 | 14/14 | - | 1230 | 41.2 | **88 N** | NA<br>NA | NA<br>NA | **Yes** | ASL |
| | 7440-02-0 | Nickel, Filtered | 2 J | 9 J | ug/L | 15SW/SD017 | 14/14 | - | 9 | 4.3 J | 73 N | NA<br>NA | NA<br>NA | No | BSL |
| | 7440-09-7 | Potassium, Filtered | 788 J | 7590 J | ug/L | 15SW/SD011 | 14/14 | - | 7590 | 1670 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7782-49-2 | Selenium, Filtered | 0.67 J | 1.1 J | ug/L | 15SW/SD004 | 2/14 | 0.12 - 0.55 | 1.1 | NA | 18 N | 50<br>50 | FED-MCL<br>IDEM | No | BSL |
| | 7440-23-5 | Sodium, Filtered | 14500 J | 141000 J | ug/L | 15SW/SD011 | 14/14 | - | 141000 | 23900 J | NA | NA<br>NA | NA<br>NA | No | NUT |
| | 7440-28-0 | Thallium, Filtered | 0.09 J | 0.1 J | ug/L | 15SW/SD018 | 2/14 | 0.043 - 0.13 | 0.1 | NA | 0.24 N | 2<br>2 | FED-MCL<br>IDEM | No | BSL |
| | 7440-62-2 | **Vanadium, Filtered** | 4.2 | 4.2 | ug/L | 15SW/SD002 | 1/14 | 1.14 - 1.14 | 4.2 | NA | **3.6 N** | NA<br>NA | NA<br>NA | **Yes** | ASL |
| | 7440-66-6 | Zinc, Filtered | 2.1 J | 88 J | ug/L | 15SW/SD004 | 13/14 | 3.4 - 3.4 | 88 | 3.7 J | 1100 N | NA<br>11000 | NA<br>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 15SW/SD014.
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.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for acenaphthene was used as a surrogate for acenaphthylene.
9 - Value is for pyrene.
10 - Values are for hexavalent chromium.
11 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.

**Associated Samples**

| | | |
|---|---|---|
| 15SW/SD004 | 15SW/SD011 | 15SW/SD017 |
| 15SW/SD004 | 15SW/SD005 | 15SW/SD017 |
| 15SW/SD006 | 15SW/SD005 | 15SW/SD018 |
| 15SW/SD006 | 15SW/SD013 | 15SW/SD018 |
| 15SW/SD009 | 15SW/SD013 | 15SW/SD019 |
| 15SW/SD009 | 15SW/SD015 | 15SW/SD019 |
| 15SW/SD010 | 15SW/SD015 | 15SW/SD001 |
| 15SW/SD010 | 15SW/SD016 | 15SW/SD001 |
| 15SW/SD011 | 15SW/SD016 | 15SW/SD002 |
| | | 15SW/SD002 |

**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
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 2.4**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SUBSURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 78-93-3 | 2-Butanone | 1 J | 18 | ug/kg | 15SB0461020 | 18/43 | 0.867 - 1.23 | 18 | NA | 24000000 sat | 4400 | 35000 | No | BSL |
| | 591-78-6 | 2-Hexanone | 2 J | 2 J | ug/kg | 15SB0460206 | 1/43 | 0.796 - 1.48 | 2 | NA | NA | NA | NA | No | NTX |
| | 67-64-1 | Acetone | 3 J | 72 | ug/kg | 15SB0210206, 15SB0400206 | 18/43 | 3 - 42 | 72 | NA | NA | 6600 | 3800 | No | BSL |
| | 75-15-0 | Carbon Disulfide | 1 J | 3 J | ug/kg | 15SB0461020 | 3/43 | 0.796 - 1.48 | 3 | NA | 720000 sat | 1500 | 10000 | No | BSL |
| | 156-59-2 | cis-1,2-Dichloroethene | 2 J | 2 J | ug/kg | 15SB0220206, 15SB0430206 | 2/43 | 0.796 - 1.48 | 2 | NA | NA | 20 | 400 | No | BSL |
| | 75-09-2 | **Methylene Chloride** | 1 J | 54 J | ug/kg | 15SB0450610 | 36/43 | 0.891 - 10 | 54 | NA | 13000 C | **1.2** | **23** | **Yes** | ASL |
| | 1330-20-7 | Total Xylenes | 1.13 J | 1.13 J | ug/kg | 15SB0311014 | 1/43 | 0.796 - 1.48 | 1.13 | NA | 71000 N | 7100 | 210000 | No | BSL |
| | 75-69-4 | Trichlorofluoromethane | 1 J | 3 | ug/kg | 15SB0311014, 15SB0450610 | 12/43 | 0.815 - 1.48 | 3 | NA | 110000 N | 8000 | NA | No | BSL |
| | **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 4 J | 47 | ug/kg | 15SB0020206 | 7/19 | 3.85 - 4.3 | 47 | NA | NA | NA | 16000 | No | BSL |
| | 83-32-9 | Acenaphthene | 6 J | 110 | ug/kg | 15SB0020206 | 5/19 | 3.78 - 4.3 | 110 | NA | NA | 31000 | 130000 | No | BSL |
| | 98-86-2 | Acetophenone | 140 J | 140 J | ug/kg | 15SB0460206 | 1/12 | 72.7 - 130 | 140 | NA | NA | 890 | NA | No | BSL |
| | 120-12-7 | Anthracene | 4 J | 120 | ug/kg | 15SB0020206 | 8/19 | 3.78 - 4.3 | 120 | NA | NA | 650000 | 51000 | No | BSL |
| | 56-55-3 | Benzo(a)anthracene | 8 | 110 | ug/kg | 15SB0280206 | 9/19 | 3.85 - 4.3 | 110 | NA | NA | 160 | 19000 | No | BSL |
| | 50-32-8 | Benzo(a)pyrene | 8 | 150 | ug/kg | 15SB0230206 | 9/19 | 3.85 - 4.3 | 150 | NA | NA | 410 | 8200 | No | BSL |
| | 205-99-2 | Benzo(b)fluoranthene | 10 | 230 | ug/kg | 15SB0230206 | 9/19 | 3.85 - 4.3 | 230 | NA | NA | 490 | 57000 | No | BSL |
| | 191-24-2 | Benzo(g,h,i)perylene | 6 J | 120 | ug/kg | 15SB0280206 | 8/19 | 3.79 - 4.3 | 120 | NA | NA | NA | 16000 | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 5 J | 86 | ug/kg | 15SB0280206 | 8/19 | 3.78 - 4.3 | 86 | NA | NA | 490 | 39000 | No | BSL |
| | 117-81-7 | Bis(2-ethylhexyl)phthalate | 110 J | 110 J | ug/kg | 15SB0090206 | 1/12 | 72.7 - 86.9 | 110 | NA | NA | 180000 | 3600000 | No | BSL |
| | 218-01-9 | Chrysene | 9 | 120 | ug/kg | 15SB0230206, 15SB0280206 | 9/19 | 3.85 - 4.3 | 120 | NA | 7500000 C | 160 | 25000 | No | BSL |
| | 84-74-2 | Di-N-Butyl Phthalate | 100 J | 180 J | ug/kg | 15SB0460206 | 2/12 | 72.7 - 87.4 | 180 | NA | NA | 250000 | 5000000 | No | BSL |
| | 53-70-3 | Dibenzo(a,h)anthracene | 7 J | 31 | ug/kg | 15SB0280206 | 3/19 | 3.78 - 4.3 | 31 | NA | NA | 1500 | 18000 | No | BSL |
| | 206-44-0 | Fluoranthene | 12 | 370 | ug/kg | 15SB0020206 | 10/19 | 3.85 - 4.3 | 370 | NA | NA | 310000 | 880000 | No | BSL |
| | 86-73-7 | Fluorene | 4 J | 120 | ug/kg | 15SB0020206 | 7/19 | 3.79 - 4.3 | 120 | NA | NA | 41000 | 170000 | No | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 6 J | 85 | ug/kg | 15SB0280206 | 8/19 | 3.79 - 4.3 | 85 | NA | NA | 1400 | 3100 | No | BSL |
| | 120-58-1 | Isosafrole | 1300 | 6000 | ug/kg | 15SB0460206 | 2/12 | 72.7 - 86.9 | 6000 | NA | NA | NA | NA | No | NTX |
| | 91-20-3 | Naphthalene | 6 J | 42 | ug/kg | 15SB0020206 | 7/19 | 3.79 - 4.3 | 42 | NA | 17000 N | 3100 | 700 | No | BSL |
| | 85-01-8 | Phenanthrene | 6 J | 510 | ug/kg | 15SB0020206 | 11/19 | 3.85 - 4.3 | 510 | NA | NA | NA | 13000 | No | BSL |
| | 129-00-0 | Pyrene | 12 | 490 | ug/kg | 15SB0280206 | 11/19 | 3.85 - 4.3 | 490 | NA | NA | 230000 | 570000 | No | BSL |
| **Pesticides PCBs** | | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 2.3 J | 2.3 J | ug/kg | 15SB0480206 | 1/5 | 1.53 - 1.64 | 2.3 | NA | NA | 710 | 140000 | No | BSL |
| | 50-29-3 | 4,4'-DDT | 1.59 J | 1.59 J | ug/kg | 15SB0480206 | 1/5 | 1.53 - 1.64 | 1.59 | NA | 750000 C | 1300 | 26000 | No | BSL |
| | 5103-71-9 | Alpha-Chlordane[8] | 1 J | 1 J | ug/kg | 15SB0140206 | 1/5 | 0.744 - 0.788 | 1 | NA | 72000 C | 480 | 9600 | No | BSL |
| | 5103-74-2 | Gamma-Chlordane[8] | 1.1 J | 1.1 J | ug/kg | 15SB0140206 | 1/5 | 0.744 - 0.788 | 1.1 | NA | 72000 C | 480 | 9600 | No | BSL |
| **Inorganics** | | | | | | | | | | | | | | | |
| | 7429-90-5 | **Aluminum** | 14400 J | 31100 J | mg/kg | 15SB0230206 | 12/12 | --- | 31100 | 5020 - 17400 | 686000 N | **8.3** | NA | **Yes** | ASL |
| | 7440-38-2 | **Arsenic** | 3.9 J | 14.9 J | mg/kg | 15SB0230206 | 12/12 | --- | 14.9 | 1.1 - 10.2 | 745 C | **0.29** | 29 | **Yes** | ASL |
| | 7440-39-3 | **Barium** | 53.7 J | 157 J | mg/kg | 15SB0080206, 15SB0100610 | 12/12 | --- | 157 | 24.8 - 155 | 68600 N | **82** | 1600 | **Yes** | ASL |
| | 7440-41-7 | Beryllium | 0.55 | 1.1 J | mg/kg | 15SB0060206, 15SB0100206 | 12/12 | --- | 1.1 | 0.3 - 0.82 | 1330 C | 3.2 | 63 | No | BSL |
| | 7440-43-9 | **Cadmium** | 0.22 J | 0.95 | mg/kg | 15SB0480206 | 12/12 | --- | 0.95 | 0.05 - 3.6 | 1780 C | **0.38** | 7.5 | **Yes** | ASL |
| | 7440-70-2 | Calcium | 726 J | 22900 J | mg/kg | 15SB0450206 | 9/12 | 301 - 5680 | 22900 | 53.6 - 35300 | NA | NA | NA | No | NUT |
| | 7440-47-3 | **Chromium[9]** | 16.5 J | 32.6 J | mg/kg | 15SB0060206 | 12/12 | --- | 32.6 | 7.7 - 30.6 | 267 C | **2.1** | NA | **Yes** | ASL |

**TABLE 2.4**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SUBSURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7440-48-4 | **Cobalt** | 5.4 J | 54.2 J | mg/kg | 15SB0100206 | 12/12 | --- | 54.2 | 1.8 - 27.1 | 1140 C | **0.17** | NA | **Yes** | ASL |
| | 7440-50-8 | Copper | 6.1 J | 18.7 J | mg/kg | 15SB0230206 | 12/12 | --- | 18.7 | 3.5 - 23.8 | NA | 560 | 920 | No | BSL |
| | 7439-89-6 | Iron | 16500 J | 35600 J | mg/kg | 15SB0230206 | 12/12 | --- | 35600 | 7140 - 40800 | NA | NA | NA | No | NTX |
| | 7439-92-1 | Lead | 9.2 J | 21.7 J | mg/kg | 15SB0480206 | 12/12 | --- | 21.7 | 6.4 - 21.5 | NA | NA | 81 | No | BSL |
| | 7439-95-4 | Magnesium | 1030 J | 3890 J | mg/kg | 15SB0230206 | 12/12 | --- | 3890 | 496 - 2870 | NA | NA | NA | No | NUT |
| | 7439-96-5 | **Manganese** | 101 | 3570 J | mg/kg | 15SB0090206 | 12/12 | --- | 3570 | 23.2 - 3040 | 6860 N | **110** | NA | **Yes** | ASL |
| | 7439-97-6 | Mercury | 0.008 J | 0.055 J | mg/kg | 15SB0100206 | 8/9 | 0.007 | 0.055 | 0.04 - 0.14 | 2.9 sat | 0.1 | 2.1 | No | BSL |
| | 7440-02-0 | **Nickel** | 12 J | 33.2 J | mg/kg | 15SB0060206 | 12/12 | --- | 33.2 | 4.6 - 23.7 | NA | **14** | 950 | **Yes** | ASL |
| | 7440-09-7 | Potassium | 1050 J | 2820 J | mg/kg | 15SB0060206 | 12/12 | --- | 2820 | 280 - 1650 | NA | NA | NA | No | NUT |
| | 7782-49-2 | **Selenium** | 0.16 J | 0.79 J | mg/kg | 15SB0100206 | 11/12 | 0.28 | 0.79 | 0.28 - 0.88 | NA | **0.26** | 5.2 | **Yes** | ASL |
| | 7440-22-4 | Silver | 0.05 J | 0.05 J | mg/kg | 15SB0460206 | 1/12 | 0.044 - 0.08 | 0.05 | 0.04 - 0.11 | NA | 1.6 | 31 | No | BSL |
| | 7440-23-5 | Sodium | 79 J | 135 J | mg/kg | 15SB0090206 | 11/12 | 83 | 135 | 3.7 - 205 | NA | NA | NA | No | NUT |
| | 7440-28-0 | **Thallium** | 0.27 J | 0.39 J | mg/kg | 15SB0230206 | 4/12 | 0.17 - 0.33 | 0.39 | 0.05 - 0.31 | NA | **0.056** | 2.8 | **Yes** | ASL |
| | 7440-62-2 | Vanadium | 23.5 J | 55.9 J | mg/kg | 15SB0230206 | 12/12 | --- | 55.9 | 14.1 - 48.5 | NA | 260 | NA | No | BSL |
| | 7440-66-6 | Zinc | 26 J | 61 J | mg/kg | 15SB0230206 | 11/12 | 64.7 | 61 | 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.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The COPC screening criteira for chlordane is used as a surrogate.
9 - The COPC screening value is for total chromium.

**Associated Samples**

| | | | | |
|---|---|---|---|---|
| 15SB0010206 | 15SB0090206 | 15SB0200206 | 15SB0310610 | 15SB0450610 |
| 15SB0020206 | 15SB0090610 | 15SB0210206 | 15SB0311014 | 15SB0451012 |
| 15SB0030206 | 15SB0100206 | 15SB0220206 | 15SB0320206 | 15SB0460206 |
| 15SB0040206 | 15SB0100610 | 15SB0230206 | 15SB0350206 | 15SB0460610 |
| 15SB0050206 | 15SB0110206 | 15SB0230206-D | 15SB0370206 | 15SB0461020 |
| 15SB0060206 | 15SB0120206 | 15SB0280206 | 15SB0400206 | 15SB0480206 |
| 15SB0060206-D | 15SB0130206 | 15SB0280206-D | 15SB0420206 | 15SB0480206-D |
| 15SB0070206 | 15SB0140206 | 15SB0290206 | 15SB0430206 | 15SB0480610 |
| 15SB0080206 | 15SB0140206-D | 15SB0300206 | 15SB0440206 | 15SB0481015 |
| 15SB0080610 | 15SB0190206 | 15SB0310206 | 15SB0450206 | 15SB0620206 |

**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
SSL = Soil Screening Level
sat = Soil Saturation Limit

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
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 15 (ROADS AND GROUNDS AREA)**
**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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 78-93-3 | 2-Butanone | 1 J | 18 | ug/kg | 15SB0461020 | 18/43 | 0.867 - 1.23 | 18 | NA | 2200000 N | 44000000 | IDEM | No | BSL |
| | 591-78-6 | 2-Hexanone | 2 J | 2 J | ug/kg | 15SB0460206 | 1/43 | 0.796 - 1.48 | 2 | NA | NA | NA | NA | No | NTX |
| | 67-64-1 | Acetone | 3 J | 72 | ug/kg | 15SB0210206, 15SB0400206 | 18/43 | 3 - 42 | 72 | NA | 1400000 N | 4800000 | IDEM | No | BSL |
| | 75-15-0 | Carbon Disulfide | 1 J | 3 J | ug/kg | 15SB0461020 | 3/43 | 0.796 - 1.48 | 3 | NA | 36000 N | 900000 | IDEM | No | BSL |
| | 156-59-2 | cis-1,2-Dichloroethene | 2 J | 2 J | ug/kg | 15SB0220206, 15SB0430206 | 2/43 | 0.796 - 1.48 | 2 | NA | 4300 N | 110000 | IDEM | No | BSL |
| | 75-09-2 | Methylene Chloride | 1 J | 54 J | ug/kg | 15SB0450610 | 36/43 | 0.891 - 10 | 54 | NA | 9100 C | 120000 | IDEM | No | BSL |
| | 1330-20-7 | Total Xylenes | 1.13 J | 1.13 J | ug/kg | 15SB0311014 | 1/43 | 0.796 - 1.48 | 1.13 | NA | 27000 N | 690000 | IDEM | No | BSL |
| | 75-69-4 | Trichlorofluoromethane | 1 J | 3 | ug/kg | 15SB0311014, 15SB0450610 | 12/43 | 0.815 - 1.48 | 3 | NA | 39000 N | NA | NA | No | BSL |
| | **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 4 J | 47 | ug/kg | 15SB0020206 | 7/19 | 3.85 - 4.3 | 47 | NA | 5600 N[8] | 3200000 | IDEM[8] | No | BSL |
| | 83-32-9 | Acenaphthene | 6 J | 110 | ug/kg | 15SB0020206 | 5/19 | 3.78 - 4.3 | 110 | NA | 370000 N | 9500000 | IDEM | No | BSL |
| | 98-86-2 | Acetophenone | 140 J | 140 J | ug/kg | 15SB0460206 | 1/12 | 72.7 - 130 | 140 | NA | NA | NA | NA | No | NTX |
| | 120-12-7 | Anthracene | 4 J | 120 | ug/kg | 15SB0020206 | 8/19 | 3.78 - 4.3 | 120 | NA | 2200000 N | 47000000 | IDEM | No | BSL |
| | 56-55-3 | Benzo(a)anthracene | 8 | 110 | ug/kg | 15SB0280206 | 9/19 | 3.85 - 4.3 | 110 | NA | 620 C | 5000 | IDEM | No | BSL |
| | 50-32-8 | **Benzo(a)pyrene** | 8 | 150 | ug/kg | 15SB0230206 | 9/19 | 3.85 - 4.3 | 150 | NA | **62 C** | 500 | IDEM | **Yes** | ASL |
| | 205-99-2 | Benzo(b)fluoranthene | 10 | 230 | ug/kg | 15SB0230206 | 9/19 | 3.85 - 4.3 | 230 | NA | 620 C | 5000 | IDEM | No | BSL |
| | 191-24-2 | Benzo(g,h,i)perylene | 6 J | 120 | ug/kg | 15SB0280206 | 8/19 | 3.79 - 4.3 | 120 | NA | 230000 N[9] | 50000 | IDEM[9] | No | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 5 J | 86 | ug/kg | 15SB0280206 | 8/19 | 3.78 - 4.3 | 86 | NA | 6200 C | 50000 | IDEM | No | BSL |
| | 117-81-7 | Bis(2-ethylhexyl)phthalate | 110 J | 110 J | ug/kg | 15SB0090206 | 1/12 | 72.7 - 86.9 | 110 | NA | 35000 C | 300000 | IDEM | No | BSL |
| | 218-01-9 | Chrysene | 9 | 120 | ug/kg | 15SB0230206, 15SB0280206 | 9/19 | 3.85 - 4.3 | 120 | NA | 62000 C | 500000 | IDEM | No | BSL |
| | 84-74-2 | Di-N-Butyl Phthalate | 100 J | 180 J | ug/kg | 15SB0460206 | 2/12 | 72.7 - 87.4 | 180 | NA | 61000 N | 18000000 | IDEM | No | BSL |
| | 53-70-3 | Dibenzo(a,h)anthracene | 7 J | 31 | ug/kg | 15SB0280206 | 3/19 | 3.78 - 4.3 | 31 | NA | 62 C | 500 | IDEM | No | BSL |
| | 206-44-0 | Fluoranthene | 12 | 370 | ug/kg | 15SB0020206 | 10/19 | 3.85 - 4.3 | 370 | NA | 230000 N | 6300000 | IDEM | No | BSL |
| | 86-73-7 | Fluorene | 4 J | 120 | ug/kg | 15SB0020206 | 7/19 | 3.79 - 4.3 | 120 | NA | 270000 N | 6300000 | IDEM | No | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 6 J | 85 | ug/kg | 15SB0280206 | 8/19 | 3.79 - 4.3 | 85 | NA | 620 C | 5000 | IDEM | No | BSL |
| | 120-58-1 | Isosafrole | 1300 | 6000 | ug/kg | 15SB0460206 | 2/12 | 72.7 - 86.9 | 6000 | NA | NA | NA | NA | No | NTX |
| | 91-20-3 | Naphthalene | 6 J | 42 | ug/kg | 15SB0020206 | 7/19 | 3.79 - 4.3 | 42 | NA | 5600 N | 3200000 | IDEM | No | BSL |
| | 85-01-8 | Phenanthrene | 6 J | 510 | ug/kg | 15SB0020206 | 11/19 | 3.85 - 4.3 | 510 | NA | 230000 N[9] | 470000 | IDEM[9] | No | BSL |
| | 129-00-0 | Pyrene | 12 | 490 | ug/kg | 15SB0280206 | 11/19 | 3.85 - 4.3 | 490 | NA | 230000 N | 4700000 | IDEM | No | BSL |
| | **Pesticides PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 2.3 J | 2.3 J | ug/kg | 15SB0480206 | 1/5 | 1.53 - 1.64 | 2.3 | NA | 2400 C | 28000 | IDEM | No | BSL |
| | 50-29-3 | 4,4'-DDT | 1.59 J | 1.59 J | ug/kg | 15SB0480206 | 1/5 | 1.53 - 1.64 | 1.59 | NA | 1700 C | 20000 | IDEM | No | BSL |
| | 5103-71-9 | Alpha-Chlordane | 1 J | 1 J | ug/kg | 15SB0140206 | 1/5 | 0.744 - 0.788 | 1 | NA | 1600 C[10] | 17000 | IDEM[10] | No | BSL |
| | 5103-74-2 | Gamma-Chlordane | 1.1 J | 1.1 J | ug/kg | 15SB0140206 | 1/5 | 0.744 - 0.788 | 1.1 | NA | 1600 C[10] | 17000 | IDEM[10] | No | BSL |
| | **Inorganics** | | | | | | | | | | | | | | |
| | 7429-90-5 | **Aluminum** | 14400 J | 31100 J | mg/kg | 15SB0230206 | 12/12 | --- | 31100 | 5020 - 17400 | **7600 N** | NA | NA | **Yes** | ASL |
| | 7440-38-2 | **Arsenic** | 3.9 J | 14.9 J | mg/kg | 15SB0230206 | 12/12 | --- | 14.9 | 1.1 - 10.2 | **0.39 C** | **3.9** | IDEM | **Yes** | ASL |
| | 7440-39-3 | Barium | 53.7 J | 157 J | mg/kg | 15SB0080206, 15SB0100610 | 12/12 | --- | 157 | 24.8 - 155 | 540 N | 23000 | IDEM | No | BSL |
| | 7440-41-7 | Beryllium | 0.55 | 1.1 J | mg/kg | 15SB0060206, 15SB0100206 | 12/12 | --- | 1.1 | 0.3 - 0.82 | 15 N | 680 | IDEM | No | BSL |
| | 7440-43-9 | Cadmium | 0.22 J | 0.95 | mg/kg | 15SB0480206 | 12/12 | --- | 0.95 | 0.05 - 3.6 | 3.7 N | 12 | IDEM | No | BSL |
| | 7440-70-2 | Calcium | 726 J | 22900 J | mg/kg | 15SB0450206 | 9/12 | 301 - 5680 | 22900 | 53.6 - 35300 | NA | NA | NA | No | NUT |
| | 7440-47-3 | Chromium | 16.5 J | 32.6 J | mg/kg | 15SB0060206 | 12/12 | --- | 32.6 | 7.7 - 30.6 | 210 C[11] | 430 | IDEM[12] | No | BSL |

**TABLE 2.3**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 | 5.4 J | 54.2 J | mg/kg | 15SB0100206 | 12/12 | --- | 54.2 | 1.8 - 27.1 | 140 N(13) | NA | NA | No | BSL |
| | 7440-50-8 | Copper | 6.1 J | 18.7 J | mg/kg | 15SB0230206 | 12/12 | --- | 18.7 | 3.5 - 23.8 | 310 N | 13000 | IDEM | No | BSL |
| | 7439-89-6 | **Iron** | 16500 J | 35600 J | mg/kg | 15SB0230206 | 12/12 | --- | 35600 | 7140 - 40800 | **2300 N** | NA | NA | **Yes** | ASL |
| | 7439-92-1 | Lead | 9.2 J | 21.7 J | mg/kg | 15SB0480206 | 12/12 | --- | 21.7 | 6.4 - 21.5 | 400 | 400 | IDEM | No | BSL |
| | 7439-95-4 | Magnesium | 1030 J | 3890 J | mg/kg | 15SB0230206 | 12/12 | --- | 3890 | 496 - 2870 | NA | NA | NA | No | NUT |
| | 7439-96-5 | **Manganese** | 101 | 3570 J | mg/kg | 15SB0090206 | 12/12 | --- | 3570 | 23.2 - 3040 | **180 N** | NA | NA | **Yes** | ASL |
| | 7439-97-6 | Mercury | 0.008 J | 0.055 J | mg/kg | 15SB0100206 | 8/9 | 0.007 | 0.055 | 0.04 - 0.14 | 2.3 N | 100 | IDEM | No | BSL |
| | 7440-02-0 | Nickel | 12 J | 33.2 J | mg/kg | 15SB0060206 | 12/12 | --- | 33.2 | 4.6 - 23.7 | 160 N | 6900 | IDEM | No | BSL |
| | 7440-09-7 | Potassium | 1050 J | 2820 J | mg/kg | 15SB0060206 | 12/12 | --- | 2820 | 280 - 1650 | NA | NA | NA | No | NUT |
| | 7782-49-2 | Selenium | 0.16 J | 0.79 J | mg/kg | 15SB0100206 | 11/12 | 0.28 | 0.79 | 0.28 - 0.88 | 39 N | 1700 | IDEM | No | BSL |
| | 7440-22-4 | Silver | 0.05 J | 0.05 J | mg/kg | 15SB0460206 | 1/12 | 0.044 - 0.08 | 0.05 | 0.04 - 0.11 | 39 N | 1700 | IDEM | No | BSL |
| | 7440-23-5 | Sodium | 79 J | 135 J | mg/kg | 15SB0090206 | 11/12 | 83 | 135 | 3.7 - 205 | NA | NA | NA | No | NUT |
| | 7440-28-0 | Thallium | 0.27 J | 0.39 J | mg/kg | 15SB0230206 | 4/12 | 0.17 - 0.33 | 0.39 | 0.05 - 0.31 | 0.52 N | 24 | IDEM | No | BSL |
| | 7440-62-2 | **Vanadium** | 23.5 J | 55.9 J | mg/kg | 15SB0230206 | 12/12 | --- | 55.9 | 14.1 - 48.5 | **7.8 N** | NA | NA | **Yes** | ASL |
| | 7440-66-6 | Zinc | 26 J | 61 J | mg/kg | 15SB0230206 | 11/12 | 64.7 | 61 | 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 - USEPA Region IX 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) (USEPA Region IX, 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. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for naphthalene was used as a surrogate for 2-methylnaphthalene.
9 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
10 - Chlordane is used as a surrogate for alpha- and gamma-chlordane.
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.

**Associated Samples**

| | | | | |
|---|---|---|---|---|
| 15SB0010206 | 15SB0090206 | 15SB0200206 | 15SB0310610 | 15SB0450610 |
| 15SB0020206 | 15SB0090610 | 15SB0210206 | 15SB0311014 | 15SB0451012 |
| 15SB0030206 | 15SB0100206 | 15SB0220206 | 15SB0320206 | 15SB0460206 |
| 15SB0040206 | 15SB0100610 | 15SB0230206 | 15SB0350206 | 15SB0460610 |
| 15SB0050206 | 15SB0110206 | 15SB0230206-D | 15SB0370206 | 15SB0461020 |
| 15SB0060206 | 15SB0120206 | 15SB0280206 | 15SB0400206 | 15SB0480206 |
| 15SB0060206-D | 15SB0130206 | 15SB0280206-D | 15SB0420206 | 15SB0480206-D |
| 15SB0070206 | 15SB0140206 | 15SB0290206 | 15SB0430206 | 15SB0480610 |
| 15SB0080206 | 15SB0140206-D | 15SB0300206 | 15SB0440206 | 15SB0481015 |
| 15SB0080610 | 15SB0190206 | 15SB0310206 | 15SB0450206 | 15SB0620206 |

**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
PRG = Preliminary Remediation Goal

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
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 15 (ROADS AND GROUNDS AREA)**
**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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 78-93-3 | 2-Butanone | 2 J | 22 | ug/kg | 15SS0120002 | 10/40 | 0.8 - 1.48 | 22 | NA | 24000000 sat | 4400 | 35000 | No | BSL |
| | 67-64-1 | Acetone | 25 J | 79 J | ug/kg | 15SS0440002 | 7/40 | 0.8 - 39 | 79 | NA | NA | 6600 | 3800 | No | BSL |
| | 75-15-0 | Carbon Disulfide | 1 J | 1 J | ug/kg | 15SS0440002 | 1/40 | 0.8 - 1.48 | 1 | NA | 720000 sat | 1500 | 10000 | No | BSL |
| | 156-59-2 | cis-1,2-Dichloroethene | 1 J | 5 | ug/kg | 15SS0220002 | 2/40 | 0.8 - 1.48 | 5 | NA | NA | 20 | 400 | No | BSL |
| | 75-09-2 | **Methylene Chloride** | 1 J | 97 J | ug/kg | 15SS0300002 | 29/40 | 0.992 - 10 | 97 | NA | 13000 C | **1.2** | **23** | **Yes** | ASL |
| | 1330-20-7 | Total Xylenes | 1.06 J | 1.06 J | ug/kg | 15SS0120002 | 1/40 | 0.8 - 1.48 | 1.06 | NA | 71000 N | 7100 | 210000 | No | BSL |
| | 75-69-4 | Trichlorofluoromethane | 1 J | 5 | ug/kg | 15SS0620002 | 13/40 | 0.8 - 1.48 | 5 | NA | 110000 N | 8000 | NA | No | BSL |
| | **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 5 J | 590 J | ug/kg | 15SS0070002 | 17/45 | 3.63 - 111 | 590 | NA | NA | NA | 16000 | No | BSL |
| | 83-32-9 | Acenaphthene | 5 J | 410 | ug/kg | 15SS0030002 | 10/45 | 3.63 - 111 | 410 | NA | NA | 31000 | 130000 | No | BSL |
| | 208-96-8 | Acenaphthylene | 4 J | 1200 | ug/kg | 15SS0030002 | 11/45 | 3.63 - 27.5 | 1200 | NA | NA | NA | 18000 | No | BSL |
| | 98-86-2 | Acetophenone | 150 J | 150 J | ug/kg | 15SS0460002 | 1/45 | 71.7 - 310 | 150 | NA | NA | 890 | NA | No | BSL |
| | 120-12-7 | Anthracene | 5 J | 1200 | ug/kg | 15SS0030002 | 21/45 | 3.63 - 15.6 | 1200 | NA | NA | 650000 | 51000 | No | BSL |
| | 56-55-3 | **Benzo(a)anthracene** | 5 J | 4600 J | ug/kg | 15SS0030002 | 28/45 | 3.63 - 15.6 | 4600 | NA | NA | **160** | 19000 | **Yes** | ASL |
| | 50-32-8 | **Benzo(a)pyrene** | 7 J | 10000 | ug/kg | 15SS0030002 | 24/45 | 3.63 - 27.5 | 10000 | NA | NA | **410** | **8200** | **Yes** | ASL |
| | 205-99-2 | **Benzo(b)fluoranthene** | 5 J | 12000 | ug/kg | 15SS0030002 | 22/45 | 3.63 - 27.5 | 12000 | NA | NA | **490** | 57000 | **Yes** | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 14 | 13000 | ug/kg | 15SS0030002 | 23/45 | 3.63 - 27.5 | 13000 | NA | NA | NA | 16000 | No | BSL |
| | 207-08-9 | **Benzo(k)fluoranthene** | 6 J | 6900 | ug/kg | 15SS0030002 | 21/45 | 3.63 - 27.5 | 6900 | NA | NA | **490** | 39000 | **Yes** | ASL |
| | 117-81-7 | Bis(2-ethylhexyl)phthalate | 79 J | 760 | ug/kg | 15SS0300002 | 11/45 | 71.7 - 301 | 760 | NA | NA | 180000 | 3600000 | No | BSL |
| | 218-01-9 | **Chrysene** | 6 J | 9500 J | ug/kg | 15SS0030002 | 29/45 | 3.63 - 14.1 | 9500 | NA | 7500000 C | **160** | 25000 | **Yes** | ASL |
| | 84-74-2 | Di-N-Butyl Phthalate | 91 J | 290 J | ug/kg | 15SS0440002 | 6/45 | 71.7 - 301 | 290 | NA | NA | 250000 | 5000000 | No | BSL |
| | 117-84-0 | Di-N-Octyl Phthalate | 920 J | 920 J | ug/kg | 15SS0300002 | 1/45 | 71.7 - 301 | 920 | NA | NA | 2400000000 | 67000000 | No | BSL |
| | 53-70-3 | **Dibenzo(a,h)anthracene** | 18 | 3200 | ug/kg | 15SS0030002 | 6/45 | 3.63 - 111 | 3200 | NA | NA | **1500** | 18000 | **Yes** | ASL |
| | 132-64-9 | Dibenzofuran | 95 J | 460 J | ug/kg | 15SS0030002 | 3/45 | 71.7 - 301 | 460 | NA | NA | 2400 | 4900 | No | BSL |
| | 206-44-0 | Fluoranthene | 4 J | 6000 | ug/kg | 15SS0030002 | 36/45 | 3.7 - 4.28 | 6000 | NA | NA | 310000 | 880000 | No | BSL |
| | 86-73-7 | Fluorene | 6 J | 330 | ug/kg | 15SS0010002 | 9/45 | 3.63 - 111 | 330 | NA | NA | 41000 | 170000 | No | BSL |
| | 193-39-5 | **Indeno(1,2,3-cd)pyrene** | 11 J | 11000 | ug/kg | 15SS0030002 | 19/45 | 3.63 - 27.5 | 11000 | NA | NA | **1400** | **3100** | **Yes** | ASL |
| | 86-30-6 | **N-Nitrosodiphenylamine** | 1500 | 1500 | ug/kg | 15SS0380002 | 1/45 | 71.7 - 301 | 1500 | NA | NA | **220** | 9700 | **Yes** | ASL |
| | 91-20-3 | Naphthalene | 4 J | 280 J | ug/kg | 15SS0070002 | 15/45 | 3.63 - 111 | 280 | NA | 17000 N | 3100 | 700 | No | BSL |
| | 85-01-8 | Phenanthrene | 5 J | 2800 | ug/kg | 15SS0010002 | 34/45 | 3.7 - 4.28 | 2800 | NA | NA | NA | 13000 | No | BSL |
| | 129-00-0 | Pyrene | 6 J | 14000 J | ug/kg | 15SS0030002 | 34/45 | 3.7 - 4.28 | 14000 | NA | NA | 230000 | 570000 | No | BSL |
| | **Pesticides PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 2.7 J | 110 | ug/kg | 15SS0220002 | 4/29 | 1.51 - 1.75 | 110 | NA | NA | 710 | 140000 | No | BSL |
| | 72-55-9 | 4,4'-DDE | 2 J | 12 | ug/kg | 15SS0490002 | 2/29 | 1.51 - 1.75 | 12 | NA | NA | 2200 | 450000 | No | BSL |
| | 50-29-3 | 4,4'-DDT | 14 | 14 | ug/kg | 15SS0490002 | 1/29 | 1.51 - 1.75 | 14 | NA | 750000 C | 1300 | 26000 | No | BSL |
| | 5103-71-9 | Alpha-Chlordane[8] | 1.6 J | 69 | ug/kg | 15SS0200002 | 4/29 | 0.729 - 0.843 | 69 | NA | 72000 C | 480 | 9600 | No | BSL |
| | 11096-82-5 | Aroclor-1260 | 20 | 1200 | ug/kg | 15SS0230002 | 4/27 | 10.1 - 11.7 | 1200 | NA | NA | NA | 6200 | No | BSL |
| | 5103-74-2 | Gamma-Chlordane[8] | 3.6 | 75 | ug/kg | 15SS0200002 | 3/29 | 0.729 - 0.843 | 75 | NA | 72000 C | 480 | 9600 | No | BSL |
| | 76-44-8 | Heptachlor | 8.5 | 8.5 | ug/kg | 15SS0200002 | 1/29 | 0.729 - 0.843 | 8.5 | NA | 4200 C | 1100 | 23000 | No | BSL |
| | 1024-57-3 | Heptachlor Epoxide | 4.8 | 4.8 | ug/kg | 15SS0200002 | 1/29 | 0.729 - 0.843 | 4.8 | NA | 4800 C | 33 | 670 | No | BSL |
| | **Herbicides** | | | | | | | | | | | | | | |
| | 87-86-5 | **Pentachlorophenol** | 28 J | 28 J | ug/kg | 15SS0490002 | 1/36 | 0.482 - 3.8 | 28 | NA | NA | **1.4** | 28 | **Yes** | ASL |
| | **Inorganics** | | | | | | | | | | | | | | |
| | 7429-90-5 | **Aluminum** | 1700 J | 29900 J | mg/kg | 15SS0200002, 15SS0310002 | 42/42 | --- | 29900 | 5020 - 17400 | 686000 N | **8.3** | NA | **Yes** | ASL |
| | 7440-36-0 | **Antimony** | 1.4 J | 2.7 J | mg/kg | 15SS0060002 | 3/42 | 0.022 - 1.2 | 2.7 | 0.49 - 11.3 | NA | **0.27** | 5.4 | **Yes** | ASL |
| | 7440-38-2 | **Arsenic** | 0.79 J | 20.7 J | mg/kg | 15SS0360002 | 42/42 | --- | 20.7 | 1.1 - 10.2 | 745 C | **0.29** | 29 | **Yes** | ASL |
| | 7440-39-3 | **Barium** | 16 J | 254 J | mg/kg | 15SS0140002 | 42/42 | --- | 254 | 24.8 - 155 | 68600 N | **82** | 1600 | **Yes** | ASL |

**TABLE 2.2**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MIGRATION FROM SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7440-41-7 | Beryllium | 0.31 J | 2.9 | mg/kg | 15SS0190002 | 38/42 | 0.1 - 0.22 | 2.9 | 0.3 - 0.82 | 1330 C | 3.2 | 63 | No | BSL |
| | 7440-43-9 | **Cadmium** | 0.18 J | 6.9 J | mg/kg | 15SS0020002 | 36/42 | 0.16 - 0.34 | 6.9 | 0.05 - 3.6 | 1780 C | **0.38** | 7.5 | **Yes** | ASL |
| | 7440-70-2 | Calcium | 170 J | 381000 J | mg/kg | 15SS0050002 | 42/42 | --- | 381000 | 53.6 - 35300 | NA | NA | NA | No | NUT |
| | 7440-47-3 | **Chromium(9)** | 6 J | 49.7 J | mg/kg | 15SS0360002 | 42/42 | --- | 49.7 | 7.7 - 30.6 | 267 C | **2.1** | NA | **Yes** | ASL |
| | 7440-48-4 | **Cobalt** | 0.59 J | 59.6 J | mg/kg | 15SS0350002 | 42/42 | --- | 59.6 | 1.8 - 27.1 | 1140 C | **0.17** | NA | **Yes** | ASL |
| | 7440-50-8 | Copper | 1.4 J | 20.1 J | mg/kg | 15SS0060002 | 42/42 | --- | 20.1 | 3.5 - 23.8 | NA | 560 | 920 | No | BSL |
| | 7439-89-6 | Iron | 1870 J | 57600 J | mg/kg | 15SS0360002 | 42/42 | --- | 57600 | 7140 - 40800 | NA | NA | NA | No | NTX |
| | 7439-92-1 | **Lead** | 1.7 J | 155 J | mg/kg | 15SS0080002 | 42/42 | --- | 155 | 6.4 - 21.5 | NA | NA | **81** | **Yes** | ASL |
| | 7439-95-4 | Magnesium | 754 J | 42700 J | mg/kg | 15SS0030002 | 42/42 | --- | 42700 | 496 - 2870 | NA | NA | NA | No | NUT |
| | 7439-96-5 | **Manganese** | 28.6 J | 4400 J | mg/kg | 15SS0350002 | 42/42 | --- | 4400 | 23.2 - 3040 | 6860 N | **110** | NA | **Yes** | ASL |
| | 7439-97-6 | **Mercury** | 0.01 J | 0.13 | mg/kg | 15SS0100002 | 35/42 | 0.006 - 0.007 | 0.13 | 0.04 - 0.14 | 2.9 sat | **0.1** | 2.1 | **Yes** | ASL |
| | 7440-02-0 | **Nickel** | 4.2 J | 31.6 J | mg/kg | 15SS0350002 | 42/42 | --- | 31.6 | 4.6 - 23.7 | NA | **14** | 950 | **Yes** | ASL |
| | 7440-09-7 | Potassium | 419 J | 2720 J | mg/kg | 15SS0440002 | 42/42 | --- | 2720 | 280 - 1650 | NA | NA | NA | No | NUT |
| | 7782-49-2 | **Selenium** | 0.11 J | 1.1 | mg/kg | 15SS0380002 | 33/42 | 0.06 - 0.5 | 1.1 | 0.28 - 0.88 | NA | **0.26** | 5.2 | **Yes** | ASL |
| | 7440-22-4 | Silver | 0.04 J | 0.04 J | mg/kg | 15SS0450002 | 1/42 | 0.041 - 0.35 | 0.04 | 0.04 - 0.11 | NA | 1.6 | 31 | No | BSL |
| | 7440-23-5 | Sodium | 76.4 J | 1250 J | mg/kg | 15SS0190002 | 27/42 | 35.3 - 121 | 1250 | 3.7 - 205 | NA | NA | NA | No | NUT |
| | 7440-28-0 | **Thallium** | 0.21 J | 0.47 J | mg/kg | 15SS0380002 | 14/42 | 0.06 - 0.49 | 0.47 | 0.05 - 0.31 | NA | **0.056** | 2.8 | **Yes** | ASL |
| | 7440-31-5 | Tin | 0.34 J | 2.2 J | mg/kg | 15SS0060002 | 6/42 | 0.21 - 1.2 | 2.2 | NA | NA | NA | NA | No | NTX |
| | 7440-62-2 | Vanadium | 5.3 J | 57.4 | mg/kg | 15SS0360002 | 42/42 | --- | 57.4 | 14.1 - 48.5 | NA | 260 | NA | No | BSL |
| | 7440-66-6 | Zinc | 19.4 J | 626 | mg/kg | 15SS0020002 | 42/42 | --- | 626 | 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.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The COPC screening criteira for chlordane is used as a surrogate.
9 - The COPC screening value is for total chromium.

**Associated Samples**

| | | | | |
|---|---|---|---|---|
| 15SS0010002 | 15SS0110002 | 15SS0210002 | 15SS0310002 | 15SS0410002 |
| 15SS0020002 | 15SS0120002 | 15SS0220002 | 15SS0320002 | 15SS0420002 |
| 15SS0030002 | 15SS0130002 | 15SS0230002 | 15SS0330002 | 15SS0430002 |
| 15SS0040002 | 15SS0140002 | 15SS0240002 | 15SS0340002 | 15SS0440002 |
| 15SS0050002 | 15SS0150002 | 15SS0250002 | 15SS0350002 | 15SS0450002 |
| 15SS0060002 | 15SS0160002 | 15SS0260002 | 15SS0360002 | 15SS0460002 |
| 15SS0070002 | 15SS0170002 | 15SS0270002 | 15SS0370002 | 15SS0470002 |
| 15SS0080002 | 15SS0180002 | 15SS0280002 | 15SS0380002 | 15SS0480002 |
| 15SS0090002 | 15SS0190002 | 15SS0290002 | 15SS0390002 | 15SS0490002 |
| 15SS0100002 | 15SS0200002 | 15SS0300002 | 15SS0400002 | 15SS0620002 |

**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

SSL = Soil Screening Level
sat = Soil Saturation Limit

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data
NUT = Essential Nutrient

**TABLE 2.1**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 15 | **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 78-93-3 | 2-Butanone | 2 J | 22 | ug/kg | 15SS0120002 | 10/40 | 0.8 - 1.48 | 22 | NA | 2200000 N | 44000000 | IDEM | No | BSL |
| | 67-64-1 | Acetone | 25 J | 79 J | ug/kg | 15SS0440002 | 7/40 | 0.8 - 39 | 79 | NA | 1400000 N | 4800000 | IDEM | No | BSL |
| | 75-15-0 | Carbon Disulfide | 1 J | 1 J | ug/kg | 15SS0440002 | 1/40 | 0.8 - 1.48 | 1 | NA | 36000 N | 900000 | IDEM | No | BSL |
| | 156-59-2 | cis-1,2-Dichloroethene | 1 J | 5 | ug/kg | 15SS0220002 | 2/40 | 0.8 - 1.48 | 5 | NA | 4300 N | 110000 | IDEM | No | BSL |
| | 75-09-2 | Methylene Chloride | 1 J | 97 J | ug/kg | 15SS0300002 | 29/40 | 0.992 - 10 | 97 | NA | 9100 C | 120000 | IDEM | No | BSL |
| | 1330-20-7 | Total Xylenes | 1.06 J | 1.06 J | ug/kg | 15SS0120002 | 1/40 | 0.8 - 1.48 | 1.06 | NA | 27000 N | 690000 | IDEM | No | BSL |
| | 75-69-4 | Trichlorofluoromethane | 1 J | 5 | ug/kg | 15SS0620002 | 13/40 | 0.8 - 1.48 | 5 | NA | 39000 N | NA | NA | No | BSL |
| | **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| | 91-57-6 | 2-Methylnaphthalene | 5 J | 590 J | ug/kg | 15SS0070002 | 17/45 | 3.63 - 111 | 590 | NA | 5600 N[8] | 3200000 | IDEM | No | BSL |
| | 83-32-9 | Acenaphthene | 5 J | 410 | ug/kg | 15SS0030002 | 10/45 | 3.63 - 111 | 410 | NA | 370000 N | 9500000 | IDEM | No | BSL |
| | 208-96-8 | Acenaphthylene | 4 J | 1200 | ug/kg | 15SS0030002 | 11/45 | 3.63 - 27.5 | 1200 | NA | 370000 N[9] | 1100000 | IDEM | No | BSL |
| | 98-86-2 | Acetophenone | 150 J | 150 J | ug/kg | 15SS0460002 | 1/45 | 71.7 - 310 | 150 | NA | NA | NA | NA | No | NTX |
| | 120-12-7 | Anthracene | 5 J | 1200 | ug/kg | 15SS0030002 | 21/45 | 3.63 - 15.6 | 1200 | NA | 2200000 N | 47000000 | IDEM | No | BSL |
| | 56-55-3 | **Benzo(a)anthracene** | 5 J | 4600 J | ug/kg | 15SS0030002 | 28/45 | 3.63 - 15.6 | 4600 | NA | **620 C** | 5000 | IDEM | **Yes** | ASL |
| | 50-32-8 | **Benzo(a)pyrene** | 7 J | 10000 | ug/kg | 15SS0030002 | 24/45 | 3.63 - 27.5 | 10000 | NA | **62 C** | **500** | IDEM | **Yes** | ASL |
| | 205-99-2 | **Benzo(b)fluoranthene** | 5 J | 12000 | ug/kg | 15SS0030002 | 22/45 | 3.63 - 27.5 | 12000 | NA | **620 C** | **5000** | IDEM | **Yes** | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 14 | 13000 | ug/kg | 15SS0030002 | 23/45 | 3.63 - 27.5 | 13000 | NA | 230000 N[10] | 50000 | IDEM | No | BSL |
| | 207-08-9 | **Benzo(k)fluoranthene** | 6 J | 6900 | ug/kg | 15SS0030002 | 21/45 | 3.63 - 27.5 | 6900 | NA | **6200 C** | 50000 | IDEM | **Yes** | ASL |
| | 117-81-7 | Bis(2-ethylhexyl)phthalate | 79 J | 760 | ug/kg | 15SS0300002 | 11/45 | 71.7 - 301 | 760 | NA | 35000 C | 300000 | IDEM | No | BSL |
| | 218-01-9 | Chrysene | 6 J | 9500 J | ug/kg | 15SS0030002 | 29/45 | 3.63 - 14.1 | 9500 | NA | 62000 C | 500000 | IDEM | No | BSL |
| | 84-74-2 | Di-N-Butyl Phthalate | 91 J | 290 J | ug/kg | 15SS0440002 | 6/45 | 71.7 - 301 | 290 | NA | 61000 N | 18000000 | IDEM | No | BSL |
| | 117-84-0 | Di-N-Octyl Phthalate | 920 J | 920 J | ug/kg | 15SS0300002 | 1/45 | 71.7 - 301 | 920 | NA | 240000 N | 3700000 | IDEM | No | BSL |
| | 53-70-3 | **Dibenzo(a,h)anthracene** | 18 | 3200 | ug/kg | 15SS0030002 | 6/45 | 3.63 - 111 | 3200 | NA | **62 C** | **500** | IDEM | **Yes** | ASL |
| | 132-64-9 | Dibenzofuran | 95 J | 460 J | ug/kg | 15SS0030002 | 3/45 | 71.7 - 301 | 460 | NA | 15000 N | 370000 | IDEM | No | BSL |
| | 206-44-0 | Fluoranthene | 4 J | 6000 | ug/kg | 15SS0030002 | 36/45 | 3.7 - 4.28 | 6000 | NA | 230000 N | 6300000 | IDEM | No | BSL |
| | 86-73-7 | Fluorene | 6 J | 330 | ug/kg | 15SS0010002 | 9/45 | 3.63 - 111 | 330 | NA | 270000 N | 6300000 | IDEM | No | BSL |
| | 193-39-5 | **Indeno(1,2,3-cd)pyrene** | 11 J | 11000 | ug/kg | 15SS0030002 | 19/45 | 3.63 - 27.5 | 11000 | NA | **620 C** | **5000** | IDEM | **Yes** | ASL |
| | 86-30-6 | N-Nitrosodiphenylamine | 1500 | 1500 | ug/kg | 15SS0380002 | 1/45 | 71.7 - 301 | 1500 | NA | 99000 C | 870000 | IDEM | No | BSL |
| | 91-20-3 | Naphthalene | 4 J | 280 J | ug/kg | 15SS0070002 | 15/45 | 3.63 - 111 | 280 | NA | 5600 N | 3200000 | IDEM | No | BSL |
| | 85-01-8 | Phenanthrene | 5 J | 2800 | ug/kg | 15SS0010002 | 34/45 | 3.7 - 4.28 | 2800 | NA | 230000 N[10] | 470000 | IDEM | No | BSL |
| | 129-00-0 | Pyrene | 6 J | 14000 J | ug/kg | 15SS0030002 | 34/45 | 3.7 - 4.28 | 14000 | NA | 230000 N | 4700000 | IDEM | No | BSL |
| | **Pesticides PCBs** | | | | | | | | | | | | | | |
| | 72-54-8 | 4,4'-DDD | 2.7 J | 110 | ug/kg | 15SS0220002 | 4/29 | 1.51 - 1.75 | 110 | NA | 2400 C | 28000 | IDEM | No | BSL |
| | 72-55-9 | 4,4'-DDE | 2 J | 12 | ug/kg | 15SS0490002 | 2/29 | 1.51 - 1.75 | 12 | NA | 1700 C | 20000 | IDEM | No | BSL |
| | 50-29-3 | 4,4'-DDT | 14 | 14 | ug/kg | 15SS0490002 | 1/29 | 1.51 - 1.75 | 14 | NA | 1700 C | 20000 | IDEM | No | BSL |
| | 5103-71-9 | Alpha-Chlordane | 1.6 J | 69 | ug/kg | 15SS0200002 | 4/29 | 0.729 - 0.843 | 69 | NA | 1600 C[11] | 17000 | IDEM[11] | No | BSL |
| | 11096-82-5 | **Aroclor-1260** | 20 | 1200 | ug/kg | 15SS0230002 | 4/27 | 10.1 - 11.7 | 1200 | NA | **110 N[12]** | 1800 | IDEM | **Yes** | ASL |
| | 5103-74-2 | Gamma-Chlordane | 3.6 | 75 | ug/kg | 15SS0200002 | 3/29 | 0.729 - 0.843 | 75 | NA | 1600 C[11] | 17000 | IDEM[11] | No | BSL |
| | 76-44-8 | Heptachlor | 8.5 | 8.5 | ug/kg | 15SS0200002 | 1/29 | 0.729 - 0.843 | 8.5 | NA | 110 C | 930 | IDEM | No | BSL |
| | 1024-57-3 | Heptachlor Epoxide | 4.8 | 4.8 | ug/kg | 15SS0200002 | 1/29 | 0.729 - 0.843 | 4.8 | NA | 53 C | 470 | IDEM | No | BSL |
| | **Herbicides** | | | | | | | | | | | | | | |
| | 87-86-5 | Pentachlorophenol | 28 J | 28 J | ug/kg | 15SS0490002 | 1/36 | 0.482 - 3.8 | 28 | NA | 3000 C | 20000 | IDEM | No | BSL |
| | **Inorganics** | | | | | | | | | | | | | | |
| | 7429-90-5 | **Aluminum** | 1700 J | 29900 J | mg/kg | 15SS0200002, 15SS0310002 | 42/42 | --- | 29900 | 5020 - 17400 | **7600 N** | NA | NA | **Yes** | ASL |
| | 7440-36-0 | Antimony | 1.4 J | 2.7 J | mg/kg | 15SS0060002 | 3/42 | 0.022 - 1.2 | 2.7 | 0.49 - 11.3 | 3.1 N | 140 | IDEM | No | BSL |
| | 7440-38-2 | **Arsenic** | 0.79 J | 20.7 J | mg/kg | 15SS0360002 | 42/42 | --- | 20.7 | 1.1 - 10.2 | **0.39 C** | **3.9** | IDEM | **Yes** | ASL |
| | 7440-39-3 | Barium | 16 J | 254 J | mg/kg | 15SS0140002 | 42/42 | --- | 254 | 24.8 - 155 | 540 N | 23000 | IDEM | No | BSL |
| | 7440-41-7 | Beryllium | 0.31 J | 2.9 | mg/kg | 15SS0190002 | 38/42 | 0.1 - 0.22 | 2.9 | 0.3 - 0.82 | 15 N | 680 | IDEM | No | BSL |

**TABLE 2.1**
**OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7440-43-9 | **Cadmium** | 0.18 J | 6.9 J | mg/kg | 15SS0020002 | 36/42 | 0.16 - 0.34 | 6.9 | 0.05 - 3.6 | **3.7 N** | 12 | IDEM | **Yes** | ASL |
| | 7440-70-2 | Calcium | 170 J | 381000 J | mg/kg | 15SS0050002 | 42/42 | --- | 381000 | 53.6 - 35300 | NA | NA | NA | No | NUT |
| | 7440-47-3 | Chromium | 6 J | 49.7 J | mg/kg | 15SS0360002 | 42/42 | --- | 49.7 | 7.7 - 30.6 | 210 C(13) | 430(14) | IDEM | No | BSL |
| | 7440-48-4 | Cobalt | 0.59 J | 59.6 J | mg/kg | 15SS0350002 | 42/42 | --- | 59.6 | 1.8 - 27.1 | 140 N(12) | NA | NA | No | BSL |
| | 7440-50-8 | Copper | 1.4 J | 20.1 J | mg/kg | 15SS0060002 | 42/42 | --- | 20.1 | 3.5 - 23.8 | 310 N | 13000 | IDEM | No | BSL |
| | 7439-89-6 | **Iron** | 1870 J | 57600 J | mg/kg | 15SS0360002 | 42/42 | --- | 57600 | 7140 - 40800 | **2300 N** | NA | NA | **Yes** | ASL |
| | 7439-92-1 | Lead | 1.7 J | 155 J | mg/kg | 15SS0080002 | 42/42 | --- | 155 | 6.4 - 21.5 | 400 | 400 | IDEM | No | BSL |
| | 7439-95-4 | Magnesium | 754 J | 42700 J | mg/kg | 15SS0030002 | 42/42 | --- | 42700 | 496 - 2870 | NA | NA | NA | No | NUT |
| | 7439-96-5 | **Manganese** | 28.6 J | 4400 J | mg/kg | 15SS0350002 | 42/42 | --- | 4400 | 23.2 - 3040 | **180 N** | NA | NA | **Yes** | ASL |
| | 7439-97-6 | Mercury | 0.01 J | 0.13 | mg/kg | 15SS0100002 | 35/42 | 0.006 - 0.007 | 0.13 | 0.04 - 0.14 | 2.3 N | 100 | IDEM | No | BSL |
| | 7440-02-0 | Nickel | 4.2 J | 31.6 J | mg/kg | 15SS0350002 | 42/42 | --- | 31.6 | 4.6 - 23.7 | 160 N | 6900 | IDEM | No | BSL |
| | 7440-09-7 | Potassium | 419 J | 2720 J | mg/kg | 15SS0440002 | 42/42 | --- | 2720 | 280 - 1650 | NA | NA | NA | No | NUT |
| | 7782-49-2 | Selenium | 0.11 J | 1.1 | mg/kg | 15SS0380002 | 33/42 | 0.06 - 0.5 | 1.1 | 0.28 - 0.88 | 39 N | 1700 | IDEM | No | BSL |
| | 7440-22-4 | Silver | 0.04 J | 0.04 J | mg/kg | 15SS0450002 | 1/42 | 0.041 - 0.35 | 0.04 | 0.04 - 0.11 | 39 N | 1700 | IDEM | No | BSL |
| | 7440-23-5 | Sodium | 76.4 J | 1250 J | mg/kg | 15SS0190002 | 27/42 | 35.3 - 121 | 1250 | 3.7 - 205 | NA | NA | NA | No | NUT |
| | 7440-28-0 | Thallium | 0.21 J | 0.47 J | mg/kg | 15SS0380002 | 14/42 | 0.06 - 0.49 | 0.47 | 0.05 - 0.31 | 0.52 N | 24 | IDEM | No | BSL |
| | 7440-31-5 | Tin | 0.34 J | 2.2 J | mg/kg | 15SS0060002 | 6/42 | 0.21 - 1.2 | 2.2 | NA | 4700 N | NA | NA | No | BSL |
| | 7440-62-2 | **Vanadium** | 5.3 J | 57.4 | mg/kg | 15SS0360002 | 42/42 | --- | 57.4 | 14.1 - 48.5 | **7.8 N** | NA | NA | **Yes** | ASL |
| | 7440-66-6 | Zinc | 19.4 J | 626 | mg/kg | 15SS0020002 | 42/42 | --- | 626 | 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 - USEPA Region IX 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) (USEPA Region IX, 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. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for naphthalene was used as a surrogate for 2-methylnaphthalene.
9 - The value for acenaphthene was 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 - Chlordane is used as a surrogate for alpha- and gamma-chlordane.
12 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
13 - The PRG for residential land use for total chromium is presented.
14 - Value is for hexavalent chromium.

**Associated Samples**

| | | | | |
|---|---|---|---|---|
| 15SS0010002 | 15SS0110002 | 15SS0210002 | 15SS0310002 | 15SS0410002 |
| 15SS0020002 | 15SS0120002 | 15SS0220002 | 15SS0320002 | 15SS0420002 |
| 15SS0030002 | 15SS0130002 | 15SS0230002 | 15SS0330002 | 15SS0430002 |
| 15SS0040002 | 15SS0140002 | 15SS0240002 | 15SS0340002 | 15SS0440002 |
| 15SS0050002 | 15SS0150002 | 15SS0250002 | 15SS0350002 | 15SS0450002 |
| 15SS0060002 | 15SS0160002 | 15SS0260002 | 15SS0360002 | 15SS0460002 |
| 15SS0070002 | 15SS0170002 | 15SS0270002 | 15SS0370002 | 15SS0470002 |
| 15SS0080002 | 15SS0180002 | 15SS0280002 | 15SS0380002 | 15SS0480002 |
| 15SS0090002 | 15SS0190002 | 15SS0290002 | 15SS0390002 | 15SS0490002 |
| 15SS0100002 | 15SS0200002 | 15SS0300002 | 15SS0400002 | 15SS0620002 |

**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
PRG = Preliminary Remediation Goal

**Rationale Codes:**
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data
NUT = Essential Nutrient

| **CLIENT:** NCWS CRANE, INDIANA | | **JOB NUMBER:** 1245 |
|---|---|---|
| **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:** 09/06/2005 |

**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 | = | 11.8 | 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 | = | 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:**<br>NCWS CRANE, INDIANA | | **JOB NUMBER:**<br>1245 |
| **SUBJECT:**<br>CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT<br>ADULT RESIDENT | | |
| **BASED ON:**<br>U.S. EPA, JULY 2004 | | |
| **BY:**<br>R. JUPIN | **CHECKED BY:** | **DATE:**<br>09/06/2005 |

**EXAMPLE CARCINOGENIC CALCULATION**

$$DEXc = \frac{11.8 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 5700 \text{ cm2/day} \times 0.07 \text{ mg/cm2} \times 0.03 \times 52 \text{ days/year} \times 24 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$$

DEXc = 9.86E-08 mg/kg/day

ILCR = 9.86E-08 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

**ILCR = 1.5E-07**

**EXAMPLE NONCARCINOGENIC CALCULATION**

$$DEXnc = \frac{11.8 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 5700 \text{ cm2/day} \times 0.07 \text{ mg/cm2} \times 0.03 \times 52 \text{ days/year} \times 24 \text{ years}}{70 \text{ kg} \times 8760 \text{ days}}$$

DEXnc = 2.87E-07 mg/kg/day

HQ = 2.87E-07 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

**HQ = 9.6E-04**

| | | |
|---|---|---|
| **CLIENT:** NSWC CRANE, INDIANA | | **JOB NUMBER:** 1245 |
| **SUBJECT:** CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT ADULT RESIDENT | | |
| **BASED ON:** U.S. EPA, DECEMBER 1989 | | |
| **BY:** R. JUPIN | **CHECKED BY:** | **DATE:** 09/06/2005 |

**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 | = | 11.8 | mg/kg | Chemical: Arsenic |
| 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:** 1245 |
|---|---|---|
| **SUBJECT:** CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT ADULT RESIDENT | | |
| **BASED ON:** U.S. EPA, DECEMBER 1989 | | |
| **BY:** R. JUPIN | **CHECKED BY:** | **DATE:** 09/06/2005 |

**EXAMPLE CARCINOGENIC CALCULATION**

$$IEXc = \frac{11.8 \text{ mg/kg} \times 50 \text{ mg/day} \times 52 \text{ days/year} \times 24 \text{ years} \times 1.0E\text{-}06 \text{ kg/mg}}{70 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 4.12E-07 mg/kg/day

ILCR = 4.12E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

**ILCR = 6.2E-07**

**EXAMPLE NONCARCINOGENIC CALCULATION**

$$IEXnc = \frac{11.8 \text{ mg/kg} \times 50 \text{ mg/day} \times 52 \text{ days/year} \times 24 \text{ years} \times 1.0E\text{-}06 \text{ kg/mg}}{70 \text{ kg} \times 8760 \text{ days}}$$

IEXnc = 1.20E-06 mg/kg/day

HQ = 1.20E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

**HQ = 4.0E-03**

| **CLIENT:** NSWC CRANE, INDIANA | | **JOB NUMBER:** 1245 |
|---|---|---|
| **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:** 09/06/2005 |

**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:** 1245 |
|---|---|---|
| **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:** 09/06/2005 |

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) |
| $\tau$ | = | lag time (hr/event) |
| B | = | Bunge Model Constant (dimensionless) |

**EXAMPLE CALCULATION OF DAevent**

**ASSUMPTIONS:**

| | | | | |
|---|---|---|---|---|
| Cgw | = | 0.0014 | mg/L | Chemical: Arsenic |
| Kp | = | 1.00E-03 | cm/hr | |
| FA | = | 1 | unitless | |
| tevent | = | 4 | hr/event | |
| CF | = | 0.001 | L/cm$^3$ | |
| t* | = | 1.39 | hr/event | |
| $\tau$ | = | 0.58 | hr/event | |
| B | = | 0.051 | | |

DAevent = 0.001 cm/hr x 0.0014 mg/L x 0.001 L/cm3 x 4 hr/event

DAevent = 5.60E-09 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 | = | 1.5E+00 | (mg/kg/day)$^{-1}$ |
| RfDd | = | 3.0E-04 | (mg/kg/day) |

| **CLIENT:** NSWC CRANE, INDIANA | | **JOB NUMBER:** 1245 |
|---|---|---|
| **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:** 09/06/2005 |

**EXAMPLE CARCINOGENIC CALCULATION**

$$DADc = \frac{5.60E\text{-}09 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 24 \text{ years} \times 52 \text{ days/year} \times 9070 \text{ cm2/day}}{70 \text{ kg} \times 25550 \text{ days}}$$

DADc = 3.54E-08 mg/kg/day

DADc = 3.54E-08 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

**ILCR = 5.3E-08**

**EXAMPLE NONCARCINOGENIC CALCULATION**

$$DADnc = \frac{5.60E\text{-}09 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 24 \text{ years} \times 52 \text{ days/year} \times 9070 \text{ cm2/day}}{70 \text{ kg} \times 8760 \text{ days}}$$

DADnc = 1.03E-07 mg/kg/day

HQ = 1.03E-07 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

**HQ = 3.4E-04**

| **CLIENT:** NSWC CRANE, INDIANA | | **JOB NUMBER:** 1245 |
|---|---|---|
| **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:** 09/06/2005 |

**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 | = | 1.4 | ug/L | Chemical: Arsenic |
| 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 | = | 1.5E+00 | $(mg/kg/day)^{-1}$ | |
| RfDo | = | 3.0E-04 | (mg/kg/day) | |

| | | |
|---|---|---|
| **CLIENT:**<br>NSWC CRANE, INDIANA | | **JOB NUMBER:**<br>1245 |
| **SUBJECT:**<br>CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER<br>ADULT RESIDENT | | |
| **BASED ON:**<br>U.S. EPA, DECEMBER 1989 | | |
| **BY:**<br>R. JUPIN | **CHECKED BY:** | **DATE:**<br>09/06/2005 |

**EXAMPLE CARCINOGENIC CALCULATION**

$$IEXc = \frac{1.4\ ug/L \times 1.0E\text{-}03\ mg/ug \times 0.01\ L/hr \times 4\ hours \times 52\ days/year \times 24\ years}{70\ kg \times 25550\ days}$$

IEXc = 3.91E-08 mg/kg/day

ILCR = 3.91E-08 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

**ILCR = 5.9E-08**

**EXAMPLE NONCARCINOGENIC CALCULATION**

$$IEXnc = \frac{1.4\ ug/L \times 1.0E\text{-}03\ mg/ug \times 0.01\ L/hr \times 4\ hours \times 52\ days/year \times 24\ years}{70\ kg \times 8760\ days}$$

IEXnc = 1.14E-07 mg/kg/day

$$HQ = \frac{1.14E\text{-}07\ mg/kg/day}{3.00E\text{-}04\ (mg/kg/day)} = \text{Hazard Quotient}$$

**HQ = 3.8E-04**

| **CLIENT:** NCWS CRANE, INDIANA | | **JOB NUMBER:** 1245 |
|---|---|---|
| **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:** 09/06/2005 |

**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 | = | 11 | 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:**<br>NCWS CRANE, INDIANA | | **JOB NUMBER:**<br>1245 |
| **SUBJECT:**<br>CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL<br>FUTURE ON-SITE ADULT RESIDENT | | |
| **BASED ON:**<br>U.S. EPA, JULY 2004 | | |
| **BY:**<br>R. JUPIN | **CHECKED BY:** | **DATE:**<br>09/06/2005 |

**EXAMPLE CARCINOGENIC CALCULATION**

$$DEXc = \frac{11\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 5700\ cm2/day \times 0.07\ mg/cm2 \times 0.03 \times 350\ days/year \times 24\ years}{70\ kg \times 25550\ days}$$

DEXc = 6.18E-07 mg/kg/day

ILCR = 6.18E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

**ILCR = 9.3E-07**

**EXAMPLE NONCARCINOGENIC CALCULATION**

$$DEXnc = \frac{11\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 5700\ cm2/day \times 0.07\ mg/cm2 \times 0.03 \times 350\ days/year \times 24\ years}{70\ kg \times 8760\ days}$$

DEXnc = 1.80E-06 mg/kg/day

HQ = 1.80E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

**HQ = 6.0E-03**

| | | |
|---|---|---|
| **CLIENT:** NSWC CRANE, INDIANA | | **JOB NUMBER:** 1245 |
| **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:** 09/06/2005 |

**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 | = | 11 | 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:** 1245 |
|---|---|---|
| **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:** 09/06/2005 |

**EXAMPLE CARCINOGENIC CALCULATION**

$$IEXc = \frac{11 \text{ mg/kg} \times 100 \text{ mg/day} \times 350 \text{ days/year} \times 24 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{70 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 5.17E-06 mg/kg/day

ILCR = 5.17E-06 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

**ILCR = 7.7E-06**

**EXAMPLE NONCARCINOGENIC CALCULATION**

$$IEXnc = \frac{11 \text{ mg/kg} \times 100 \text{ mg/day} \times 350 \text{ days/year} \times 24 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{70 \text{ kg} \times 8760 \text{ days}}$$

IEXnc = 1.51E-05 mg/kg/day

HQ = 1.51E-05 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

**HQ = 5.0E-02**

TABLE 9.10. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 1.E-06 | | 6.E-07 | 2.E-06 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 3.E-05 | | 1.E-05 | 4.E-05 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 4.E-06 | | 1.E-06 | 5.E-06 | Benzo(b)fluoranthene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 9.E-06 | | 4.E-06 | 1.E-05 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-06 | | 1.E-06 | 5.E-06 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Aroclor-1260 | 2.E-06 | | 7.E-07 | 2.E-06 | Aroclor-1260 | | | | | | | |
| | | | Aluminum | | | | | Aluminum | | | | | | | |
| | | | Arsenic | 3.E-05 | | 2.E-06 | 3.E-05 | Arsenic | | | | | | | |
| | | | Cadmium | | | | | Cadmium | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 7.42E-05 | 2.23E-05 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-07 | | 4.E-05 | 4.E-05 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 3.E-06 | | 9.E-04 | 9.E-04 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 7.E-07 | | 2.E-04 | 2.E-04 | Benzo(b)fluoranthene | | | | | | | |
| | | | Benzo(k)fluoranthene | 2.E-08 | | 6.E-06 | 6.E-06 | Benzo(k)fluoranthene | | | | | | | |
| | | | Chrysene | 6.E-09 | | 1.E-06 | 1.E-06 | Chrysene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-07 | | 1.E-04 | 1.E-04 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-07 | | 9.E-05 | 9.E-05 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Antimony | | | | | Antimony | | | | | | | |
| | | | Arsenic | 4.E-07 | | 8.E-08 | 5.E-07 | Arsenic | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 5.16E-06 | 1.46E-03 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |

TABLE 9.10. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 1.E-06 | | 1.E-07 | 1.E-06 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 2.E-06 | | 1.E-06 | 3.E-06 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 2.E-07 | | 2.E-07 | 4.E-07 | Benzo(b)fluoranthene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-07 | | 3.E-07 | 6.E-07 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 1.E-07 | | 1.E-07 | 2.E-07 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Aroclor-1254 | 4.E-08 | | 3.E-08 | 7.E-08 | Aroclor-1254 | | | | | | | |
| | | | Aroclor-1260 | 8.E-08 | | 7.E-08 | 1.E-07 | Aroclor-1260 | | | | | | | |
| | | | Aluminum | | | | | Aluminum | | | | | | | |
| | | | Arsenic | 2.E-06 | | 4.E-07 | 2.E-06 | Arsenic | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 5.67E-06 | 2.55E-06 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |
| | | | | | | Total ILCR Across Surface Soil | 1.E-04 | | | | | Total HI Across Surface Soil | | | |
| | | | | | | Total ILCR Across Surface Water | 1.E-03 | | | | | Total HI Across Surface Water | | | |
| | | | | | | Total ILCR Across Sediment | 8.E-06 | | | | | Total HI Across Sediment | | | |
| | | | | | | Total ILCR Across All Media and All Exposure Routes | 2.E-03 | | | | | Total HI Across All Media and All Exposure Routes | | | |

TABLE 9.9. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 4.E-07 | | 2.E-07 | 7.E-07 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 9.E-06 | | 5.E-06 | 1.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-06 | | 6.E-07 | 2.E-06 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-06 | | 1.E-06 | 4.E-06 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 1.E-06 | | 5.E-07 | 1.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 5.E-07 | | 3.E-07 | 7.E-07 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 3.E-02 | | | 3.E-02 | | |
| | | | Arsenic | 8.E-06 | | 9.E-07 | 9.E-06 | Arsenic | Skin, CVS | 5.E-02 | | 6.E-03 | 6.E-02 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 3.E-03 | | 3.E-04 | 4.E-03 | | |
| | | | Iron | | | | | Iron | NA | 1.E-01 | | | 1.E-01 | | |
| | | | Manganese | | | | | Manganese | CNS | 1.E-02 | | | 1.E-02 | 2.23E-05 | 8.47E-06 |
| | | | Vanadium | | | | | Vanadium | Kidney | 5.E-02 | | | 5.E-02 | 2.65E-01 | 6.29E-03 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 3.E-08 | | 3.E-05 | 3.E-05 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 5.E-07 | | 7.E-04 | 7.E-04 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-07 | | 2.E-04 | 2.E-04 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | 3.E-09 | | 4.E-06 | 4.E-06 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | 8.E-10 | | 7.E-07 | 7.E-07 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 5.E-08 | | 1.E-04 | 1.E-04 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.E-08 | | 6.E-05 | 6.E-05 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | 2.E-04 | | 1.E-03 | 2.E-03 | | |
| | | | Arsenic | 6.E-08 | | 5.E-08 | 1.E-07 | Arsenic | Skin, CVS | 4.E-04 | | 3.E-04 | 7.E-04 | | |
| | | | Iron | | | | | Iron | NA | 5.E-04 | | 4.E-04 | 9.E-04 | | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-03 | | 4.E-02 | 4.E-02 | 7.55E-07 | 1.03E-03 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-04 | | 1.E-02 | 1.E-02 | 3.12E-03 | 5.22E-02 |

TABLE 9.9. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 5.E-08 | | 5.E-08 | 1.E-07 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 5.E-07 | | 5.E-07 | 1.E-06 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-08 | | 6.E-08 | 1.E-07 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 1.E-07 | | 1.E-07 | 2.E-07 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.E-08 | | 4.E-08 | 8.E-08 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 1.E-08 | | 1.E-08 | 2.E-08 | Aroclor-1254 | Immune System | 8.E-04 | | 9.E-04 | 2.E-03 | | |
| | | | Aroclor-1260 | 2.E-08 | | 3.E-08 | 5.E-08 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 1.E-03 | | | 1.E-03 | | |
| | | | Arsenic | 6.E-07 | | 1.E-07 | 8.E-07 | Arsenic | Skin, CVS | 4.E-03 | | 1.E-03 | 5.E-03 | | |
| | | | Iron | | | | | Iron | NA | 1.E-02 | | | 1.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-03 | | | 2.E-03 | 1.41E-06 | 9.68E-07 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-03 | | | 3.E-03 | 2.16E-02 | 1.86E-03 |
| | | | | | | | Total ILCR Across Surface Soil | | | | | | Total HI Across Surface Soil | 3.E-01 | |
| | | | | | | | Total ILCR Across Surface Water | | | | | | Total HI Across Surface Water | 6.E-02 | |
| | | | | | | | Total ILCR Across Sediment | | | | | | Total HI Across Sediment | 2.E-02 | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | 4.E-01 | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 8.E-02 | Total Kidney HI = | 7.E-02 |
| Total Skin HI = | 6.E-02 | Total Blood HI = | 2.E-03 |
| Total CVS HI = | 6.E-02 | Total Immune System HI = | 2.E-03 |

TABLE 9.8. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 1.E-06 | | 4.E-07 | 1.E-06 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 2.E-05 | | 7.E-06 | 3.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 2.E-06 | | 9.E-07 | 3.E-06 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 7.E-06 | | 2.E-06 | 9.E-06 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.E-06 | | 8.E-07 | 3.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 1.E-06 | | 4.E-07 | 2.E-06 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 2.E-01 | | | 2.E-01 | | |
| | | | Arsenic | 2.E-05 | | 2.E-06 | 2.E-05 | Arsenic | Skin, CVS | 5.E-01 | | 4.E-02 | 5.E-01 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 3.E-02 | | 2.E-03 | 3.E-02 | | |
| | | | Iron | | | | | Iron | NA | 1.E+00 | | | 1.E+00 | | |
| | | | Manganese | | | | | Manganese | CNS | 1.E-01 | | | 1.E-01 | 5.19E-05 | 1.39E-05 |
| | | | Vanadium | | | | | Vanadium | Kidney | 4.E-01 | | | 4.E-01 | 2.48E+00 | 4.12E-02 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-07 | | 1.E-05 | 1.E-05 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 3.E-06 | | 3.E-04 | 3.E-04 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-07 | | 7.E-05 | 7.E-05 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | 2.E-08 | | 2.E-06 | 2.E-06 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | 5.E-09 | | 3.E-07 | 3.E-07 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-07 | | 4.E-05 | 4.E-05 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.E-07 | | 3.E-05 | 3.E-05 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | 5.E-03 | | 2.E-03 | 7.E-03 | | |
| | | | Arsenic | 3.E-07 | | 2.E-08 | 4.E-07 | Arsenic | Skin, CVS | 9.E-03 | | 6.E-04 | 9.E-03 | | |
| | | | Iron | | | | | Iron | NA | 1.E-02 | | 7.E-04 | 1.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 4.E-02 | | 7.E-02 | 1.E-01 | 4.40E-06 | 4.35E-04 |
| | | | Vanadium | | | | | Vanadium | Kidney | 7.E-03 | | 2.E-02 | 2.E-02 | 7.29E-02 | 8.86E-02 |

TABLE 9.8. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 1.E-06 | | 8.E-08 | 1.E-06 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 1.E-06 | | 9.E-07 | 2.E-06 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-07 | | 1.E-07 | 2.E-07 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-07 | | 2.E-07 | 4.E-07 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 9.E-08 | | 7.E-08 | 2.E-07 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 3.E-08 | | 2.E-08 | 5.E-08 | Aroclor-1254 | Immune System | 8.E-03 | | 6.E-03 | 1.E-02 | | |
| | | | Aroclor-1260 | 5.E-08 | | 4.E-08 | 1.E-07 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 1.E-02 | | | 1.E-02 | | |
| | | | Arsenic | 1.E-06 | | 2.E-07 | 2.E-06 | Arsenic | Skin, CVS | 4.E-02 | | 6.E-03 | 4.E-02 | | |
| | | | Iron | | | | | Iron | NA | 1.E-01 | | | 1.E-01 | | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-02 | | | 2.E-02 | 4.27E-06 | 1.58E-06 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-02 | | | 3.E-02 | 2.02E-01 | 1.22E-02 |
| | | | | | | Total ILCR Across Surface Soil | 7.E-05 | | | | | Total HI Across Surface Soil | 3.E+00 | | |
| | | | | | | Total ILCR Across Surface Water | 4.E-04 | | | | | Total HI Across Surface Water | 2.E-01 | | |
| | | | | | | Total ILCR Across Sediment | 6.E-06 | | | | | Total HI Across Sediment | 2.E-01 | | |
| | | | | | | Total ILCR Across All Media and All Exposure Routes | 5.E-04 | | | | | Total HI Across All Media and All Exposure Routes | 3.E+00 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 5.E-01 | Total Kidney HI = | 5.E-01 |
| Total Skin HI = | 6.E-01 | Total Blood HI = | 7.E-03 |
| Total CVS HI = | 6.E-01 | Total Immune System HI = | 1.E-02 |

TABLE 9.7. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child + Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 4.E-07 | | 3.E-07 | 7.E-07 | Benzo(a)anthracene | | | | | | |
| | | | Benzo(a)pyrene | 7.E-06 | | 7.E-06 | 1.E-05 | Benzo(a)pyrene | | | | | | |
| | | | Benzo(b)fluoranthene | 9.E-07 | | 8.E-07 | 2.E-06 | Benzo(b)fluoranthene | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-06 | | 2.E-06 | 4.E-06 | Dibenzo(a,h)anthracene | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 8.E-07 | | 7.E-07 | 2.E-06 | Indeno(1,2,3-cd)pyrene | | | | | | |
| | | | Aroclor-1260 | 4.E-07 | | 4.E-07 | 8.E-07 | Aroclor-1260 | | | | | | |
| | | | Aluminum | | | | | Aluminum | | | | | | |
| | | | Arsenic | 6.E-06 | | 1.E-06 | 8.E-06 | Arsenic | | | | | | |
| | | | Cadmium | | | | | Cadmium | | | | | | |
| | | | Iron | | | | | Iron | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 1.82E-05 1.24E-05 |
| | | | Vanadium | | | | | Vanadium | | | | | | |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 3.E-08 | | 3.E-05 | 3.E-05 | Benzo(a)anthracene | | | | | | |
| | | | Benzo(a)pyrene | 5.E-07 | | 7.E-04 | 7.E-04 | Benzo(a)pyrene | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-07 | | 2.E-04 | 2.E-04 | Benzo(b)fluoranthene | | | | | | |
| | | | Benzo(k)fluoranthene | 3.E-09 | | 4.E-06 | 4.E-06 | Benzo(k)fluoranthene | | | | | | |
| | | | Chrysene | 8.E-10 | | 7.E-07 | 7.E-07 | Chrysene | | | | | | |
| | | | Dibenzo(a,h)anthracene | 5.E-08 | | 1.E-04 | 1.E-04 | Dibenzo(a,h)anthracene | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.E-08 | | 6.E-05 | 6.E-05 | Indeno(1,2,3-cd)pyrene | | | | | | |
| | | | Antimony | | | | | Antimony | | | | | | |
| | | | Arsenic | 6.E-08 | | 5.E-08 | 1.E-07 | Arsenic | | | | | | |
| | | | Iron | | | | | Iron | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 7.55E-07 1.03E-03 |
| | | | Vanadium | | | | | Vanadium | | | | | | |

TABLE 9.7. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child + Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 5.E-08 | | 8.E-08 | 1.E-07 | Benzo(a)anthracene | | | | | | |
| | | | Benzo(a)pyrene | 5.E-07 | | 8.E-07 | 1.E-06 | Benzo(a)pyrene | | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-08 | | 1.E-07 | 2.E-07 | Benzo(b)fluoranthene | | | | | | |
| | | | Dibenzo(a,h)anthracene | 1.E-07 | | 2.E-07 | 3.E-07 | Dibenzo(a,h)anthracene | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.E-08 | | 6.E-08 | 1.E-07 | Indeno(1,2,3-cd)pyrene | | | | | | |
| | | | Aroclor-1254 | 1.E-08 | | 2.E-08 | 3.E-08 | Aroclor-1254 | | | | | | |
| | | | Aroclor-1260 | 2.E-08 | | 4.E-08 | 6.E-08 | Aroclor-1260 | | | | | | |
| | | | Aluminum | | | | | Aluminum | | | | | | |
| | | | Arsenic | 6.E-07 | | 2.E-07 | 9.E-07 | Arsenic | | | | | | |
| | | | Iron | | | | | Iron | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 1.41E-06 1.54E-06 |
| | | | Vanadium | | | | | Vanadium | | | | | | |
| | | | | | | | Total ILCR Across Surface Soil | 3.E-05 | | | | | Total HI Across Surface Soil | |
| | | | | | | | Total ILCR Across Surface Water | 1.E-03 | | | | | Total HI Across Surface Water | |
| | | | | | | | Total ILCR Across Sediment | 3.E-06 | | | | | Total HI Across Sediment | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | 1.E-03 | | | | | Total HI Across All Media and All Exposure Routes | |

TABLE 9.6. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 3.E-08 | | 5.E-08 | 9.E-08 | Benzo(a)anthracene | NA | | | | | |
| | | | Benzo(a)pyrene | 7.E-07 | | 1.E-06 | 2.E-06 | Benzo(a)pyrene | NA | | | | | |
| | | | Benzo(b)fluoranthene | 8.E-08 | | 1.E-07 | 2.E-07 | Benzo(b)fluoranthene | NA | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-07 | | 3.E-07 | 5.E-07 | Dibenzo(a,h)anthracene | NA | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 7.E-08 | | 1.E-07 | 2.E-07 | Indeno(1,2,3-cd)pyrene | NA | | | | | |
| | | | Aroclor-1260 | 3.E-08 | | 6.E-08 | 1.E-07 | Aroclor-1260 | NA | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 2.E-03 | | | 2.E-03 | |
| | | | Arsenic | 6.E-07 | | 2.E-07 | 8.E-07 | Arsenic | Skin, CVS | 4.E-03 | | 1.E-03 | 5.E-03 | |
| | | | Cadmium | | | | | Cadmium | Kidney | 3.E-04 | | 7.E-05 | 3.E-04 | |
| | | | Iron | | | | | Iron | NA | 9.E-03 | | | 9.E-03 | |
| | | | Manganese | | | | | Manganese | CNS | 8.E-04 | | | 8.E-04 | 1.65E-06 2.00E-06 |
| | | | Vanadium | | | | | Vanadium | Kidney | 4.E-03 | | | 4.E-03 | 1.97E-02 1.49E-03 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 3.E-08 | | 3.E-05 | 3.E-05 | Benzo(a)anthracene | NA | | | | | |
| | | | Benzo(a)pyrene | 5.E-07 | | 7.E-04 | 7.E-04 | Benzo(a)pyrene | NA | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-07 | | 2.E-04 | 2.E-04 | Benzo(b)fluoranthene | NA | | | | | |
| | | | Benzo(k)fluoranthene | 3.E-09 | | 4.E-06 | 4.E-06 | Benzo(k)fluoranthene | NA | | | | | |
| | | | Chrysene | 8.E-10 | | 7.E-07 | 7.E-07 | Chrysene | NA | | | | | |
| | | | Dibenzo(a,h)anthracene | 5.E-08 | | 1.E-04 | 1.E-04 | Dibenzo(a,h)anthracene | NA | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.E-08 | | 6.E-05 | 6.E-05 | Indeno(1,2,3-cd)pyrene | NA | | | | | |
| | | | Antimony | | | | | Antimony | Blood | 2.E-04 | | 1.E-03 | 2.E-03 | |
| | | | Arsenic | 6.E-08 | | 5.E-08 | 1.E-07 | Arsenic | Skin, CVS | 4.E-04 | | 3.E-04 | 7.E-04 | |
| | | | Iron | | | | | Iron | NA | 5.E-04 | | 4.E-04 | 9.E-04 | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-03 | | 4.E-02 | 4.E-02 | 7.55E-07 1.03E-03 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-04 | | 1.E-02 | 1.E-02 | 3.12E-03 5.22E-02 |

TABLE 9.6. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 5.E-08 | | 8.E-08 | 1.E-07 | Benzo(a)anthracene | NA | | | | | |
| | | | Benzo(a)pyrene | 5.E-07 | | 8.E-07 | 1.E-06 | Benzo(a)pyrene | NA | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-08 | | 1.E-07 | 2.E-07 | Benzo(b)fluoranthene | NA | | | | | |
| | | | Dibenzo(a,h)anthracene | 1.E-07 | | 2.E-07 | 3.E-07 | Dibenzo(a,h)anthracene | NA | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.E-08 | | 6.E-08 | 1.E-07 | Indeno(1,2,3-cd)pyrene | NA | | | | | |
| | | | Aroclor-1254 | 1.E-08 | | 2.E-08 | 3.E-08 | Aroclor-1254 | Immune System | 8.E-04 | | 1.E-03 | 2.E-03 | |
| | | | Aroclor-1260 | 2.E-08 | | 4.E-08 | 6.E-08 | Aroclor-1260 | NA | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 1.E-03 | | | 1.E-03 | |
| | | | Arsenic | 6.E-07 | | 2.E-07 | 9.E-07 | Arsenic | Skin, CVS | 4.E-03 | | 2.E-03 | 6.E-03 | |
| | | | Iron | | | | | Iron | NA | 1.E-02 | | | 1.E-02 | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-03 | | | 2.E-03 | 1.41E-06 1.54E-06 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-03 | | | 3.E-03 | 2.16E-02 2.95E-03 |
| | | | | | | | Total ILCR Across Surface Soil | | | | | | Total HI Across Surface Soil | 2.E-02 |
| | | | | | | | Total ILCR Across Surface Water | | | | | | Total HI Across Surface Water | 6.E-02 |
| | | | | | | | Total ILCR Across Sediment | | | | | | Total HI Across Sediment | 2.E-02 |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | 1.E-01 |

| | | | |
|---|---|---|---|
| Total CNS HI = | 5.E-02 | Total Kidney HI = | 2.E-02 |
| Total Skin HI = | 1.E-02 | Total Blood HI = | 2.E-03 |
| Total CVS HI = | 1.E-02 | Total Immune System HI = | 2.E-03 |

TABLE 9.3. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 3.E-07 | | 3.E-07 | 6.E-07 | Benzo(a)anthracene | NA | | | | | |
| | | | Benzo(a)pyrene | 7.E-06 | | 6.E-06 | 1.E-05 | Benzo(a)pyrene | NA | | | | | |
| | | | Benzo(b)fluoranthene | 8.E-07 | | 7.E-07 | 1.E-06 | Benzo(b)fluoranthene | NA | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-06 | | 2.E-06 | 4.E-06 | Dibenzo(a,h)anthracene | NA | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 7.E-07 | | 6.E-07 | 1.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | |
| | | | Aroclor-1260 | 3.E-07 | | 3.E-07 | 7.E-07 | Aroclor-1260 | NA | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 2.E-02 | | | 2.E-02 | |
| | | | Arsenic | 6.E-06 | | 1.E-06 | 7.E-06 | Arsenic | Skin, CVS | 4.E-02 | | 7.E-03 | 4.E-02 | |
| | | | Cadmium | | | | | Cadmium | Kidney | 2.E-03 | | 3.E-04 | 3.E-03 | |
| | | | Iron | | | | | Iron | NA | 9.E-02 | | | 9.E-02 | |
| | | | Manganese | | | | | Manganese | CNS | 8.E-03 | | | 8.E-03 | 1.66E-05 1.04E-05 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-02 | | | 3.E-02 | 1.90E-01 7.43E-03 |
| Surface Water | Surface Water | Surface Water | | | | | | | NA | | | | | |
| | | | | | | | | | NA | | | | | |
| | | | | | | | | | NA | | | | | |
| | | | | | | | | | NA | | | | | |
| | | | | | | | | | NA | | | | | |
| | | | | | | | | | NA | | | | | |
| | | | | | | | | | NA | | | | | |
| | | | | | | | | | Blood | | | | | |
| | | | | | | | | | Skin, CVS | | | | | |
| | | | | | | | | | NA | | | | | |
| | | | | | | | | | CNS | | | | | |
| | | | | | | | | | Kidney | | | | | |

TABLE 9.3. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | NA | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | Immune System | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | CNS | | | | |
| | | | | | | | | | Skin, CVS | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | CNS | | | | |
| | | | | | | | | | Kidney | | | | |
| | | | | | | Total ILCR Across Surface Soil | 3.E-05 | | | | | Total HI Across Surface Soil | 2.E-01 |
| | | | | | | Total ILCR Across Surface Water | | | | | | Total HI Across Surface Water | |
| | | | | | | Total ILCR Across Sediment | | | | | | Total HI Across Sediment | |
| | | | | | | Total ILCR Across All Media and All Exposure Routes | 3.E-05 | | | | | Total HI Across All Media and All Exposure Routes | 2.E-01 |

| | | | |
|---|---|---|---|
| Total CNS HI = | 3.E-02 | Total Kidney HI = | 4.E-02 |
| Total Skin HI = | 4.E-02 | Total CVS HI = | 4.E-02 |
| | | | |

TABLE 9.3. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 3.E-07 | | 3.E-07 | 6.E-07 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 7.E-06 | | 6.E-06 | 1.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 8.E-07 | | 7.E-07 | 1.E-06 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-06 | | 2.E-06 | 4.E-06 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 7.E-07 | | 6.E-07 | 1.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 3.E-07 | | 3.E-07 | 7.E-07 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 2.E-02 | | | 2.E-02 | | |
| | | | Arsenic | 6.E-06 | | 1.E-06 | 7.E-06 | Arsenic | Skin, CVS | 4.E-02 | | 7.E-03 | 4.E-02 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 2.E-03 | | 3.E-04 | 3.E-03 | | |
| | | | Iron | | | | | Iron | NA | 9.E-02 | | | 9.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 8.E-03 | | | 8.E-03 | 1.66E-05 | 1.04E-05 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-02 | | | 3.E-02 | 1.90E-01 | 7.43E-03 |
| Surface Water | Surface Water | Surface Water | | | | | | | NA | | | | | | |
| | | | | | | | | | NA | | | | | | |
| | | | | | | | | | NA | | | | | | |
| | | | | | | | | | NA | | | | | | |
| | | | | | | | | | NA | | | | | | |
| | | | | | | | | | NA | | | | | | |
| | | | | | | | | | NA | | | | | | |
| | | | | | | | | | Blood | | | | | | |
| | | | | | | | | | Skin, CVS | | | | | | |
| | | | | | | | | | NA | | | | | | |
| | | | | | | | | | CNS | | | | | | |
| | | | | | | | | | Kidney | | | | | | |

TABLE 9.3. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | NA | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | Immune System | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | CNS | | | | |
| | | | | | | | | | Skin, CVS | | | | |
| | | | | | | | | | NA | | | | |
| | | | | | | | | | CNS | | | | |
| | | | | | | | | | Kidney | | | | |
| | | | | | | Total ILCR Across Surface Soil | 3.E-05 | | | | | Total HI Across Surface Soil | 2.E-01 |
| | | | | | | Total ILCR Across Surface Water | | | | | | Total HI Across Surface Water | |
| | | | | | | Total ILCR Across Sediment | | | | | | Total HI Across Sediment | |
| | | | | | | Total ILCR Across All Media and All Exposure Routes | 3.E-05 | | | | | Total HI Across All Media and All Exposure Routes | 2.E-01 |

| | | | |
|---|---|---|---|
| Total CNS HI = | 3.E-02 | Total Kidney HI = | 4.E-02 |
| Total Skin HI = | 4.E-02 | Total CVS HI = | 4.E-02 |

TABLE 9.3. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 3.E-07 | | 3.E-07 | 6.E-07 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 7.E-06 | | 6.E-06 | 1.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 8.E-07 | | 7.E-07 | 1.E-06 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-06 | | 2.E-06 | 4.E-06 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 7.E-07 | | 6.E-07 | 1.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 3.E-07 | | 3.E-07 | 7.E-07 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 2.E-02 | | | 2.E-02 | | |
| | | | Arsenic | 6.E-06 | | 1.E-06 | 7.E-06 | Arsenic | Skin, CVS | 4.E-02 | | 7.E-03 | 4.E-02 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 2.E-03 | | 3.E-04 | 3.E-03 | | |
| | | | Iron | | | | | Iron | NA | 9.E-02 | | | 9.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 8.E-03 | | | 8.E-03 | 1.66E-05 | 1.04E-05 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-02 | | | 3.E-02 | 1.90E-01 | 7.43E-03 |
| | | | | | | | Total ILCR Across Surface Soil | | | | | | Total HI Across Surface Soil | | |
| | | | | | | | 3.E-05 | | | | | | 2.E-01 | | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | | |
| | | | | | | | 3.E-05 | | | | | | 2.E-01 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 3.E-02 | Total Kidney HI = | 4.E-02 |
| Total Skin HI = | 4.E-02 | Total CVS HI = | 4.E-02 |

TABLE 9.2. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 3.E-08 | | 3.E-08 | 6.E-08 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 6.E-07 | | 5.E-07 | 1.E-06 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 8.E-08 | | 7.E-08 | 1.E-07 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-07 | | 2.E-07 | 4.E-07 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 7.E-08 | | 6.E-08 | 1.E-07 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 3.E-08 | | 3.E-08 | 6.E-08 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 2.E-03 | | | 2.E-03 | | |
| | | | Arsenic | 6.E-07 | | 1.E-07 | 7.E-07 | Arsenic | Skin, CVS | 3.E-03 | | 7.E-04 | 4.E-03 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 2.E-04 | | 3.E-05 | 3.E-04 | | |
| | | | Iron | | | | | Iron | NA | 9.E-03 | | | 9.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 8.E-04 | | | 8.E-04 | 1.59E-06 | 1.00E-06 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-03 | | | 3.E-03 | 1.82E-02 | 7.13E-04 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | | | 4.E-06 | 4.E-06 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | | | 8.E-05 | 8.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | | | 2.E-05 | 2.E-05 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | | | 5.E-07 | 5.E-07 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | | | 9.E-08 | 9.E-08 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | | | 1.E-05 | 1.E-05 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | | | 8.E-06 | 8.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | | | 1.E-04 | 1.E-04 | | |
| | | | Arsenic | | | 5.E-09 | 5.E-09 | Arsenic | Skin, CVS | | | 3.E-05 | 3.E-05 | | |
| | | | Iron | | | | | Iron | NA | | | 4.E-05 | 4.E-05 | | |
| | | | Manganese | | | | | Manganese | CNS | | | 3.E-03 | 3.E-03 | | 1.27E-04 |
| | | | Vanadium | | | | | Vanadium | Kidney | | | 9.E-04 | 9.E-04 | | 4.38E-03 |

TABLE 9.2. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 5.E-08 | | 4.E-08 | 8.E-08 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 5.E-07 | | 4.E-07 | 9.E-07 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-08 | | 5.E-08 | 1.E-07 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 1.E-07 | | 8.E-08 | 2.E-07 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.E-08 | | 3.E-08 | 7.E-08 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 1.E-08 | | 1.E-08 | 2.E-08 | Aroclor-1254 | Immune System | 7.E-04 | | 7.E-04 | 1.E-03 | | |
| | | | Aroclor-1260 | 2.E-08 | | 2.E-08 | 4.E-08 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 1.E-03 | | | 1.E-03 | | |
| | | | Arsenic | 6.E-07 | | 1.E-07 | 7.E-07 | Arsenic | Skin, CVS | 4.E-03 | | 7.E-04 | 4.E-03 | | |
| | | | Iron | | | | | Iron | NA | 1.E-02 | | | 1.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-03 | | | 2.E-03 | 1.35E-06 | 7.70E-07 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-03 | | | 3.E-03 | 2.00E-02 | 1.42E-03 |
| | | | | | | | Total ILCR Across Surface Soil | | | | | | Total HI Across Surface Soil | 2.E-02 | |
| | | | | | | | Total ILCR Across Surface Water | | | | | | Total HI Across Surface Water | 4.E-03 | |
| | | | | | | | Total ILCR Across Sediment | | | | | | Total HI Across Sediment | 2.E-02 | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | 4.E-02 | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 9.E-03 | Total Kidney HI = | 7.E-03 |
| Total Skin HI = | 9.E-03 | Total Blood HI = | 1.E-04 |
| Total CVS HI = | 9.E-03 | Total Immune System HI = | 1.E-03 |

TABLE 9.1. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface and Subsurface Soil | Benzo(a)anthracene | 1.2E-08 | | 4.9E-09 | 1.7E-08 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 3.7E-07 | | 1.4E-07 | 5.1E-07 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 4.4E-08 | | 1.7E-08 | 6.2E-08 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 7.8E-08 | | 3.0E-08 | 1.1E-07 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.0E-08 | | 1.6E-08 | 5.6E-08 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 2.3E-08 | | 9.8E-09 | 3.3E-08 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 3.7E-02 | | | 3.7E-02 | | |
| | | | Arsenic | 4.4E-07 | | 4.0E-08 | 4.8E-07 | Arsenic | Skin, CVS | 6.8E-02 | | 6.2E-03 | 7.5E-02 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 4.2E-03 | | 2.5E-04 | 4.4E-03 | | |
| | | | Iron | | | | | Iron | NA | 1.8E-01 | | | 1.8E-01 | | |
| | | | Manganese | | | | | Manganese | CNS | 1.8E-02 | | | 1.8E-02 | 1.00E-06 | 2.60E-07 |
| | | | Vanadium | | | | | Vanadium | Kidney | 6.7E-02 | | | 6.7E-02 | 3.72E-01 | 6.41E-03 |
| | | | Total ILCR Across Surface / Subsurface Soil | | | | 1.3E-06 | | Total HI Across Surface / Subsurface Soil | | | | 3.8E-01 | | |
| | | | Total ILCR Across All Media and All Exposure Routes | | | | 1.3E-06 | | Total HI Across All Media and All Exposure Routes | | | | 3.8E-01 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 5.5E-02 | Total Kidney HI = | 7.1E-02 |
| Total Skin HI = | 7.5E-02 | Total CVS HI = | 7.5E-02 |

TABLE 9.10a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 2.E-07 | | 2.E-08 | 2.E-07 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 3.E-06 | | 5.E-07 | 4.E-06 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 4.E-07 | | 6.E-08 | 4.E-07 | Benzo(b)fluoranthene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 1.E-06 | | 1.E-07 | 1.E-06 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-07 | | 5.E-08 | 4.E-07 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Aroclor-1260 | 2.E-07 | | 3.E-08 | 2.E-07 | Aroclor-1260 | | | | | | | |
| | | | Aluminum | | | | | Aluminum | | | | | | | |
| | | | Arsenic | 3.E-06 | | 9.E-08 | 3.E-06 | Arsenic | | | | | | | |
| | | | Cadmium | | | | | Cadmium | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 7.96E-06 | 8.54E-07 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-08 | | 4.E-06 | 4.E-06 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 3.E-07 | | 1.E-04 | 1.E-04 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-08 | | 2.E-05 | 2.E-05 | Benzo(b)fluoranthene | | | | | | | |
| | | | Benzo(k)fluoranthene | 2.E-09 | | 7.E-07 | 7.E-07 | Benzo(k)fluoranthene | | | | | | | |
| | | | Chrysene | 5.E-10 | | 1.E-07 | 1.E-07 | Chrysene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-08 | | 2.E-05 | 2.E-05 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.E-08 | | 1.E-05 | 1.E-05 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Antimony | | | | | Antimony | | | | | | | |
| | | | Arsenic | 3.E-08 | | 6.E-09 | 4.E-08 | Arsenic | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 4.22E-07 | 1.57E-04 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |

TABLE 9.10a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 1.E-07 | | 4.E-09 | 1.E-07 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 1.E-07 | | 4.E-08 | 2.E-07 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 2.E-08 | | 5.E-09 | 2.E-08 | Benzo(b)fluoranthene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-08 | | 8.E-09 | 3.E-08 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 1.E-08 | | 3.E-09 | 1.E-08 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Aroclor-1254 | 3.E-09 | | 9.E-10 | 4.E-09 | Aroclor-1254 | | | | | | | |
| | | | Aroclor-1260 | 6.E-09 | | 2.E-09 | 8.E-09 | Aroclor-1260 | | | | | | | |
| | | | Aluminum | | | | | Aluminum | | | | | | | |
| | | | Arsenic | 2.E-07 | | 1.E-08 | 2.E-07 | Arsenic | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 4.58E-07 | 7.30E-08 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |
| | | | | | | | Total ILCR Across Surface Soil | | | | | | Total HI Across Surface Soil | | |
| | | | | | | | 9.E-06 | | | | | | | | |
| | | | | | | | Total ILCR Across Surface Water | | | | | | Total HI Across Surface Water | | |
| | | | | | | | 2.E-04 | | | | | | | | |
| | | | | | | | Total ILCR Across Sediment | | | | | | Total HI Across Sediment | | |
| | | | | | | | 5.E-07 | | | | | | | | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | | |
| | | | | | | | 2.E-04 | | | | | | | | |

TABLE 9.9a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 4.E-08 | | 6.E-09 | 5.E-08 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 9.E-07 | | 1.E-07 | 1.E-06 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-07 | | 2.E-08 | 1.E-07 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-07 | | 4.E-08 | 3.E-07 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 9.E-08 | | 1.E-08 | 1.E-07 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 5.E-08 | | 7.E-09 | 5.E-08 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 9.E-03 | | | 9.E-03 | | |
| | | | Arsenic | 8.E-07 | | 3.E-08 | 8.E-07 | Arsenic | Skin, CVS | 2.E-02 | | 6.E-04 | 2.E-02 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 1.E-03 | | 3.E-05 | 1.E-03 | | |
| | | | Iron | | | | | Iron | NA | 4.E-02 | | | 4.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 4.E-03 | | | 4.E-03 | 2.17E-06 | 2.36E-07 |
| | | | Vanadium | | | | | Vanadium | Kidney | 2.E-02 | | | 2.E-02 | 8.87E-02 | 6.01E-04 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-09 | | 3.E-06 | 3.E-06 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 3.E-08 | | 7.E-05 | 7.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 8.E-09 | | 2.E-05 | 2.E-05 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | 2.E-10 | | 4.E-07 | 4.E-07 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | 6.E-11 | | 7.E-08 | 7.E-08 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-09 | | 1.E-05 | 1.E-05 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-09 | | 6.E-06 | 6.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | 5.E-05 | | 3.E-04 | 4.E-04 | | |
| | | | Arsenic | 4.E-09 | | 4.E-09 | 8.E-09 | Arsenic | Skin, CVS | 9.E-05 | | 9.E-05 | 2.E-04 | | |
| | | | Iron | | | | | Iron | NA | 1.E-04 | | 1.E-04 | 2.E-04 | | |
| | | | Manganese | | | | | Manganese | CNS | 4.E-04 | | 1.E-02 | 1.E-02 | 5.50E-08 | 1.06E-04 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-05 | | 3.E-03 | 3.E-03 | 7.81E-04 | 1.30E-02 |

TABLE 9.9a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 3.E-09 | | 1.E-09 | 4.E-09 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 4.E-08 | | 1.E-08 | 5.E-08 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 4.E-09 | | 1.E-09 | 6.E-09 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 7.E-09 | | 2.E-09 | 9.E-09 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-09 | | 8.E-10 | 4.E-09 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 8.E-10 | | 3.E-10 | 1.E-09 | Aroclor-1254 | Immune System | 2.E-04 | | 6.E-05 | 3.E-04 | | |
| | | | Aroclor-1260 | 2.E-09 | | 5.E-10 | 2.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 3.E-04 | | | 3.E-04 | | |
| | | | Arsenic | 5.E-08 | | 3.E-09 | 5.E-08 | Arsenic | Skin, CVS | 1.E-03 | | 7.E-05 | 1.E-03 | | |
| | | | Iron | | | | | Iron | NA | 3.E-03 | | | 3.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 5.E-04 | | | 5.E-04 | 1.02E-07 | 2.02E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-04 | | | 8.E-04 | 5.41E-03 | 1.33E-04 |
| | | | | | | | Total ILCR Across Surface Soil | | | | | | Total HI Across Surface Soil | 9.E-02 | |
| | | | | | | | Total ILCR Across Surface Water | | | | | | Total HI Across Surface Water | 1.E-02 | |
| | | | | | | | Total ILCR Across Sediment | | | | | | Total HI Across Sediment | 6.E-03 | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | 1.E-01 | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 2.E-02 | Total Kidney HI = | 2.E-02 |
| Total Skin HI = | 2.E-02 | Total Blood HI = | 4.E-04 |
| Total CVS HI = | 2.E-02 | Total Immune System HI = | 3.E-04 |

TABLE 9.8a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 1.E-07 | | 2.E-08 | 1.E-07 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 2.E-06 | | 3.E-07 | 3.E-06 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 3.E-07 | | 4.E-08 | 3.E-07 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 7.E-07 | | 1.E-07 | 8.E-07 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-07 | | 4.E-08 | 3.E-07 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 1.E-07 | | 2.E-08 | 1.E-07 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 8.E-02 | | | 8.E-02 | | |
| | | | Arsenic | 2.E-06 | | 7.E-08 | 2.E-06 | Arsenic | Skin, CVS | 2.E-01 | | 5.E-03 | 2.E-01 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 1.E-02 | | 2.E-04 | 1.E-02 | | |
| | | | Iron | | | | | Iron | NA | 4.E-01 | | | 4.E-01 | | |
| | | | Manganese | | | | | Manganese | CNS | 3.E-02 | | | 3.E-02 | 5.79E-06 | 6.18E-07 |
| | | | Vanadium | | | | | Vanadium | Kidney | 1.E-01 | | | 1.E-01 | 8.28E-01 | 5.51E-03 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-08 | | 1.E-06 | 1.E-06 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 2.E-07 | | 3.E-05 | 3.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 5.E-08 | | 8.E-06 | 8.E-06 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | 2.E-09 | | 2.E-07 | 2.E-07 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | 4.E-10 | | 4.E-08 | 4.E-08 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-08 | | 5.E-06 | 5.E-06 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.E-08 | | 3.E-06 | 3.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | 1.E-03 | | 6.E-04 | 2.E-03 | | |
| | | | Arsenic | 3.E-08 | | 2.E-09 | 3.E-08 | Arsenic | Skin, CVS | 2.E-03 | | 1.E-04 | 2.E-03 | | |
| | | | Iron | | | | | Iron | NA | 3.E-03 | | 2.E-04 | 3.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 1.E-02 | | 2.E-02 | 3.E-02 | 3.67E-07 | 5.13E-05 |
| | | | Vanadium | | | | | Vanadium | Kidney | 2.E-03 | | 4.E-03 | 6.E-03 | 1.82E-02 | 2.21E-02 |

TABLE 9.8a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 9.E-08 | | 3.E-09 | 9.E-08 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 1.E-07 | | 3.E-08 | 1.E-07 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-08 | | 3.E-09 | 1.E-08 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-08 | | 6.E-09 | 2.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 8.E-09 | | 2.E-09 | 1.E-08 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 2.E-09 | | 7.E-10 | 3.E-09 | Aroclor-1254 | Immune System | 2.E-03 | | 6.E-04 | 2.E-03 | | |
| | | | Aroclor-1260 | 4.E-09 | | 1.E-09 | 6.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 3.E-03 | | | 3.E-03 | | |
| | | | Arsenic | 1.E-07 | | 8.E-09 | 1.E-07 | Arsenic | Skin, CVS | 9.E-03 | | 6.E-04 | 1.E-02 | | |
| | | | Iron | | | | | Iron | NA | 2.E-02 | | | 2.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 4.E-03 | | | 4.E-03 | 3.56E-07 | 5.28E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-03 | | | 8.E-03 | 5.05E-02 | 1.22E-03 |
| | | | | | | | Total ILCR Across Surface Soil | | | | | Total HI Across Surface Soil | 8.E-01 | | |
| | | | | | | | Total ILCR Across Surface Water | | | | | Total HI Across Surface Water | 4.E-02 | | |
| | | | | | | | Total ILCR Across Sediment | | | | | Total HI Across Sediment | 5.E-02 | | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | Total HI Across All Media and All Exposure Routes | 9.E-01 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 1.E-01 | Total Kidney HI = | 2.E-01 |
| Total Skin HI = | 2.E-01 | Total Blood HI = | 2.E-03 |
| Total CVS HI = | 2.E-01 | Total Immune System HI = | 2.E-03 |

TABLE 9.7a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child + Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 6.E-08 | | 3.E-09 | 7.E-08 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 2.E-07 | | 7.E-08 | 2.E-07 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 2.E-08 | | 8.E-09 | 3.E-08 | Benzo(b)fluoranthene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 6.E-08 | | 2.E-08 | 8.E-08 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.E-08 | | 7.E-09 | 3.E-08 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Aroclor-1260 | 9.E-09 | | 4.E-09 | 1.E-08 | Aroclor-1260 | | | | | | | |
| | | | Aluminum | | | | | Aluminum | | | | | | | |
| | | | Arsenic | 2.E-07 | | 1.E-08 | 2.E-07 | Arsenic | | | | | | | |
| | | | Cadmium | | | | | Cadmium | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 4.98E-07 | 1.23E-07 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-08 | | 4.E-06 | 4.E-06 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 3.E-07 | | 1.E-04 | 1.E-04 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-08 | | 2.E-05 | 2.E-05 | Benzo(b)fluoranthene | | | | | | | |
| | | | Benzo(k)fluoranthene | 2.E-09 | | 7.E-07 | 7.E-07 | Benzo(k)fluoranthene | | | | | | | |
| | | | Chrysene | 5.E-10 | | 1.E-07 | 1.E-07 | Chrysene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-08 | | 2.E-05 | 2.E-05 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.E-08 | | 1.E-05 | 1.E-05 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Antimony | | | | | Antimony | | | | | | | |
| | | | Arsenic | 3.E-08 | | 6.E-09 | 4.E-08 | Arsenic | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 4.22E-07 | 1.57E-04 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |

TABLE 9.7a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child + Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 1.E-08 | | 5.E-09 | 2.E-08 | Benzo(a)anthracene | | | | | | | |
| | | | Benzo(a)pyrene | 1.E-07 | | 5.E-08 | 2.E-07 | Benzo(a)pyrene | | | | | | | |
| | | | Benzo(b)fluoranthene | 2.E-08 | | 6.E-09 | 2.E-08 | Benzo(b)fluoranthene | | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-08 | | 1.E-08 | 4.E-08 | Dibenzo(a,h)anthracene | | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 1.E-08 | | 4.E-09 | 1.E-08 | Indeno(1,2,3-cd)pyrene | | | | | | | |
| | | | Aroclor-1254 | 3.E-09 | | 1.E-09 | 4.E-09 | Aroclor-1254 | | | | | | | |
| | | | Aroclor-1260 | 6.E-09 | | 3.E-09 | 9.E-09 | Aroclor-1260 | | | | | | | |
| | | | Aluminum | | | | | Aluminum | | | | | | | |
| | | | Arsenic | 2.E-07 | | 1.E-08 | 2.E-07 | Arsenic | | | | | | | |
| | | | Iron | | | | | Iron | | | | | | | |
| | | | Manganese | | | | | Manganese | | | | | | 3.76E-07 | 9.43E-08 |
| | | | Vanadium | | | | | Vanadium | | | | | | | |
| | | | | | | | Total ILCR Across Surface Soil | 6.E-07 | | | | | Total HI Across Surface Soil | | |
| | | | | | | | Total ILCR Across Surface Water | 2.E-04 | | | | | Total HI Across Surface Water | | |
| | | | | | | | Total ILCR Across Sediment | 5.E-07 | | | | | Total HI Across Sediment | | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | 2.E-04 | | | | | Total HI Across All Media and All Exposure Routes | | |

TABLE 9.6a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 2.E-09 | | 1.E-09 | 3.E-09 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 5.E-08 | | 2.E-08 | 7.E-08 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-09 | | 3.E-09 | 8.E-09 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-08 | | 7.E-09 | 2.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 5.E-09 | | 2.E-09 | 8.E-09 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 3.E-09 | | 1.E-09 | 4.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 5.E-04 | | | 5.E-04 | | |
| | | | Arsenic | 4.E-08 | | 5.E-09 | 5.E-08 | Arsenic | Skin, CVS | 9.E-04 | | 1.E-04 | 1.E-03 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 6.E-05 | | 5.E-06 | 7.E-05 | | |
| | | | Iron | | | | | Iron | NA | 2.E-03 | | | 2.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-04 | | | 2.E-04 | 1.21E-07 | 4.17E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 9.E-04 | | | 9.E-04 | 4.93E-03 | 1.06E-04 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-09 | | 3.E-06 | 3.E-06 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 3.E-08 | | 7.E-05 | 7.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 8.E-09 | | 2.E-05 | 2.E-05 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | 2.E-10 | | 4.E-07 | 4.E-07 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | 6.E-11 | | 7.E-08 | 7.E-08 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-09 | | 1.E-05 | 1.E-05 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-09 | | 6.E-06 | 6.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | 5.E-05 | | 3.E-04 | 4.E-04 | | |
| | | | Arsenic | 4.E-09 | | 4.E-09 | 8.E-09 | Arsenic | Skin, CVS | 9.E-05 | | 9.E-05 | 2.E-04 | | |
| | | | Iron | | | | | Iron | NA | 1.E-04 | | 1.E-04 | 2.E-04 | | |
| | | | Manganese | | | | | Manganese | CNS | 4.E-04 | | 1.E-02 | 1.E-02 | 5.50E-08 | 1.06E-04 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-05 | | 3.E-03 | 3.E-03 | 7.81E-04 | 1.30E-02 |

TABLE 9.6a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 3.E-09 | | 2.E-09 | 5.E-09 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 4.E-08 | | 2.E-08 | 5.E-08 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 4.E-09 | | 2.E-09 | 6.E-09 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 7.E-09 | | 3.E-09 | 1.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-09 | | 1.E-09 | 4.E-09 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 8.E-10 | | 4.E-10 | 1.E-09 | Aroclor-1254 | Immune System | 2.E-04 | | 1.E-04 | 3.E-04 | | |
| | | | Aroclor-1260 | 2.E-09 | | 9.E-10 | 3.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 3.E-04 | | | 3.E-04 | | |
| | | | Arsenic | 5.E-08 | | 5.E-09 | 5.E-08 | Arsenic | Skin, CVS | 1.E-03 | | 1.E-04 | 1.E-03 | | |
| | | | Iron | | | | | Iron | NA | 3.E-03 | | | 3.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 5.E-04 | | | 5.E-04 | 1.02E-07 | 3.21E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-04 | | | 8.E-04 | 5.41E-03 | 2.11E-04 |
| | | | | | | Total ILCR Across Surface Soil | 2.E-07 | | | | | Total HI Across Surface Soil | 5.E-03 | | |
| | | | | | | Total ILCR Across Surface Water | 1.E-04 | | | | | Total HI Across Surface Water | 1.E-02 | | |
| | | | | | | Total ILCR Across Sediment | 1.E-07 | | | | | Total HI Across Sediment | 6.E-03 | | |
| | | | | | | Total ILCR Across All Media and All Exposure Routes | 1.E-04 | | | | | Total HI Across All Media and All Exposure Routes | 2.E-02 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 1.E-02 | Total Kidney HI = | 4.E-03 |
| Total Skin HI = | 2.E-03 | Total Blood HI = | 4.E-04 |
| Total CVS HI = | 2.E-03 | Total Immune System HI = | 3.E-04 |

TABLE 9.5a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (0 to 6 years)

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 6.E-08 | | 2.E-09 | 6.E-08 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 1.E-07 | | 4.E-08 | 2.E-07 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 2.E-08 | | 5.E-09 | 2.E-08 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 4.E-08 | | 1.E-08 | 5.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 1.E-08 | | 5.E-09 | 2.E-08 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 7.E-09 | | 3.E-09 | 9.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 4.E-03 | | | 4.E-03 | | |
| | | | Arsenic | 1.E-07 | | 9.E-09 | 1.E-07 | Arsenic | Skin, CVS | 9.E-03 | | 7.E-04 | 9.E-03 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 6.E-04 | | 3.E-05 | 6.E-04 | | |
| | | | Iron | | | | | Iron | NA | 2.E-02 | | | 2.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-03 | | | 2.E-03 | 3.78E-07 | 8.09E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-03 | | | 8.E-03 | 4.60E-02 | 7.21E-04 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-08 | | 1.E-06 | 1.E-06 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 2.E-07 | | 3.E-05 | 3.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 5.E-08 | | 8.E-06 | 8.E-06 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | 2.E-09 | | 2.E-07 | 2.E-07 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | 4.E-10 | | 4.E-08 | 4.E-08 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-08 | | 5.E-06 | 5.E-06 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.E-08 | | 3.E-06 | 3.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | 1.E-03 | | 6.E-04 | 2.E-03 | | |
| | | | Arsenic | 3.E-08 | | 2.E-09 | 3.E-08 | Arsenic | Skin, CVS | 2.E-03 | | 1.E-04 | 2.E-03 | | |
| | | | Iron | | | | | Iron | NA | 3.E-03 | | 2.E-04 | 3.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 1.E-02 | | 2.E-02 | 3.E-02 | 3.67E-07 | 5.13E-05 |
| | | | Vanadium | | | | | Vanadium | Kidney | 2.E-03 | | 4.E-03 | 6.E-03 | 1.82E-02 | 2.21E-02 |

TABLE 9.5a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (0 to 6 years)

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 9.E-09 | | 3.E-09 | 1.E-08 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 1.E-07 | | 3.E-08 | 1.E-07 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-08 | | 4.E-09 | 2.E-08 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-08 | | 7.E-09 | 3.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 8.E-09 | | 3.E-09 | 1.E-08 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 2.E-09 | | 8.E-10 | 3.E-09 | Aroclor-1254 | Immune System | 2.E-03 | | 7.E-04 | 3.E-03 | | |
| | | | Aroclor-1260 | 4.E-09 | | 2.E-09 | 6.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 3.E-03 | | | 3.E-03 | | |
| | | | Arsenic | 1.E-07 | | 1.E-08 | 1.E-07 | Arsenic | Skin, CVS | 9.E-03 | | 7.E-04 | 1.E-02 | | |
| | | | Iron | | | | | Iron | NA | 2.E-02 | | | 2.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 4.E-03 | | | 4.E-03 | 2.73E-07 | 6.23E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-03 | | | 8.E-03 | 5.05E-02 | 1.43E-03 |
| | | | | | | | Total ILCR Across Surface Soil | | | | | | Total HI Across Surface Soil | | |
| | | | | | | | 5.E-07 | | | | | | 5.E-02 | | |
| | | | | | | | Total ILCR Across Surface Water | | | | | | Total HI Across Surface Water | | |
| | | | | | | | 5.E-05 | | | | | | 4.E-02 | | |
| | | | | | | | Total ILCR Across Sediment | | | | | | Total HI Across Sediment | | |
| | | | | | | | 3.E-07 | | | | | | 5.E-02 | | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | | |
| | | | | | | | 5.E-05 | | | | | | 1.E-01 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 4.E-02 | Total Kidney HI = | 2.E-02 |
| Total Skin HI = | 2.E-02 | Total Blood HI = | 2.E-03 |
| Total CVS HI = | 2.E-02 | Total Immune System HI = | 3.E-03 |

TABLE 9.4a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADOLESCENT TRESPASSERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent (6 to 17 years)

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 6.E-09 | | 2.E-09 | 8.E-09 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 1.E-07 | | 4.E-08 | 2.E-07 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-08 | | 5.E-09 | 2.E-08 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 4.E-08 | | 1.E-08 | 5.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 1.E-08 | | 4.E-09 | 2.E-08 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 7.E-09 | | 2.E-09 | 9.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 8.E-04 | | | 8.E-04 | | |
| | | | Arsenic | 1.E-07 | | 8.E-09 | 1.E-07 | Arsenic | Skin, CVS | 2.E-03 | | 1.E-04 | 2.E-03 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 1.E-04 | | 5.E-06 | 1.E-04 | | |
| | | | Iron | | | | | Iron | NA | 4.E-03 | | | 4.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 3.E-04 | | | 3.E-04 | 3.08E-07 | 7.29E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 1.E-03 | | | 1.E-03 | 8.02E-03 | 1.18E-04 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | 2.E-08 | | 1.E-06 | 1.E-06 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 2.E-07 | | 3.E-05 | 3.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 5.E-08 | | 7.E-06 | 7.E-06 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | 1.E-09 | | 2.E-07 | 2.E-07 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | 4.E-10 | | 3.E-08 | 3.E-08 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-08 | | 5.E-06 | 5.E-06 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.E-08 | | 3.E-06 | 3.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | 2.E-04 | | 9.E-05 | 3.E-04 | | |
| | | | Arsenic | 3.E-08 | | 2.E-09 | 3.E-08 | Arsenic | Skin, CVS | 4.E-04 | | 2.E-05 | 4.E-04 | | |
| | | | Iron | | | | | Iron | NA | 5.E-04 | | 3.E-05 | 5.E-04 | | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-03 | | 3.E-03 | 5.E-03 | 3.52E-07 | 4.62E-05 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.E-04 | | 7.E-04 | 1.E-03 | 3.18E-03 | 3.63E-03 |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 4.E-09 | | 3.E-09 | 7.E-09 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 5.E-08 | | 3.E-08 | 8.E-08 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 6.E-09 | | 4.E-09 | 9.E-09 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 9.E-09 | | 6.E-09 | 2.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 4.E-09 | | 2.E-09 | 6.E-09 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 1.E-09 | | 7.E-10 | 2.E-09 | Aroclor-1254 | Immune System | 2.E-04 | | 1.E-04 | 3.E-04 | | |
| | | | Aroclor-1260 | 2.E-09 | | 1.E-09 | 4.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 2.E-04 | | | 2.E-04 | | |
| | | | Arsenic | 6.E-08 | | 9.E-09 | 7.E-08 | Arsenic | Skin, CVS | 8.E-04 | | 1.E-04 | 9.E-04 | | |
| | | | Iron | | | | | Iron | NA | 2.E-03 | | | 2.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 4.E-04 | | | 4.E-04 | 1.31E-07 | 5.61E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 7.E-04 | | | 7.E-04 | 4.41E-03 | 2.35E-04 |
| | | | | | | | Total ILCR Across Surface Soil: 4.E-07 | | | | | | Total HI Across Surface Soil: 8.E-03 | | |
| | | | | | | | Total ILCR Across Surface Water: 5.E-05 | | | | | | Total HI Across Surface Water: 7.E-03 | | |
| | | | | | | | Total ILCR Across Sediment: 2.E-07 | | | | | | Total HI Across Sediment: 5.E-03 | | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes: 5.E-05 | | | | | | Total HI Across All Media and All Exposure Routes: 2.E-02 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 6.E-03 | Total Kidney HI = | 3.E-03 |
| Total Skin HI = | 3.E-03 | Total Blood HI = | 3.E-04 |
| Total CVS HI = | 3.E-03 | Total Immune System HI = | 3.E-04 |

TABLE 9.3a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 5.E-08 | | 9.E-09 | 6.E-08 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 1.E-06 | | 2.E-07 | 1.E-06 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 1.E-07 | | 2.E-08 | 1.E-07 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.E-07 | | 6.E-08 | 4.E-07 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 1.E-07 | | 2.E-08 | 1.E-07 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 6.E-08 | | 1.E-08 | 7.E-08 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 8.E-03 | | | 8.E-03 | | |
| | | | Arsenic | 9.E-07 | | 4.E-08 | 9.E-07 | Arsenic | Skin, CVS | 2.E-02 | | 6.E-04 | 2.E-02 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 1.E-03 | | 3.E-05 | 1.E-03 | | |
| | | | Iron | | | | | Iron | NA | 4.E-02 | | | 4.E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 3.E-03 | | | 3.E-03 | 2.61E-06 | 3.29E-07 |
| | | | Vanadium | | | | | Vanadium | Kidney | 1.E-02 | | | 1.E-02 | 8.30E-02 | 6.51E-04 |
| | | | | | | | Total ILCR Across Surface Soil | | | | | | Total HI Across Surface Soil | | |
| | | | | | | | 3.E-06 | | | | | | 8.E-02 | | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | | |
| | | | | | | | 3.E-06 | | | | | | 8.E-02 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 1.E-02 | Total Kidney HI = | 2.E-02 |
| Total Skin HI = | 2.E-02 | Total CVS HI = | 2.E-02 |

TABLE 9.2a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface Soil | Benzo(a)anthracene | 3.E-09 | | 5.E-10 | 3.E-09 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 6.E-08 | | 1.E-08 | 7.E-08 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 7.E-09 | | 1.E-09 | 8.E-09 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 2.E-08 | | 3.E-09 | 2.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 6.E-09 | | 1.E-09 | 7.E-09 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 3.E-09 | | 6.E-10 | 4.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 4.E-04 | | | 4.E-04 | | |
| | | | Arsenic | 5.E-08 | | 2.E-09 | 5.E-08 | Arsenic | Skin, CVS | 9.E-04 | | 3.E-05 | 9.E-04 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 6.E-05 | | 2.E-06 | 6.E-05 | | |
| | | | Iron | | | | | Iron | NA | 2.E-03 | | | 2.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 2.E-04 | | | 2.E-04 | 1.43E-07 | 1.80E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-04 | | | 8.E-04 | 4.55E-03 | 3.57E-05 |
| Surface Water | Surface Water | Surface Water | Benzo(a)anthracene | | | 5.E-07 | 5.E-07 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | | | 1.E-05 | 1.E-05 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | | | 3.E-06 | 3.E-06 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Benzo(k)fluoranthene | | | 7.E-08 | 7.E-08 | Benzo(k)fluoranthene | NA | | | | | | |
| | | | Chrysene | | | 1.E-08 | 1.E-08 | Chrysene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | | | 2.E-06 | 2.E-06 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | | | 1.E-06 | 1.E-06 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Antimony | | | | | Antimony | Blood | | | 3.E-05 | 3.E-05 | | |
| | | | Arsenic | | | 4.E-10 | 4.E-10 | Arsenic | Skin, CVS | | | 7.E-06 | 7.E-06 | | |
| | | | Iron | | | | | Iron | NA | | | 9.E-06 | 9.E-06 | | |
| | | | Manganese | | | | | Manganese | CNS | | | 8.E-04 | 8.E-04 | | 1.61E-05 |
| | | | Vanadium | | | | | Vanadium | Kidney | | | 2.E-04 | 2.E-04 | | 1.10E-03 |
| Sediment | Sediment | Sediment | Benzo(a)anthracene | 4.E-09 | | 7.E-10 | 5.E-09 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 4.E-08 | | 8.E-09 | 5.E-08 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 5.E-09 | | 9.E-10 | 6.E-09 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 9.E-09 | | 1.E-09 | 1.E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.E-09 | | 6.E-10 | 4.E-09 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1254 | 1.E-09 | | 2.E-10 | 1.E-09 | Aroclor-1254 | Immune System | 2.E-04 | | 3.E-05 | 2.E-04 | | |
| | | | Aroclor-1260 | 2.E-09 | | 4.E-10 | 2.E-09 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 3.E-04 | | | 3.E-04 | | |
| | | | Arsenic | 5.E-08 | | 2.E-09 | 6.E-08 | Arsenic | Skin, CVS | 9.E-04 | | 4.E-05 | 1.E-03 | | |
| | | | Iron | | | | | Iron | NA | 2.E-03 | | | 2.E-03 | | |
| | | | Manganese | | | | | Manganese | CNS | 4.E-04 | | | 4.E-04 | 1.22E-07 | 1.39E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 8.E-04 | | | 8.E-04 | 5.00E-03 | 7.09E-05 |

| | | | |
|---|---|---|---|
| Total ILCR Across Surface Soil | 2.E-07 | Total HI Across Surface Soil | 5.E-03 |
| Total ILCR Across Surface Water | 2.E-05 | Total HI Across Surface Water | 1.E-03 |
| Total ILCR Across Sediment | 1.E-07 | Total HI Across Sediment | 5.E-03 |
| Total ILCR Across All Media and All Exposure Routes | 2.E-05 | Total HI Across All Media and All Exposure Routes | 1.E-02 |

| | | | |
|---|---|---|---|
| Total CNS HI = | 2.E-03 | Total Kidney HI = | 2.E-03 |
| Total Skin HI = | 2.E-03 | Total Blood HI = | 3.E-05 |
| Total CVS HI = | 2.E-03 | Total Immune System HI = | 2.E-04 |

TABLE 9.1a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION WORKERS
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

| Medium | Exposure Medium | Exposure Point | Chemical | Carcinogenic Risk | | | | Chemical | Non-Carcinogenic Hazard Quotient | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | | Primary Target Organ | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Soil | Soil | Surface and Subsurface Soil | Benzo(a)anthracene | 6.2E-09 | | 1.6E-09 | 7.9E-09 | Benzo(a)anthracene | NA | | | | | | |
| | | | Benzo(a)pyrene | 1.8E-07 | | 4.8E-08 | 2.3E-07 | Benzo(a)pyrene | NA | | | | | | |
| | | | Benzo(b)fluoranthene | 2.2E-08 | | 5.8E-09 | 2.8E-08 | Benzo(b)fluoranthene | NA | | | | | | |
| | | | Dibenzo(a,h)anthracene | 3.9E-08 | | 1.0E-08 | 4.9E-08 | Dibenzo(a,h)anthracene | NA | | | | | | |
| | | | Indeno(1,2,3-cd)pyrene | 2.0E-08 | | 5.3E-09 | 2.5E-08 | Indeno(1,2,3-cd)pyrene | NA | | | | | | |
| | | | Aroclor-1260 | 1.2E-08 | | 3.3E-09 | 1.5E-08 | Aroclor-1260 | NA | | | | | | |
| | | | Aluminum | | | | | Aluminum | CNS | 1.9E-02 | | | 1.9E-02 | | |
| | | | Arsenic | 2.2E-07 | | 1.3E-08 | 2.3E-07 | Arsenic | Skin, CVS | 3.4E-02 | | 2.1E-03 | 3.6E-02 | | |
| | | | Cadmium | | | | | Cadmium | Kidney | 2.1E-03 | | 8.4E-05 | 2.2E-03 | | |
| | | | Iron | | | | | Iron | NA | 8.9E-02 | | | 8.9E-02 | | |
| | | | Manganese | | | | | Manganese | CNS | 8.8E-03 | | | 8.8E-03 | 5.02E-07 | 8.68E-08 |
| | | | Vanadium | | | | | Vanadium | Kidney | 3.3E-02 | | | 3.3E-02 | 1.86E-01 | 2.14E-03 |
| | | | | | | | Total ILCR Across Surface / Subsurface Soil | | | | | | Total HI Across Surface / Subsurface Soil | | |
| | | | | | | | 5.9E-07 | | | | | | 1.9E-01 | | |
| | | | | | | | Total ILCR Across All Media and All Exposure Routes | | | | | | Total HI Across All Media and All Exposure Routes | | |
| | | | | | | | 5.9E-07 | | | | | | 1.9E-01 | | |

| | | | |
|---|---|---|---|
| Total CNS HI = | 2.8E-02 | Total Kidney HI = | 3.6E-02 |
| Total Skin HI = | 3.6E-02 | Total CVS HI = | 3.6E-02 |

**TABLE 1**
**SELECTION OF EXPOSURE PATHWAYS**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 | Enrtire Site including Asphalt Covered Area | Maintenance Workers | Adult | Ingestion<br>Dermal | Quant<br>Quant | Maintenance workers may contact surface soil during normal work activities. |
| | | | | Occupational Workers | Adult | Ingestion<br>Dermal | Quant<br>Quant | Occupational workers may contact surface soil during normal work activities. |
| | | | | Trespassers | Adolescents | Ingestion<br>Dermal | Quant<br>Quant | Although access to the base is controlled, once inside the base, access to the SWMU 15 is not limited by any physical restraint. Adolescent trespassers may be exposed to surface soil while at the site. |
| | | Air | Enrtire Site including Asphalt Covered Area | Maintenance Workers | Adult | Inhalation | Qual | Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs. |
| | | | | Occupational Workers | Adult | Inhalation | Qual | |
| | | | | Trespassers | Adolescents | Inhalation | Qual | |
| | Groundwater | Groundwater | Perched Aquifer | Maintenance Workers | Adult | Ingestion<br>Dermal<br>Inhalation | None<br>None<br>None | Groundwater in the perched aquifer at SWMU 15 is not considered to be a source of potable water. Few organic chemicals were detected in groundwater and concentrations were less than risk-based screening levels. Metals detected in groundwater are not related to past site activities. |
| | | | | Occupational Workers | Adult | Ingestion<br>Dermal<br>Inhalation | None<br>None<br>None | |
| | | | | Trespassers | Adolescents | Ingestion<br>Dermal<br>Inhalation | None<br>None<br>None | |
| | Surface Water | Surface Water | Entire Site | Maintenance Workers | Adult | Ingestion<br>Dermal | None<br>Quant | Maintenance workers are not expected to ingest surface water.<br>Maintenance workers may have dermal contact with surface water. |
| | | | | Occupational Workers | Adult | Ingestion<br>Dermal | None<br>None | Occupational workers are not expected to be exposed to surface water. |
| | | | | Trespassers | Adolescents | Ingestion<br>Dermal | Quant<br>Quant | Although access to the base is controlled, once inside the base, access to the SWMU 15 is not limited by any physical restraint. Adolescent trespassers may be exposed to surface water while at the site. |
| | Sediment | Sediment | Entire Site | Maintenance Workers | Adult | Ingestion<br>Dermal | Quant<br>Quant | Maintenance workers may contact sediment. |
| | | | | Occupational Workers | Adult | Ingestion<br>Dermal | None<br>None | Occupational workers are not expected to be exposed to sediment. |
| | | | | Trespassers | Adolescents | Ingestion<br>Dermal | Quant<br>Quant | Although access to the base is controlled, once inside the base, access to the SWMU 15 is not limited by any physical restraint. Adolescent trespassers may be exposed to sediment while at the site. |

**TABLE 1**
**SELECTION OF EXPOSURE PATHWAYS**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 | Surface/ Subsurface soil | Surface/ Subsurface Soil | Entire Site Including Asphalt Covered Area | Construction Workers | Adult | Ingestion<br>Dermal | Quant<br>Quant | Construction workers may have contact with surface and subsurface soil during excavation activities. |
| | | Air | Entire Site Including Asphalt Covered Area | Construction Workers | Adult | Inhalation | Qual | Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs. |
| | Surface Soil | Surface Soil | Entire Site Including Asphalt Covered Area | Recreational Users | Child | Ingestion<br>Dermal | Quant<br>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<br>Dermal | Quant<br>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<br>Dermal | Quant<br>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<br>Dermal | Quant<br>Quant | Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions. |
| | | Air | Enrtire Site Including Asphalt Covered Area | Recreational Users | Child | Inhalation | Qual | Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs. |
| | | | | | Adult | Inhalation | Qual | Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs. |
| | | | | Residents | Child | Inhalation | Qual | Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs. |
| | | | | | Adult | Inhalation | Qual | Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs. |
| | Ground Water | Groundwater | Perched Aquifer | Construction Workers | Adult | Ingestion<br>Dermal<br>Inhalation | None<br>None<br>None | Groundwater in the perched aquifer at SWMU 15 is not considered to be a source of potable water. Few organic chemicals were detected in groundwater and concentrations were less than risk-based screening levels. Metals detected in groundwater are not related to past site activities. |
| | | | | Recreational Users | Child | Ingestion<br>Dermal<br>Inhalation | None<br>None<br>None | |
| | | | | | Adult | Ingestion<br>Dermal<br>Inhalation | None<br>None<br>None | |
| | | | | Residents | Child | Ingestion<br>Dermal<br>Inhalation | None<br>None<br>None | |
| | | | | | Adult | Ingestion<br>Dermal<br>Inhalation | None<br>None<br>None | |

**TABLE 1**
**SELECTION OF EXPOSURE PATHWAYS**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 | Surface Water | Surface Water | Entire Site | Construction Workers | Adult | Ingestion | None | Construction workers are not expected to be exposed to surface water. |
| | | | | | | Dermal | None | |
| | | | | Recreational Users | Child | Ingestion | Quant | This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future. |
| | | | | | | Dermal | Quant | |
| | | | | | Adult | Ingestion | Quant | This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future. |
| | | | | | | Dermal | Quant | |
| | | | | Residents | Child | Ingestion | Quant | Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions. |
| | | | | | | Dermal | Quant | |
| | | | | | Adult | Ingestion | Quant | Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions. |
| | | | | | | Dermal | Quant | |
| | Sediment | Sediment | Entire Site | Construction Workers | Adult | Ingestion | None | Construction workers are not expected to be exposed to sediment. |
| | | | | | | Dermal | None | |
| | | | | Recreational Users | Child | Ingestion | Quant | This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future. |
| | | | | | | Dermal | Quant | |
| | | | | | Adult | Ingestion | Quant | This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future. |
| | | | | | | Dermal | Quant | |
| | | | | Residents | Child | Ingestion | Quant | Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions. |
| | | | | | | Dermal | Quant | |
| | | | | | Adult | Ingestion | Quant | Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions. |
| | | | | | | Dermal | Quant | |

Notes:
Quant - Quantitative.
Qual - Qualitative.

TABLE 8.9 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 4.8E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.5E-06 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.1E-05 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.2E-05 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.7E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-05 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 7.3E-06 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-07 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.2E-05 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 8.8E-08 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.8E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-05 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.1E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.7E-06 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.3E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 3.1E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.6E-09 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.9E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.1E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 8.2E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | (total) | | | | | | | | | | **1.3E-04** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.3E-04** | |

TABLE 8.10 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 8.6E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.3E-08 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.2E-07 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.6E-07 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.8E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-07 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 8.1E-08 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-09 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 2.1E-07 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-09 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.2E-08 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.7E-08 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.1E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.7E-08 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 5.5E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 7.3E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 9.2E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 2.7E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.9E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | (total) | | | | | | | | | | **1.4E-06** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 5.3E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-06 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.2E-05 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.0E-05 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 3.0E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-05 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 8.0E-06 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 5.8E-07 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.3E-05 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 9.6E-08 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.9E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-05 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.2E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.5E-06 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 3.6E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 4.8E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.2E-09 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 6.1E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.8E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.3E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | (total) | | | | | | | | | | **1.4E-04** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.4E-04** | |

TABLE 8.11 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

**Receptor Population: Recreational User**
**Receptor Age: Child**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 2.7E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-07 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 3.7E-07 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-06 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 8.8E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.4E-07 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.5E-07 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-08 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 6.7E-07 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-09 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 3.7E-08 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-07 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 3.3E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.4E-07 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.7E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.3E-07 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-07 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 2.9E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 8.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 6.0E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | | | | | | | | | | | **4.4E-06** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.7E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-05 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 3.9E-05 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-04 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 9.3E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-05 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.5E-05 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-06 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 4.1E-05 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-07 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 6.1E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-05 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 3.6E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-05 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.1E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.5E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-08 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.9E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 5.5E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 4.0E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | | | | | | | | | | | **4.4E-04** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **4.4E-04** | |

TABLE 8.12 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 4.6E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-08 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 6.3E-08 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.6E-07 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.5E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 4.3E-08 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 3.2E-09 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.1E-07 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 8.4E-10 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 6.4E-09 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.7E-08 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 5.6E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.1E-08 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 3.0E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 3.9E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-08 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 4.9E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.0E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | | | | | | | | | | | **7.5E-07** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.9E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.9E-05 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 9.1E-05 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.6E-04 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.2E-04 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-04 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 5.9E-05 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-06 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 9.7E-05 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 7.1E-07 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.4E-05 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-04 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 8.6E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.3E-05 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.7E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 3.5E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-08 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 4.5E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.3E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 9.3E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | | | | | | | | | | | **1.0E-03** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.0E-03** | |

TABLE 8.13 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

**Receptor Population: Residents**
**Receptor Age: Child**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 2.7E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-07 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 3.7E-07 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-06 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 8.8E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.4E-07 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.5E-07 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-08 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 6.7E-07 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-09 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 3.7E-08 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-07 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 3.3E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.4E-07 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.7E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.3E-07 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-07 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 2.9E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 8.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 6.0E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | | | | | | | | | | | **4.4E-06** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.7E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-05 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 3.9E-05 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-04 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 9.3E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-05 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.5E-05 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-06 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 4.1E-05 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-07 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 6.1E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-05 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 3.6E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-05 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.1E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.5E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-08 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.9E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 5.5E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 4.0E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | | | | | | | | | | | **4.4E-04** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **4.4E-04** | |

TABLE 8.14 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

**Receptor Population: Residents**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 4.6E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-08 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 6.3E-08 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.6E-07 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.5E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 4.3E-08 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 3.2E-09 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.1E-07 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 8.4E-10 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 6.4E-09 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.7E-08 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 5.6E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.1E-08 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 3.0E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 3.9E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-08 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 4.9E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.0E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | | | | | | | | | | | **7.5E-07** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.9E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.9E-05 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 9.1E-05 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.6E-04 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.2E-04 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-04 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 5.9E-05 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-06 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 9.7E-05 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 7.1E-07 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.4E-05 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-04 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 8.6E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.3E-05 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.7E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 3.5E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-08 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 4.5E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.3E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 9.3E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | | | | | | | | | | | **1.0E-03** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.0E-03** | |

TABLE 7.9 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (total) | | | | | | | | | | | | | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.4E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 3.2E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 7.6E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.0E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 3.4E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 5.0E-06 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 3.0E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 6.6E-09 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 1.1E-04 | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 8.7E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 2.9E-05 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.1E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 3.7E-05 | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 3.2E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 3.3E-03 | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 2.3E-08 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 8.8E-04 | 0.026 |
| | (total) | | | | | | | | | | | | **4.4E-03** | |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **4.4E-03** | |

TABLE 7.10 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 5.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 7.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 5.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 7.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 6.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 3.5E-07 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 8.8E-04 | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 4.6E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 1.5E-03 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 5.9E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 2.0E-03 | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.7E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 7.1E-03 | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.2E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 1.2E-03 | |
| | (total) | | | | | | | | | | | | **1.3E-02** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.4E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 7.8E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.9E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 5.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 8.4E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.2E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 7.4E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.3E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 3.8E-04 | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 3.0E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 1.0E-04 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.9E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.3E-04 | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.1E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 1.2E-02 | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 8.0E-08 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 3.1E-03 | 0.026 |
| | (total) | | | | | | | | | | | | **1.5E-02** | |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.8E-02** | |

TABLE 7.11 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

**Receptor Population: Recreational User**
**Receptor Age: Child**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.3E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.0E-05 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 7.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 3.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.0E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 5.0E-03 | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.7E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 8.9E-03 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.4E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.1E-02 | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 9.8E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 4.1E-02 | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 7.0E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 7.0E-03 | |
| | (total) | | | | | | | | | | | | **7.3E-02** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.9E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.5E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.1E-03 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.9E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 4.8E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 7.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 4.2E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.3E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 2.2E-03 | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.8E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 5.9E-04 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 2.2E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 7.4E-04 | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 6.5E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 6.7E-02 | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 4.6E-07 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 1.8E-02 | 0.026 |
| | (total) | | | | | | | | | | | | **8.9E-02** | |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **1.6E-01** | |

TABLE 7.12 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 1.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 3.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 8.6E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 2.2E-04 | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.1E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 3.8E-04 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.4E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 4.8E-04 | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 4.2E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 1.7E-03 | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 3.0E-07 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 3.0E-04 | |
| | (total) | | | | | | | | | | | | **3.1E-03** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.1E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 2.7E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 6.4E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 1.7E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 2.8E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.2E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 2.5E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 7.8E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 1.3E-03 | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.0E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 3.4E-04 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.3E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 4.4E-04 | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 3.8E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 4.0E-02 | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 2.7E-07 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 1.0E-02 | 0.026 |
| | (total) | | | | | | | | | | | | **5.2E-02** | |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.5E-02** | |

TABLE 7.13 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

**Receptor Population: Residents**
**Receptor Age: Child**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.3E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.0E-05 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 7.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 3.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.0E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 5.0E-03 | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.7E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 8.9E-03 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.4E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.1E-02 | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 9.8E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 4.1E-02 | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 7.0E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 7.0E-03 | |
| | (total) | | | | | | | | | | | | **7.3E-02** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.9E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.5E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.1E-03 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.9E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 4.8E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 7.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 4.2E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.3E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 2.2E-03 | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.8E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 5.9E-04 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 2.2E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 7.4E-04 | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 6.5E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 6.7E-02 | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 4.6E-07 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 1.8E-02 | 0.026 |
| | (total) | | | | | | | | | | | | **8.9E-02** | |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **1.6E-01** | |

TABLE 4.14
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

**Receptor Population: Residents**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 1.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 3.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 8.6E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 2.2E-04 | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.1E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 3.8E-04 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.4E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 4.8E-04 | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 4.2E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 1.7E-03 | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 3.0E-07 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 3.0E-04 | |
| | (total) | | | | | | | | | | | | **3.1E-03** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.1E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 2.7E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 6.4E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 1.7E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 2.8E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.2E-05 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 2.5E-04 | mg/kg-day | | mg/kg-day | NA | NA | | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 7.8E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 1.3E-03 | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.0E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 3.4E-04 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.3E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 4.4E-04 | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 3.8E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 4.0E-02 | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 2.7E-07 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 1.0E-02 | 0.026 |
| | (total) | | | | | | | | | | | | **5.2E-02** | |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.5E-02** | |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**MAINTENANCE WORKERS - REASONABLE MAXIMUM EXPOSURE (RME)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 4.38E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.02E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 2.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 2.46E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 6.59E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.09E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 2.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 1.60E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 2.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 9.59E-06 |
| Antimony | 1.06E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.12E-09 |
| Arsenic | 1.40E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.80E-09 |
| Iron | 1.77E+00 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 3.55E-06 |
| Manganese | 5.15E-01 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 1.03E-06 |
| Vanadium | 3.69E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 7.38E-09 |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**ADOLESCENT TRESPASSERS - REASONABLE MAXIMUM EXPOSURE (RME)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 4.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 6.19E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 4.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.44E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 4.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 3.48E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 4.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 9.32E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 4.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.54E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 4.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 2.27E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 4.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 1.36E-05 |
| Antimony | 1.06E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 4.24E-09 |
| Arsenic | 1.40E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 5.60E-09 |
| Iron | 1.77E+00 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 7.09E-06 |
| Manganese | 5.15E-01 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 2.06E-06 |
| Vanadium | 3.69E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 1.48E-08 |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**CHILD RECREATIONAL USERS - REASONABLE MAXIMUM EXPOSURE (RME)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 4.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 6.19E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 4.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.44E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 4.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 3.48E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 4.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 9.32E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 4.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.54E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 4.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 2.27E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 4.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 1.36E-05 |
| Antimony | 1.06E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 4.24E-09 |
| Arsenic | 1.40E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 5.60E-09 |
| Iron | 1.77E+00 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 7.09E-06 |
| Manganese | 5.15E-01 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 2.06E-06 |
| Vanadium | 3.69E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 1.48E-08 |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**ADULT RECREATIONAL USERS - REASONABLE MAXIMUM EXPOSURE (RME)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 4.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 6.19E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 4.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.44E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 4.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 3.48E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 4.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 9.32E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 4.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.54E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 4.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 2.27E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 4.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 1.36E-05 |
| Antimony | 1.06E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 4.24E-09 |
| Arsenic | 1.40E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 5.60E-09 |
| Iron | 1.77E+00 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 7.09E-06 |
| Manganese | 5.15E-01 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 2.06E-06 |
| Vanadium | 3.69E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 1.48E-08 |
| | | | i | | | 4.00E+00 | | | 2.00E-03 | | | 1 | |
| | | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | |
| | | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | |
| | | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | |
| | | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | |
| | | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**FUTURE CHILD RESIDENTS - REASONABLE MAXIMUM EXPOSURE (RME)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | ORGANIC OR INORGANIC? | t* (HR) | tevent | T (HR) | Kp (CM/HR) | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | o | 8.53E+00 | 4.00E+00 | 2.03E+00 | 4.74E-01 | 2.75E+00 | 1 | 6.19E-06 |
| Benzo(a)pyrene | 2.26E-03 | o | 1.17E+01 | 4.00E+00 | 2.69E+00 | 7.01E-01 | 4.27E+00 | 1 | 1.44E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | o | 1.20E+01 | 4.00E+00 | 2.77E+00 | 7.02E-01 | 4.29E+00 | 1 | 3.48E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | o | 1.17E+01 | 4.00E+00 | 2.72E+00 | 6.60E-01 | 4.03E+00 | 1 | 9.32E-06 |
| Chrysene | 4.12E-03 | o | 8.53E+00 | 4.00E+00 | 2.03E+00 | 4.74E-01 | 2.75E+00 | 1 | 1.54E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | o | 1.76E+01 | 4.00E+00 | 3.88E+00 | 1.51E+00 | 9.68E+00 | 0.6 | 2.27E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | o | 1.68E+01 | 4.00E+00 | 3.78E+00 | 1.04E+00 | 6.65E+00 | 0.6 | 1.36E-05 |
| Antimony | 1.06E-03 | i | | 4.00E+00 | | 1.00E-03 | | 1 | 4.24E-09 |
| Arsenic | 1.40E-03 | i | | 4.00E+00 | | 1.00E-03 | | 1 | 5.60E-09 |
| Iron | 1.77E+00 | i | | 4.00E+00 | | 1.00E-03 | | 1 | 7.09E-06 |
| Manganese | 5.15E-01 | i | | 4.00E+00 | | 1.00E-03 | | 1 | 2.06E-06 |
| Vanadium | 3.69E-03 | i | | 4.00E+00 | | 1.00E-03 | | 1 | 1.48E-08 |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**FUTURE ADULT RESIDENTS - REASONABLE MAXIMUM EXPOSURE (RME)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 4.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 6.19E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 4.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.44E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 4.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 3.48E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 4.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 9.32E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 4.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.54E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 4.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 2.27E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 4.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 1.36E-05 |
| Antimony | 1.06E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 4.24E-09 |
| Arsenic | 1.40E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 5.60E-09 |
| Iron | 1.77E+00 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 7.09E-06 |
| Manganese | 5.15E-01 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 2.06E-06 |
| Vanadium | 3.69E-03 | | i | | | 4.00E+00 | | | 1.00E-03 | | | 1 | 1.48E-08 |

**TABLE 4.9**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**MAINTENANCE WORKERS TO SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 3,300 | U.S. EPA, July 2004 | 3,300 | U.S. EPA, July 2004 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4.3 |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 24 | Professional judgement | 12 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 2 | Professional judgement | 1 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**

Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Dermal Intake(RME) = 1.11E+00 Cancer Dermal Intake(CTE) = 1.99E-01
Noncancer Dermal Intake(RME) = 3.10E+00 Noncancer Dermal Intake(CTE) = 1.55E+00

**TABLE 4.10**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.05 | U.S. EPA Region 4, May 2000 | 0.05 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 26 | Professional judgement | 13 | Professional judgement | |
| | ED | Exposure Duration | (years) | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 4015 | U.S. EPA, December 1989 | 4,015 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 3,280 | U.S. EPA, August 1997 | 3,100 | U.S. EPA, August 1997 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4.3 |
| | ED | Exposure Duration | years | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | of the text. |
| | EF | Exposure Frequency | days/year | 26 | Professional judgement | 13 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 4,015 | U.S. EPA, December 1989 | 4,015 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 5.21E-05
Noncancer Ingestion Intake(RME) = 3.31E-04

Cancer Ingestion Intake(CTE) = 1.30E-05
Noncancer Ingestion Intake(CTE) = 8.28E-05

Cancer Dermal Intake(RME) = 8.54E-01
Noncancer Dermal Intake(RME) = 5.43E+00

Cancer Dermal Intake(CTE) = 4.03E-01
Noncancer Dermal Intake(CTE) = 2.57E+00

**TABLE 4.11**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**CHILD RECREATIONAL USERS TO SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.05 | U.S. EPA Region 4, May 2000 | 0.05 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 52 | Professional judgement | 26 | Professional judgement | |
| | ED | Exposure Duration | (years) | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 2190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 3,300 | 1/2 total body area (EPA 2004) | 3,300 | 1/2 total body area (EPA 2004) | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4.3 |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 52 | Professional judgement | 26 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 1.63E-04
Noncancer Ingestion Intake(RME) = 1.90E-03

Cancer Ingestion Intake(CTE) = 1.36E-05
Noncancer Ingestion Intake(CTE) = 4.75E-04

Cancer Dermal Intake(RME) = 2.69E+00
Noncancer Dermal Intake(RME) = 3.13E+01

Cancer Dermal Intake(CTE) = 4.48E-01
Noncancer Dermal Intake(CTE) = 1.57E+01

**TABLE 4.12**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**ADULT RECREATIONAL USERS TO SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.01 | U.S. EPA Region 4, May 2000 | 0.01 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 52 | Professional judgement | 26 | Professional judgement | |
| | ED | Exposure Duration | (years) | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 8760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 9,070 | USEPA, August 1997 | 9,070 | USEPA, August 1997 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4.3 |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 52 | Professional judgement | 26 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 2.79E-05
Noncancer Ingestion Intake(RME) = 8.14E-05

Cancer Ingestion Intake(CTE) = 2.04E-06
Noncancer Ingestion Intake(CTE) = 2.04E-05

Cancer Dermal Intake(RME) = 6.33E+00
Noncancer Dermal Intake(RME) = 1.85E+01

Cancer Dermal Intake(CTE) = 9.23E-01
Noncancer Dermal Intake(CTE) = 9.23E+00

**TABLE 4.13**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**FUTURE CHILD RESIDENTS TO SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.05 | U.S. EPA Region 4, May 2000 | 0.05 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 52 | Professional judgement | 26 | Professional judgement | |
| | ED | Exposure Duration | (years) | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 2190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 3,300 | 1/2 total body area (EPA 200 | 3,300 | 1/2 total body area (EPA 200 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4.: |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 52 | Professional judgement | 26 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 1.63E-04
Noncancer Ingestion Intake(RME) = 1.90E-03

Cancer Ingestion Intake(CTE) = 1.36E-05
Noncancer Ingestion Intake(CTE) = 4.75E-04

Cancer Dermal Intake(RME) = 2.69E+00
Noncancer Dermal Intake(RME) = 3.13E+01

Cancer Dermal Intake(CTE) = 4.48E-01
Noncancer Dermal Intake(CTE) = 1.57E+01

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**MAINTENANCE WORKERS - CENTRAL TENDENCY EXPOSURE (CTE)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 1.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 3.10E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 1.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 7.19E-06 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 1.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 1.74E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 1.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 4.66E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 1.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 7.69E-06 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 1.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 1.13E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 1.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 6.78E-06 |
| Antimony | 1.06E-03 | | i | | | 1.00E+00 | | | 1.00E-03 | | | 1 | 1.06E-09 |
| Arsenic | 1.40E-03 | | i | | | 1.00E+00 | | | 1.00E-03 | | | 1 | 1.40E-09 |
| Iron | 1.77E+00 | | i | | | 1.00E+00 | | | 1.00E-03 | | | 1 | 1.77E-06 |
| Manganese | 5.15E-01 | | i | | | 1.00E+00 | | | 1.00E-03 | | | 1 | 5.15E-07 |
| Vanadium | 3.69E-03 | | i | | | 1.00E+00 | | | 1.00E-03 | | | 1 | 3.69E-09 |

**TABLE 4.14**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**FUTURE ADULT RESIDENTS TO SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.01 | U.S. EPA Region 4, May 2000 | 0.01 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 52 | Professional judgement | 26 | Professional judgement | |
| | ED | Exposure Duration | (years) | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 8760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 9,070 | USEPA, August 1997 | 9,070 | USEPA, August 1997 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4.: |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 52 | Professional judgement | 26 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 2.79E-05
Noncancer Ingestion Intake(RME) = 8.14E-05

Cancer Ingestion Intake(CTE) = 2.04E-06
Noncancer Ingestion Intake(CTE) = 2.04E-05

Cancer Dermal Intake(RME) = 6.33E+00
Noncancer Dermal Intake(RME) = 1.85E+01

Cancer Dermal Intake(CTE) = 9.23E-01
Noncancer Dermal Intake(CTE) = 9.23E+00

TABLE 8.9a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (total) | | | | | | | | | | | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 6.2E-07 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.5E-07 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.4E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-05 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 3.5E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-06 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 9.3E-07 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-08 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.5E-06 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-08 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 2.3E-07 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-06 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.4E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.9E-07 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.1E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.8E-10 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.2E-10 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.5E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.0E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 7.4E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | (total) | | | | | | | | | | **1.6E-05** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.6E-05** | |

TABLE 8.10a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 2.2E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-08 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 2.9E-08 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-07 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 7.0E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.1E-08 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.0E-08 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-09 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 5.4E-08 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-10 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 3.0E-09 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-08 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 2.6E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.9E-08 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.4E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.8E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-08 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 2.3E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 6.7E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 4.8E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | (total) | | | | | | | | | | **3.5E-07** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.8E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-06 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.1E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-05 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 9.9E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.2E-06 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.7E-06 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 1.9E-07 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 4.4E-06 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 3.2E-08 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 6.5E-07 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.7E-06 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 3.9E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-06 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 8.6E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.1E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-09 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.4E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 4.2E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 3.0E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | (total) | | | | | | | | | | **4.6E-05** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **4.7E-05** | |

TABLE 8.11a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

**Receptor Population: Recreational User**
**Receptor Age: Child**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 2.3E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-08 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 3.1E-08 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-07 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 7.3E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-08 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.1E-08 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-09 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 5.6E-08 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 4.1E-10 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 3.1E-09 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-08 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 2.7E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.4E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.9E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-08 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 2.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 7.0E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 5.0E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | | | | | | | | | | | **3.7E-07** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 2.0E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-06 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.6E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.3E-05 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.1E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.0E-06 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 3.0E-06 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-07 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 4.9E-06 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 3.6E-08 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 7.2E-07 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.2E-06 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 4.3E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-06 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 9.5E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.3E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.9E-09 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.6E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 4.6E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 3.3E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | | | | | | | | | | | **5.1E-05** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **5.2E-05** | |

TABLE 8.12a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.4E-09 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-09 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.6E-09 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-08 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.1E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.0E-09 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 3.2E-09 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-10 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 8.4E-09 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 6.1E-11 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.7E-10 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-09 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 4.1E-09 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-09 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.2E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.8E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-09 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.6E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.0E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 7.5E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | | | | | | | | | | | **5.5E-08** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 4.0E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-06 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 9.4E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-05 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.3E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-05 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 6.1E-06 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-07 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.0E-05 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 7.3E-08 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.5E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-05 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 8.8E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.5E-06 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.0E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.6E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-09 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.3E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 9.5E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 6.8E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | | | | | | | | | | | **1.1E-04** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.1E-04** | |

TABLE 8.13a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

**Receptor Population: Residents**
**Receptor Age: Child**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 2.3E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-08 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 3.1E-08 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-07 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 7.3E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-08 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 2.1E-08 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-09 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 5.6E-08 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 4.1E-10 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 3.1E-09 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-08 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 2.7E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.4E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.9E-08 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-08 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 2.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 7.0E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 5.0E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | | | | | | | | | | | **3.7E-07** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 2.0E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-06 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.6E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.3E-05 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.1E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.0E-06 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 3.0E-06 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-07 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 4.9E-06 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 3.6E-08 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 7.2E-07 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.2E-06 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 4.3E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-06 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 9.5E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.3E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.9E-09 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.6E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 4.6E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 3.3E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | | | | | | | | | | | **5.1E-05** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **5.2E-05** | |

TABLE 8.14a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

**Receptor Population: Residents**
**Receptor Age: Adult**

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.4E-09 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-09 | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.6E-09 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-08 | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.1E-08 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.0E-09 | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 3.2E-09 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-10 | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 8.4E-09 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 6.1E-11 | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.7E-10 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-09 | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 4.1E-09 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-09 | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.2E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.8E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-09 | |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.6E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.0E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 7.5E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | |
| | | | | | | | | | | | **5.5E-08** | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 4.0E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-06 | 1 |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 9.4E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-05 | 1 |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.3E-05 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-05 | 1 |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 6.1E-06 | mg/kg-day | 7.30E-02 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-07 | 1 |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.0E-05 | mg/kg-day | 7.30E-03 | $(mg/kg\text{-}day)^{-1}$ | 7.3E-08 | 1 |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.5E-06 | mg/kg-day | 7.30E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-05 | 1 |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 8.8E-06 | mg/kg-day | 7.30E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.5E-06 | 1 |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.0E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.15 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.6E-09 | mg/kg-day | 1.50E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-09 | 1 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.3E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 1 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 9.5E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 6.8E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | | 0.026 |
| | | | | | | | | | | | **1.1E-04** | |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.1E-04** | |

TABLE 7.9a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (total) | | | | | | | | | | | | |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 4.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.7E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 7.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.2E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 1.6E-09 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 2.7E-05 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.2E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 7.2E-06 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 2.7E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 9.2E-06 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 8.0E-07 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 8.3E-04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 5.7E-09 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 2.2E-04 |
| | (total) | | | | | | | | | | | | **1.1E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **1.1E-03** |

TABLE 7.10a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 4.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 1.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 3.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 8.8E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 2.2E-04 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 1.2E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 3.9E-04 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 1.5E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 4.9E-04 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 4.3E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 1.8E-03 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 3.1E-07 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 3.1E-04 |
| | (total) | | | | | | | | | | | | **3.2E-03** |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 1.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 2.6E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 6.3E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 1.7E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 2.8E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 2.5E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 5.4E-09 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 9.1E-05 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 7.2E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 2.4E-05 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 9.1E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 3.0E-05 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 2.6E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 2.8E-03 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.9E-08 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 7.3E-04 |
| | (total) | | | | | | | | | | | | **3.6E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **6.8E-03** |

TABLE 7.11a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 7.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.6E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 7.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 2.0E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 9.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 5.0E-07 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 1.3E-03 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 6.6E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 2.2E-03 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 8.4E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 2.8E-03 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 2.4E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 1.0E-02 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.8E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 1.8E-03 |
| | (total) | | | | | | | | | | | | **1.8E-02** |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 6.9E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.6E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 3.9E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 1.0E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.7E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 2.5E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.5E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 3.3E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 5.5E-04 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 4.4E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 1.5E-04 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 5.6E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.9E-04 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.6E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 1.7E-02 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.2E-07 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 4.4E-03 |
| | (total) | | | | | | | | | | | | **2.2E-02** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **4.0E-02** |

TABLE 7.12a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 3.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 8.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 4.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.2E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 5.4E-05 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.8E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 9.5E-05 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.6E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.2E-04 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.0E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 4.4E-04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 7.5E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 7.5E-05 |
| | (total) | | | | | | | | | | | | **7.8E-04** |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 4.0E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 9.4E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.3E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 6.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.0E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.5E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 8.8E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.0E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 3.3E-04 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.6E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 8.6E-05 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.3E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.1E-04 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 9.5E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 9.9E-03 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 6.8E-08 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 2.6E-03 |
| | (total) | | | | | | | | | | | | **1.3E-02** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **1.4E-02** |

TABLE 7.13a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 7.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.6E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 7.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 2.0E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 9.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 5.0E-07 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 1.3E-03 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 6.6E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 2.2E-03 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 8.4E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 2.8E-03 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 2.4E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 1.0E-02 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.8E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 1.8E-03 |
| | (total) | | | | | | | | | | | | **1.8E-02** |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 6.9E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 1.6E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 3.9E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 1.0E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.7E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 2.5E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 1.5E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 3.3E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 5.5E-04 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 4.4E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 1.5E-04 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 5.6E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.9E-04 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.6E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 1.7E-02 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 1.2E-07 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 4.4E-03 |
| | (total) | | | | | | | | | | | | **2.2E-02** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **4.0E-02** |

TABLE 4.14a
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE WATER
SWMU 15 (ROADS AND GROUNDS AREA)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 3.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 4.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 3.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 8.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 4.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 4.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.2E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | NA | NA | 5.4E-05 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.8E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 9.5E-05 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.6E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.2E-04 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 1.0E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | NA | NA | 4.4E-04 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 7.5E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | NA | NA | 7.5E-05 |
| | (total) | | | | | | | | | | | | **7.8E-04** |
| Dermal | Benzo(a)anthracene | 1.66E-03 | mg/L | 1.66E-03 | mg/L | M | 4.0E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.26E-03 | mg/L | 2.26E-03 | mg/L | M | 9.4E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 5.38E-03 | mg/L | 5.38E-03 | mg/L | M | 2.3E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(k)fluoranthene | 1.55E-03 | mg/L | 1.55E-03 | mg/L | M | 6.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Chrysene | 4.12E-03 | mg/L | 4.12E-03 | mg/L | M | 1.0E-04 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 2.30E-04 | mg/L | 2.30E-04 | mg/L | M | 1.5E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.02E-03 | mg/L | 2.02E-03 | mg/L | M | 8.8E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Antimony | 1.06E-03 | mg/L | 1.06E-03 | mg/L | M | 2.0E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | NA | NA | 3.3E-04 |
| | Arsenic | 1.40E-03 | mg/L | 1.40E-03 | mg/L | M | 2.6E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | NA | NA | 8.6E-05 |
| | Iron | 1.77E+00 | mg/L | 1.77E+00 | mg/L | M | 3.3E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | NA | NA | 1.1E-04 |
| | Manganese | 5.15E-01 | mg/L | 5.15E-01 | mg/L | M | 9.5E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | NA | NA | 9.9E-03 |
| | Vanadium | 3.69E-03 | mg/L | 3.69E-03 | mg/L | M | 6.8E-08 | mg/kg-day | 2.60E-05 | mg/kg-day | NA | NA | 2.6E-03 |
| | (total) | | | | | | | | | | | | **1.3E-02** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **1.4E-02** |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**ADOLESCENT TRESPASSERS - CENTRAL TENDENCY EXPOSURE (CTE)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 4.38E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.02E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 2.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 2.46E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 6.59E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.09E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 2.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 1.60E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 2.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 9.59E-06 |
| Antimony | 1.06E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.12E-09 |
| Arsenic | 1.40E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.80E-09 |
| Iron | 1.77E+00 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 3.55E-06 |
| Manganese | 5.15E-01 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 1.03E-06 |
| Vanadium | 3.69E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 7.38E-09 |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**CHILD RECREATIONAL USERS - CENTRAL TENDENCY EXPOSURE (CTE)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 4.38E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.02E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 2.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 2.46E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 6.59E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.09E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 2.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 1.60E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 2.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 9.59E-06 |
| Antimony | 1.06E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.12E-09 |
| Arsenic | 1.40E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.80E-09 |
| Iron | 1.77E+00 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 3.55E-06 |
| Manganese | 5.15E-01 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 1.03E-06 |
| Vanadium | 3.69E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 7.38E-09 |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**ADULT RECREATIONAL USERS - CENTRAL TENDENCY EXPOSURE (CTE)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 4.38E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.02E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 2.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 2.46E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 6.59E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.09E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 2.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 1.60E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 2.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 9.59E-06 |
| Antimony | 1.06E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.12E-09 |
| Arsenic | 1.40E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.80E-09 |
| Iron | 1.77E+00 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 3.55E-06 |
| Manganese | 5.15E-01 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 1.03E-06 |
| Vanadium | 3.69E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 7.38E-09 |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**FUTURE CHILD RESIDENTS - CENTRAL TENDENCY EXPOSURE (CTE)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 4.38E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.02E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 2.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 2.46E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 6.59E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.09E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 2.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 1.60E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 2.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 9.59E-06 |
| Antimony | 1.06E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.12E-09 |
| Arsenic | 1.40E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.80E-09 |
| Iron | 1.77E+00 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 3.55E-06 |
| Manganese | 5.15E-01 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 1.03E-06 |
| Vanadium | 3.69E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 7.38E-09 |

**CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER**
**FUTURE ADULT RESIDENTS - CENTRAL TENDENCY EXPOSURE (CTE)**

**SITE NAME:** SWMU 15 (ROADS AND GROUNDS AREA)
**LOCATION:** NSWC CRANE, CRANE, INDIANA
**DATE:** 10/31/05

**REFERENCES:** U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A )/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM$^2$/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM$^2$)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B$^2$)/(1 + B)$^2$)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM$^3$)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

| CHEMICAL | SW CONC. (mg/L) | | ORGANIC OR INORGANIC? | | t* (HR) | tevent | T (HR) | | Kp (CM/HR) | | B | FA | DAevent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 1.66E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 4.38E-06 |
| Benzo(a)pyrene | 2.26E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.69E+00 | | 7.01E-01 | | 4.27E+00 | 1 | 1.02E-05 |
| Benzo(b)fluoranthene | 5.38E-03 | | o | | 1.20E+01 | 2.00E+00 | 2.77E+00 | | 7.02E-01 | | 4.29E+00 | 1 | 2.46E-05 |
| Benzo(k)fluoranthene | 1.55E-03 | | o | | 1.17E+01 | 2.00E+00 | 2.72E+00 | | 6.60E-01 | | 4.03E+00 | 1 | 6.59E-06 |
| Chrysene | 4.12E-03 | | o | | 8.53E+00 | 2.00E+00 | 2.03E+00 | | 4.74E-01 | | 2.75E+00 | 1 | 1.09E-05 |
| Dibenzo(a,h)anthracene | 2.30E-04 | | o | | 1.76E+01 | 2.00E+00 | 3.88E+00 | | 1.51E+00 | | 9.68E+00 | 0.6 | 1.60E-06 |
| Indeno(1,2,3-cd)pyrene | 2.02E-03 | | o | | 1.68E+01 | 2.00E+00 | 3.78E+00 | | 1.04E+00 | | 6.65E+00 | 0.6 | 9.59E-06 |
| Antimony | 1.06E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.12E-09 |
| Arsenic | 1.40E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 2.80E-09 |
| Iron | 1.77E+00 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 3.55E-06 |
| Manganese | 5.15E-01 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 1.03E-06 |
| Vanadium | 3.69E-03 | | i | | | 2.00E+00 | | | 1.00E-03 | | | 1 | 7.38E-09 |

**TABLE 4.9a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO GULLY SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for for estimating DAevent and the chemical-specific dermally absorbed dose from water (DAD) are provided in Section 7.3.4. of the text. USEPA, July 2004 |
| | A | Skin Surface Area | $cm^2$ | 3,300 | U.S. EPA, July 2004 | 3,300 | U.S. EPA, July 2004 | |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | |
| | EF | Exposure Frequency | days/year | 24 | Professional judgement | 12 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 2 | Professional judgement | 1 | Professional judgement | |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**

Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Dermal Intake(RME) = 1.11E+00 Cancer Dermal Intake(CTE) = 1.99E-01
Noncancer Dermal Intake(RME) = 3.10E+00 Noncancer Dermal Intake(CTE) = 1.55E+00

**TABLE 4.10a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.05 | U.S. EPA Region 4, May 2000 | 0.05 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 26 | Professional judgement | 13 | Professional judgement | |
| | ED | Exposure Duration | (years) | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 4015 | U.S. EPA, December 1989 | 4,015 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 3,280 | U.S. EPA, August 1997 | 3,100 | U.S. EPA, August 1997 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4. |
| | ED | Exposure Duration | years | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | of the text. |
| | EF | Exposure Frequency | days/year | 26 | Professional judgement | 13 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 4,015 | U.S. EPA, December 1989 | 4,015 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 5.21E-05
Noncancer Ingestion Intake(RME) = 3.31E-04

Cancer Ingestion Intake(CTE) = 1.30E-05
Noncancer Ingestion Intake(CTE) = 8.28E-05

Cancer Dermal Intake(RME) = 8.54E-01
Noncancer Dermal Intake(RME) = 5.43E+00

Cancer Dermal Intake(CTE) = 4.03E-01
Noncancer Dermal Intake(CTE) = 2.57E+00

**TABLE 4.11a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**CHILD RECREATIONAL USERS TO GULLY SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.05 | U.S. EPA Region 4, May 2000 | 0.05 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 52 | Professional judgement | 26 | Professional judgement | |
| | ED | Exposure Duration | (years) | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 2190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 3,300 | 1/2 total body area (EPA 2004) | 3,300 | 1/2 total body area (EPA 2004) | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4. |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 52 | Professional judgement | 26 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 1.63E-04
Noncancer Ingestion Intake(RME) = 1.90E-03

Cancer Ingestion Intake(CTE) = 1.36E-05
Noncancer Ingestion Intake(CTE) = 4.75E-04

Cancer Dermal Intake(RME) = 2.69E+00
Noncancer Dermal Intake(RME) = 3.13E+01

Cancer Dermal Intake(CTE) = 4.48E-01
Noncancer Dermal Intake(CTE) = 1.57E+01

**TABLE 4.12a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**ADULT RECREATIONAL USERS TO GULLY SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.01 | U.S. EPA Region 4, May 2000 | 0.01 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 52 | Professional judgement | 26 | Professional judgement | |
| | ED | Exposure Duration | (years) | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 8760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 9,070 | USEPA, August 1997 | 9,070 | USEPA, August 1997 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4. |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 52 | Professional judgement | 26 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 2.79E-05
Noncancer Ingestion Intake(RME) = 8.14E-05

Cancer Ingestion Intake(CTE) = 2.04E-06
Noncancer Ingestion Intake(CTE) = 2.04E-05

Cancer Dermal Intake(RME) = 6.33E+00
Noncancer Dermal Intake(RME) = 1.85E+01

Cancer Dermal Intake(CTE) = 9.23E-01
Noncancer Dermal Intake(CTE) = 9.23E+00

**TABLE 4.13a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**FUTURE CHILD RESIDENTS TO GULLY SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.05 | U.S. EPA Region 4, May 2000 | 0.05 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 52 | Professional judgement | 26 | Professional judgement | |
| | ED | Exposure Duration | (years) | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 2190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 3,300 | 1/2 total body area (EPA 200 | 3,300 | 1/2 total body area (EPA 200 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4. |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 52 | Professional judgement | 26 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 1.63E-04
Noncancer Ingestion Intake(RME) = 1.90E-03

Cancer Ingestion Intake(CTE) = 1.36E-05
Noncancer Ingestion Intake(CTE) = 4.75E-04

Cancer Dermal Intake(RME) = 2.69E+00
Noncancer Dermal Intake(RME) = 3.13E+01

Cancer Dermal Intake(CTE) = 4.48E-01
Noncancer Dermal Intake(CTE) = 1.57E+01

**TABLE 4.14a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF**
**FUTURE ADULT RESIDENTS TO GULLY SURFACE WATER**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| **Ingestion** | Cw | Chemical Concentration in Water | (mg/L) | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | Chronic Daily Intake (CDI) (mg/kg-day)= |
| | IR | Ingestion Rate of Surface Water | (L/hr) | 0.01 | U.S. EPA Region 4, May 2000 | 0.01 | U.S. EPA Region 4, May 2000 | Cw x IR x ET x EF x ED / BW x AT |
| | EF | Exposure Frequency | (days/year) | 52 | Professional judgement | 26 | Professional judgement | |
| | ED | Exposure Duration | (years) | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | ET | Exposure Time | (hr/day) | 4 | Professional judgement | 2 | Professional judgement | |
| | BW | Body Weight | (kg) | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | (days) | 25550 | U.S. EPA, December 1989 | 25550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Noncancer) | (days) | 8760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| **Dermal** | Cw | Chemical Concentration in Water | mg/L | Max or 95% UCL | U.S. EPA, December 2002 | Maximum | U.S. EPA, December 2002 | The equations and parameters for |
| | A | Skin Surface Area | $cm^2$ | 9,070 | USEPA, August 1997 | 9,070 | USEPA, August 1997 | for estimating DAevent and the chemical- |
| | DAevent | Absorbed Dose per Event | $mg/cm^2$-event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | specific dermally absorbed dose from |
| | EV | Event Frequency | event/day | 1 | Professional judgement | 1 | Professional judgement | water (DAD) are provided in Section 7.3.4. |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | of the text. |
| | EF | Exposure Frequency | days/year | 52 | Professional judgement | 26 | Professional judgement | |
| | $t_{event}$ | Duration of Event | hour/event | 4 | Professional judgement | 2 | Professional judgement | USEPA, July 2004 |
| | t* | Time to reach steady state | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | T | Lag Time | hour/event | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | B | Bunge Model Constant | dimensionless | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | Kp | Permeability Coefficient from Water | cm/hour | chemical-specific | U.S. EPA, July 2004 | chemical-specific | U.S. EPA, July 2004 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | USEPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | USEPA, December 1989 | |

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

**Daily Intake Calculations**
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 2.79E-05 Cancer Ingestion Intake(CTE) = 2.04E-06
Noncancer Ingestion Intake(RME) = 8.14E-05 Noncancer Ingestion Intake(CTE) = 2.04E-05

Cancer Dermal Intake(RME) = 6.33E+00 Cancer Dermal Intake(CTE) = 9.23E-01
Noncancer Dermal Intake(RME) = 1.85E+01 Noncancer Dermal Intake(CTE) = 9.23E+00

**TABLE 8.2 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 4.2E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 8.6E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.3E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.0E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.6E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 9.5E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.9E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.7E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 6.3E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 3.7E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.5E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 4.2E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 9.4E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 1.9E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.2E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.6E-06** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.6E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 7.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.4E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 8.9E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.5E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.3E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 8.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.5E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 7.3E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.8E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.0E-06** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **2.6E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.3 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 4.4E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.2E-07 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 8.9E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.5E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.1E-06 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.9E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.8E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-06 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 9.9E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.2E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.7E-07 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.5E-07 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 6.6E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 3.8E-06 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.8E-06 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 4.4E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 9.8E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 2.0E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.2E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.7E-05** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.8E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-07 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 7.7E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.6E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 9.3E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.4E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-06 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 8.5E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.6E-07 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.2E-07 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 7.6E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-06 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.9E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.0E-05** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **2.7E-05** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
PCBS - 0.14
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Occupational Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.4 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.3E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.4E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 6.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 8.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.1E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 7.4E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.4E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.3E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 4.9E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.9E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.3E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 7.3E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 1.5E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 9.0E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.2E-06** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.8E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 5.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.1E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 6.9E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.0E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.8E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 6.3E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.6E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.2E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.4E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 5.6E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.5E-08 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.2E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **7.7E-07** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **2.0E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.5 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.0E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.5E-07 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.5E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 6.6E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.8E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.3E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.1E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.1E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 1.5E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 9.0E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-06 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.0E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 2.3E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 4.6E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 2.8E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **4.5E-06** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 8.8E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.4E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.8E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.2E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 5.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.2E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.0E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 3.8E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.5E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.8E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 6.8E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **2.4E-06** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **7.0E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.6 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 4.4E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.2E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 8.9E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.5E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.1E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.9E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.8E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 9.9E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.2E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.7E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.5E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 6.6E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 3.8E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.8E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 4.4E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 9.7E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 2.0E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.2E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.7E-06** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 7.3E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.8E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 4.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 3.1E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.5E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.6E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **2.0E-06** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **3.7E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.7 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.4E-06 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-06 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.8E-06 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-05 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 3.4E-06 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-06 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 8.9E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.5E-06 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 3.1E-06 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-06 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 5.5E-07 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-06 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 2.1E-02 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.2E-05 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-05 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.4E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 3.1E-02 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 6.2E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 3.8E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **5.2E-05** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.0E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.7E-07 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.0E-06 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.5E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.0E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.2E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.4E-06 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.1E-06 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.2E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.1E-07 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-07 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.0E-06 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-06 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.9E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.4E-05** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **6.6E-05** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.8 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.9E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-07 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.8E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.5E-06 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-06 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.8E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-06 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.3E-06 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.7E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.3E-07 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.7E-07 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 8.8E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 5.2E-06 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.7E-06 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.9E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.3E-02 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 2.7E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.6E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **2.2E-05** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.1E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-07 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 6.2E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.6E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 7.6E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.5E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.0E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-06 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 6.9E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.0E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.3E-07 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-07 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 6.2E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.3E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.4E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **8.5E-06** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **3.1E-05** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.2 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 7.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 1.8E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.8E-03 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.0E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.4E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 2.4E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 2.6E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 8.7E-03 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 5.4E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 7.6E-04 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 3.2E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.2E-03 |
| | (total) | | | | | | | | | | | | **1.8E-02** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 6.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.0E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.8E-04 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 7.8E-10 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 3.1E-05 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **7.1E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **1.9E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.3 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.5E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 3.0E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 8.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 1.8E-02 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.8E-02 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.1E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.6E-02 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 2.5E-03 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 2.7E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 9.1E-02 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 5.6E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 8.0E-03 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 3.4E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.4E-02 |
| | (total) | | | | | | | | | | | | **1.9E-01** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.6E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 6.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.1E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 7.1E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 8.1E-09 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 3.3E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **7.4E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.0E-01** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Occupational Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.4 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 4.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 5.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 4.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 8.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 3.1E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 3.1E-03 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.8E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.1E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 4.2E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 4.6E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 1.5E-02 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 9.4E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.3E-03 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 5.7E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 5.7E-03 |
| | (total) | | | | | | | | | | | | **3.2E-02** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 3.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 4.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 7.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 3.6E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.2E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.4E-09 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 5.5E-05 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.3E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **3.3E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.5 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 7.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.7E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 1.8E-02 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.8E-02 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.0E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.5E-02 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 2.4E-03 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 2.7E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 8.8E-02 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 5.4E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 7.7E-03 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 3.3E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.3E-02 |
| | (total) | | | | | | | | | | | | **1.8E-01** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.0E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.5E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 6.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.3E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.1E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.9E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 7.9E-09 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 3.2E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **7.2E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **1.9E-01** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.6 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 3.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 8.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 5.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 1.9E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.9E-03 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.1E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.7E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.3E-07 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 2.6E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 2.8E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 9.5E-03 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 5.8E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 8.3E-04 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 3.5E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.5E-03 |
| | (total) | | | | | | | | | | | | **2.0E-02** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 4.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 5.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 4.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 9.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 4.3E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.4E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.6E-09 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 6.5E-05 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.5E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.1E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.7 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.6E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 3.3E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 4.0E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.0E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 3.6E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 6.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 2.4E-01 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.4E-01 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.4E-04 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 4.7E-01 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.6E-05 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 3.2E-02 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 3.6E-01 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 1.2E+00 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 7.3E-03 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.0E-01 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 4.4E-04 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 4.4E-01 |
| | (total) | | | | | | | | | | | | **2.5E+00** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.2E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.4E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.3E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.5E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.2E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.9E-02 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 4.5E-08 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 1.8E-03 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **4.1E-02** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.5E+00** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.8 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.7E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 3.5E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 4.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 3.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 6.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 2.6E-02 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.6E-02 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.5E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 5.0E-02 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.7E-06 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 3.5E-03 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 3.8E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 1.3E-01 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 7.8E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.1E-02 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 4.7E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 4.7E-02 |
| | (total) | | | | | | | | | | | | **2.7E-01** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 9.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 5.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.0E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 3.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.8E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.0E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 6.9E-09 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 2.8E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **6.3E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.7E-01** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 4.2**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 24 | Professional Judgement | 12 | Professional Judgement | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | U.S. EPA, July 2004 | 3,300 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.02 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 24 | Professional Judgement | 12 | Professional Judgement | |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

**TABLE 4.3**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 250 | U.S. EPA, May 1993 | 219 | U.S. EPA, May 1993 | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | U.S. EPA, July 2004 | 3,300 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.02 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 250 | U.S. EPA, May 1993 | 219 | U.S. EPA, May 1993 | |
| | ED | Exposure Duration | years | 25 | U.S. EPA, December 1989 | 9 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-07
Noncancer Ingestion Intake - RME = 9.78E-07

Cancer Ingestion Intake - CTE = 5.51E-08
Noncancer Ingestion Intake - CTE = 4.29E-07

Cancer Dermal Intake - RME = 2.31E-06
Noncancer Dermal Intake - RME = 6.46E-06

Cancer Dermal Intake - CTE = 7.27E-08
Noncancer Dermal Intake - CTE = 5.66E-07

**TABLE 4.4**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 26 | Professional Judgement | 13 | Professional Judgement | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 4,015 | U.S. EPA, December 1989 | 4,015 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,280 | U.S. EPA, August 1997 | 3,100 | U.S. EPA, August 1997 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 26 | Professional Judgement | 13 | Professional Judgement | |
| | ED | Exposure Duration | years | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | |
| | BW | Body Weight | kg | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 4,015 | U.S. EPA, December 1989 | 4,015 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 6.51E-09
Noncancer Ingestion Intake - CTE = 4.14E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

**TABLE 4.5**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 200 | U.S. EPA, May 1993 | 100 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 0.5 | Professional Judgment | 0.5 | Professional Judgment | BW x AT |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | 1/2 total body area (EPA 2004) | 3,300 | 1/2 total body area (EPA 2004) | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | |
| | ED | Exposure Duration | years | 6 | U.S. EPA, December 1989 | 2 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

**TABLE 4.6**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 0.5 | Professional Judgment | 0.5 | Professional Judgment | BW x AT |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 9,070 | U.S. EPA, August 1997 | 9,070 | U.S. EPA, August 1997 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.07 | U.S. EPA, July 2004 | 0.01 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | |
| | ED | Exposure Duration | years | 24 | U.S. EPA, December 1989 | 7 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

**TABLE 4.7**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 200 | U.S. EPA, May 1993 | 100 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 350 | U.S. EPA, May 1993 | 234 | U.S. EPA, May 1993 | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 2,800 | U.S. EPA, July 2004 | 2,800 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 350 | U.S. EPA, May 1993 | 234 | U.S. EPA, May 1993 | |
| | ED | Exposure Duration | years | 6 | U.S. EPA, December 1989 | 2 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 1.10E-06
Noncancer Ingestion Intake - RME = 1.28E-05

Cancer Ingestion Intake - CTE = 1.22E-07
Noncancer Ingestion Intake - CTE = 4.27E-06

Cancer Dermal Intake - RME = 3.07E-06
Noncancer Dermal Intake - RME = 3.58E-05

Cancer Dermal Intake - CTE = 1.37E-07
Noncancer Dermal Intake - CTE = 4.79E-06

**TABLE 4.8**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 350 | U.S. EPA, May 1993 | 234 | U.S. EPA, May 1993 | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 5,700 | U.S. EPA, July 2004 | 5,700 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.07 | U.S. EPA, July 2004 | 0.01 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 350 | U.S. EPA, May 1993 | 234 | U.S. EPA, May 1993 | |
| | ED | Exposure Duration | years | 24 | U.S. EPA, December 1989 | 7 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 4.70E-07
Noncancer Ingestion Intake - RME = 1.37E-06

Cancer Ingestion Intake - CTE = 4.58E-08
Noncancer Ingestion Intake - CTE = 4.58E-07

Cancer Dermal Intake - RME = 1.87E-06
Noncancer Dermal Intake - RME = 5.47E-06

Cancer Dermal Intake - CTE = 5.22E-08
Noncancer Dermal Intake - CTE = 5.22E-07

**TABLE 8.2a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.8E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-09 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 7.7E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.6E-08 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 9.4E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-09 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.5E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 8.5E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-09 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.5E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-09 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 5.7E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 3.3E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.0E-08 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.8E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 8.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 1.7E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.0E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.4E-07** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 6.5E-10 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.8E-10 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.3E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.7E-09 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.6E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-09 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 4.2E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-09 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.5E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-09 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.8E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.6E-10 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.3E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-09 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.0E-12 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.8E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.6E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.3a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 6.9E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.1E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.4E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.7E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 4.5E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.3E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.8E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.5E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 1.0E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 6.1E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.1E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 6.9E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.5E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 3.1E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.9E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **2.6E-06** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.7E-09 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.9E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 7.7E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.6E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.7E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 5.1E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.4E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.6E-08 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 9.2E-11 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **3.3E-07** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **2.9E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
PCBS - 0.14
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Occupational Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.4a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 8.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.0E-09 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.0E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 5.3E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.8E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 3.3E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.5E-09 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 1.2E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 7.2E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 8.2E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.8E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 3.7E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 2.2E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **3.1E-07** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.6E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.9E-09 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 5.4E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-08 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 6.5E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.7E-09 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.7E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 5.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-09 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.1E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-09 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 5.3E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.0E-09 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.0E-11 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **7.3E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **3.8E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.5a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 8.5E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 5.5E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.0E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.9E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 3.4E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-09 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 1.3E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 7.5E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 8.5E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.9E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 3.9E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 2.3E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **3.8E-07** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-09 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 6.0E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-08 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 7.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-09 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.9E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 6.6E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.8E-09 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.3E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-09 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 5.9E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.9E-09 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.3E-11 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **8.1E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **4.6E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.6a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-09 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 6.5E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.8E-08 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 7.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.8E-09 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.1E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 7.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-09 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.3E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-09 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 4.8E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.8E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.2E-08 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.2E-09 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 7.1E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 1.5E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 8.8E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.2E-07** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.5E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-09 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 3.1E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-08 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 3.7E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-09 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 9.8E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.1E-09 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 3.4E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-09 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 6.5E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-09 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 3.0E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.6E-09 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-11 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **4.2E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.6E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.7a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 3.1E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-06 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 3.8E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 9.9E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.3E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 3.5E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-07 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 6.1E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-07 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 2.3E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.3E-06 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-06 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 3.4E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 7.0E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 4.2E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **5.8E-06** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 2.2E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 4.6E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.3E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 5.5E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.0E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 5.0E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.7E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 9.6E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.9E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 4.5E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.8E-08 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.7E-10 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **6.2E-07** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **6.4E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.8a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.8E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.2E-08 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.6E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.4E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-07 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-07 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.3E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.5E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.3E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.6E-08 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 8.6E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 5.0E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.6E-07 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.8E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.3E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 2.6E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.6E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **2.2E-06** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 8.6E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-09 |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-07 |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-08 |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 5.5E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.0E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.9E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-08 |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 3.7E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.3E-09 |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.7E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-08 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 6.6E-11 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **2.4E-07** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **2.4E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.2a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 6.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 7.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 6.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 4.4E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 4.4E-04 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.6E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 8.6E-04 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.0E-08 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 5.9E-05 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 6.6E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.2E-03 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 1.3E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.9E-04 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 8.1E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 8.1E-04 |
| | (total) | | | | | | | | | | | | **4.5E-03** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.1E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.3E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.2E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.0E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.4E-05 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.9E-11 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 1.6E-06 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **3.6E-05** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **4.6E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.3a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.3E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 8.1E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 8.1E-03 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 4.7E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.6E-02 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.4E-07 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 1.1E-03 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.2E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 4.0E-02 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 2.4E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 3.5E-03 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.5E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 1.5E-02 |
| | (total) | | | | | | | | | | | | **8.3E-02** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 9.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 6.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.9E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.2E-04 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 7.1E-10 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 2.9E-05 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **6.5E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **8.4E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

PCBS - 0.14 Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Occupational Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.4a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 7.8E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 7.8E-04 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 4.6E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.5E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.2E-08 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 1.0E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.2E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 3.9E-03 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 2.4E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 3.4E-04 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.4E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 1.4E-03 |
| | (total) | | | | | | | | | | | | **8.0E-03** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 3.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 4.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 3.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 7.2E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 3.4E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.1E-04 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.3E-10 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 5.2E-06 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.2E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **8.1E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

PCBS - 0.14 Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.5a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 6.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 7.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 6.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 4.5E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 4.5E-03 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.6E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 8.7E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.0E-07 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 6.0E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 6.6E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.2E-02 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 1.4E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.9E-03 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 8.2E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 8.2E-03 |
| | (total) | | | | | | | | | | | | **4.6E-02** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 6.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 2.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 4.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.1E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.9E-04 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 7.9E-10 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 3.2E-05 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **7.2E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **4.7E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

PCBS - 0.14 Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.6a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 6.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 7.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 2.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 7.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 1.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 4.8E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 4.8E-04 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 2.8E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 9.3E-04 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 3.2E-08 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 6.4E-05 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 7.1E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.4E-03 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 1.5E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 2.1E-04 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 8.8E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 8.8E-04 |
| | (total) | | | | | | | | | | | | **4.9E-03** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 3.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 3.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 9.8E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 3.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 6.5E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 3.0E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.0E-04 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 1.2E-10 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 4.7E-06 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.1E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.0E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

PCBS - 0.14 Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.7a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.1E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.3E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.5E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.2E-05 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 8.0E-02 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 8.0E-02 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 4.7E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.6E-01 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.4E-06 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 1.1E-02 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.2E-01 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 4.0E-01 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 2.4E-03 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 3.5E-02 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.5E-04 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 1.5E-01 |
| | (total) | | | | | | | | | | | | **8.3E-01** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 7.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.6E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 5.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 3.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.6E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 5.3E-03 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 6.0E-09 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 2.4E-04 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **5.5E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **8.3E-01** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

PCBS - 0.14 Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.8a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 1.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 3.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.3E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 2.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | 8.6E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 8.6E-03 |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 5.0E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.7E-02 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 5.8E-07 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 1.2E-03 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | 1.3E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 4.3E-02 |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | 2.6E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 3.7E-03 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 1.6E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 1.6E-02 |
| | (total) | | | | | | | | | | | | **8.9E-02** |
| Dermal | Benzo(a)anthracene | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 8.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.56E+00 | mg/kg | 2.56E+00 | mg/kg | M | 1.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 3.10E+00 | mg/kg | 3.10E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 8.14E-01 | mg/kg | 8.14E-01 | mg/kg | M | 5.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.83E+00 | mg/kg | 2.83E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 5.00E-01 | mg/kg | 5.00E-01 | mg/kg | M | 3.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.88E+04 | mg/kg | 1.88E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.10E+01 | mg/kg | 1.10E+01 | mg/kg | M | 1.7E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 5.7E-04 |
| | Cadmium | 1.26E+00 | mg/kg | 1.26E+00 | mg/kg | M | 6.6E-10 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 2.6E-05 |
| | Iron | 2.79E+04 | mg/kg | 2.79E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 5.70E+02 | mg/kg | 5.70E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **6.0E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **8.9E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

PCBS - 0.14 Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 4.2a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 24 | Professional Judgement | 12 | Professional Judgement | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | U.S. EPA, July 2004 | 3,300 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.02 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 24 | Professional Judgement | 12 | Professional Judgement | |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

**TABLE 4.3a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 250 | U.S. EPA, May 1993 | 219 | U.S. EPA, May 1993 | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | U.S. EPA, July 2004 | 3,300 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.02 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 250 | U.S. EPA, May 1993 | 219 | U.S. EPA, May 1993 | |
| | ED | Exposure Duration | years | 25 | U.S. EPA, December 1989 | 9 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-07
Noncancer Ingestion Intake - RME = 9.78E-07

Cancer Ingestion Intake - CTE = 5.51E-08
Noncancer Ingestion Intake - CTE = 4.29E-07

Cancer Dermal Intake - RME = 2.31E-06
Noncancer Dermal Intake - RME = 6.46E-06

Cancer Dermal Intake - CTE = 7.27E-08
Noncancer Dermal Intake - CTE = 5.66E-07

**TABLE 4.4a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 26 | Professional Judgement | 13 | Professional Judgement | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 4,015 | U.S. EPA, December 1989 | 4,015 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,280 | U.S. EPA, August 1997 | 3,100 | U.S. EPA, August 1997 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 26 | Professional Judgement | 13 | Professional Judgement | |
| | ED | Exposure Duration | years | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | |
| | BW | Body Weight | kg | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 4,015 | U.S. EPA, December 1989 | 4,015 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 6.51E-09
Noncancer Ingestion Intake - CTE = 4.14E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

**TABLE 4.5a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 200 | U.S. EPA, May 1993 | 100 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 0.5 | Professional Judgment | 0.5 | Professional Judgment | BW x AT |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | 1/2 total body area (EPA 2004) | 3,300 | 1/2 total body area (EPA 2004) | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | |
| | ED | Exposure Duration | years | 6 | U.S. EPA, December 1989 | 2 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

**TABLE 4.6a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 0.5 | Professional Judgment | 0.5 | Professional Judgment | BW x AT |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 9,070 | U.S. EPA, August 1997 | 9,070 | U.S. EPA, August 1997 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.07 | U.S. EPA, July 2004 | 0.01 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | |
| | ED | Exposure Duration | years | 24 | U.S. EPA, December 1989 | 7 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

**TABLE 4.7a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 200 | U.S. EPA, May 1993 | 100 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 350 | U.S. EPA, May 1993 | 234 | U.S. EPA, May 1993 | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 2,800 | U.S. EPA, July 2004 | 2,800 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 350 | U.S. EPA, May 1993 | 234 | U.S. EPA, May 1993 | |
| | ED | Exposure Duration | years | 6 | U.S. EPA, December 1989 | 2 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 1.10E-06
Noncancer Ingestion Intake - RME = 1.28E-05

Cancer Ingestion Intake - CTE = 1.22E-07
Noncancer Ingestion Intake - CTE = 4.27E-06

Cancer Dermal Intake - RME = 3.07E-06
Noncancer Dermal Intake - RME = 3.58E-05

Cancer Dermal Intake - CTE = 1.37E-07
Noncancer Dermal Intake - CTE = 4.79E-06

**TABLE 4.8a**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 350 | U.S. EPA, May 1993 | 234 | U.S. EPA, May 1993 | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 5,700 | U.S. EPA, July 2004 | 5,700 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.07 | U.S. EPA, July 2004 | 0.01 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 350 | U.S. EPA, May 1993 | 234 | U.S. EPA, May 1993 | |
| | ED | Exposure Duration | years | 24 | U.S. EPA, December 1989 | 7 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 4.70E-07
Noncancer Ingestion Intake - RME = 1.37E-06

Cancer Ingestion Intake - CTE = 4.58E-08
Noncancer Ingestion Intake - CTE = 4.58E-07

Cancer Dermal Intake - RME = 1.87E-06
Noncancer Dermal Intake - RME = 5.47E-06

Cancer Dermal Intake - CTE = 5.22E-08
Noncancer Dermal Intake - CTE = 5.22E-07

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**CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 6.2E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.5E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 6.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 7.8E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.7E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.3E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.6E-08 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 5.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.7E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 5.3E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.1E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 3.8E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 4.0E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 1.0E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 4.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 1.1E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.4E-06** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 5.3E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.8E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.2E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 6.7E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.1E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.2E-08 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 4.4E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.2E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.9E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.8E-09 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.0E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 7.8E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **7.7E-07** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **2.1E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.16 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.8E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.5E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.2E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.8E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 6.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.0E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.4E-08 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 4.0E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.9E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.1E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.2E-09 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 8.6E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.9E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.1E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.6E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 8.0E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 8.6E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.0E-06** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.2E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.2E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.8E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 8.7E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.3E-08 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.4E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.5E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.8E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.6E-09 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.9E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 6.0E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.1E-08 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **5.9E-07** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.6E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.17 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-07 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-06 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-07 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.2E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-07 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.0E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.3E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.7E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.4E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 9.2E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 9.6E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-06 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 2.5E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 1.1E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 2.7E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **3.3E-06** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.3E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.4E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.4E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-06 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-07 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.7E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-07 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.1E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.8E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.2E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.4E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.5E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.9E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.9E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.9E-06** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **5.1E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.18 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 6.5E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.7E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 7.0E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.1E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 8.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.9E-08 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 5.3E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 5.5E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.1E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 3.9E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 4.1E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 1.1E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 4.6E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 1.1E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.4E-06** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.1E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.8E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.4E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.3E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.8E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.2E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-07 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 8.8E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.4E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 9.8E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.0E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.1E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.6E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.4E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.5E-06** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **2.9E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.19 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-06 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-06 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-07 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.2E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-07 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.0E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.3E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.7E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.4E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 9.2E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 9.6E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-06 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 2.5E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 1.1E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 2.7E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **4.3E-06** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.1E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.0E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.7E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.4E-07 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-07 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.3E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-07 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 9.0E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.6E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.0E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.1E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.2E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.6E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.4E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.6E-06** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **5.9E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.20 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 6.5E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.7E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 7.0E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.1E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 8.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.9E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.9E-08 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 5.3E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 5.5E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.1E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 3.9E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 4.1E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 1.1E-03 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 4.6E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 1.1E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.4E-06** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 6.7E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 7.2E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-07 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 8.4E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-07 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 5.5E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.0E-08 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 6.2E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-08 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.3E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-08 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 9.9E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **9.7E-07** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **2.4E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.15 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.5E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 7.4E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 3.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 1.1E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.1E-03 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.1E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.7E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 2.9E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 9.6E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 1.2E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.8E-03 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 3.1E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.1E-03 |
| | (total) | | | | | | | | | | | | **2.0E-02** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.4E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 6.9E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.2E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 7.3E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.4E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.1E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.16 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 3.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 3.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 3.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 6.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 2.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 2.6E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.3E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 5.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 1.9E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.9E-03 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.0E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.5E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 5.1E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 1.7E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 2.2E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 3.1E-03 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 5.5E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 5.5E-03 |
| | (total) | | | | | | | | | | | | **3.5E-02** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 2.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.8E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 3.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 5.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 2.4E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.2E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 5.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.8E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.3E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **2.5E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **3.8E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.17 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.5E-07 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 7.5E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 3.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 1.1E-02 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.1E-02 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.1E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.7E-02 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 2.9E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 9.7E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 1.2E-03 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.8E-02 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 3.1E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.1E-02 |
| | (total) | | | | | | | | | | | | **2.0E-01** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.5E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.6E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.4E-07 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 6.9E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.2E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 7.4E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.4E-02** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.2E-01** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

PCBS - 0.14 Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.18 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 4.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.6E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 8.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 3.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 1.1E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.1E-03 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.2E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 4.0E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 3.1E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 1.0E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 1.3E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.9E-03 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 3.3E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.3E-03 |
| | (total) | | | | | | | | | | | | **2.2E-02** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 3.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 3.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 3.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 6.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 2.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 2.9E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.4E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 6.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 4.6E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.5E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **3.0E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.5E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.19 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.5E-07 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 7.5E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 3.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 1.1E-02 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.1E-02 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.1E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.7E-02 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 2.9E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 9.7E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 1.2E-03 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.8E-02 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 3.1E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.1E-02 |
| | (total) | | | | | | | | | | | | **2.0E-01** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.3E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.6E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.2E-07 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 5.9E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.9E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.3E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.2E-02** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.1E-01** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.20 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 4.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.6E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 8.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 3.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 1.1E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.1E-03 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.2E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 4.0E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 3.1E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 1.0E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 1.3E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.9E-03 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 3.3E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.3E-03 |
| | (total) | | | | | | | | | | | | **2.2E-02** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 2.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 4.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.8E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 9.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 3.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.9E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 9.6E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.9E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **2.4E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 4.15**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Sediment | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csed x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 24 | Professional Judgment | 12 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 25 | U.S. EPA, May 1993 | 9 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |
| Dermal | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csed x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | U.S. EPA, July 2004 | 3,300 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.02 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 24 | Professional Judgment | 12 | Professional Judgment | |
| | ED | Exposure Duration | years | 25 | U.S. EPA, December 1989 | 9 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 9,125 | U.S. EPA, December 1989 | 3,285 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

**TABLE 4.16**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Sediment | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csed x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 0.5 | Professional Judgement | BW x AT |
| | EF | Exposure Frequency | days/year | 26 | Professional Judgement | 13 | Professional Judgement | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 11 | 6 - 17 years of age | 11 | 6 - 17 years of age | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 4,015 | U.S. EPA, December 1989 | 4,015 | U.S. EPA, December 1989 | |
| Dermal | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csed x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,280 | U.S. EPA, August 1997 | 3,100 | U.S. EPA, August 1997 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 26 | Professional Judgment | 13 | Professional Judgment | |
| | ED | Exposure Duration | years | 11 | U.S. EPA, December 1989 | 11 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 43 | U.S. EPA, August 1997 | 43 | U.S. EPA, August 1997 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 4,015 | U.S. EPA, December 1989 | 4,015 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 3.25E-09
Noncancer Ingestion Intake - CTE = 2.07E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

**TABLE 4.17**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Sediment | mg/day | 200 | U.S. EPA, May 1993 | 100 | U.S. EPA, May 1993 | Csed x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 0.5 | Professional Judgment | 0.5 | Professional Judgment | BW x AT |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| Dermal | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csed x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | 1/2 total body area (EPA 2004) | 3,300 | 1/2 total body area (EPA 2004) | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | |
| | ED | Exposure Duration | years | 6 | U.S. EPA, December 1989 | 2 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

**TABLE 4.18**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Sediment | mg/day | 100 | U.S. EPA, May 1993 | 50 | U.S. EPA, May 1993 | Csed x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 0.5 | Professional Judgment | 0.5 | Professional Judgment | BW x AT |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| Dermal | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csed x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 9,070 | U.S. EPA, August 1997 | 9,070 | U.S. EPA, August 1997 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.07 | U.S. EPA, July 2004 | 0.01 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | |
| | ED | Exposure Duration | years | 24 | U.S. EPA, December 1989 | 7 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

**TABLE 4.19**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Sediment | mg/day | 100 | Professional Judgment | 50 | Professional Judgment | Csed x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 6 | U.S. EPA, May 1993 | 2 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |
| Dermal | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csed x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 2,800 | U.S. EPA, July 2004 | 2,800 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.2 | U.S. EPA, July 2004 | 0.04 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | |
| | ED | Exposure Duration | years | 6 | U.S. EPA, December 1989 | 2 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 15 | U.S. EPA, May 1993 | 15 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 2,190 | U.S. EPA, December 1989 | 730 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 4.56E-07
Noncancer Dermal Intake - RME = 5.32E-06

Cancer Dermal Intake - CTE = 1.52E-08
Noncancer Dermal Intake - CTE = 5.32E-07

**TABLE 4.20**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Sediment | mg/day | 50 | Professional Judgment | 25 | Professional Judgment | Csed x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 24 | U.S. EPA, May 1993 | 7 | U.S. EPA, May 1993 | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |
| Dermal | Csed | Chemical Concentration in Sediment | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csed x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 5,700 | U.S. EPA, July 2004 | 5,700 | U.S. EPA, July 2004 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.07 | U.S. EPA, July 2004 | 0.01 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 52 | Professional Judgment | 26 | Professional Judgment | |
| | ED | Exposure Duration | years | 24 | U.S. EPA, December 1989 | 7 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 8,760 | U.S. EPA, December 1989 | 2,555 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 2.78E-07
Noncancer Dermal Intake - RME = 8.12E-07

Cancer Dermal Intake - CTE = 5.80E-09
Noncancer Dermal Intake - CTE = 5.80E-08

**TABLE 8.15a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 5.6E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.1E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 6.0E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 7.0E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.1E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.2E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.6E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 4.6E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.8E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.5E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 9.9E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 3.4E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.6E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-08 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 9.3E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.9E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 9.9E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.2E-07** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 9.6E-10 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.0E-10 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.0E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.6E-09 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.8E-10 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.0E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 7.9E-10 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.7E-10 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 8.8E-11 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.8E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.7E-10 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.4E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-09 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.4E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.4E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.16a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 6.0E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 6.5E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.8E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 7.6E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.5E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.3E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.3E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 4.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.6E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 5.1E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-09 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.1E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 3.7E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.8E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.8E-08 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 1.0E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 4.2E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 1.1E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.3E-07** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 3.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.2E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 4.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.6E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 8.2E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.0E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.6E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.1E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.4E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.5E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 5.7E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.6E-09 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **5.6E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.9E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.17a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.3E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.2E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.9E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.6E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.6E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.9E-08 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.0E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.5E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.1E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-09 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.2E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.5E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 7.7E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 8.0E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 2.1E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 8.9E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 2.2E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **2.7E-07** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.3E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.7E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.4E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.0E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.1E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.6E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.5E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.0E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.9E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 8.2E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 6.3E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.5E-09 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **6.2E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **3.4E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.18a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.7E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.1E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.7E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.9E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.2E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.0E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.0E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 8.4E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.9E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.0E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.5E-08 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.8E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.3E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 8.4E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.0E-07** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 2.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.4E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.8E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 4.7E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.8E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 2.0E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.1E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 4.3E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.5E-10 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.3E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-09 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **3.2E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.3E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.19a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.3E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 9.2E-08 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.4E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.9E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.6E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-08 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.6E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.9E-08 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.0E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 7.5E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.1E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-09 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.2E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.5E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 7.7E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 8.0E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-07 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 2.1E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 8.9E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 2.2E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **3.6E-07** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 3.7E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.7E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.0E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.9E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 4.6E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 7.7E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.6E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.0E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.4E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 6.7E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.0E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 5.4E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.1E-09 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **5.3E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **4.1E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.20a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.7E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 3.4E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.1E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.7E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.3E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.9E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.2E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.8E-09 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.0E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 8.0E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 8.4E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-09 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.9E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.0E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.5E-08 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.8E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.3E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 8.4E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **1.0E-07** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.4E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-09 |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.5E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.1E-08 |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.8E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-09 |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.9E-10 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.1E-09 |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.1E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 8.4E-10 |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.3E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.6E-10 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.7E-10 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-10 |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.1E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.1E-09 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | | | | | | | | | | | **2.0E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.2E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.15a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.2E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.7E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.9E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.7E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.7E-04 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.8E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 9.2E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.2E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.4E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.1E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 4.4E-04 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 7.7E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 7.7E-04 |
| | (total) | | | | | | | | | | | | **5.0E-03** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 7.5E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 8.1E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 9.4E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.6E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 6.1E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 6.9E-10 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 3.4E-05 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.4E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.1E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.7E-05 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **7.1E-05** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.1E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.16a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 3.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 4.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 8.1E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.3E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.6E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 6.8E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.3E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.3E-04 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.4E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 8.1E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 6.4E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.1E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 2.7E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 3.9E-04 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 6.8E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 6.8E-04 |
| | (total) | | | | | | | | | | | | **4.4E-03** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 2.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 3.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 5.2E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 2.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 2.3E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.1E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 4.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.6E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.2E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **2.3E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **4.6E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.17a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.8E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.9E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.7E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.7E-03 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.8E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 9.3E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.3E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.4E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.1E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 4.4E-03 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 7.8E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 7.8E-03 |
| | (total) | | | | | | | | | | | | **5.1E-02** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.4E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 6.9E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.2E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 7.4E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.4E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.2E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.18a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.9E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.0E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 2.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 8.4E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.9E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.9E-04 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.0E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.0E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.8E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.6E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.3E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 4.7E-04 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 8.4E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 8.4E-04 |
| | (total) | | | | | | | | | | | | **5.4E-03** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 2.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 4.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 2.0E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 4.3E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.3E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.1E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **2.1E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.6E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.19a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | mg/kg-day | | | |
| | | | | | | | | | | mg/kg-day | | | |
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.8E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.9E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.7E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.7E-03 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.8E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 9.3E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.3E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.4E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.1E-04 | mg/kg-day | 7.0E-02 | | NA | NA | 4.4E-03 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 7.8E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 7.8E-03 |
| | (total) | | | | | | | | | mg/kg-day | | | **5.1E-02** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.2E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 5.9E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.9E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.3E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | | NA | NA | |
| | (total) | | | | | | | | | | | | **1.2E-03** |
| | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | | | **5.2E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

Other Metals - not evaluated for dermal contact with soil or sediment

**TABLE 7.20a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | mg/kg-day | | | |
| | | | | | | | | | | mg/kg-day | | | |
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.9E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.0E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 2.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 8.4E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.9E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.9E-04 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.0E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.0E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.8E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.6E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.3E-05 | mg/kg-day | 7.0E-02 | | NA | NA | 4.7E-04 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 8.4E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 8.4E-04 |
| | (total) | | | | | | | | | mg/kg-day | | | **5.4E-03** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.9E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.3E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 6.4E-05 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.1E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.8E-05 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | | NA | NA | |
| | (total) | | | | | | | | | | | | **1.3E-04** |
| | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | | | **5.5E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.15a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Maintenance Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.2E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.6E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.7E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.9E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.7E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.7E-04 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.8E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 9.2E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.2E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.4E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.1E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 4.4E-04 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 7.7E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 7.7E-04 |
| | (total) | | | | | | | | | | | | **5.0E-03** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 7.5E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 8.1E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 9.4E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 1.6E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 6.1E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 6.9E-10 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 3.4E-05 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 1.4E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.1E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.7E-05 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **7.1E-05** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.1E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Maintenance Worker**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.16a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 3.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 4.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 8.1E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.3E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.6E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 6.8E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.3E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.3E-04 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.4E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 8.1E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 6.4E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.1E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 2.7E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 3.9E-04 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 6.8E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 6.8E-04 |
| | (total) | | | | | | | | | | | | **4.4E-03** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 2.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 3.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 5.2E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 2.0E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 2.3E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.1E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 4.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.6E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.2E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **2.3E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **4.6E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Trespasser**
**Receptor Age: Adolescent (age 6 - 17)**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.17a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.8E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.9E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.7E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.7E-03 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.8E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 9.3E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.3E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.4E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.1E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 4.4E-03 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 7.8E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 7.8E-03 |
| | (total) | | | | | | | | | | | | **5.1E-02** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 3.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.4E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 6.9E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.2E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 7.4E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.4E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.2E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.18a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.9E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.0E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 2.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 8.4E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.9E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.9E-04 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.0E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.0E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.8E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.6E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.3E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 4.7E-04 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 8.4E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 8.4E-04 |
| | (total) | | | | | | | | | | | | **5.4E-03** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 2.2E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 2.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 4.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 2.0E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 4.3E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.3E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.1E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **2.1E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.6E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Recreational User**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.19a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Child

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 4.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.3E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 3.8E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 1.9E-03 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 7.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.7E-03 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.7E-03 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.8E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 9.3E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.3E-03 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.4E-02 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.1E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 4.4E-03 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 7.8E-06 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 7.8E-03 |
| | (total) | | | | | | | | | | | | **5.1E-02** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.3E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.2E-08 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 5.9E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 1.9E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.3E-04 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.2E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.2E-02** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Child**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.20a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Residents
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 4.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 5.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 9.9E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 3.9E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 4.0E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 2.0E-04 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 8.4E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | 2.9E-04 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 2.9E-04 |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 3.0E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 1.0E-03 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | 7.8E-04 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 2.6E-03 |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | 3.3E-05 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 4.7E-04 |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | 8.4E-07 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 8.4E-04 |
| | (total) | | | | | | | | | | | | **5.4E-03** |
| Dermal | Benzo(a)anthracene | 1.85E+00 | mg/kg | 1.85E+00 | mg/kg | M | 1.4E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.5E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.33E+00 | mg/kg | 2.33E+00 | mg/kg | M | 1.8E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.90E-01 | mg/kg | 3.90E-01 | mg/kg | M | 2.9E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 1.52E+00 | mg/kg | 1.52E+00 | mg/kg | M | 1.1E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1254 | 1.58E-01 | mg/kg | 1.58E-01 | mg/kg | M | 1.3E-09 | mg/kg-day | 2.0E-05 | mg/kg-day | NA | NA | 6.4E-05 |
| | Aroclor-1260 | 3.29E-01 | mg/kg | 3.29E-01 | mg/kg | M | 2.7E-09 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.13E+04 | mg/kg | 1.13E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.18E+01 | mg/kg | 1.18E+01 | mg/kg | M | 2.1E-08 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.8E-05 |
| | Iron | 3.08E+04 | mg/kg | 3.08E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 1.31E+03 | mg/kg | 1.31E+03 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.29E+01 | mg/kg | 3.29E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **1.3E-04** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **5.5E-03** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

**Receptor Population: Residents**
**Receptor Age: Adult**

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 8.1 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface / Subsurface Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 6.17E-01 | mg/kg | 6.17E-01 | mg/kg | M | 1.7E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-08 |
| | Benzo(a)pyrene | 1.81E+00 | mg/kg | 1.81E+00 | mg/kg | M | 5.0E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.7E-07 |
| | Benzo(b)fluoranthene | 2.19E+00 | mg/kg | 2.19E+00 | mg/kg | M | 6.1E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-08 |
| | Dibenzo(a,h)anthracene | 3.87E-01 | mg/kg | 3.87E-01 | mg/kg | M | 1.1E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 7.8E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.5E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.0E-08 |
| | Aroclor-1260 | 4.23E-01 | mg/kg | 4.23E-01 | mg/kg | M | 1.2E-08 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.3E-08 |
| | Aluminum | 1.93E+04 | mg/kg | 1.93E+04 | mg/kg | M | 5.4E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.06E+01 | mg/kg | 1.06E+01 | mg/kg | M | 2.9E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.4E-07 |
| | Cadmium | 1.08E+00 | mg/kg | 1.08E+00 | mg/kg | M | 3.0E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.74E+04 | mg/kg | 2.74E+04 | mg/kg | M | 7.6E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 6.35E+02 | mg/kg | 6.35E+02 | mg/kg | M | 1.8E-05 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 9.5E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **1.0E-06** |
| Dermal | Benzo(a)anthracene | 6.17E-01 | mg/kg | 6.17E-01 | mg/kg | M | 6.7E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 4.9E-09 |
| | Benzo(a)pyrene | 1.81E+00 | mg/kg | 1.81E+00 | mg/kg | M | 2.0E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.4E-07 |
| | Benzo(b)fluoranthene | 2.19E+00 | mg/kg | 2.19E+00 | mg/kg | M | 2.4E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.7E-08 |
| | Dibenzo(a,h)anthracene | 3.87E-01 | mg/kg | 3.87E-01 | mg/kg | M | 4.2E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.0E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.2E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-08 |
| | Aroclor-1260 | 4.23E-01 | mg/kg | 4.23E-01 | mg/kg | M | 4.9E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 9.8E-09 |
| | Aluminum | 1.93E+04 | mg/kg | 1.93E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.06E+01 | mg/kg | 1.06E+01 | mg/kg | M | 2.6E-08 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.0E-08 |
| | Cadmium | 1.08E+00 | mg/kg | 1.08E+00 | mg/kg | M | 9.0E-11 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.74E+04 | mg/kg | 2.74E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 6.35E+02 | mg/kg | 6.35E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **2.6E-07** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **1.3E-06** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.1 - REASONABLE MAXIMUM EXPOSURE (RME)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface / Subsurface Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 6.17E-01 | mg/kg | 6.17E-01 | mg/kg | M | 1.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 1.81E+00 | mg/kg | 1.81E+00 | mg/kg | M | 3.5E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.19E+00 | mg/kg | 2.19E+00 | mg/kg | M | 4.2E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.87E-01 | mg/kg | 3.87E-01 | mg/kg | M | 7.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 3.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 4.23E-01 | mg/kg | 4.23E-01 | mg/kg | M | 8.2E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.93E+04 | mg/kg | 1.93E+04 | mg/kg | M | 3.7E-02 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 3.7E-02 |
| | Arsenic | 1.06E+01 | mg/kg | 1.06E+01 | mg/kg | M | 2.1E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.8E-02 |
| | Cadmium | 1.08E+00 | mg/kg | 1.08E+00 | mg/kg | M | 2.1E-06 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 4.2E-03 |
| | Iron | 2.74E+04 | mg/kg | 2.74E+04 | mg/kg | M | 5.3E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 1.8E-01 |
| | Manganese | 6.35E+02 | mg/kg | 6.35E+02 | mg/kg | M | 1.2E-03 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 1.8E-02 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 6.7E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 6.7E-02 |
| | (total) | | | | | | | | | | | | **3.7E-01** |
| Dermal | Benzo(a)anthracene | 6.17E-01 | mg/kg | 6.17E-01 | mg/kg | M | 4.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 1.81E+00 | mg/kg | 1.81E+00 | mg/kg | M | 1.4E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.19E+00 | mg/kg | 2.19E+00 | mg/kg | M | 1.7E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.87E-01 | mg/kg | 3.87E-01 | mg/kg | M | 2.9E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.5E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 4.23E-01 | mg/kg | 4.23E-01 | mg/kg | M | 3.4E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.93E+04 | mg/kg | 1.93E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.06E+01 | mg/kg | 1.06E+01 | mg/kg | M | 1.8E-06 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 6.2E-03 |
| | Cadmium | 1.08E+00 | mg/kg | 1.08E+00 | mg/kg | M | 6.3E-09 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 2.5E-04 |
| | Iron | 2.74E+04 | mg/kg | 2.74E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 6.35E+02 | mg/kg | 6.35E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **6.4E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **3.8E-01** |

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 4.1**
**VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CONSTRUCTION WORKERS TO SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface / Subsurface Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

| Exposure Route | Parameter Code | Parameter Definition | Units | RME Value | RME Rationale/ Reference | CTE Value | CTE Rationale/ Reference | Intake Equation/ Model Name |
|---|---|---|---|---|---|---|---|---|
| Ingestion | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Ingestion CDI[1] (mg/kg/day) = |
| | IR | Ingestion Rate of Soil | mg/day | 330 | U.S. EPA, December 2002 | 165 | Professional Judgement | Csoil x IR x Fi x EF x ED x CF |
| | Fi | Fraction Ingested | unitless | 1.0 | U.S. EPA, May 1993 | 1.0 | U.S. EPA, May 1993 | BW x AT |
| | EF | Exposure Frequency | days/year | 150 | Professional Judgement | 150 | Professional Judgement | U.S. EPA, December 1989 |
| | ED | Exposure Duration | years | 1 | Professional Judgement | 1 | Professional Judgement | |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 365 | U.S. EPA, December 1989 | 365 | U.S. EPA, December 1989 | |
| Dermal | Csoil | Chemical Concentration in Soil | mg/kg | 95% UCL or Max | U.S. EPA, December 2002 | 95% UCL or Max | U.S. EPA, December 2002 | Dermal CDI[1] (mg/kg/day) = |
| | CF | Conversion Factor | kg/mg | 1.0E-06 | U.S. EPA, December 1989 | 1.0E-06 | U.S. EPA, December 1989 | Csoil x CF x SA x AF x ABS x EF x ED |
| | SA | Skin Surface Area | $cm^2$/day | 3,300 | U.S. EPA, December 2002 | 3,300 | U.S. EPA, December 2002 | BW x AT |
| | AF | Soil to Skin Adherence Factor | $mg/cm^2$ | 0.3 | U.S. EPA, December 2002 | 0.1 | U.S. EPA, July 2004 | U.S. EPA, December 1989 |
| | ABS | Dermal Absorption Factor (Solid) | unitless | chemical specific | U.S. EPA, July 2004 | chemical specific | U.S. EPA, July 2004 | |
| | EF | Exposure Frequency | days/year | 150 | Professional Judgement | 150 | Professional Judgement | |
| | ED | Exposure Duration | years | 1 | Professional Judgement | 1 | Professional Judgement | |
| | BW | Body Weight | kg | 70 | U.S. EPA, May 1993 | 70 | U.S. EPA, May 1993 | |
| | AT-C | Averaging Time (Cancer) | days | 25,550 | U.S. EPA, December 1989 | 25,550 | U.S. EPA, December 1989 | |
| | AT-N | Averaging Time (Non-Cancer) | days | 365 | U.S. EPA, December 1989 | 365 | U.S. EPA, December 1989 | |

1 CDI = Chronic Daily Intake

**Daily Intake Calculations**

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.77E-08
Noncancer Ingestion Intake - RME = 1.94E-06

Cancer Ingestion Intake - CTE = 1.38E-08
Noncancer Ingestion Intake - CTE = 9.69E-07

Cancer Dermal Intake - RME = 8.30E-08
Noncancer Dermal Intake - RME = 5.81E-06

Cancer Dermal Intake - CTE = 2.77E-08
Noncancer Dermal Intake - CTE = 1.94E-06

**TABLE 8.1a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface / Subsurface Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Risk Calculation (1) | Intake (Cancer) | Intake (Cancer) Units | Cancer Slope Factor | Cancer Slope Factor Units | Cancer Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 6.17E-01 | mg/kg | 6.17E-01 | mg/kg | M | 8.5E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 6.2E-09 |
| | Benzo(a)pyrene | 1.81E+00 | mg/kg | 1.81E+00 | mg/kg | M | 2.5E-08 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.8E-07 |
| | Benzo(b)fluoranthene | 2.19E+00 | mg/kg | 2.19E+00 | mg/kg | M | 3.0E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-08 |
| | Dibenzo(a,h)anthracene | 3.87E-01 | mg/kg | 3.87E-01 | mg/kg | M | 5.4E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.9E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 2.8E-08 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 2.0E-08 |
| | Aroclor-1260 | 4.23E-01 | mg/kg | 4.23E-01 | mg/kg | M | 5.9E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.2E-08 |
| | Aluminum | 1.93E+04 | mg/kg | 1.93E+04 | mg/kg | M | 2.7E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.06E+01 | mg/kg | 1.06E+01 | mg/kg | M | 1.5E-07 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 2.2E-07 |
| | Cadmium | 1.08E+00 | mg/kg | 1.08E+00 | mg/kg | M | 1.5E-08 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.74E+04 | mg/kg | 2.74E+04 | mg/kg | M | 3.8E-04 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 6.35E+02 | mg/kg | 6.35E+02 | mg/kg | M | 8.8E-06 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 4.8E-07 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **5.0E-07** |
| Dermal | Benzo(a)anthracene | 6.17E-01 | mg/kg | 6.17E-01 | mg/kg | M | 2.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 1.6E-09 |
| | Benzo(a)pyrene | 1.81E+00 | mg/kg | 1.81E+00 | mg/kg | M | 6.5E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 4.8E-08 |
| | Benzo(b)fluoranthene | 2.19E+00 | mg/kg | 2.19E+00 | mg/kg | M | 7.9E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.8E-09 |
| | Dibenzo(a,h)anthracene | 3.87E-01 | mg/kg | 3.87E-01 | mg/kg | M | 1.4E-09 | mg/kg-day | 7.3E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.0E-08 |
| | Indeno(1,2,3-cd)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 7.2E-09 | mg/kg-day | 7.3E-01 | $(mg/kg\text{-}day)^{-1}$ | 5.3E-09 |
| | Aroclor-1260 | 4.23E-01 | mg/kg | 4.23E-01 | mg/kg | M | 1.6E-09 | mg/kg-day | 2.0E+00 | $(mg/kg\text{-}day)^{-1}$ | 3.3E-09 |
| | Aluminum | 1.93E+04 | mg/kg | 1.93E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Arsenic | 1.06E+01 | mg/kg | 1.06E+01 | mg/kg | M | 8.8E-09 | mg/kg-day | 1.5E+00 | $(mg/kg\text{-}day)^{-1}$ | 1.3E-08 |
| | Cadmium | 1.08E+00 | mg/kg | 1.08E+00 | mg/kg | M | 3.0E-11 | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Iron | 2.74E+04 | mg/kg | 2.74E+04 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Manganese | 6.35E+02 | mg/kg | 6.35E+02 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | | $(mg/kg\text{-}day)^{-1}$ | |
| | (total) | | | | | | | | | | **8.7E-08** |
| | | | | | | | | | | **Total Risk Across All Exposure Routes/Pathways** | **5.9E-07** |

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 7.1a - CENTRAL TENDENCY EXPOSURE (CTE)**
**CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, CRANE, INDIANA**

Scenario Timeframe: Future
Medium: Surface / Subsurface Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

| Exposure Route | Chemical of Potential Concern | Medium EPC Value | Medium EPC Units | Route EPC Value | Route EPC Units | EPC Selected for Hazard Calculation (1) | Intake (Non-Cancer) | Intake (Non-Cancer) Units | Reference Dose | Reference Dose Units | Reference Concentration | Reference Concentration Units | Hazard Quotient |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Benzo(a)anthracene | 6.17E-01 | mg/kg | 6.17E-01 | mg/kg | M | 6.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 1.81E+00 | mg/kg | 1.81E+00 | mg/kg | M | 1.8E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.19E+00 | mg/kg | 2.19E+00 | mg/kg | M | 2.1E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.87E-01 | mg/kg | 3.87E-01 | mg/kg | M | 3.7E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 1.9E-06 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 4.23E-01 | mg/kg | 4.23E-01 | mg/kg | M | 4.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.93E+04 | mg/kg | 1.93E+04 | mg/kg | M | 1.9E-02 | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | 1.9E-02 |
| | Arsenic | 1.06E+01 | mg/kg | 1.06E+01 | mg/kg | M | 1.0E-05 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 3.4E-02 |
| | Cadmium | 1.08E+00 | mg/kg | 1.08E+00 | mg/kg | M | 1.0E-06 | mg/kg-day | 5.0E-04 | mg/kg-day | NA | NA | 2.1E-03 |
| | Iron | 2.74E+04 | mg/kg | 2.74E+04 | mg/kg | M | 2.7E-02 | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | 8.9E-02 |
| | Manganese | 6.35E+02 | mg/kg | 6.35E+02 | mg/kg | M | 6.2E-04 | mg/kg-day | 7.0E-02 | mg/kg-day | NA | NA | 8.8E-03 |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | 3.3E-05 | mg/kg-day | 1.0E-03 | mg/kg-day | NA | NA | 3.3E-02 |
| | (total) | | | | | | | | | | | | **1.9E-01** |
| Dermal | Benzo(a)anthracene | 6.17E-01 | mg/kg | 6.17E-01 | mg/kg | M | 1.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(a)pyrene | 1.81E+00 | mg/kg | 1.81E+00 | mg/kg | M | 4.6E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Benzo(b)fluoranthene | 2.19E+00 | mg/kg | 2.19E+00 | mg/kg | M | 5.5E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Dibenzo(a,h)anthracene | 3.87E-01 | mg/kg | 3.87E-01 | mg/kg | M | 9.7E-08 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Indeno(1,2,3-cd)pyrene | 2.00E+00 | mg/kg | 2.00E+00 | mg/kg | M | 5.0E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aroclor-1260 | 4.23E-01 | mg/kg | 4.23E-01 | mg/kg | M | 1.1E-07 | mg/kg-day | | mg/kg-day | NA | NA | |
| | Aluminum | 1.93E+04 | mg/kg | 1.93E+04 | mg/kg | M | | mg/kg-day | 1.0E+00 | mg/kg-day | NA | NA | |
| | Arsenic | 1.06E+01 | mg/kg | 1.06E+01 | mg/kg | M | 6.2E-07 | mg/kg-day | 3.0E-04 | mg/kg-day | NA | NA | 2.1E-03 |
| | Cadmium | 1.08E+00 | mg/kg | 1.08E+00 | mg/kg | M | 2.1E-09 | mg/kg-day | 2.5E-05 | mg/kg-day | NA | NA | 8.4E-05 |
| | Iron | 2.74E+04 | mg/kg | 2.74E+04 | mg/kg | M | | mg/kg-day | 3.0E-01 | mg/kg-day | NA | NA | |
| | Manganese | 6.35E+02 | mg/kg | 6.35E+02 | mg/kg | M | | mg/kg-day | 2.8E-03 | mg/kg-day | NA | NA | |
| | Vanadium | 3.45E+01 | mg/kg | 3.45E+01 | mg/kg | M | | mg/kg-day | 2.6E-05 | mg/kg-day | NA | NA | |
| | (total) | | | | | | | | | | | | **2.1E-03** |
| | | | | | | | | | | | | **Total Hazard Index Across All Exposure Routes/Pathways** | **1.9E-01** |

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBS - 0.14 Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil or sediment

| dermal abs | GI Abs |
|---|---|
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.13 | 1 |
| 0.14 | 1 |
| | 1 |
| 0.03 | 1 |
| 0.001 | 0.05 |
| | 1 |
| | 0.04 |
| | 0.026 |

**TABLE 6.1**
**CANCER TOXICITY DATA -- ORAL/DERMAL**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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) |
| **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 | 9/23/2005 |
| Benzo(b)fluoranthene | 7.3E-01 | $(mg/kg/day)^{-1}$ | 1 | 7.3E-01 | $(mg/kg/day)^{-1}$ | B2 | EPA(1) | 7/1993 |
| Benzo(k)fluoranthene | 7.3E-02 | $(mg/kg/day)^{-1}$ | 1 | 7.3E-02 | $(mg/kg/day)^{-1}$ | B2 | EPA(1) | 7/1993 |
| Chrysene | 7.3E-03 | $(mg/kg/day)^{-1}$ | 1 | 7.3E-03 | $(mg/kg/day)^{-1}$ | B2 | EPA(1) | 7/1993 |
| 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 |
| **Pesticides PCBs** | | | | | | | | |
| Aroclor-1254 | 2.0E+00 | (mg/kg/day)-1 | 1 | 2.0E+00 | (mg/kg/day)-1 | B2 | EPA(2) | 9/23/2005 |
| Aroclor-1260 | 2.0E+00 | (mg/kg/day)-1 | 1 | 2.0E+00 | (mg/kg/day)-1 | B2 | EPA(2) | 9/23/2005 |
| **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 | 9/23/2005 |
| Cadmium | NA | NA | NA | NA | NA | B1 | IRIS | 9/23/2005 |
| Iron | NA | NA | NA | NA | NA | NA | NA | NA |
| Manganese | NA | NA | NA | NA | NA | D | IRIS | 9/23/2005 |
| Vanadium | NA | NA | NA | NA | NA | NA | NA | NA |

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(1) = U.S. EPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.

EPA(2) = U.S. EPA, PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September 1996, EPA/600/P-96/001F.

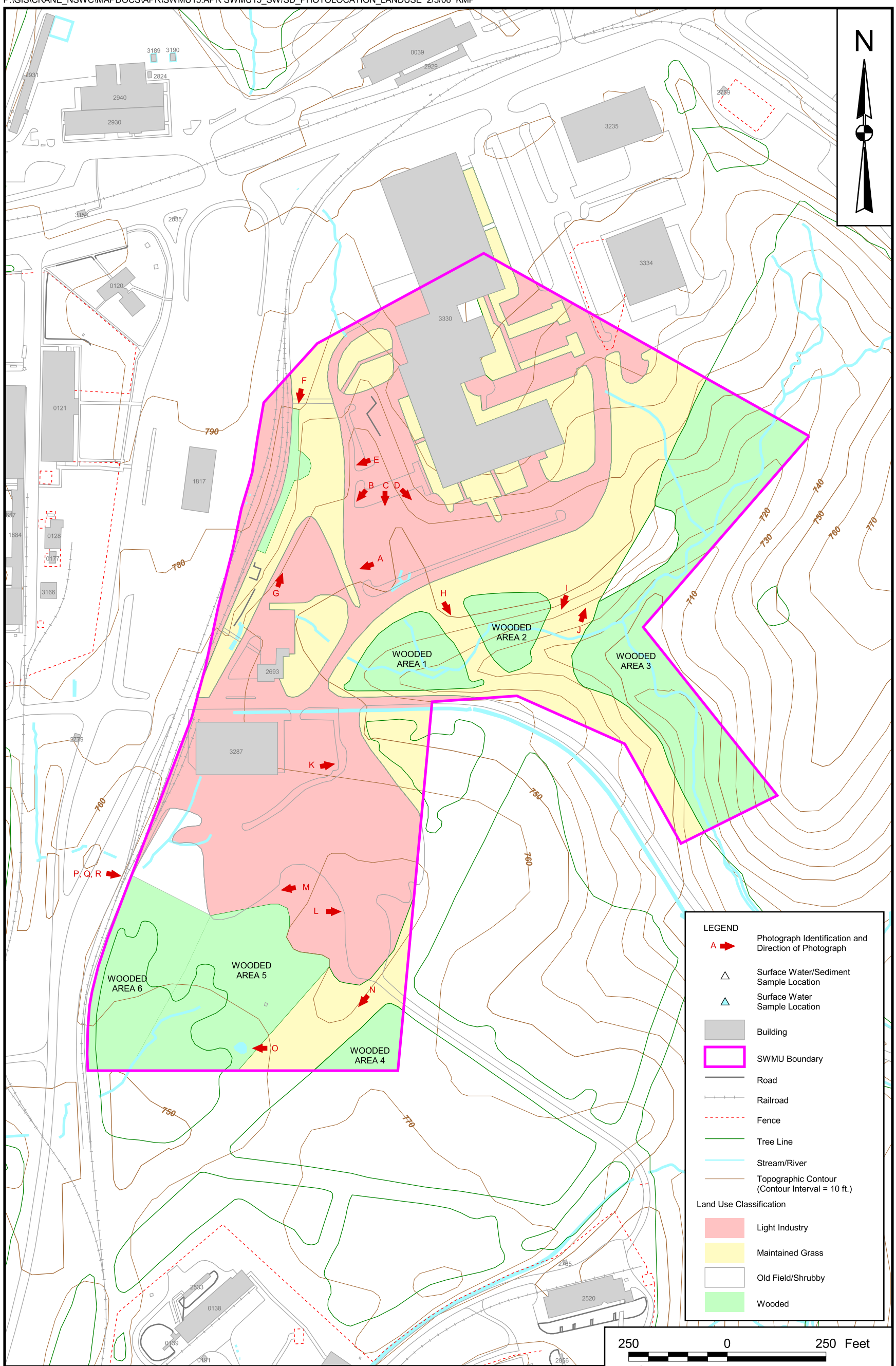
IRIS = Integrated Risk Information System.

NA = Not Available.

# APPENDIX J

# SUPPORTING DOCUMENTATION FOR THE ECOLOGICAL RISK ASSESSMENT
# SWMU 15

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU15.APR SWMU15_SW/SD_PHOTOLOCATION_LANDUSE 2/3/06 KMP




| | | | |
|---|---|---|---|
| DRAWN BY K. PEILA DATE 2/2/06 | NAVFAC | PHOTOGRAPH DIRECTION MARKERS AND LAND USE MAP<br>SWMU 15 - ROADS AND GROUNDS AREA<br>NSWC CRANE<br>CRANE, INDIANA | CONTRACT NUMBER CTO 0331 |
| CHECKED BY T. ROJAHN DATE 2/2/06 | | | APPROVED BY — DATE — |
| COST/SCHEDULE-AREA | | | APPROVED BY — DATE — |
| SCALE AS NOTED | | | DRAWING NO. FIGURE J-1 REV 0 |

**TABLE J.2-3**
**SOIL TO EARTHWORM BIOACCUMULATION FACTORS FOR PAHS**

| Soil | Wet-Weight BAFs[1] | Dry-Weight BAFs[2] | Soil Type |
|---|---|---|---|
| OT1 | 0.081 | 0.506 | Silty clay loam |
| OT2 | 0.026 | 0.163 | Light sandy loam |
| OT3 | 0.105 | 0.656 | Silty clay loam |
| OT4 | 0.257 | 1.606 | Silty clay loam |
| OT5 | 0.192 | 1.200 | Silty clay loam |
| OT6 | 0.091 | 0.569 | Silty clay loam |
| GP1 | 0.069 | 0.431 | Silty clay loam |
| GP2 | 0.072 | 0.450 | Silty clay loam |
| GP3 | 0.062 | 0.388 | Silty clay loam |
| GP4 | 0.11 | 0.688 | Silty clay |
| GP5 | 0.042 | 0.263 | Silty clay |
| GP6 | 0.062 | 0.388 | Silty clay |
| **Minimum BAF** | **0.026** | **0.163** | |
| **Maximum BAF** | **0.257** | **1.606** | |
| **Average BAF** | **0.097** | **0.609** | |

**Notes:**
Source of data is Ma et al., (1998)
1 - BAFs from the study are based on wet weight and normalized to the percent of organic carbon and percent lipids.
2 - These BAFs were calculated by dividing the wet weight BAF by 0.16 (percent solids of an earthworm)

| | Earthworm Bioaccuumulation Factors[1] | | | |
|---|---|---|---|---|
| **Chemical** | **Soil Concentration (mg/kg)** | **Earthworm Concentration (mg/kg)** | **BAF (dry weight)** | **BAF (wet weight)[2]** |
| Acenaphthylene | ND | ND | ND | ND |
| Anthanthrene | 1.2 | 0.11 | 0.092 | 0.015 |
| Anthracene | 0.92 | 0.047 | 0.051 | 0.008 |
| Benzo(a)anthracene | 2 | 0.25 | 0.13 | 0.020 |
| Benzo(a)pyrene | 3.8 | 1.3 | 0.34 | 0.055 |
| Benzo(b)fluoranthene | 2.6 | 0.83 | 0.32 | 0.051 |
| Benzo(e)pryene | 2.1 | 0.91 | 0.43 | 0.069 |
| Benzo(g,h,i)perylene | 4.5 | 1.1 | 0.24 | 0.039 |
| Benzo(k)fluoranthene | 1.5 | 0.38 | 0.25 | 0.041 |
| Chrysene | 2 | 0.35 | 0.18 | 0.028 |
| Dibenzo(a,i)pyrene | 1.4 | 0.44 | 0.31 | 0.050 |
| Dibenzo(a,j)anthracene | 0.87 | 0.32 | 0.37 | 0.059 |
| Fluoranthene | 2.4 | 0.19 | 0.079 | 0.013 |
| Fluorene | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | 3.1 | 1.3 | 0.42 | 0.067 |
| Naphthalene | ND | ND | ND | ND |
| Perylene | 1.2 | 0.3 | 0.25 | 0.040 |
| Phenanthrene | 2.3 | 0.28 | 0.12 | 0.019 |
| Pyrene | 2.5 | 0.23 | 0.092 | 0.015 |
| Triphenylene | 1.3 | 0.87 | 0.67 | 0.107 |
| | | **Minimum BAF** | **0.051** | **0.0082** |
| | | **Maximum BAF** | **0.669** | **0.107** |
| | | **Average BAF** | **0.256** | **0.041** |

**Notes:**
ND - No data available
1 - Source of data is Table 25 in Beyer (1990)
2 - Wet weight BAF was calculated by multiplying the dry weight BAF by 0.16 (percent solids of an earthworm)

**TABLE J.2-2**

**EARTHWORM BAFS FOR PESTICIDES**

| Parameter | Study Values: Worm Concentration: Dry Weight | Study Values: Worm Concentration: Wet Weight | Study Values: Soil Conc. (dry weight) | Study Values: Dry Weight BAF | Study Values: Wet Weight BAF | Calculated Values: Final Dry Weight[1] BAF | Calculated Values: Final Wet Weight[2] BAF | Reference | Comments |
|---|---|---|---|---|---|---|---|---|---|
| ***DDT*** | NA | NA | NA | 5 | NA | 5 | 0.80 | 1 | soil type unknown (11-year field study) |
| | 0.5 | NA | 1 | 0.5 | NA | 0.5 | 0.080 | 2 | compost (lab) |
| | 6.9 | NA | 4 | 1.7 | NA | 1.7 | 0.28 | 2 | compost (lab) |
| | 37 | NA | 16 | 2.3 | NA | 2.3 | 0.37 | 2 | compost (lab) |
| | 159 | NA | 64 | 2.5 | NA | 2.5 | 0.40 | 2 | compost (lab) |
| | NA | NA | NA | 9 | NA | 9.0 | 1.44 | 3 | from data collected in 67 agricultural fields |
| | NA | NA | NA | NA | 1.2-4.9 | 7.5-31 | 1.2-4.9 | 4 | agricultural soil (0.94 ppm DDT in soil) |
| ***Average dry/wet weight BAF from field studies[3]*** | | | | ***NA*** | ***NA*** | ***13.0*** | ***2.1*** | | |
| ***Dieldrin*** | NA | NA | NA | 8 | NA | 8 | 1.28 | 1 | soil type unknown (11-year field study) |
| | NA | NA | NA | 2.4 | NA | 2.4 | 0.38 | 2 | compost (lab) (17 ppm dieldrin in compost) |
| | NA | NA | NA | 5.6 | NA | 5.6 | 0.90 | 2 | compost (lab) (17 ppm dieldrin in compost) |
| | NA | 18.4 | 25 | NA | 0.74 | 4.6 | 0.7 | 5 | compost (20-day lab study) |
| | NA | 24.4 | 25 | NA | 0.98 | 6.1 | 1.0 | 5 | compost (20-day lab study) |
| | NA | 4.6 | 10 | NA | 0.46 | 2.9 | 0.5 | 6 | 90-day lab study |
| | NA | 9.7 | 30 | NA | 0.32 | 2.0 | 0.3 | 6 | 90-day lab study |
| | NA | 12.4 | 50 | NA | 0.25 | 1.6 | 0.2 | 6 | 90-day lab study |
| | NA | 13.9 | 100 | NA | 0.14 | 0.87 | 0.1 | 6 | 90-day lab study |
| | NA | NA | NA | NA | 0.97-4 | 6.16-25 | 0.97-4 | 4 | agricultural soil (1.36 ppm total aldrin and dieldrin in soil) |
| ***Average dry/wet weight BAF from field studies[3]*** | | | | ***NA*** | ***NA*** | ***6.64*** | ***1.06*** | | |
| ***gamma-BHC*** | NA | NA | NA | 5 | 1.5-4.2 | 5 | 1.5-4.2 | 4 | agricultural soil (0.004 ppm gamma-BHC in soil) |
| ***Average dry/wet weight BAF from field studies[3]*** | | | | ***NA*** | ***NA*** | ***5*** | ***2.85*** | | |
| ***Heptachlor*** | NA | NA | NA | 10 | NA | 10 | 1.60 | 4 | soil type unknown (11-year field study) |
| ***Average dry/wet weight BAF from field studies[3]*** | | | | ***NA*** | ***NA*** | ***10*** | ***1.6*** | | |
| ***Aldrin*** | NA | NA | NA | 3.3 | NA | 3.3 | 0.528 | 3 | from data collected in 7 agricultural fields |
| ***Chlordane*** | NA | NA | NA | 5 | NA | 5.0 | 0.8 | 3 | from data collected in 7 agricultural fields |
| ***Endrin*** | NA | NA | NA | 3.6 | NA | 3.6 | 0.576 | 3 | from data collected in 26 agricultural fields |
| ***Heptachlor epoxide*** | NA | NA | NA | 3 | NA | 3.0 | 0.48 | 3 | from data collected in 9 agricultural fields |

**Notes:**
BAF - bioaccumulation factor = worm concentration/soil concentration
NA - Not applicable
The percent solids of earthworms is assummed to be 0.16 [Sample et al., 1997])

**TABLE J.2-2**

**EARTHWORM BAFS FOR PESTICIDES**

1 - The calculated dry weight BAF was either obtained directly from the study or was calculated by dividing the wet weight BAF by 0.16
2 - The calculated wet weight BAF was either obtained directly from the study or was calculated by multiplying the dry weight BAF by 0.16
3 - The compost studies were not used in calculation of average BAF because the properties of the compost may be different than soil.
The compost studies were presented for informational purposes only.

**References**

1 - Beyer and Gish, 1980 and Beyer and Krynitsky, 1989
2 - Davis, 1971
3 - Gish, 1970
4 - Wheatly and Hardman, 1968
5 - Jeffries and Davis, 1968
6 - Venter and Reinecke, 1985

**TABLE J.2-1**

**DRY WEIGHT BAFS AND/OR BSAFS FOR PLANTS, EARTHWORMS, FISH, SEDIMENT INVERTEBRATES, AND MAMMALS**

| | Plant BAFs[1,2] | | Earthworm BAFs[3] | | Fish BSAFs[4] | | Sediment Invertebrate BSAFs[5] | |
|---|---|---|---|---|---|---|---|---|
| **Chemicals** | **Conservative[6]** | **Average[6]** | **Conservative[6]** | **Average[6]** | **Conservative[6]** | **Average[6]** | **Conservative[6]** | **Average[6]** |
| **Semivolatile Organics** | | | | | | | | |
| Acenaphthene | 1.20E-01 | 1.20E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Acenaphthylene | 2.70E-01 | 2.70E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Anthracene | 1.10E-01 | 1.10E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Benzo(a)anthracene | 1.90E-02 | 1.90E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Benzo(a)pyrene | 1.10E-02 | 1.10E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Benzo(g,h,i)perylene | 5.60E-03 | 5.60E-03 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Benzo(k)Fluoranthene | 4.30E-03 | 4.30E-03 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Chrysene | 1.90E-02 | 1.90E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Dibenzo(a,h)Anthracene | 4.30E-03 | 4.30E-03 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Fluoranthene | 5.50E-02 | 5.50E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Fluorene | 1.10E-01 | 1.10E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Indeno(1,2,3-cd)pyrene | 5.60E-03 | 5.60E-03 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Naphthalene | 4.60E-01 | 4.60E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Pentachlorophenol | 1.40E-02 | 1.40E-02 | 1.00E+00 | 1.00E+00 | | | 1.00E+00 | 1.00E+00 |
| Phenanthrene | 8.20E-02 | 8.20E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Pyrene | 5.50E-02 | 5.50E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| **Pesticides/ PCBs** | | | | | | | | |
| 4,4'-DDD | 1.60E-02 | 1.60E-02 | 1.30E+01 | 1.30E+01 | 2.80E-01 | 2.80E-01 | 1.00E+00 | 1.00E+00 |
| 4,4'-DDE | 1.90E-02 | 1.90E-02 | 1.30E+01 | 1.30E+01 | 7.70E+00 | 7.70E+00 | 1.00E+00 | 1.00E+00 |
| 4,4'-DDT | 7.80E-03 | 7.80E-03 | 1.30E+01 | 1.30E+01 | 1.67E+00 | 1.67E+00 | 1.00E+00 | 1.00E+00 |
| Alpha-Chlordane | 2.50E-02 | 2.50E-02 | 5.00E+00 | 5.00E+00 | 4.77E+00 | 4.77E+00 | 1.00E+00 | 1.00E+00 |
| Aroclor-1254 | 1.30E-02 | 1.30E-02 | 1.59E+01 | 6.67E+00 | 1.85E+00 | 1.85E+00 | 6.41E+01 | 3.62E+01 |
| Aroclor-1260 | 2.90E-03 | 2.90E-03 | 1.59E+01 | 6.67E+00 | 1.85E+00 | 1.85E+00 | 6.41E+01 | 3.62E+01 |
| Gamma-Chlordane | 2.50E-02 | 2.50E-02 | 5.00E+00 | 5.00E+00 | 2.22E+00 | 2.22E+00 | 1.00E+00 | 1.00E+00 |
| Heptachlor | 1.20E-01 | 1.20E-01 | 1.00E+01 | 1.00E+01 | 1.80E+00 | 1.80E+00 | 1.00E+00 | 1.00E+00 |
| **Inorganics** | | | | | | | | |
| Arsenic | 1.10E+00 | 3.75E-02 | 5.23E-01 | 2.24E-01 | 1.00E+00 | 1.00E+00 | 6.90E-01 | 1.43E-01 |
| Cadmium | 3.25E+00 | 5.86E-01 | 4.07E+01 | 7.71E+00 | 1.00E+00 | 1.00E+00 | 7.99E+00 | 6.00E-01 |
| Chromium | 8.39E-02 | 4.10E-02 | 3.16E+00 | 3.06E-01 | 1.00E+00 | 1.00E+00 | 4.68E-01 | 1.00E-01 |
| Copper | 6.25E-01 | 1.24E-01 | 1.53E+00 | 5.15E-01 | 1.00E+00 | 1.00E+00 | 5.25E+00 | 1.56E+00 |
| Lead | 4.68E-01 | 3.89E-02 | 1.52E+00 | 2.66E-01 | 1.00E+00 | 1.00E+00 | 6.07E-01 | 7.10E-02 |
| Mercury | 5.00E+00 | 6.52E-01 | 2.06E+01 | 1.69E+00 | 1.00E+00 | 1.00E+00 | 2.87E+00 | 1.14E+00 |
| Nickel | 1.41E+00 | 1.80E-02 | 4.73E+00 | 1.06E+00 | 1.00E+00 | 1.00E+00 | 2.32E+00 | 4.86E-01 |
| Selenium | 3.01E+00 | 6.72E-01 | 1.34E+00 | 9.85E-01 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 |
| Zinc | 1.82E+00 | 3.66E-01 | 1.29E+01 | 3.20E+00 | 1.00E+00 | 1.00E+00 | 7.53E+00 | 1.94E+00 |

**Notes:**

BAF - Bioaccumulation Factor

BSAF - Biota Sediment Accumulation Factor

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 - Sample et al., (February, 1998) for all chemicals; conservative value is 90th percentile; average value is median value

4 - U.S. EPA, September 1997; only one value is available for conservative and average exposures. Values for organic chemicals are the same for wet-weight and dry weight.

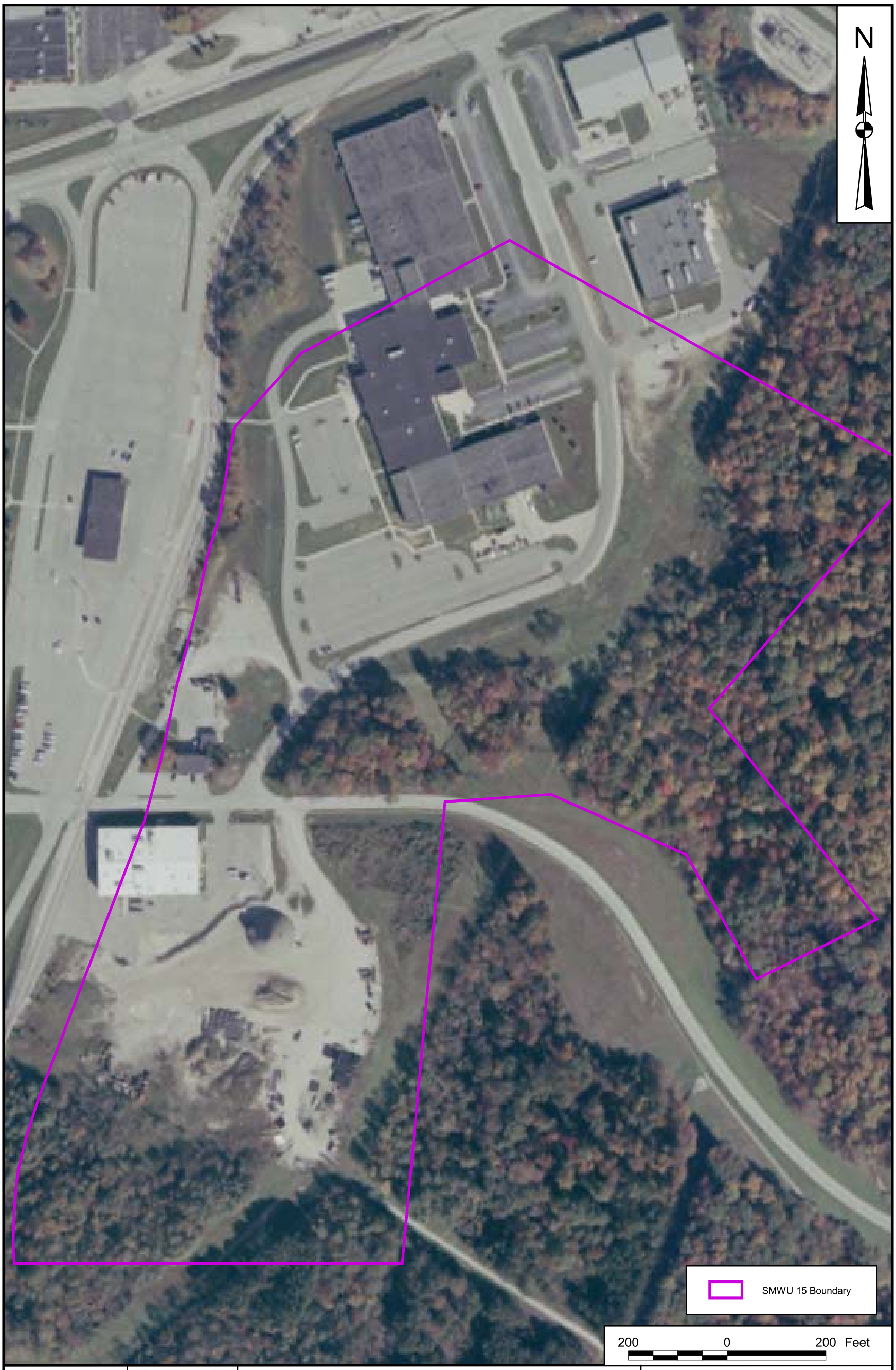
5 - ORNL (August, 1998) for all chemicals; conservative value is 90th percentile; average value is median value

6 - Conservative and average refers to the exposure scenarios for which the uptake factors are used

7 - Values are from Sample et al., (1998) as cited in the Draft Eco SSL Guidance (EPA, July 2000). The conservative values for metals were not cited in the Draft Eco SSLs so they were obtained directly from Sample et al., (1998).

Default value of 1 is assigned to parameters without uptake factors

P:\GIS\NSWC_CRANE\APR\SWMU15_AERIAL.APR AERIAL LAYOUT 2/2/06 KMP




| | | | |
|---|---|---|---|
| DRAWN BY C. SPEHAR | DATE 9/8/05 | AERIAL PHOTOGRAPH<br>SWMU 15 - ROADS AND GROUNDS AREA<br>NSWC CRANE<br>CRANE, INDIANA | CONTRACT NUMBER CTO 0331 |
| CHECKED BY E. LEE | DATE 9/8/05 | | APPROVED BY — DATE — |
| COST/SCHEDULE-AREA | | | APPROVED BY — DATE — |
| SCALE AS NOTED | NAVFAC | | DRAWING NO. FIGURE J-2 REV 0 |

# Checklist for Ecological Assessment/Sampling

## I. SITE DESCRIPTION

1. Site Name: NSWC CRANE

   Location: SWMU 15 - ROADS AND GROUNDS AREA

   County: MARTIN City: CRANE State: INDIANA

2. Latitude: 38.8648204299 Longitude: -86.8179697861

3. What is the approximate area of the site? 44.5 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 VISIT FOR ECOLOGICAL ASSESSMENT. Other visits were made for groundwater, surface water, sediment & soil sampling (SEE RFI, OCTOBER 2005)

5. Please attach to the checklist USGS topographic map(s) of the site, if available.
   SEE FIGURE J-1 OF this REPORT.

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.

   AERIAL PHOTOS - SEE FIGURE J-2 (SWMU BOUNDARY) & FIGURE J-3 (1 MILE RADIUS) OF this REPORT

   GROUND PHOTOS = Attached to this REPORT & FIGURE A-2 OF the "RESOURCE CONSERVATION and RECOVERY ACT, FACILITY INVESTIGATION REPORT, ROADS AND GROUNDS AREA (SWMU 15), NAVAL SURFACE WARFARE CENTER CRANE, CRANE, INDIANA" (RFI OCTOBER 2005).

7. The land use on the site is:

- % Urban
- % Rural
- % Residential
48 % Industrial (☒ light ☐ heavy)
- % Agricultural

(Crops: _____)

- % Recreational

(Describe; note if it is a park, etc.)

NA

- % Undisturbed
52 % Other { 30% WOODED; 2% OLD FIELD /SHRUBBY; 20% MAINTAINED GRASS }

The area surrounding the site is:
ONE mile radius

- % Urban
- % Rural
- % Residential
17 % Industrial (☒ light ☐ heavy)
- % Agricultural

(Crops: _____)

1 % Recreational

(Describe; note if it is a park, etc.)

LAKE GREENWOOD

- % Undisturbed
82 % Other { 74% WOODED; 8% MAINTAINED GRASS }

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
X Heavy Equipment
_____ Mining
_____ Natural Events
_____ Erosion
_____ Other

Please describe:

NEW-
BUILDING AND PARKING LOT CONSTRUCTION.

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.*

THERE IS A SMALL CLUSTER OF CATTAIL (< 1000 sq ft) just NORTH OF WOODED AREA #6 (SEE PHOTOS P&R OF this REPORT)

Please provide the source(s) of information used to identify these sensitive areas, and indicate their general location on the site map.

SWMU 15 is outside OF FEMAs Floodplain (ZONE A). MARTIN County Soil SURVEY CONSIDERS this site AREA AS POOR to VERY POOR FOR WETLAND plants AND Wildlife.

10. What type of facility is located at the site?

☐ Chemical ☐ Manufacturing ☐ Mixing ☐ Waste disposal

☒ Other (specify) ROADS and GROUNDS SUPPORT ACTIVITIES; ALSO, SITE OF A FORMER ASPHALT PLANT - ALONG the NW boundary OF the SWMU.

11. What are the suspected contaminants of concern at the site? If known, what are the maximum concentration levels?

SEE SECTIONS 3, 5, etc. OF the RFI, October 2005.

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) intermittent STREAMS

13. If known, what is the approximate depth to the water table? ~ 2' in low ELEVATIONS to ~ 12' in the higher elevations (BASED ON 8 temporary WELLS SAMPLED in 1/05).

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.

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.

For additional information SEE section 8.2.1.1 of the RFI, October 2005.

20. Record weather conditions at the time this checklist was prepared:

DATE: 10/16/05

60°s Temperature (°C/°F) — Normal daily high temperature

CALM Wind (direction/speed) 0.0 Precipitation (rain, snow)

Mostly Sunny 0-10% Cloud cover

## IA. SUMMARY OF OBSERVATIONS AND SITE SETTING

SWMU 15 – light industry comprises 48% (21.5 acres) and consists of several buildings, asphalt and gravel roads, parking lots, railroad and gravel storage lay down areas. Other comprises 52% of SWMU 15 and consists of 30% (13.0 acres) wooded, 20% (9.0 acres) maintained grass associated mainly with buildings and transmission line corridors and 2% (1.0 acres) old field/shrubby.

There are six distinct wooded areas within the boundary of SWMU 15 (See Figure J-1 attached to this Ecological Checklist). Wooded Area #1 (See Photo C attached to this Ecological Checklist) is a small strongly sloping riparian woodlot with white oak as the dominant species in the tree canopy, and shagbark hickory, sugar maple, black locust and sassafras as associated species. Sassafras, and sugar maple are common species in the understory. Wooded Area #2 (See Photo D attached to this Ecological Checklist) is also a small strongly sloping riparian woodlot with sugar maple as the dominant species in the tree canopy, and white oak, sassafras, black walnut and American beech as associated species. Sugar maple, sassafras, tulip poplar and flowering dogwood are common species in the understory. Wooded Area #3 (See Photo J attached to this Ecological Checklist) likewise is a strongly sloping riparian section of a much larger woodlot which extends outside the SWMU boundary with tulip poplar, sugar maple, and sycamore as the dominant species in the tree canopy, and white oak, black oak, shagbark hickory and black walnut as associated species. Sugar maple, sassafras, flowering dogwood, white oak and red oak are common species in the understory. Wooded Area #4 (small section of a larger gently sloping woodlot) is a thin stand of black locust, black walnut and sugar maple with a heavy underbrush of greenbrier, goldenrod sp., grasses and Japanese honeysuckle. Wooded Area #5 (See Photo N attached to this Ecological Checklist) is a gently sloping less mature woodlot with black locust, sassafras, ash, sycamore and cottonwood as the common species in the tree canopy. Hawthorn sp., American elm and sassafras are common species in the understory. Wooded Area #6 is a gently sloping woodlot with a well established stand of white pine. The dense tree canopy and heavy needle cover accounts for only a trace of an understory and herbaceous layer.

SWMU 15 generally drains to the south. Storm sewers with catch basins, drainage ditches/gullies and intermittent streams divert surface water from SWMU 15 to Turkey Creek tributaries. Turkey Creek flows into Boggs Creek. Boggs Creek in turn 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 the White River.

Wildlife sign observed on site included whitetail deer and raccoon.

See attached aerials (Figures J-2 and J-3) and ground photographs (associated with Figure J-1) to enhance site familiarity; also, see ground photographs associated with site surface water drainage in Appendix A of the FIR, October 2005.

Completed by Terry Rozich Affiliation T+NUS

Additional Preparers

Site Manager – Ralph Basinski

Date: 2/02/2006

## 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.

2. What percentage or area of the site is wooded? (30 % 13 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. Combination of ground truthing and AERIAL photography (SEE FIGURE J-2 of this REPORT).

3. What is the dominant type of vegetation in the wooded area? (Circle one: Evergreen/Deciduous/ Mixed) Provide a photograph, if available. SEE photos C, D, H, I, J & N.

   Dominant plant, if known: Sugar maple, WHITE OAK, tulip poplar & SYCAMORE; WHITE PINE is the dominant SPECIES IN Wooded AREA #6.

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.

   Wooded AREAS #1-3 (>12IN) & 4-6 (6-12IN)

5. Specify type of understory present, if known. Provide a photograph, if available.

   Wood AREAS #1-5 · SASSAFRAS, SUGAR maple, tulip poplar flowering dogwood, hawthorn sp. and WHITE & black OAK types. Wooded AREA #6 - only A trace OF understory under A WHITE PINE CANOPY.

### IIB. SHRUB/SCRUB / OLD FIELD

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? ( 2 % 1 acres). Indicate the areas of shrub/scrub on the site map. Please identify what information was used to determine this area.

   Ground truthing and/or AERIAL photograph (SEE FIGURE J-2)

3. What is the dominant type of scrub/shrub vegetation, if known? Provide a photograph, if available.

   SEE ABOVE FIGURE and Photo M OF this REPORT.

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** - SEE II B
(Combination part old field transitioning into a shrubby area)

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 grassy areas associated with buildings and transmission line corridors make up 20% (9.0 acres) of the site.

2. Describe the terrestrial miscellaneous habitat(s) and identify these area(s) on the site map.

Areas of dense maintained grass are shown on Figure J-1 of this report and can be seen on photos A, B, C, D, F, G, H, I, J, K and N.

3. What observations, if any, were made at the site regarding the presence and/or absence of insects, fish, birds, mammals, etc.?

WHITETAIL deer and RACCOON sign.

4. Review the questions in Section I to determine if any additional habitat checklists should be completed for this site.

## 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)_____ | |

2. If known, what is the name of the waterbody? NA - ALL UNNAMED

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.
Some minor construction debris along a small stretch of intermittent stream within wooded Area #3.

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)?
See Supplemental Surface Water / Sediment Documentation sheets in Appendix C.2 of this RFI Report to which this Ecological Checklist is attached.

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.
Ground truthing and the Soil Survey of Martin County, Indiana

8. Is there a discharge from the site to the waterbody? ☑ yes ☐ no If yes, please describe the discharge and its path.
SEE Section 1A of this CHECKLIST.

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 SECTION 1A OF this CHECKLIST.

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:

| | |
|---|---|
| ____ | Width (ft.) |
| ____ | Depth (ft.) |
| ____ | Velocity (specify units):_____ |
| ____ | Temperature (depth of the water at which the reading was taken_____) |
| ____ | pH |
| ____ | Dissolved oxygen |
| NA | Salinity |
| ____ | Turbidity (clear, slightly turbid, turbid, opaque) (Secchi disk depth NA) |
| ____ | Other (specify)_____ |

SEE COMMENT #5 OF this SECTION. AND APPENDIX C.3 OF this RFI REPORT.

11. Describe observed color and area of coloration.

SEE comment FOR #10 OF this section.

12. Is any aquatic vegetation present? ☑ yes ☐ no If yes, please identify the type of vegetation present, if known.

☑ Emergent ☐ Submergent ☐ Floating

Small AREA OF CATTAILS - SEE PHOTOS P & R. and #9 OF Section I OF this Checklist.

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.?

No FISH OR INVERTEBRATES WERE OBSERVED during this ASSESSMENT; WHITE tail deer & RACCOON SIGN WERE OBSERVED.

# 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)

**TABLE J.2-1**

**DRY WEIGHT BAFS AND/OR BSAFS FOR PLANTS, EARTHWORMS, FISH, SEDIMENT INVERTEBRATES, AND MAMMALS**

| | Plant BAFs[1,2] | | Earthworm BAFs[3] | | Fish BSAFs[4] | | Sediment Invertebrate BSAFs[5] | |
|---|---|---|---|---|---|---|---|---|
| **Chemicals** | **Conservative[6]** | **Average[6]** | **Conservative[6]** | **Average[6]** | **Conservative[6]** | **Average[6]** | **Conservative[6]** | **Average[6]** |
| **Semivolatile Organics** | | | | | | | | |
| Acenaphthene | 1.20E-01 | 1.20E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Acenaphthylene | 2.70E-01 | 2.70E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Anthracene | 1.10E-01 | 1.10E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Benzo(a)anthracene | 1.90E-02 | 1.90E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Benzo(a)pyrene | 1.10E-02 | 1.10E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Benzo(g,h,i)perylene | 5.60E-03 | 5.60E-03 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Benzo(k)Fluoranthene | 4.30E-03 | 4.30E-03 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Chrysene | 1.90E-02 | 1.90E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Dibenzo(a,h)Anthracene | 4.30E-03 | 4.30E-03 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Fluoranthene | 5.50E-02 | 5.50E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Fluorene | 1.10E-01 | 1.10E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Indeno(1,2,3-cd)pyrene | 5.60E-03 | 5.60E-03 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Naphthalene | 4.60E-01 | 4.60E-01 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Pentachlorophenol | 1.40E-02 | 1.40E-02 | 1.00E+00 | 1.00E+00 | | | 1.00E+00 | 1.00E+00 |
| Phenanthrene | 8.20E-02 | 8.20E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| Pyrene | 5.50E-02 | 5.50E-02 | 6.69E-01 | 2.56E-01 | 2.90E-01 | 2.90E-01 | 1.00E+00 | 1.00E+00 |
| **Pesticides/ PCBs** | | | | | | | | |
| 4,4'-DDD | 1.60E-02 | 1.60E-02 | 1.30E+01 | 1.30E+01 | 2.80E-01 | 2.80E-01 | 1.00E+00 | 1.00E+00 |
| 4,4'-DDE | 1.90E-02 | 1.90E-02 | 1.30E+01 | 1.30E+01 | 7.70E+00 | 7.70E+00 | 1.00E+00 | 1.00E+00 |
| 4,4'-DDT | 7.80E-03 | 7.80E-03 | 1.30E+01 | 1.30E+01 | 1.67E+00 | 1.67E+00 | 1.00E+00 | 1.00E+00 |
| Alpha-Chlordane | 2.50E-02 | 2.50E-02 | 5.00E+00 | 5.00E+00 | 4.77E+00 | 4.77E+00 | 1.00E+00 | 1.00E+00 |
| Aroclor-1254 | 1.30E-02 | 1.30E-02 | 1.59E+01 | 6.67E+00 | 1.85E+00 | 1.85E+00 | 6.41E+01 | 3.62E+01 |
| Aroclor-1260 | 2.90E-03 | 2.90E-03 | 1.59E+01 | 6.67E+00 | 1.85E+00 | 1.85E+00 | 6.41E+01 | 3.62E+01 |
| Gamma-Chlordane | 2.50E-02 | 2.50E-02 | 5.00E+00 | 5.00E+00 | 2.22E+00 | 2.22E+00 | 1.00E+00 | 1.00E+00 |
| Heptachlor | 1.20E-01 | 1.20E-01 | 1.00E+01 | 1.00E+01 | 1.80E+00 | 1.80E+00 | 1.00E+00 | 1.00E+00 |
| **Inorganics** | | | | | | | | |
| Arsenic | 1.10E+00 | 3.75E-02 | 5.23E-01 | 2.24E-01 | 1.00E+00 | 1.00E+00 | 6.90E-01 | 1.43E-01 |
| Cadmium | 3.25E+00 | 5.86E-01 | 4.07E+01 | 7.71E+00 | 1.00E+00 | 1.00E+00 | 7.99E+00 | 6.00E-01 |
| Chromium | 8.39E-02 | 4.10E-02 | 3.16E+00 | 3.06E-01 | 1.00E+00 | 1.00E+00 | 4.68E-01 | 1.00E-01 |
| Copper | 6.25E-01 | 1.24E-01 | 1.53E+00 | 5.15E-01 | 1.00E+00 | 1.00E+00 | 5.25E+00 | 1.56E+00 |
| Lead | 4.68E-01 | 3.89E-02 | 1.52E+00 | 2.66E-01 | 1.00E+00 | 1.00E+00 | 6.07E-01 | 7.10E-02 |
| Mercury | 5.00E+00 | 6.52E-01 | 2.06E+01 | 1.69E+00 | 1.00E+00 | 1.00E+00 | 2.87E+00 | 1.14E+00 |
| Nickel | 1.41E+00 | 1.80E-02 | 4.73E+00 | 1.06E+00 | 1.00E+00 | 1.00E+00 | 2.32E+00 | 4.86E-01 |
| Selenium | 3.01E+00 | 6.72E-01 | 1.34E+00 | 9.85E-01 | 1.00E+00 | 1.00E+00 | 1.00E+00 | 1.00E+00 |
| Zinc | 1.82E+00 | 3.66E-01 | 1.29E+01 | 3.20E+00 | 1.00E+00 | 1.00E+00 | 7.53E+00 | 1.94E+00 |

**Notes:**

BAF - Bioaccumulation Factor

BSAF - Biota Sediment Accumulation Factor

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 - Sample et al., (February, 1998) for all chemicals; conservative value is 90th percentile; average value is median value

4 - U.S. EPA, September 1997; only one value is available for conservative and average exposures. Values for organic chemicals are the same for wet-weight and dry weight.

5 - ORNL (August, 1998) for all chemicals; conservative value is 90th percentile; average value is median value

6 - Conservative and average refers to the exposure scenarios for which the uptake factors are used

7 - Values are from Sample et al., (1998) as cited in the Draft Eco SSL Guidance (EPA, July 2000). The conservative values for metals were not cited in the Draft Eco SSLs so they were obtained directly from Sample et al., (1998).

Default value of 1 is assigned to parameters without uptake factors

**TABLE J.2-2**

**EARTHWORM BAFS FOR PESTICIDES**

| Parameter | Study Values: Worm Concentration: Dry Weight | Study Values: Worm Concentration: Wet Weight | Study Values: Soil Conc. (dry weight) | Study Values: Dry Weight BAF | Study Values: Wet Weight BAF | Calculated Values: Final Dry Weight[1] BAF | Calculated Values: Final Wet Weight[2] BAF | Reference | Comments |
|---|---|---|---|---|---|---|---|---|---|
| ***DDT*** | NA | NA | NA | 5 | NA | 5 | 0.80 | 1 | soil type unknown (11-year field study) |
| | 0.5 | NA | 1 | 0.5 | NA | 0.5 | 0.080 | 2 | compost (lab) |
| | 6.9 | NA | 4 | 1.7 | NA | 1.7 | 0.28 | 2 | compost (lab) |
| | 37 | NA | 16 | 2.3 | NA | 2.3 | 0.37 | 2 | compost (lab) |
| | 159 | NA | 64 | 2.5 | NA | 2.5 | 0.40 | 2 | compost (lab) |
| | NA | NA | NA | 9 | NA | 9.0 | 1.44 | 3 | from data collected in 67 agricultural fields |
| | NA | NA | NA | NA | 1.2-4.9 | 7.5-31 | 1.2-4.9 | 4 | agricultural soil (0.94 ppm DDT in soil) |
| ***Average dry/wet weight BAF from field studies[3]*** | | | | ***NA*** | ***NA*** | ***13.0*** | ***2.1*** | | |
| ***Dieldrin*** | NA | NA | NA | 8 | NA | 8 | 1.28 | 1 | soil type unknown (11-year field study) |
| | NA | NA | NA | 2.4 | NA | 2.4 | 0.38 | 2 | compost (lab) (17 ppm dieldrin in compost) |
| | NA | NA | NA | 5.6 | NA | 5.6 | 0.90 | 2 | compost (lab) (17 ppm dieldrin in compost) |
| | NA | 18.4 | 25 | NA | 0.74 | 4.6 | 0.7 | 5 | compost (20-day lab study) |
| | NA | 24.4 | 25 | NA | 0.98 | 6.1 | 1.0 | 5 | compost (20-day lab study) |
| | NA | 4.6 | 10 | NA | 0.46 | 2.9 | 0.5 | 6 | 90-day lab study |
| | NA | 9.7 | 30 | NA | 0.32 | 2.0 | 0.3 | 6 | 90-day lab study |
| | NA | 12.4 | 50 | NA | 0.25 | 1.6 | 0.2 | 6 | 90-day lab study |
| | NA | 13.9 | 100 | NA | 0.14 | 0.87 | 0.1 | 6 | 90-day lab study |
| | NA | NA | NA | NA | 0.97-4 | 6.16-25 | 0.97-4 | 4 | agricultural soil (1.36 ppm total aldrin and dieldrin in soil) |
| ***Average dry/wet weight BAF from field studies[3]*** | | | | ***NA*** | ***NA*** | ***6.64*** | ***1.06*** | | |
| ***gamma-BHC*** | NA | NA | NA | 5 | 1.5-4.2 | 5 | 1.5-4.2 | 4 | agricultural soil (0.004 ppm gamma-BHC in soil) |
| ***Average dry/wet weight BAF from field studies[3]*** | | | | ***NA*** | ***NA*** | ***5*** | ***2.85*** | | |
| ***Heptachlor*** | NA | NA | NA | 10 | NA | 10 | 1.60 | 4 | soil type unknown (11-year field study) |
| ***Average dry/wet weight BAF from field studies[3]*** | | | | ***NA*** | ***NA*** | ***10*** | ***1.6*** | | |
| ***Aldrin*** | NA | NA | NA | 3.3 | NA | 3.3 | 0.528 | 3 | from data collected in 7 agricultural fields |
| ***Chlordane*** | NA | NA | NA | 5 | NA | 5.0 | 0.8 | 3 | from data collected in 7 agricultural fields |
| ***Endrin*** | NA | NA | NA | 3.6 | NA | 3.6 | 0.576 | 3 | from data collected in 26 agricultural fields |
| ***Heptachlor epoxide*** | NA | NA | NA | 3 | NA | 3.0 | 0.48 | 3 | from data collected in 9 agricultural fields |

**Notes:**
BAF - bioaccumulation factor = worm concentration/soil concentration
NA - Not applicable
The percent solids of earthworms is assummed to be 0.16 [Sample et al., 1997])

**TABLE J.2-2**

**EARTHWORM BAFS FOR PESTICIDES**

1 - The calculated dry weight BAF was either obtained directly from the study or was calculated by dividing the wet weight BAF by 0.16
2 - The calculated wet weight BAF was either obtained directly from the study or was calculated by multiplying the dry weight BAF by 0.16
3 - The compost studies were not used in calculation of average BAF because the properties of the compost may be different than soil.
The compost studies were presented for informational purposes only.

**References**

1 - Beyer and Gish, 1980 and Beyer and Krynitsky, 1989
2 - Davis, 1971
3 - Gish, 1970
4 - Wheatly and Hardman, 1968
5 - Jeffries and Davis, 1968
6 - Venter and Reinecke, 1985

**TABLE J.2-3**
**SOIL TO EARTHWORM BIOACCUMULATION FACTORS FOR PAHS**

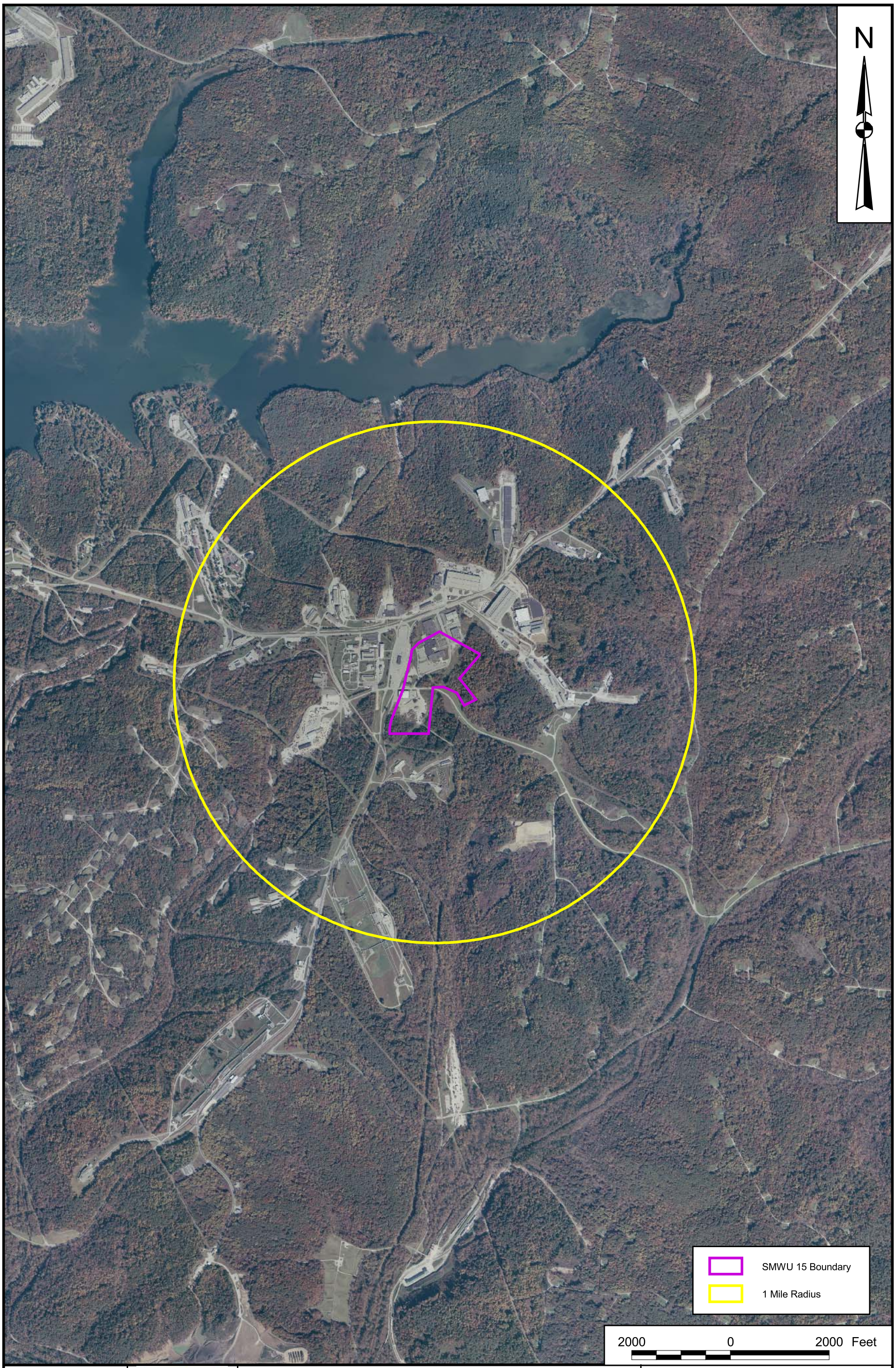
| Soil | Wet-Weight BAFs[1] | Dry-Weight BAFs[2] | Soil Type |
|---|---|---|---|
| OT1 | 0.081 | 0.506 | Silty clay loam |
| OT2 | 0.026 | 0.163 | Light sandy loam |
| OT3 | 0.105 | 0.656 | Silty clay loam |
| OT4 | 0.257 | 1.606 | Silty clay loam |
| OT5 | 0.192 | 1.200 | Silty clay loam |
| OT6 | 0.091 | 0.569 | Silty clay loam |
| GP1 | 0.069 | 0.431 | Silty clay loam |
| GP2 | 0.072 | 0.450 | Silty clay loam |
| GP3 | 0.062 | 0.388 | Silty clay loam |
| GP4 | 0.11 | 0.688 | Silty clay |
| GP5 | 0.042 | 0.263 | Silty clay |
| GP6 | 0.062 | 0.388 | Silty clay |
| **Minimum BAF** | **0.026** | **0.163** | |
| **Maximum BAF** | **0.257** | **1.606** | |
| **Average BAF** | **0.097** | **0.609** | |

**Notes:**
Source of data is Ma et al., (1998)
1 - BAFs from the study are based on wet weight and normalized to the percent of organic carbon and percent lipids.
2 - These BAFs were calculated by dividing the wet weight BAF by 0.16 (percent solids of an earthworm)

| | Earthworm Bioaccuumulation Factors[1] | | | |
|---|---|---|---|---|
| **Chemical** | **Soil Concentration (mg/kg)** | **Earthworm Concentration (mg/kg)** | **BAF (dry weight)** | **BAF (wet weight)[2]** |
| Acenaphthylene | ND | ND | ND | ND |
| Anthanthrene | 1.2 | 0.11 | 0.092 | 0.015 |
| Anthracene | 0.92 | 0.047 | 0.051 | 0.008 |
| Benzo(a)anthracene | 2 | 0.25 | 0.13 | 0.020 |
| Benzo(a)pyrene | 3.8 | 1.3 | 0.34 | 0.055 |
| Benzo(b)fluoranthene | 2.6 | 0.83 | 0.32 | 0.051 |
| Benzo(e)pryene | 2.1 | 0.91 | 0.43 | 0.069 |
| Benzo(g,h,i)perylene | 4.5 | 1.1 | 0.24 | 0.039 |
| Benzo(k)fluoranthene | 1.5 | 0.38 | 0.25 | 0.041 |
| Chrysene | 2 | 0.35 | 0.18 | 0.028 |
| Dibenzo(a,i)pyrene | 1.4 | 0.44 | 0.31 | 0.050 |
| Dibenzo(a,j)anthracene | 0.87 | 0.32 | 0.37 | 0.059 |
| Fluoranthene | 2.4 | 0.19 | 0.079 | 0.013 |
| Fluorene | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | 3.1 | 1.3 | 0.42 | 0.067 |
| Naphthalene | ND | ND | ND | ND |
| Perylene | 1.2 | 0.3 | 0.25 | 0.040 |
| Phenanthrene | 2.3 | 0.28 | 0.12 | 0.019 |
| Pyrene | 2.5 | 0.23 | 0.092 | 0.015 |
| Triphenylene | 1.3 | 0.87 | 0.67 | 0.107 |
| | | **Minimum BAF** | **0.051** | **0.0082** |
| | | **Maximum BAF** | **0.669** | **0.107** |
| | | **Average BAF** | **0.256** | **0.041** |

**Notes:**
ND - No data available
1 - Source of data is Table 25 in Beyer (1990)
2 - Wet weight BAF was calculated by multiplying the dry weight BAF by 0.16 (percent solids of an earthworm)

P:\GIS\NSWC_CRANE\APR\SWMU15_AERIAL.APR AERIAL RADIUS 2/2/06 KMP




| | | | |
|---|---|---|---|
| DRAWN BY K. PEILA | DATE 2/2/06 | AERIAL PHOTOGRAPH SHOWING ONE MILE RADIUS<br>SWMU 15 - ROADS AND GROUNDS AREA<br>NSWC CRANE<br>CRANE, INDIANA | CONTRACT NUMBER CTO 0331 |
| CHECKED BY T. ROJAHN | DATE 2/2/06 | | APPROVED BY — DATE — |
| COST/SCHEDULE-AREA | | | APPROVED BY — DATE — |
| SCALE AS NOTED | | | DRAWING NO. FIGURE J-3 REV 0 |

## TABLE J.3-1

## CALCULATION OF EXPOSURE PARAMETERS FOR SURROGATE WILDLIFE RECEPTORS

| Exposure Parameters | Meadow Vole | | Short-Tailed Shrew | | American Woodcock | Bobwhite Quail | | Belted Kingfisher | Mink |
|---|---|---|---|---|---|---|---|---|---|
| Body Weights (g) | 32.9 | | 17.61 | 16.87 | 168 | 180 | 181 | 150 | 1734 |
| | 39.1 | | 17.33 | 15.58 | 209 | 168 | 183 | 136 | 974 |
| | 35.5 | | 19.21 | 15.7 | 166 | 162 | 179 | 158 | 1040 |
| | 39 | | 17.4 | 15.25 | 212 | 175 | 175 | 147 | 1233 |
| | | | | | 169 | 178 | 183.2 | 148 | 550 |
| | | | | | 213 | 179 | 185.5 | 170 | 586 |
| | | | | | | 180 | 173 | | |
| | | | | | | 162.8 | 180.4 | | |
| ***Minimum*** | ***32.9*** | | ***15.25*** | | ***166*** | ***162*** | | ***136*** | ***550*** |
| ***Maximum*** | ***39.1*** | | ***19.21*** | | ***213*** | ***186*** | | ***170.0*** | ***1734*** |
| ***Average*** | ***36.6*** | | ***16.87*** | | ***190*** | ***177*** | | ***152*** | ***1019.5*** |
| Food Ingestion Rate (g/g-day) (1) | 0.3 | | 0.49 | 0.77 | 1.0 | 0.067 | 0.079 | 0.5 | 0.13 |
| | 0.35 | | 0.62 | 0.55 | 0.77 | 0.072 | 0.093 | 0.41 | 0.12 |
| | | | 0.43 | 0.96 | 0.73 | 0.09 | 0.089 | | 0.16 |
| | | | 0.52 | 0.54 | | | | | 0.22 |
| ***Minimum*** | ***0.3*** | | ***0.43*** | | ***0.73*** | ***0.067*** | | ***0.41*** | ***0.12*** |
| ***Maximum*** | ***0.35*** | | ***0.96*** | | ***1.0*** | ***0.093*** | | ***0.5*** | ***0.22*** |
| ***Average*** | ***0.325*** | | ***0.61*** | | ***0.8*** | ***0.082*** | | ***0.455*** | ***0.1575*** |
| Food Ingestion Rate (kg/day) | | | | | | | | | |
| **Conservative** | ***1.28E-02*** | | ***1.62E-02*** | | ***1.90E-01*** | ***1.64E-02*** | | ***0.0758*** | ***0.2243*** |
| ***Average*** | ***1.19E-02*** | | ***1.03E-02*** | | ***1.58E-01*** | ***1.44E-02*** | | ***0.0689*** | ***0.1606*** |
| Water Ingestion Rate (g/g-day) (1) | 0.14 | 0.21 | 0.223 | | 0.1 | 0.115 | 0.1 | 0.11 | 0.11 |
| | | | | | 0.1 | 0.106 | 0.131 | | 0.099 |
| | | | | | | 0.093 | 0.101 | | 0.028 |
| | | | | | | 0.086 | 0.102 | | |
| | | | | | | 0.11 | 0.1 | | |
| ***Minimum*** | ***0.14*** | | ***0.223*** | | ***0.1*** | ***0.086*** | | ***0.11*** | ***0.028*** |
| ***Maximum*** | ***0.21*** | | ***0.223*** | | ***0.1*** | ***0.131*** | | ***0.11*** | ***0.11*** |
| ***Average*** | ***0.175*** | | ***0.223*** | | ***0.1*** | ***0.104*** | | ***0.110*** | ***0.079*** |
| Water Ingestion Rate (L/day) | | | | | | | | | |
| **Conservative** | ***7.69E-03*** | | ***4.28E-03*** | | ***2.13E-02*** | ***2.31E-02*** | | ***0.0187*** | ***0.1907*** |
| ***Average*** | ***6.41E-03*** | | ***3.76E-03*** | | ***1.90E-02*** | ***1.84E-02*** | | ***0.0167*** | ***0.0805*** |
| Home Range (Ha) | 0.43 | 0.097 | 0.3925 | | 4.5 | 7.6 | | 2.185 | 7.8 |
| | 0.019 | 0.041 | | | 32.4 | 16.7 | | 1.028 | 20.4 |
| | 0.013 | 0.033 | | | 3.1 | 6.4 | | 1.03 | |
| | 0.012 | 0.013 | | | 73.6 | 15.6 | | 0.39 | |
| | 0.043 | 0.057 | | | 10.5 | | | | |
| | 0.023 | 0.032 | | | | | | | |
| | 0.051 | 0.078 | | | | | | | |
| | 0.058 | 0.061 | | | | | | | |
| ***Minimum (acres)*** | ***0.0297*** | | ***0.97*** | | ***7.7*** | ***16*** | | ***0.39*** | ***19*** |
| ***Maximum (acres)*** | ***1.06*** | | ***0.97*** | | ***182*** | ***41*** | | ***2.19*** | ***50*** |
| ***Average (acres)*** | ***0.16*** | | ***0.97*** | | ***61*** | ***29*** | | ***1.16*** | ***35*** |

***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

ESI

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July 28, 2005

Mr. Aaron Bernhardt
Tetra Tech NUS, Inc.
Foster Plaza 7
661 Andersen Drive
Pittsburgh, PA 15220

Dear Mr. Bernhardt;

Enclosed, please find two (2) copies of our final report evaluating the toxicity of sediment samples collected as part of the US Navy NSWC Crane Sediment Evaluation. Sediment toxicity was evaluated during June 2005 using the freshwater amphipod, *Hyalella azteca*.

Please do not hesitate to call me or Brian Buzby should you have any questions or comments on the report.

Sincerely,

EnviroSystems, Incorporated

Kenneth A. Simon
President

Enclosure
Two (2) Copies: One (1) Bound, One (1) Unbound
Report Number 13373-05-06

# TOXICOLOGICAL EVALUATION OF SEDIMENT SAMPLES

**US Navy NSWC Crane CTO-0331**
***Hyalella azteca***
**Survival and Growth Tests**
**Project Number 1245**

Prepared For

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June 2005
Reference Number 13373-05-06

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# TOXICOLOGICAL EVALUATION OF SEDIMENT SAMPLES

**US Navy NSWC Crane CTO-0331**
**Sediment Evaluation**
***Hyalella azteca***
**Acute Exposure Sediment Toxicity Tests**

Project Number 1245

## 1.0 INTRODUCTION

Toxicity tests expose groups of organisms to environmental samples, a laboratory control and/or a field reference site for a specified period to assess potential impacts on a variety of endpoints, such as survival, growth or reproduction. Analysis of variance techniques are used to determine the relative toxicity of the samples as compared to the laboratory control and/or field reference site.

This report presents the results of chronic exposure, survival and growth, toxicity tests conducted on six samples collected from the US Navy NSWC Crane, CTO-0331 project site. The samples were provided byTetra Tech NUS, Pittsburgh, PA . Testing was based on programs and protocols developed by the ASTM (2001) and US EPA (2000). The toxicity of the samples was assessed by conducting toxicity tests using the freshwater amphipod *Hyalella azteca*. Assays and supporting analyses were performed at EnviroSystems, Incorporated (ESI), Hampton, New Hampshire.

## 2.0 MATERIALS AND METHODS

### 2.1 General Methods, Biological Evaluations

Toxicological and analytical protocols used in this program follow procedures outlined in *Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates* (ASTM 2004), *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (US EPA 2000) and *Standard Methods for the Examination of Water and Wastewater*, 20th Edition (APHA 1998). These protocols provide standard approaches for physical and chemical analysis and for the evaluation of toxicological effects of sediments on aquatic invertebrates.

### 2.2 Test Species

*H. azteca* were obtained from Aquatic Research Organisms (ARO), Hampton, New Hampshire. Organisms were approximately 8 days old at the start of the assay. Organisms were received at ESI the day prior to starting the assays. Organisms were held in a mix of moderately hard and natural surface water prior to the start of the assay.

## 2.3 Test Samples and Laboratory Control Sediment

A total of seven (7) sediment samples from the US Navy NSWC Crane, CTO-0331 project site were received by ESI on June 9, 2005. Once received, samples were inspected, to determine integrity, given unique sample numbers and logged into the laboratory sample management database. Once logged into the sample management database samples were placed in a secure refrigerated, 2 - 4 °C, storage area until required. A listing of sample description, collection and receipt information is summarized in Table 1.

The amphipod assay laboratory control substrate was an artificial sediment consisting primarily of silica sand, with approximately 2-3%, by weight, of a field collected natural detritus. The detritus was collected above the water line in the pond but in a damp area. The top 0.5 to 1.0 cm of the sediment was collected. The organic detritus was mixed into the silica sand.

Overlying water was a mix of moderately hard synthetic and natural surface water. The surface water was collected from Bow Lake, Strafford, New Hampshire. Use of synthetic/natural surface water over an artificial reconstituted water is recommended by the protocol (EPA 2000, ASTM 2001).

## 2.4 *Hyalella azteca* Survival and Growth Assays

The 10 day amphipod survival and growth tests were conducted according to ASTM Method E 1706-95 (ASTM 2004) and EPA method 100.4 (EPA 2000). Endpoints of the 10 day exposure were survival and growth, measured as dry weight. The tests were started on June 22 and terminated on July 2, 2005.

The site sediment and laboratory control sediment treatments consisted of 8 replicates with 10 organisms/replicate. Test vessels were 400 mL glass beakers containing approximately 100 mL of sediment and 250 mL of overlying water. The overlying water volume to sediment surface area ratio was approximately 7:1. Test vessels were drilled at a consistent height above their bases and the hole covered with Nytex® screen. The screened hole facilitated water exchange without compromising organisms. Vessels were maintained in a water bath during the assay. Depth of the water in the bath was set to be approximately 1 cm below the drain hole in the test vessel to eliminate flow of water from the bath into the test vessel. The water bath was maintained in a limited-access temperature controlled room. Temperatures in the room and water bath were independently maintained at 23 ±1°C. The photoperiod in the test chamber was set at 16:8 hour light:dark. Light was provided by cool white flourescent bulbs.

One day prior to test initiation (Day -1), control and test sediments were sieved using a 4 mm sieve to remove rocks, twigs, and other debris. Sediments were placed in the test vessels. Overlying water was immediately added, and the vessels were left undisturbed overnight to settle. Floating detritus was removed the next morning. On Day 0, organisms were added below the water surface of each test vessel.

Overlying water in each replicate was renewed daily after collection of water quality data. The volume of water added to each test chamber was approximately 500 mL or two volumes. Water exchanges were facilitated by use of a distribution system designed to provide equal, regulated, flow to each chamber. The system was activated manually by the addition of water during the assay.

Prior to the daily overlying water renewal, temperature, specific conductance, pH, and dissolved oxygen were measured in one replicate of each treatment. Temperature data was collected in a surrogate test chamber collected on a hourly basis during the 10 day exposure period. Alkalinity, and hardness of the overlying water were measured at the beginning and end of the assay. Ammonia of the overlying water was measured daily. Water quality data are presented in Table 4. Daily overlying water quality records are available in Appendix A. Each replicate was fed 1.0 mL of a yeast/trout chow/alfalfa suspension after the daily renewal.

After 10 days exposure, all replicates of each test treatment were terminated to collect data for the survival and growth endpoints. Each test chamber was gently swirled to loosen the sediments and the test material was dumped into an 8" stainless steel sieve with a 0.35 mm mesh screen. The sediments were washed through the sieve using synthetic, moderately hard reconstituted water and material left on the screen was sorted to recover of the organisms. This process was continued until the entire sample was evaluated. Organisms recovered were set aside to determine growth. Surviving amphipods were counted and placed on tared weighing pans. Pans were dried overnight at 70°C to obtain dry weight to the nearest 0.01 mg. The mean dry weight of surviving organisms was determined to assess growth.

## 2.5 Statistical Analysis

Endpoints were analyzed using CETIS® (Comprehensive Environmental Toxicity Information System) software to determine significant differences between the test sediments and the laboratory control sediment. Data sets were evaluated to determine normality of distribution and homogeneity of sample variance. Data sets were subsequently evaluated using the appropriate parametric or non-parametric Analysis of Variance (ANOVA) statistic. Pair-wise comparisons were made using the most appropriate two sample analysis. Statistical difference was evaluated at $\alpha=0.05$. Statistical comparisons were made against the laboratory control treatment and the project's reference site.

## 2.6 Quality Control

As part of the laboratory quality control program, reference toxicant evaluations are conducted by ESI on a regular basis for each test species. These results provide relative health and response data while allowing for comparison with historic data sets. Results were within two standard deviations of ESI's historic mean for the species. Results are summarized in Table 5.

## 2.7 Protocol Deviations

Review of data collected during this series of assays documented the following deviations from the prescribed protocol. Review of water quality parameters collected at the beginning and end of the assays documented a greater than 50% change in the alkalinity, hardness, and ammonia levels of the overlying water between the start and end of the assay. Review of the water quality data collected on the renewal water used in the assays documented that prior to being added to the test chambers, there was less than a 50% change in concentration for the identified parameters between the start and end of the assay. The changes reported in the test chambers reflect the influence of the substrate on the water quality parameters. Temperature data from the hourly data logger is unavailable due to a malfunction of the device.

It is the opinion of the study director that the protocol deviations recorded as part of a review of the project data had no significant impact on the overall outcome of the assays.

## 3.0 TOXICOLOGICAL TESTING RESULTS AND DISCUSSION

Amphipod survival and growth data are summarized in Tables 2 and 3, respectively. Water quality data collected during the assays is summarized in Table 4. Reference toxicant data is summarized in Table 5. Support data, including copies of laboratory bench sheets, individual endpoint summaries and statistical analysis data printouts are provided in Appendix A.

### 3.1 *Hyalella azteca* Survival and Growth Evaluation

At the end of the 10 day exposure period, mean survival in laboratory control sediment was 88.8%. Amphipods recovered from laboratory control sediment had a mean dry weight of 0.199 mg/amphipod. The dry weight of a representative group of amphipods at the start of the assay was 0.035 mg/individual. The minimum test acceptability criteria for survival in the laboratory control is 80%. The minimum acceptable criteria for growth is a demonstration of increased dry weight after 10 days exposure. These data indicate that the organisms were healthy and not stressed by handling.

Amphipod survival in the project site sediments at the end of the 10-day exposure period ranged from 86.3% to 98.8%, sites 15SD022-0006 and 15SD024-0006, respectively. Mean dry weights of the surviving amphipods ranged from 0.178 to 0.230 mg/amphipod for sites 15SD022-0006 and 15SD024-0006, respectively. Survival and growth of the amphipods maintained in the reference site sediment, 15SD026-0006 was 93.8% and 0.215 mg/amphipod.

### 3.2 *Hyalella azteca* Test Summary

Review of survival data showed that after 10 days exposure survival and growth of amphipods maintained in the site sediments from the US Navy NSWC Crane project site was not significantly less than survival observed in the laboratory control. Statistical comparisons of survival made against the project reference site, 15SD026-0006, showed no statistically significant reductions in survival for any of the project sites. Analysis of growth data showed that amphipods maintained in sediment from project sites 15SD022-0006 and 15SD023-0006 exhibited statistically significant lower growth as compared to the project reference site sediment.

## 4.0 REFERENCES


APHA. 1998. *Standard Methods for the Examination of Water and Wastewater*, 20th Edition. Washington D.C.

ASTM. 2004. Annual Book of ASTM Standards. Volume 11.05. *Test Methods for Measuring the Toxicity of sediment-Associated Contaminants with Freshwater Invertebrates.* E 1706-00. ASTM, Philadelphia.

U.S. EPA. 2000. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates.* Second Edition. EPA/600-R-99/064.

**Table 1. Sample Collection and Receipt Summary. US Navy NSWC Crane Project Site Ecological Risk Evaluation. Tetra Tech NUS. June 2005.**

| Sample Station | | ESI Ref# | Matrix | Sample Collected Date | Sample Collected Time | Sample Received Date | Sample Received Time |
|---|---|---|---|---|---|---|---|
| 15SD020-0006 | | 001 | Sediment | 06/07/05 | 1215 | 06/09/05 | 1100 |
| 15SD021-0006 | NA | 002 | Sediment | 06/07/05 | 1305 | 06/09/05 | 1100 |
| 15SD022-0006 | | 003 | Sediment | 06/07/05 | 1340 | 06/09/05 | 1100 |
| 15SD023-0006 | | 004 | Sediment | 06/07/05 | 1430 | 06/09/05 | 1100 |
| 15SD026-0006 | | 005 | Sediment | 06/07/05 | 1435 | 06/09/05 | 1100 |
| 15SD025-0006 | NA | 006 | Sediment | 06/07/05 | 1500 | 06/09/05 | 1100 |
| 15SD024-0006 | | 007 | Sediment | 06/07/05 | 1510 | 06/09/05 | 1100 |

NA - Not Analyzed for toxicity.

**Table 2. *Hyalella azteca* Survival Summary. US Navy NSWC Crane Project Site Ecological Risk Evaluation. Tetra Tech NUS. June 2005.**

| Site Reference | ESI Ref # | Mean Survival (%) | Distribution | Variance | Statistical Summary: Statistic | Critical Value | p Value | Significant Difference |
|---|---|---|---|---|---|---|---|---|
| Statistical Comparison of Survival Against Laboratory Control | | | | | | | | |
| Lab Control | -000 | 88.8% | - | - | - | - | - | - |
| 15SD020-0006 | -001 | 88.8% | Normal | Equal | 0.0000 | 1.7613 | 0.5000 | NO |
| 15SD022-0006 | -003 | 86.3% | Normal | Equal | 0.3457 | 1.7613 | 0.3674 | NO |
| 15SD023-0006 | -004 | 93.8% | Normal | Equal | -0.9687 | 1.7613 | 0.8232 | NO |
| 15SD026-0006 | -005 | 93.8% | Normal | Equal | -0.9596 | 1.7613 | 0.8254 | NO |
| 15SD024-0006 | -007 | 98.8% | Normal | Equal | -2.4402 | 1.7613 | 0.9857 | NO |
| Statistical Comparison of Survival Against Project Reference Site - 155D026-0006 | | | | | | | | |
| 15SD026-0006 | -005 | 93.8% | - | - | - | - | - | - |
| 15SD020-0006 | -001 | 88.8% | Normal | Equal | 0.9596 | 1.7613 | 0.1768 | NO |
| 15SD022-0006 | -003 | 86.3% | Normal | Equal | 1.2312 | 1.7613 | 0.1193 | NO |
| 15SD023-0006 | -004 | 93.8% | Non-normal | Equal | 31.5000 | | 0.4796 | NO |
| 15SD024-0006 | -007 | 98.8% | Non-normal | Equal | 23.0000 | | 0.8089 | NO |

**Table 3.** ***Hyalella azteca* Growth Summary. US Navy NSWC Crane Project Site Ecological Risk Evaluation. Tetra Tech NUS. June 2005.**

| Site Reference | ESI Ref # | Mean Dry Weight (mg/amphipod) | Distribution | Variance | Statistical Summary: Statistic | Critical Value | p Value | Significant Difference |
|---|---|---|---|---|---|---|---|---|
| Statistical Comparison of Growth Against Laboratory Control | | | | | | | | |
| Lab Control | -000 | 0.199 | - | - | - | - | - | - |
| 15SD020-0006 | -001 | 0.192 | Normal | Equal | 0.4053 | 1.7613 | 0.3457 | NO |
| 15SD022-0006 | -003 | 0.178 | Normal | Equal | 1.2403 | 1.7613 | 0.1176 | NO |
| 15SD023-0006 | -004 | 0.184 | Normal | Equal | 0.8745 | 1.7613 | 0.1983 | NO |
| 15SD026-0006 | -005 | 0.215 | Normal | Equal | -0.8540 | 1.7613 | 0.7963 | NO |
| 15SD024-0006 | -007 | 0.230 | Normal | Equal | -1.9006 | 1.7613 | 0.9609 | NO |
| Statistical Comparison of Growth Against Project Reference Site - 155D026-0006 | | | | | | | | |
| 15SD026-0006 | -005 | 0.215 | - | - | - | - | - | - |
| 15SD020-0006 | -001 | 0.192 | Normal | Equal | 1.5451 | 1.7613 | 0.0723 | NO |
| 15SD022-0006 | -003 | 0.178 | Normal | Equal | 2.8378 | 1.7613 | 0.0066 | YES |
| 15SD023-0006 | -004 | 0.184 | Normal | Equal | 2.3438 | 1.7613 | 0.0172 | YES |
| 15SD024-0006 | -007 | 0.230 | Normal | Equal | -1.3747 | 1.7613 | 0.9046 | NO |

**Table 4.** ***Hyalella azteca* Water Quality Summary. US Navy NSWC Crane Project Site Ecological Risk Evaluation. Tetra Tech NUS. June 2005.**

| Site ID | ESI Reference | Day | Alkalinity (mg/L) | Ammonia (mg/L) | Hardness (mg/L) | pH (SU) | Conductivity (µmhos/cm) |
|---|---|---|---|---|---|---|---|
| MHR/POND | | Day 0 | <10 | <0.1 | 26 | ND | ND |
| | | Day 10 | <10 | <0.1 | 23 | ND | ND |
| Lab Control | -000 | Day 0 | 23 | <0.1 | 27 | 6.90 | 91 |
| | | Day 10 | 34 | 1.2 | 35 | 7.12 | 134 |
| 15SD020-0006 | -001 | Day 0 | <10 | <0.1 | 45 | 7.52 | 120 |
| | | Day 10 | 54 | <0.1 | 76 | 7.57 | 167 |
| 15SD022-0006 | -003 | Day 0 | 12 | <0.1 | 38 | 7.71 | 130 |
| | | Day 10 | 68 | 0.1 | 84 | 7.78 | 198 |
| 15SD023-0006 | -004 | Day 0 | <10 | <0.1 | 41 | 7.87 | 148 |
| | | Day 10 | 57 | <0.1 | 84 | 7.77 | 200 |
| 15SD026-0006 | -005 | Day 0 | <10 | <0.1 | 39 | 7.74 | 104 |
| | | Day 10 | 28 | <0.1 | 59 | 7.53 | 148 |
| 15SD024-0006 | -007 | Day 0 | 13 | 0.2 | 41 | 7.67 | 140 |
| | | Day 10 | 73 | <0.1 | 100 | 7.87 | 205 |

**Comments:** ND- No data available for this parameter.

**TABLE 5. Reference Toxicant Evaluation. US Navy NSWC Crane Project Site Ecological Risk Evaluation. Tetra Tech NUS. June 2005.**

REFERENCE TOXICANT EVALUATION
(Results are expressed as µg/L Cadmium)

| Species | Start Date | LC-50 | Historic Mean | Number of Tests | ±1 Std Deviation | ±2 Std Deviation |
|---|---|---|---|---|---|---|
| *H. azteca* | 06/22/05 | 0.0020 | 0.013 | 43 | 0.030 | 0.059 |

Note: Reference toxicant testing was conducted at ESI. The historic mean for survival represents the mean determined from the ESI-conducted reference toxicant testing database.

APPENDIX A
RAW DATA
STATISTICAL SUPPORT


| Contents | Number of Pages |
|---|---|
| *H. Azteca* Sediment Evaluation | |
| Daily Water Quality Measurements and Feeding Record | 2 |
| Day 10 Survival Summary | 1 |
| Day 10 Organism Recovery Bench Sheets | 4 |
| Day 10 Survival Statistical Analysis | 10 |
| Day 10 Dry Weight Summary | 1 |
| Day 10 Growth Data Bench Sheets | 1 |
| Initial Dry Weight Data | 1 |
| Day 10 Growth Statistical Analysis | 10 |
| Organism History | 1 |
| Daily Ammonia Values | 7 |
| Sample Receipt and Chain of Custody Records | 2 |
| Total Pages | 40 |

# *H. azteca* 10 DAY EXPOSURE SEDIMENT ASSAY

| STUDY # | CLIENT: | OVERLYING WATER: | START DATE: |
|---|---|---|---|
| 13373 | TTNUS | MHR/POND | 06/22/05 |

| DAY | Lab | | | | -001 | | | | -003 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) |
| 0 | 7.8 | 91 | 6.90 | 24 | 8.2 | 120 | 7.52 | 24 | 8.4 | 130 | 7.71 | 24 |
| 1 | 6.8 | 127 | 6.87 | 24 | 7.5 | 208 | 7.74 | 24 | 8.1 | 212 | 7.99 | 24 |
| 2 | 6.3 | 143 | 6.93 | 23 | 7.0 | 213 | 7.73 | 23 | 7.4 | 249 | 7.92 | 23 |
| 3 | 5.2 | 147 | 7.06 | 24 | 6.0 | 230 | 7.74 | 25 | 6.4 | 271 | 7.96 | 25 |
| 4 | 6.1 | 154 | 7.14 | 25 | 6.5 | 228 | 7.83 | 25 | 6.8 | 278 | 7.99 | 25 |
| 5 | 6.7 | 136 | 7.47 | 25 | 7.1 | 200 | 8.09 | 25 | 7.0 | 240 | 8.17 | 25 |
| 6 | 6.1 | 130 | 7.15 | 24 | 6.9 | 200 | 7.78 | 25 | 7.1 | 235 | 7.98 | 25 |
| 7 | 6.6 | 118 | 7.20 | 25 | 7.0 | 184 | 7.74 | 25 | 7.0 | 216 | 7.93 | 25 |
| 8 | 5.9 | 129 | 7.11 | 25 | 6.6 | 192 | 7.62 | 25 | 6.8 | 235 | 7.83 | 25 |
| 9 | 6.4 | 123 | 7.30 | 24 | 6.6 | 177 | 7.83 | 24 | 6.9 | 211 | 8.08 | 24 |
| 10 | 7.0 | 134 | 7.12 | 24 | 6.8 | 167 | 7.57 | 24 | 7.1 | 198 | 7.78 | 24 |

| DAY | -004 | | | | -005 | | | | Water Quality Station # | S/C Meter # | $\Delta H_2O$ fed | DATE | INIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) | | | | | |
| 0 | 8.4 | 148 | 7.87 | 24 | 8.5 | 104 | 7.74 | 24 | 1 | 330i | ✓ | 6/22/05 | BB |
| 1 | 7.9 | 225 | 8.00 | 24 | 7.9 | 164 | 7.76 | 24 | 1 | 330i | ✓ | 6/23/05 | DABB |
| 2 | 7.6 | 276 | 7.96 | 23 | 7.6 | 178 | 7.73 | 23 | 1 | 330i | ✓ | 6/24/05 | BB |
| 3 | 6.5 | 291 | 7.99 | 25 | 6.6 | 191 | 7.86 | 25 | 1 | 330i | ✓ | 6/25 | RH |
| 4 | 6.8 | 287 | 8.08 | 25 | 7.1 | 190 | 7.88 | 25 | 1 | 330i | ✓ | 6/26/05 | DABB |
| 5 | 7.2 | 243 | 8.20 | 25 | 7.3 | 171 | 7.97 | 25 | 2 | 330i | ✓ | 6/27/05 | DABB |
| 6 | 6.9 | 235 | 8.00 | 25 | 6.9 | 168 | 7.65 | 25 | 1 | 330i | ✓ | 6/28/05 | DABB |
| 7 | 7.0 | 212 | 7.95 | 25 | 7.1 | 154 | 7.76 | 25 | 1 | 330i | ✓ | 6/29/05 | DABB |
| 8 | 7.0 | 231 | 7.87 | 25 | 6.8 | 161 | 7.71 | 25 | 1 | 330i | ✓ | 6/30/05 | DABB |
| 9 | 7.1 | 205 | 7.96 | 24 | 7.3 | 150 | 7.89 | 24 | 2 | 330i | ✓ | 7/1/05 | DABB |
| 10 | 7.3 | 200 | 7.77 | 24 | 7.3 | 148 | 7.53 | 24 | 1 | 330i | | 7/2/05 | DABB |

Date & Initial Chemistry Sampling

| DAY 0 Alkalinity, Hardness & Ammonia in MHR/POND | DAY 0 Alkalinity, Hardness & Ammonia in each treatment | DAY 10 Alkalinity, Hardness & Ammonia in each treatment |
|---|---|---|
| BB | BB | |

FEED 1 mL of YCT food mixture/replicate  Two Volume additions Daily  23 °C

~~Daily Amm~~

~~0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10~~

# *H. azteca* 10 DAY EXPOSURE SEDIMENT ASSAY

| STUDY # | CLIENT: | OVERLYING WATER: | START DATE: |
|---|---|---|---|
| 13373 | TTNUS | MHR/POND | 06/22/05 |

| DAY | -007 DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 8.4 | 140 | 7.67 | 24 | | | | | | | | |
| 1 | 8.2 | 260 | 7.91 | 24 | | | | | | | | |
| 2 | 7.4 | 314 | 7.90 | 23 | | | | | | | | |
| 3 | 6.5 | 331 | 7.96 | 25 | | | | | | | | |
| 4 | 7.2 | 321 | 8.11 | 25 | | | | | | | | |
| 5 | 7.5 | 279 | 8.21 | 25 | | | | | | | | |
| 6 | 7.0 | 266 | 7.99 | 25 | | | | | | | | |
| 7 | 7.1 | 230 | 7.97 | 25 | | | | | | | | |
| 8 | 7.1 | 245 | 7.89 | 25 | | | | | | | | |
| 9 | 7.4 | 214 | 8.09 | 24 | | | | | | | | |
| 10 | 7.6 | 205 | 7.87 | 24 | | | | | | | | |

| DAY | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) | DO (mg/L) | S/C (umhos/cm) | pH (SU) | TEMP (°C) | Water Quality Station # | S/C Meter # | ΔH$_2$O fed | DATE | INIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | 1 | 330i | ✓ | 6/22/05 | BB |
| 1 | | | | | | | | | 1 | 330i | ✓ | 6/23/05 | DHBS |
| 2 | | | | | | | | | 1 | 330i | ✓ | 6/24/05 | BB |
| 3 | | | | | | | | | 1 | 330i | ✓ | 6/25/05 | DHBS |
| 4 | | | | | | | | | 1 | 330i | ✓ | 6/26/05 | DHBS |
| 5 | | | | | | | | | 2 | 330i | ✓ | 6/27/05 | DHBS |
| 6 | | | | | | | | | 1 | 330i | ✓ | 6/28/05 | DHBS |
| 7 | | | | | | | | | 1 | 330i | ✓ | 6/29/05 | DHBS |
| 8 | | | | | | | | | 1 | 330i | ✓ | 6/30/05 | DHBS |
| 9 | | | | | | | | | 2 | 330i | ✓ | 7/1/05 | DHBS |
| 10 | | | | | | | | | 1 | 330i | | 7/2/05 | KBT |

Date & Initial Chemistry Sampling

| DAY 0 Alkalinity, Hardness & Ammonia in MHR/POND | DAY 0 Alkalinity, Hardness & Ammonia in each treatment | DAY 10 Alkalinity, Hardness & Ammonia in each treatment |
|---|---|---|
| BB | BB | |

FEED 1 mL of YCT food mixture/replicate  Two Volume additions Daily  23 °C

Daily Amm*
2, 3, 4, 5, 6, 7, 8, 9, 10

**STUDY:** 13373
**CLIENT:** Tetra Tech NUS, Inc.
**PROJECT:** NSWC CRANE - CTO-0331
**TASK:** H. azteca 10 Day Survival and Growth
**DATA:** Survival
**START DATE:** 06/22/05
**DATE ENDED:** 07/02/05

| Project Site | Replicate | Larvae @ Start | Day 10 Surviving Organisms | Percent Survival | Mean % Survival/ Site | Distribution | Variance | Statistic | Critical Value | p Value | Significant Difference in Survival | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Control | A | 10 | 8 | 80.0% | 88.8% | | | | | | | |
| | B | 10 | 10 | 100.0% | | | | | | | | |
| | C | 10 | 9 | 90.0% | | | | | | | | |
| | D | 10 | 8 | 80.0% | | | | | | | | |
| | E | 10 | 9 | 90.0% | | | | | | | | |
| | F | 10 | 10 | 100.0% | | | | | | | | |
| | G | 10 | 7 | 70.0% | | | | | | | | |
| | H | 10 | 10 | 100.0% | | | | | | | | |
| 155D020-0006 | A | 10 | 7 | 70.0% | 88.8% | Normal | Equal | 0.0000 | 1.7613 | 0.5000 | NO | Lab |
| ESI-001 | B | 10 | 9 | 90.0% | | Normal | Equal | 0.9596 | 1.7613 | 0.1768 | NO | 155D026 |
| | C | 10 | 10 | 100.0% | | | | | | | | |
| | D | 10 | 10 | 100.0% | | | | | | | | |
| | E | 10 | 8 | 80.0% | | | | | | | | |
| | F | 10 | 8 | 80.0% | | | | | | | | |
| | G | 10 | 9 | 90.0% | | | | | | | | |
| | H | 10 | 10 | 100.0% | | | | | | | | |
| 155D022-0006 | A | 10 | 8 | 80.0% | 86.3% | Normal | Equal | 0.3457 | 1.7613 | 0.3674 | NO | Lab |
| ESI-003 | B | 10 | 8 | 80.0% | | Normal | Equal | 1.2312 | 1.7613 | 0.1193 | NO | 155D026 |
| | C | 10 | 10 | 100.0% | | | | | | | | |
| | D | 10 | 9 | 90.0% | | | | | | | | |
| | E | 10 | 8 | 80.0% | | | | | | | | |
| | F | 10 | 10 | 100.0% | | | | | | | | |
| | G | 10 | 6 | 60.0% | | | | | | | | |
| | H | 10 | 10 | 100.0% | | | | | | | | |
| 155D023-0006 | A | 10 | 9 | 90.0% | 93.8% | Normal | Equal | -0.9687 | 1.7613 | 0.8254 | NO | Lab |
| ESI-004 | B | 10 | 7 | 70.0% | | Non-normal | Equal | 31.5000 | | 0.4796 | NO | 155D026 |
| | C | 10 | 10 | 100.0% | | | | | | | | |
| | D | 10 | 10 | 100.0% | | | | | | | | |
| | E | 10 | 10 | 100.0% | | | | | | | | |
| | F | 10 | 10 | 100.0% | | | | | | | | |
| | G | 10 | 10 | 100.0% | | | | | | | | |
| | H | 10 | 9 | 90.0% | | | | | | | | |
| 155D026-0006 | A | 10 | 10 | 100.0% | 93.8% | Normal | Equal | -0.9596 | 1.7613 | 0.8232 | NO | Lab |
| ESI-005 | B | 10 | 10 | 100.0% | | | | | | | | |
| | C | 10 | 10 | 100.0% | | | | | | | | |
| | D | 10 | 10 | 100.0% | | | | | | | | |
| | E | 10 | 8 | 80.0% | | | | | | | | |
| | F | 10 | 10 | 100.0% | | | | | | | | |
| | G | 10 | 8 | 80.0% | | | | | | | | |
| | H | 10 | 9 | 90.0% | | | | | | | | |
| 155D024-0006 | A | 10 | 10 | 100.0% | 98.8% | Normal | Equal | -2.4402 | 1.7613 | 0.9857 | NO | Lab |
| ESI-007 | B | 10 | 9 | 90.0% | | Non-normal | Equal | 23.0000 | | 0.8089 | NO | 155D026 |
| | C | 10 | 10 | 100.0% | | | | | | | | |
| | D | 10 | 10 | 100.0% | | | | | | | | |
| | E | 10 | 10 | 100.0% | | | | | | | | |
| | F | 10 | 10 | 100.0% | | | | | | | | |
| | G | 10 | 10 | 100.0% | | | | | | | | |
| | H | 10 | 10 | 100.0% | | | | | | | | |

ESI STUDY # 13373

*Hyalella azteca* SEDIMENT ASSAY

DAY10:

| SAMPLE ID | TIME | #LIVE ADULTS | COMMENTS | |
|---|---|---|---|---|
| 1A | 1045 | 7 | | |
| 1B | 1048 | 9 | | |
| 1C | 1052 | 10 | | |
| 1D | 1054 | 10 | | |
| 1E | 1055 | 8 | | |
| 1F | 1056 | 8 | | |
| 1G | 1057 | 9 | | |
| 1H | 1058 | 10 | | |
| Lab A | 1020 | 8 | | |
| Lab B | 1025 | 10 | | 9 Pa wt. lost 1 in transfer |
| Lab C | 1035 | 9 | | |
| Lab D | 1043 | 8 | | |
| Lab E | 1050 | 9 | | |
| Lab F | 1055 | 10 | | |
| Lab G | 1205 | 7 | | |
| Lab H | 120 | 10 | | |

ANALYST: CLS

DATE: 7/12/05

ESI STUDY # 13373

*Hyalella azteca* SEDIMENT ASSAY

DAY10:

| SAMPLE ID | TIME | #LIVE ADULTS | COMMENTS | |
|---|---|---|---|---|
| 003A | 1002 | 8 | | |
| 003 B | 1004 | ~~9~~ 8 | | |
| 003 C | 1006 | 10 | | |
| 003 D | 1008 | 9 | | |
| 003 E | 1010 | 8 | | |
| 003 F | 1012 | 10 | | |
| 003 G | 1014 | 6 | | |
| 003 H | 1016 | 10 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

ANALYST: KCAS

DATE: 7/2/05

ESI STUDY # 13373

*Hyalella azteca* SEDIMENT ASSAY

DAY10:

| SAMPLE ID | TIME | #LIVE ADULTS | COMMENTS | |
|---|---|---|---|---|
| -004A | 1125 | 9 | | |
| -004B | 1127 | 7 | | |
| -004C | 1129 | 10 | | |
| -004D | 1132 | 10 | | |
| -004E | 1134 | 10 | | |
| -004F | 1136 | 10 | | |
| -004G | 1139 | 10 | | |
| -004H | 1142 | 9 | | |
| -005A | 1145 | 10 | | |
| -005B | 1148 | 10 | | |
| -005C | 1150 | 10 | | |
| -005D | 1152 | 10 | | |
| -005E | 1155 | 8 | | |
| -005F | 1157 | 10 | | |
| -005G | 1159 | 8 | | |
| -005H | 1200 | 9 | | |

ANALYST: BB

DATE: 7/2/05

ESI STUDY # 13373

*Hyalella azteca* SEDIMENT ASSAY

DAY10:

| SAMPLE ID | TIME | #LIVE ADULTS | COMMENTS | |
|---|---|---|---|---|
| -007 A | 1202 | 10 | | |
| -007 B | 1203 | 9 | | |
| -007 C | 1205 | 10 | | |
| -007 D | 1206 | 10 | | |
| -007 E | 1208 | 10 | | |
| -007 F | 1210 | 10 | | |
| -007 G | 1211 | 10 | | |
| -007 H | 1214 | 10 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | BB 7/2/05 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

ANALYST: BB

DATE: 7/2/05

# CETIS Test Summary

Report Date: 05 Jul-05 11:42 AM
Link: 09-7361-7778

**Hyalella 10-d Survival and Growth Sediment Test**

**EnviroSystems, Inc.**

**Proportion Survived Summary**

| Sample Code | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|
| 13373-000 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.03981 | 0.11260 | 12.69% |
| 13373-005 | 8 | 0.93750 | 0.80000 | 1.00000 | 0.03239 | 0.09161 | 9.77% |
| 13373-001 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.03981 | 0.11260 | 12.69% |
| 13373-003 | 8 | 0.86250 | 0.60000 | 1.00000 | 0.04978 | 0.14079 | 16.32% |
| 13373-004 | 8 | 0.93750 | 0.70000 | 1.00000 | 0.03750 | 0.10607 | 11.31% |
| 13373-007 | 8 | 0.98750 | 0.90000 | 1.00000 | 0.01250 | 0.03536 | 3.58% |

**Proportion Survived Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 |
|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 0.90000 | 1.00000 | 0.70000 | 1.00000 |
| 13373-005 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.80000 | 1.00000 | 0.80000 | 0.90000 |
| 13373-001 | 0.70000 | 0.90000 | 1.00000 | 1.00000 | 0.80000 | 0.80000 | 0.90000 | 1.00000 |
| 13373-003 | 0.80000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 1.00000 | 0.60000 | 1.00000 |
| 13373-004 | 0.90000 | 0.70000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.90000 |
| 13373-007 | 1.00000 | 0.90000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

# *Hyalella azteca* Assay
## GROWTH DATA

**STUDY NUMBER:** 13373 **CLIENT:** TTNUS

| ESI SAMPLE ID | REP | FOIL TARE WEIGHT (g) | *H. azteca* + FOIL (g) |
|---|---|---|---|
| Lab | A | 0.20859 | 0.21020 |
| | B | 0.20841 | 0.21014 |
| | C | 0.20915 | 0.21025 |
| | D | 0.20823 | 0.20959 |
| | E | 0.20784 | 0.20993 |
| | F | 0.20907 | 0.21103 |
| | G | 0.20955 | 0.21139 |
| | H | 0.20800 | 0.21017 |
| -001 | A | 0.20754 | 0.20910 |
| | B | 0.20835 | 0.20956 |
| | C | 0.20871 | 0.21074 |
| | D | 0.20892 | 0.21067 |
| | E | 0.20887 | 0.21045 |
| | F | 0.20842 | 0.21028 |
| | G | 0.20942 | 0.21122 |
| | H | 0.20872 | 0.21045 |
| -003 | A | 0.20991 | 0.21148 |
| | B | 0.20887 | 0.21065 |
| | C | 0.20868 | 0.21028 |
| | D | 0.20851 | 0.21016 |
| | E | 0.20778 | 0.20930 |
| | F | 0.20815 | 0.20977 |
| | G | 0.20833 | 0.20926 |
| | H | 0.20841 | 0.20993 |
| -004 | A | 0.20846 | 0.21014 |
| | B | 0.20857 | 0.21018 |
| | C | 0.20753 | 0.20910 |
| | D | 0.20770 | 0.20933 |
| | E | 0.20840 | 0.21002 |
| | F | 0.20757 | 0.20941 |
| | G | 0.20780 | 0.20966 |
| | H | 0.20808 | 0.20992 |
| RECORDED BY: | | BB | |
| DATE: | | 7/2/05 | 7/5/05 |

| ESI SAMPLE ID | REP | FOIL TARE WEIGHT (g) | *H. azteca* + FOIL (g) |
|---|---|---|---|
| -005 | A | 0.20740 | 0.20942 |
| | B | 0.20828 | 0.21050 |
| | C | 0.21049 | 0.21278 |
| | D | 0.20833 | 0.21072 |
| | E | 0.20901 | 0.21032 |
| | F | 0.20815 | 0.21014 |
| | G | 0.20899 | 0.21094 |
| | H | 0.20710 | 0.20911 |
| -007 | A | 0.20755 | 0.20954 |
| | B | 0.20803 | 0.21017 |
| | C | 0.20826 | 0.21066 |
| | D | 0.20903 | 0.21168 |
| | E | 0.20776 | 0.21007 |
| | F | 0.20815 | 0.21031 |
| | G | 0.20847 | 0.21097 |
| | H | 0.20638 | 0.20837 |
| | A | | |
| | B | | |
| | C | | |
| | D | | |
| | E | | |
| | F | | |
| | G | | |
| | H | | |
| | A | | |
| | B | | |
| | C | | |
| | D | | |
| | E | | |
| | F | | |
| | G | | |
| | H | | |
| RECORDED BY: | | BB | |
| DATE: | | 7/2/05 | 7/5/05 |

NOTES:

## *Hyalella azteca* Assay

**STUDY NUMBER:** 13373 **CLIENT:** TTNUS

| ESI SAMPLE ID | REP | TARE WEIGHT (G) | *H. azteca* + FOIL (G) | NET WEIGHT (MG) | # *H. azteca* | MEAN DRY WEIGHT PER *H. azteca* (MG) |
|---|---|---|---|---|---|---|
| START ORGANISMS | A | 0.20836 | 0.20869 | | | |
| | B | 0.20852 | 0.20888 | | | |
| | C | 0.20880 | 0.20918 | | | |
| | D | 0.20802 | 0.20837 | | | |
| RECORDED BY: | | | | | | |
| DATE: | | 6/22/05 | 6/24/05 | | | |

NOTES:

# CETIS Test Summary

Report Date: 05 Jul-05 4:42 PM
Link: 09-7361-7778

**Hyalella 10-d Survival and Growth Sediment Test** — **EnviroSystems, Inc.**

**Mean Dry Weight-mg Summary**

| Sample Code | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|
| 13373-000 | 8 | 0.19875 | 0.12000 | 0.26000 | 0.01481 | 0.04190 | 21.08% |
| 13373-005 | 8 | 0.21375 | 0.16000 | 0.24000 | 0.00944 | 0.02669 | 12.49% |
| 13373-001 | 8 | 0.19125 | 0.13000 | 0.23000 | 0.01109 | 0.03137 | 16.40% |
| 13373-003 | 8 | 0.17750 | 0.15000 | 0.22000 | 0.00861 | 0.02435 | 13.72% |
| 13373-004 | 8 | 0.18375 | 0.16000 | 0.23000 | 0.00865 | 0.02446 | 13.31% |
| 13373-007 | 8 | 0.23125 | 0.20000 | 0.27000 | 0.00854 | 0.02416 | 10.45% |

**Mean Dry Weight-mg Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 |
|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.20000 | 0.19000 | 0.12000 | 0.17000 | 0.23000 | 0.20000 | 0.26000 | 0.22000 |
| 13373-005 | 0.20000 | 0.22000 | 0.23000 | 0.24000 | 0.16000 | 0.20000 | 0.24000 | 0.22000 |
| 13373-001 | 0.22000 | 0.13000 | 0.20000 | 0.18000 | 0.20000 | 0.23000 | 0.20000 | 0.17000 |
| 13373-003 | 0.20000 | 0.22000 | 0.16000 | 0.18000 | 0.19000 | 0.16000 | 0.16000 | 0.15000 |
| 13373-004 | 0.19000 | 0.23000 | 0.16000 | 0.16000 | 0.16000 | 0.18000 | 0.19000 | 0.20000 |
| 13373-007 | 0.20000 | 0.24000 | 0.24000 | 0.27000 | 0.23000 | 0.22000 | 0.25000 | 0.20000 |

# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:40 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.78403 | 8.88539 | 0.46287 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.95833 | 0.84420 | 0.60307 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.000225 | 0.000225 | 1 | 0.16 | 0.69138 | Non-Significant Effect |
| Error | 0.019175 | 0.0013696 | 14 | | | |
| Total | 0.01940000 | 0.0015946 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-001 | 0.40531 | 1.76131 | 0.3457 | 0.03259 | Non-Significant Effect |

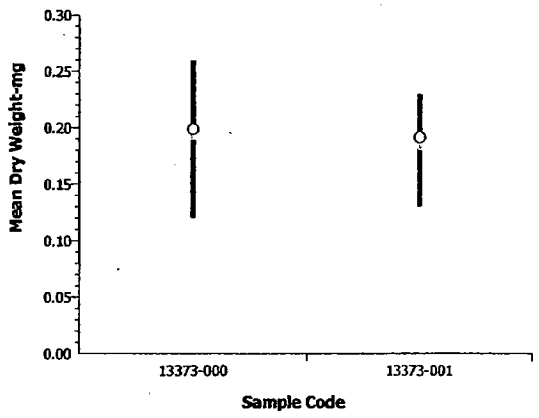
**Data Summary**

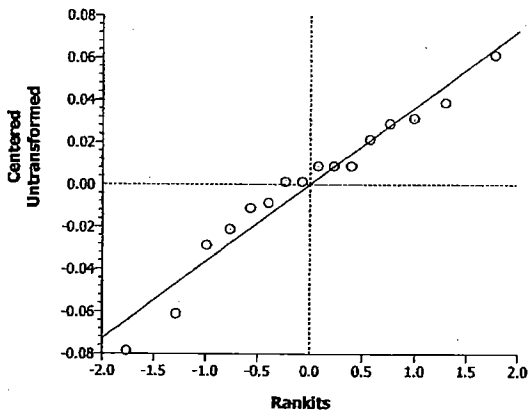
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.19875 | 0.12000 | 0.26000 | 0.04190 | | | | |
| 13373-001 | 8 | 0.19125 | 0.13000 | 0.23000 | 0.03137 | | | | |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.20000 | 0.19000 | 0.12000 | 0.17000 | 0.23000 | 0.20000 | 0.26000 | 0.22000 | | |
| 13373-001 | 0.22000 | 0.13000 | 0.20000 | 0.18000 | 0.20000 | 0.23000 | 0.20000 | 0.17000 | | |

**Graphics**



**STUDY:** 13373
**CLIENT:** Tetra Tech NUS, Inc.
**PROJECT:** NSWC CRANE - CTO-0331
**TASK:** H. azteca 10 Day Survival and Growth
**DATA:** Growth - Dry Weight
**START DATE:** 06/22/05
**DATE ENDED:** 07/02/05
**START WEIGHT:** 0.035 mg

| Project Site | Replicate | Tare Weight | Total Weight | Total Dry Weight | Number Larvae | Mean Dry Weight (mg) | Site Mean Dry Weight (mg) | Distribution | Variance | Statistic | Critical Value | p Value | Significant Difference in Survival |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Control | A | 0.20859 | 0.21020 | 0.00161 | 8 | 0.20 | 0.199 | | | | | | |
| | B | 0.20841 | 0.21014 | 0.00173 | 9 | 0.19 | | | | | | | |
| | C | 0.20915 | 0.21025 | 0.00110 | 9 | 0.12 | | | | | | | |
| | D | 0.20823 | 0.20959 | 0.00136 | 8 | 0.17 | | | | | | | |
| | E | 0.20784 | 0.20993 | 0.00209 | 9 | 0.23 | | | | | | | |
| | F | 0.20907 | 0.21103 | 0.00196 | 10 | 0.20 | | | | | | | |
| | G | 0.20955 | 0.21139 | 0.00184 | 7 | 0.26 | | | | | | | |
| | H | 0.20800 | 0.21017 | 0.00217 | 10 | 0.22 | | | | | | | |
| 155D020-0006 | A | 0.20754 | 0.20910 | 0.00156 | 7 | 0.22 | 0.192 | Normal | Equal | 0.4053 | 1.7613 | 0.3457 | NO |
| ESI-001 | B | 0.20835 | 0.20956 | 0.00121 | 9 | 0.13 | | Normal | Equal | 1.5451 | 1.7613 | 0.0723 | NO |
| | C | 0.20871 | 0.21074 | 0.00203 | 10 | 0.20 | | | | | | | |
| | D | 0.20892 | 0.21067 | 0.00175 | 10 | 0.18 | | | | | | | |
| | E | 0.20887 | 0.21045 | 0.00158 | 8 | 0.20 | | | | | | | |
| | F | 0.20842 | 0.21028 | 0.00186 | 8 | 0.23 | | | | | | | |
| | G | 0.20942 | 0.21122 | 0.00180 | 9 | 0.20 | | | | | | | |
| | H | 0.20872 | 0.21045 | 0.00173 | 10 | 0.17 | | | | | | | |
| 155D022-0006 | A | 0.20991 | 0.21148 | 0.00157 | 8 | 0.20 | 0.178 | Normal | Equal | 1.2403 | 1.7613 | 0.1176 | NO |
| ESI-003 | B | 0.20887 | 0.21065 | 0.00178 | 8 | 0.22 | | Normal | Equal | 2.8378 | 1.7613 | 0.0066 | YES |
| | C | 0.20868 | 0.21028 | 0.00160 | 10 | 0.16 | | | | | | | |
| | D | 0.20851 | 0.21016 | 0.00165 | 9 | 0.18 | | | | | | | |
| | E | 0.20778 | 0.20930 | 0.00152 | 8 | 0.19 | | | | | | | |
| | F | 0.20815 | 0.20977 | 0.00162 | 10 | 0.16 | | | | | | | |
| | G | 0.20833 | 0.20926 | 0.00093 | 6 | 0.16 | | | | | | | |
| | H | 0.20841 | 0.20993 | 0.00152 | 10 | 0.15 | | | | | | | |
| 155D023-0006 | A | 0.20846 | 0.21014 | 0.00168 | 9 | 0.19 | 0.184 | Normal | Equal | 0.8745 | 1.7613 | 0.1983 | NO |
| ESI-004 | B | 0.20857 | 0.21018 | 0.00161 | 7 | 0.23 | | Normal | Equal | 2.3438 | 1.7613 | 0.0172 | YES |
| | C | 0.20753 | 0.20910 | 0.00157 | 10 | 0.16 | | | | | | | |
| | D | 0.20770 | 0.20933 | 0.00163 | 10 | 0.16 | | | | | | | |
| | E | 0.20840 | 0.21002 | 0.00162 | 10 | 0.16 | | | | | | | |
| | F | 0.20757 | 0.20941 | 0.00184 | 10 | 0.18 | | | | | | | |
| | G | 0.20780 | 0.20966 | 0.00186 | 10 | 0.19 | | | | | | | |
| | H | 0.20808 | 0.20992 | 0.00184 | 9 | 0.20 | | | | | | | |
| 155D026-0006 | A | 0.20740 | 0.20942 | 0.00202 | 10 | 0.20 | 0.215 | Normal | Equal | -0.8540 | 1.7613 | 0.7963 | NO |
| ESI-005 | B | 0.20828 | 0.21050 | 0.00222 | 10 | 0.22 | | | | | | | |
| | C | 0.21049 | 0.21278 | 0.00229 | 10 | 0.23 | | | | | | | |
| | D | 0.20833 | 0.21072 | 0.00239 | 10 | 0.24 | | | | | | | |
| | E | 0.20901 | 0.21032 | 0.00131 | 8 | 0.16 | | | | | | | |
| | F | 0.20815 | 0.21011 | 0.00196 | 10 | 0.20 | | | | | | | |
| | G | 0.20899 | 0.21094 | 0.00195 | 8 | 0.24 | | | | | | | |
| | H | 0.20710 | 0.20911 | 0.00201 | 9 | 0.22 | | | | | | | |
| 155D024-0006 | A | 0.20755 | 0.20954 | 0.00199 | 10 | 0.20 | 0.230 | Normal | Equal | -1.9006 | 1.7613 | 0.9609 | NO |
| ESI-007 | B | 0.20803 | 0.21017 | 0.00214 | 9 | 0.24 | | Normal | Equal | -1.3747 | 1.7613 | 0.9046 | NO |
| | C | 0.20826 | 0.21066 | 0.00240 | 10 | 0.24 | | | | | | | |
| | D | 0.20903 | 0.21168 | 0.00265 | 10 | 0.27 | | | | | | | |
| | E | 0.20776 | 0.21007 | 0.00231 | 10 | 0.23 | | | | | | | |
| | F | 0.20815 | 0.21031 | 0.00216 | 10 | 0.22 | | | | | | | |
| | G | 0.20847 | 0.21097 | 0.00250 | 10 | 0.25 | | | | | | | |
| | H | 0.20638 | 0.20837 | 0.00199 | 10 | 0.20 | | | | | | | |

# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Mann-Whitney U | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 5.93016 | 8.88539 | 0.03162 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.79299 | 0.84420 | 0.00145 | Non-normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0232360 | 0.0232360 | 1 | 2.02 | 0.17714 | Non-Significant Effect |
| Error | 0.1610529 | 0.0115038 | 14 | | | |
| Total | 0.18428889 | 0.0347398 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | Ties | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-005 | | 13373-007 | 23 | | 0.8089 | 3 | Non-Significant Effect |

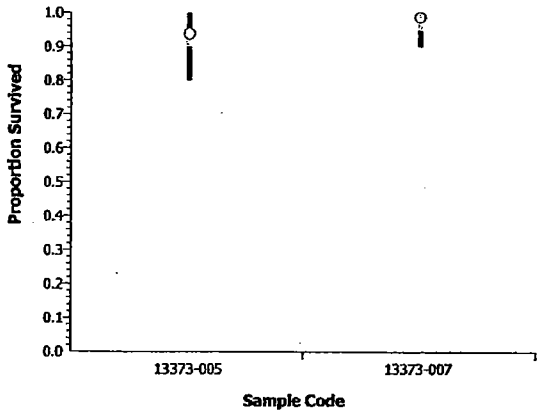
**Data Summary**

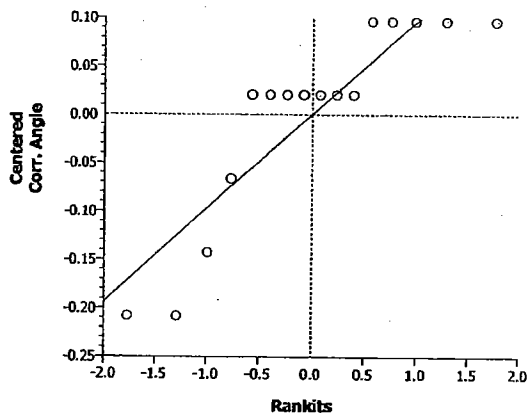
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-005 | 8 | 0.93750 | 0.80000 | 1.00000 | 0.09161 | 1.31543 | 1.10715 | 1.41202 | 0.14031 |
| 13373-007 | 8 | 0.98750 | 0.90000 | 1.00000 | 0.03536 | 1.39164 | 1.24905 | 1.41202 | 0.05762 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-005 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.80000 | 1.00000 | 0.80000 | 0.90000 | | |
| 13373-007 | 1.00000 | 0.90000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — **EnviroSystems, Inc.**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.15934 | 8.88539 | 0.85035 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.89755 | 0.84420 | 0.07356 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0232360 | 0.0232360 | 1 | 0.94 | 0.34911 | Non-Significant Effect |
| Error | 0.3466339 | 0.0247596 | 14 | | | |
| Total | 0.36986988 | 0.0479956 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-004 | -0.9687 | 1.76131 | 0.8254 | 0.13857 | Non-Significant Effect |

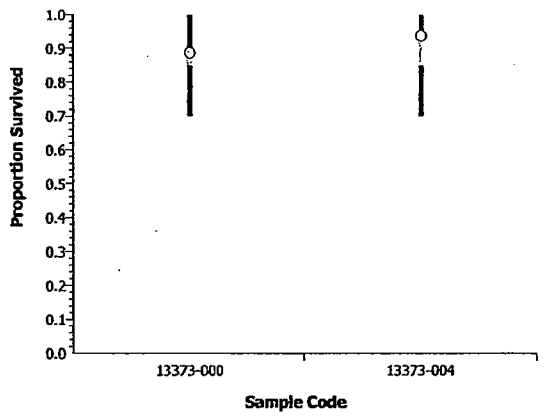
**Data Summary**

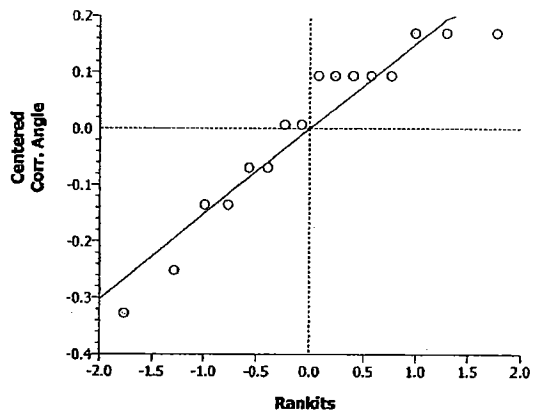
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.11260 | 1.24245 | 0.99116 | 1.41202 | 0.16305 |
| 13373-004 | 8 | 0.93750 | 0.70000 | 1.00000 | 0.10607 | 1.31867 | 0.99116 | 1.41202 | 0.15143 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 0.90000 | 1.00000 | 0.70000 | 1.00000 | | |
| 13373-004 | 0.90000 | 0.70000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.90000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.35042 | 8.88539 | 0.70185 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.88148 | 0.84420 | 0.04042 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0213036 | 0.0213036 | 1 | 0.92 | 0.35356 | Non-Significant Effect |
| Error | 0.3239197 | 0.0231371 | 14 | | | |
| Total | 0.34522326 | 0.0444407 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-005 | -0.9596 | 1.76131 | 0.8232 | 0.13396 | Non-Significant Effect |

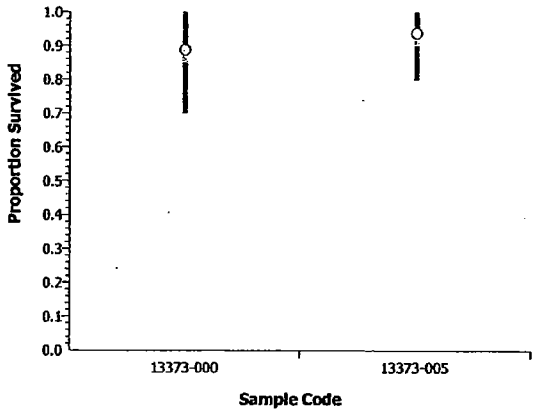
**Data Summary**

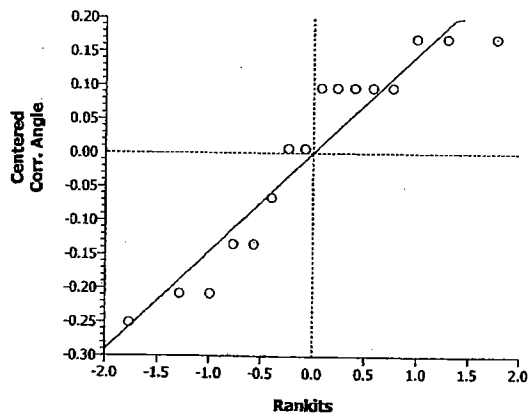
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.11260 | 1.24245 | 0.99116 | 1.41202 | 0.16305 |
| 13373-005 | 8 | 0.93750 | 0.80000 | 1.00000 | 0.09161 | 1.31543 | 1.10715 | 1.41202 | 0.14031 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 0.90000 | 1.00000 | 0.70000 | 1.00000 | | |
| 13373-005 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.80000 | 1.00000 | 0.80000 | 0.90000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — **EnviroSystems, Inc.**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.40026 | 8.88539 | 0.66806 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.89950 | 0.84420 | 0.07909 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0038123 | 0.0038123 | 1 | 0.12 | 0.73474 | Non-Significant Effect |
| Error | 0.4467036 | 0.0319074 | 14 | | | |
| Total | 0.45051598 | 0.0357197 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-003 | 0.34566 | 1.76131 | 0.3674 | 0.15731 | Non-Significant Effect |

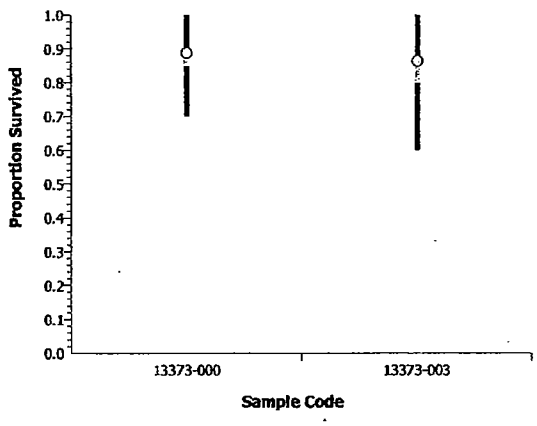
**Data Summary**

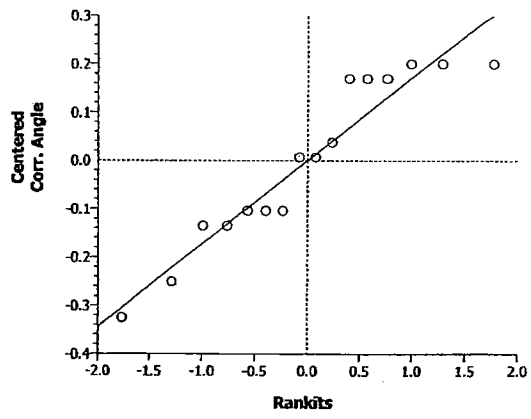
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.11260 | 1.24245 | 0.99116 | 1.41202 | 0.16305 |
| 13373-003 | 8 | 0.86250 | 0.60000 | 1.00000 | 0.14079 | 1.21158 | 0.88608 | 1.41202 | 0.19295 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 0.90000 | 1.00000 | 0.70000 | 1.00000 | | |
| 13373-003 | 0.80000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 1.00000 | 0.60000 | 1.00000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.00000 | 8.88539 | 1.00000 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84848 | 0.84420 | 0.01174 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0 | 0 | 1 | 0.00 | 1.00000 | Non-Significant Effect |
| Error | 0.3722125 | 0.0265866 | 14 | | | |
| Total | 0.37221253 | 0.0265866 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-001 | 0 | 1.76131 | 0.5000 | 0.14359 | Non-Significant Effect |

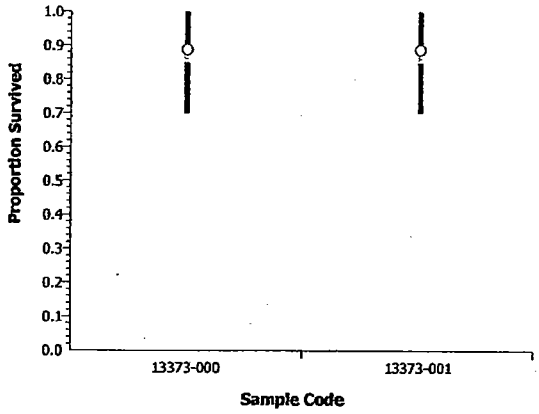
**Data Summary**

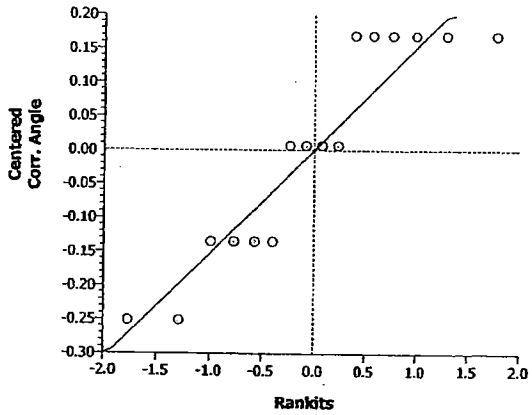
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.11260 | 1.24245 | 0.99116 | 1.41202 | 0.16305 |
| 13373-001 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.11260 | 1.24245 | 0.99116 | 1.41202 | 0.16305 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 0.90000 | 1.00000 | 0.70000 | 1.00000 | | |
| 13373-001 | 0.70000 | 0.90000 | 1.00000 | 1.00000 | 0.80000 | 0.80000 | 0.90000 | 1.00000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:41 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 2.96084 | 8.88539 | 0.17542 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96709 | 0.84420 | 0.75485 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0018063 | 0.0018063 | 1 | 1.54 | 0.23524 | Non-Significant Effect |
| Error | 0.0164375 | 0.0011741 | 14 | | | |
| Total | 0.01824375 | 0.0029804 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-003 | 1.24032 | 1.76131 | 0.1176 | 0.03018 | Non-Significant Effect |

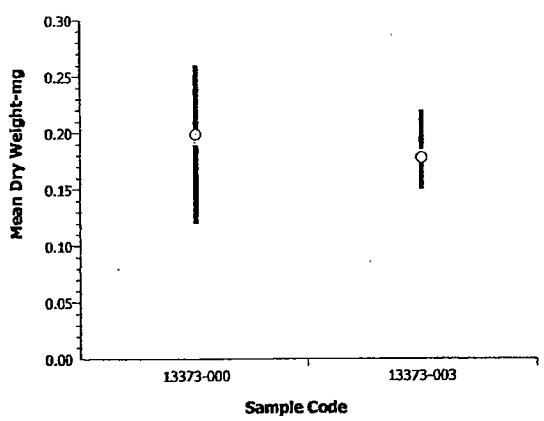
**Data Summary**

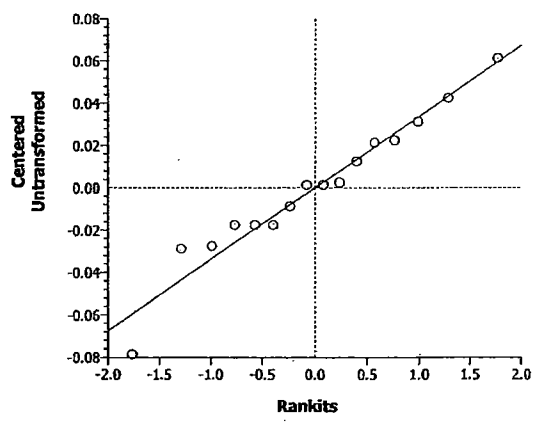
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.19875 | 0.12000 | 0.26000 | 0.04190 | | | | |
| 13373-003 | 8 | 0.17750 | 0.15000 | 0.22000 | 0.02435 | | | | |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.20000 | 0.19000 | 0.12000 | 0.17000 | 0.23000 | 0.20000 | 0.26000 | 0.22000 | | |
| 13373-003 | 0.20000 | 0.22000 | 0.16000 | 0.18000 | 0.19000 | 0.16000 | 0.16000 | 0.15000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:41 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 2.93433 | 8.88539 | 0.17887 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96270 | 0.84420 | 0.67838 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0009 | 0.0009 | 1 | 0.76 | 0.39659 | Non-Significant Effect |
| Error | 0.016475 | 0.0011768 | 14 | | | |
| Total | 0.017375 | 0.0020768 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-004 | 0.87453 | 1.76131 | 0.1983 | 0.03021 | Non-Significant Effect |

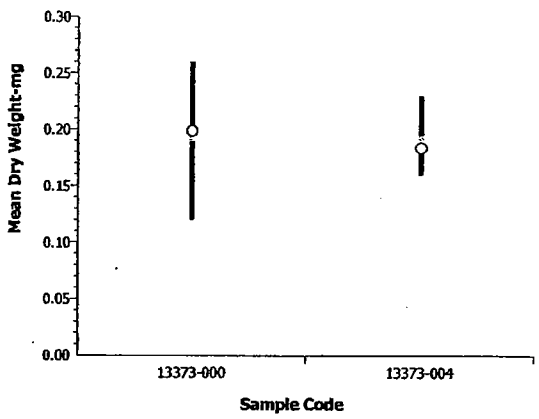
**Data Summary**

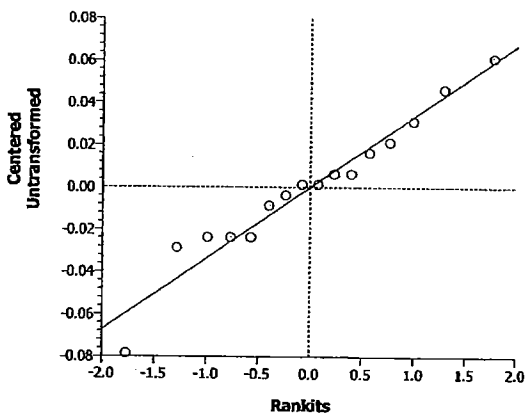
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.19875 | 0.12000 | 0.26000 | 0.04190 | | | | |
| 13373-004 | 8 | 0.18375 | 0.16000 | 0.23000 | 0.02446 | | | | |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.20000 | 0.19000 | 0.12000 | 0.17000 | 0.23000 | 0.20000 | 0.26000 | 0.22000 | | |
| 13373-004 | 0.19000 | 0.23000 | 0.16000 | 0.16000 | 0.16000 | 0.18000 | 0.19000 | 0.20000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — **EnviroSystems, Inc.**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:40 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 2.46366 | 8.88539 | 0.25717 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.95350 | 0.84420 | 0.52384 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0009 | 0.0009 | 1 | 0.73 | 0.40746 | Non-Significant Effect |
| Error | 0.017275 | 0.0012339 | 14 | | | |
| Total | 0.018175 | 0.0021339 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-005 | -0.8540 | 1.76131 | 0.7963 | 0.03094 | Non-Significant Effect |

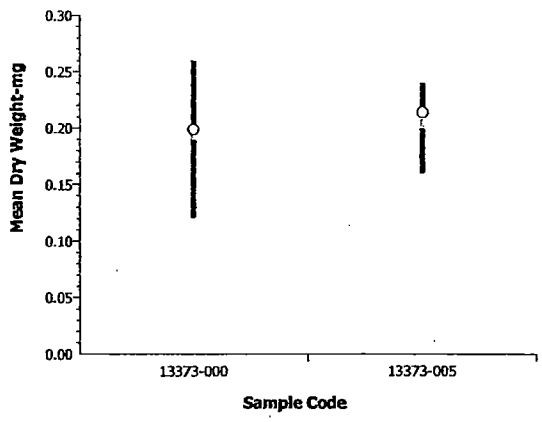
**Data Summary**

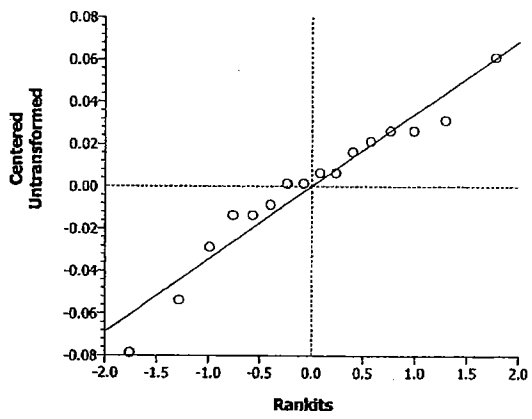
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.19875 | 0.12000 | 0.26000 | 0.04190 | | | | |
| 13373-005 | 8 | 0.21375 | 0.16000 | 0.24000 | 0.02669 | | | | |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.20000 | 0.19000 | 0.12000 | 0.17000 | 0.23000 | 0.20000 | 0.26000 | 0.22000 | | |
| 13373-005 | 0.20000 | 0.22000 | 0.23000 | 0.24000 | 0.16000 | 0.20000 | 0.24000 | 0.22000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:41 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 3.00612 | 8.88539 | 0.16971 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96888 | 0.84420 | 0.78547 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.004225 | 0.004225 | 1 | 3.61 | 0.07815 | Non-Significant Effect |
| Error | 0.016375 | 0.0011696 | 14 | | | |
| Total | 0.0206 | 0.0053946 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-007 | -1.9006 | 1.76131 | 0.9609 | 0.03012 | Non-Significant Effect |

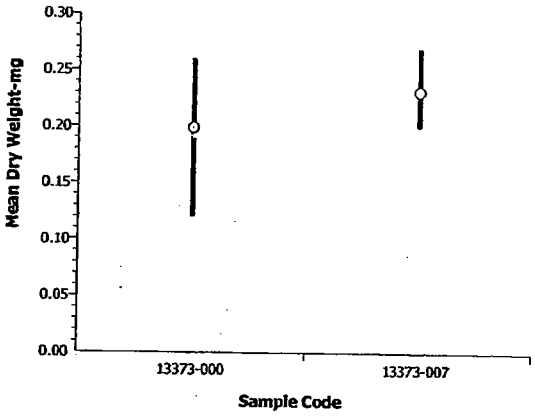
**Data Summary**

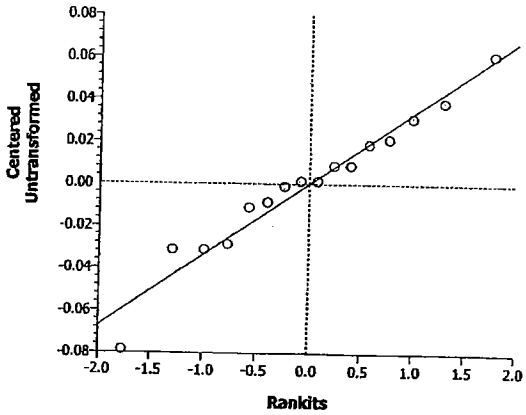
| Sample Code | Count | Original Data Mean | Minimum | Maximum | SD | Transformed Data Mean | Minimum | Maximum | SD |
|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 8 | 0.19875 | 0.12000 | 0.26000 | 0.04190 | | | | |
| 13373-007 | 8 | 0.23125 | 0.20000 | 0.27000 | 0.02416 | | | | |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.20000 | 0.19000 | 0.12000 | 0.17000 | 0.23000 | 0.20000 | 0.26000 | 0.22000 | | |
| 13373-007 | 0.20000 | 0.24000 | 0.24000 | 0.27000 | 0.23000 | 0.22000 | 0.25000 | 0.20000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — **EnviroSystems, Inc.**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:41 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.38095 | 8.88539 | 0.68092 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.91050 | 0.84420 | 0.11870 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.002025 | 0.002025 | 1 | 2.39 | 0.14462 | Non-Significant Effect |
| Error | 0.011875 | 0.0008482 | 14 | | | |
| Total | 0.01390000 | 0.0028732 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-005 | | 13373-001 | 1.54511 | 1.76131 | 0.0723 | 0.02565 | Non-Significant Effect |

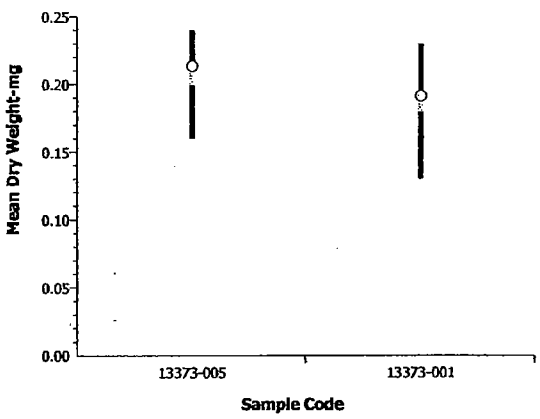
**Data Summary**

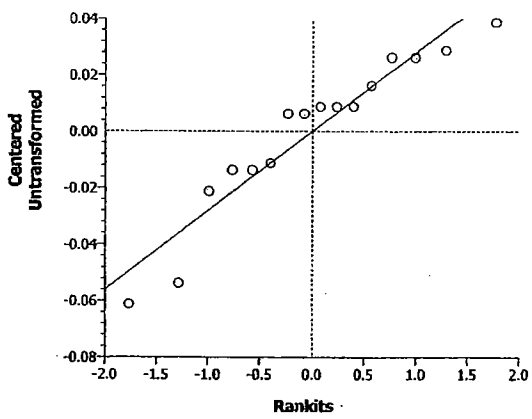
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-005 | 8 | 0.21375 | 0.16000 | 0.24000 | 0.02669 | | | | |
| 13373-001 | 8 | 0.19125 | 0.13000 | 0.23000 | 0.03137 | | | | |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-005 | 0.20000 | 0.22000 | 0.23000 | 0.24000 | 0.16000 | 0.20000 | 0.24000 | 0.22000 | | |
| 13373-001 | 0.22000 | 0.13000 | 0.20000 | 0.18000 | 0.20000 | 0.23000 | 0.20000 | 0.17000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:41 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

## ANOVA Assumptions

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.20181 | 8.88539 | 0.81458 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96524 | 0.84420 | 0.72281 | Normal Distribution |

## ANOVA Table

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0052563 | 0.0052563 | 1 | 8.05 | 0.01316 | Significant Effect |
| Error | 0.0091375 | 0.0006527 | 14 | | | |
| Total | 0.01439375 | 0.0059089 | 15 | | | |

## Group Comparisons

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-005 | | 13373-003 | 2.83784 | 1.76131 | 0.0066 | 0.0225 | Significant Effect |

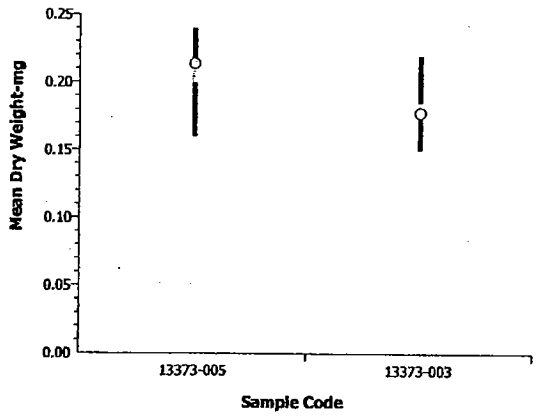
## Data Summary

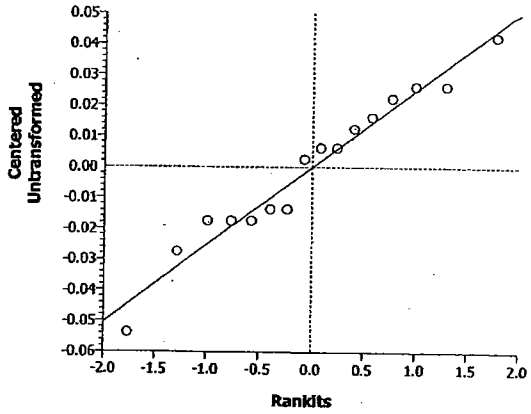
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-005 | 8 | 0.21375 | 0.16000 | 0.24000 | 0.02669 | | | | |
| 13373-003 | 8 | 0.17750 | 0.15000 | 0.22000 | 0.02435 | | | | |

## Data Detail

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-005 | 0.20000 | 0.22000 | 0.23000 | 0.24000 | 0.16000 | 0.20000 | 0.24000 | 0.22000 | | |
| 13373-003 | 0.20000 | 0.22000 | 0.16000 | 0.18000 | 0.19000 | 0.16000 | 0.16000 | 0.15000 | | |

## Graphics



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:41 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.19104 | 8.88539 | 0.82349 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96952 | 0.84420 | 0.79617 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0036 | 0.0036 | 1 | 5.49 | 0.03437 | Significant Effect |
| Error | 0.0091750 | 0.0006554 | 14 | | | |
| Total | 0.01277500 | 0.0042554 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-005 | | 13373-004 | 2.34376 | 1.76131 | 0.0172 | 0.02254 | Significant Effect |

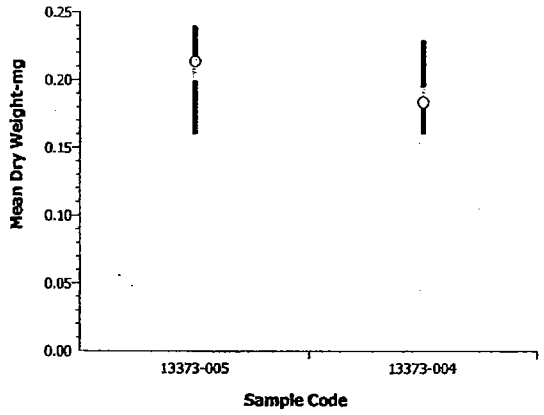
**Data Summary**

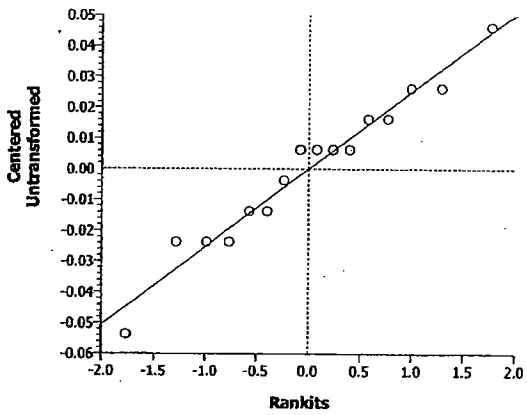
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-005 | 8 | 0.21375 | 0.16000 | 0.24000 | 0.02669 | | | | |
| 13373-004 | 8 | 0.18375 | 0.16000 | 0.23000 | 0.02446 | | | | |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-005 | 0.20000 | 0.22000 | 0.23000 | 0.24000 | 0.16000 | 0.20000 | 0.24000 | 0.22000 | | |
| 13373-004 | 0.19000 | 0.23000 | 0.16000 | 0.16000 | 0.16000 | 0.18000 | 0.19000 | 0.20000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Mean Dry Weight-mg | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 4:41 PM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Untransformed | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.22018 | 8.88539 | 0.79961 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96183 | 0.84420 | 0.66318 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.001225 | 0.001225 | 1 | 1.89 | 0.19083 | Non-Significant Effect |
| Error | 0.009075 | 0.0006482 | 14 | | | |
| Total | 0.01030000 | 0.0018732 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-005 | | 13373-007 | -1.3747 | 1.76131 | 0.9046 | 0.02242 | Non-Significant Effect |

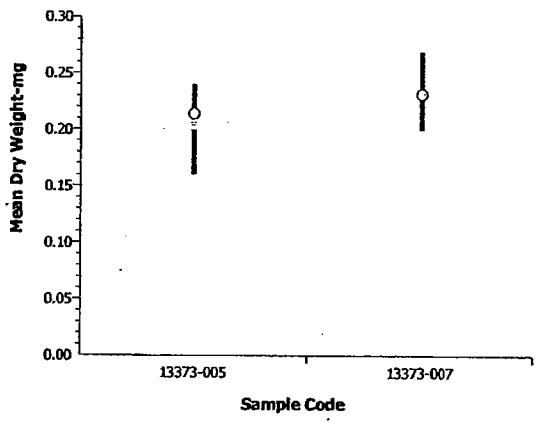
**Data Summary**

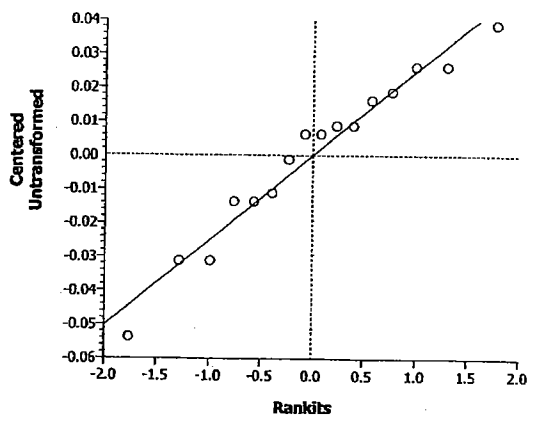
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-005 | 8 | 0.21375 | 0.16000 | 0.24000 | 0.02669 | | | | |
| 13373-007 | 8 | 0.23125 | 0.20000 | 0.27000 | 0.02416 | | | | |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-005 | 0.20000 | 0.22000 | 0.23000 | 0.24000 | 0.16000 | 0.20000 | 0.24000 | 0.22000 | | |
| 13373-007 | 0.20000 | 0.24000 | 0.24000 | 0.27000 | 0.23000 | 0.22000 | 0.25000 | 0.20000 | | |

**Graphics**



# Aquatic Research Organisms

## DATA SHEET

I. **Organism History**

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared____ Field collected____

Hatch date 6/15/05 Receipt date____

Lot number 061505HA Strain____

Brood Origination USFWS MO

II. **Water Quality**

Temperature 24 °C Salinity — ppt DO Sat

pH 7.2 Hardness ~120 ppm

III. **Culture Conditions**

System: RW static renewal

Diet: Flake Food ✓ Phytoplankton____ Trout Chow ✓

Brine Shrimp____ Rotifers____ Other____

Prophylactic Treatments:____

Comments:____

IV. **Shipping Information**

Client: ESI # of Organisms: 700+

Carrier: Pick up Date Shipped: 6/22/05

Biologist: Stan Kositsky

**1 - 800 - 927 - 1650**

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

Report No: 13373
Project: TTNUS Ammonia

Sample ID: Lab
Matrix: Water

| Parameter | Lab ID | Result | Quant Limit | Units | Date Sampled | Date of Analysis | Method/Reference |
|---|---|---|---|---|---|---|---|
| Ammonia-N | 13373-013 | ND | 0.1 | mg/L as N | 06/22/05 | 06/28/05 1327 | APHA 4500-NH3 G |
| Ammonia-N | 13373-029 | 1.1 | 0.1 | mg/L as N | 06/23/05 | 06/28/05 1334 | APHA 4500-NH3 G |
| Ammonia-N | 13373-035 | 1.5 | 0.1 | mg/L as N | 06/24/05 | 06/28/05 1341 | APHA 4500-NH3 G |
| Ammonia-N | 13373-041 | 2 | 0.1 | mg/L as N | 06/25/05 | 06/28/05 1351 | APHA 4500-NH3 G |
| Ammonia-N | 13373-047 | 2.3 | 0.1 | mg/L as N | 06/26/05 | 06/28/05 1534 | APHA 4500-NH3 G |
| Ammonia-N | 13373-053 | 2 | 0.1 | mg/L as N | 06/27/05 | 06/28/05 1539 | APHA 4500-NH3 G |
| Ammonia-N | 13373-059 | 1.7 | 0.1 | mg/L as N | 06/28/05 | 07/06/05 1200 | APHA 4500-NH3 G |
| Ammonia-N | 13373-065 | 1.3 | 0.1 | mg/L as N | 06/29/05 | 07/06/05 1211 | APHA 4500-NH3 G |
| Ammonia-N | 13373-071 | 2 | 0.1 | mg/L as N | 06/30/05 | 07/06/05 1216 | APHA 4500-NH3 G |
| Ammonia-N | 13373-077 | 1.4 | 0.1 | mg/L as N | 07/01/05 | 07/06/05 1224 | APHA 4500-NH3 G |
| Ammonia-N | 13373-088 | 1.2 | 0.1 | mg/L as N | 07/02/05 | 07/13/05 1106 | APHA 4500-NH3 G |

Report No: 13373
Project: TTNUS Ammonia

Sample ID: -001
Matrix: Water

| Parameter | Lab ID | Result | Quant Limit | Units | Date Sampled | Date of Analysis | Method/Reference |
|---|---|---|---|---|---|---|---|
| Ammonia-N | 13373-016 | ND | 0.1 | mg/L as N | 06/22/05 | 06/28/05 1329 | APHA 4500-NH3 G |
| Ammonia-N | 13373-030 | ND | 0.1 | mg/L as N | 06/23/05 | 06/28/05 1337 | APHA 4500-NH3 G |
| Ammonia-N | 13373-036 | ND | 0.1 | mg/L as N | 06/24/05 | 06/28/05 1342 | APHA 4500-NH3 G |
| Ammonia-N | 13373-042 | 0.21 | 0.1 | mg/L as N | 06/25/05 | 06/28/05 1526 | APHA 4500-NH3 G |
| Ammonia-N | 13373-048 | 0.22 | 0.1 | mg/L as N | 06/26/05 | 06/28/05 1535 | APHA 4500-NH3 G |
| Ammonia-N | 13373-054 | ND | 0.1 | mg/L as N | 06/27/05 | 06/28/05 1540 | APHA 4500-NH3 G |
| Ammonia-N | 13373-060 | 0.24 | 0.1 | mg/L as N | 06/28/05 | 07/06/05 1200 | APHA 4500-NH3 G |
| Ammonia-N | 13373-066 | 0.11 | 0.1 | mg/L as N | 06/29/05 | 07/06/05 1212 | APHA 4500-NH3 G |
| Ammonia-N | 13373-072 | ND | 0.1 | mg/L as N | 06/30/05 | 07/06/05 1217 | APHA 4500-NH3 G |
| Ammonia-N | 13373-078 | 0.18 | 0.1 | mg/L as N | 07/01/05 | 07/06/05 1225 | APHA 4500-NH3 G |
| Ammonia-N | 13373-091 | ND | 0.1 | mg/L as N | 07/02/05 | 07/13/05 1107 | APHA 4500-NH3 G |

Report No: 13373
Project: TTNUS Ammonia

Sample ID: -003
Matrix: Water

| Parameter | Lab ID | Result | Quant Limit | Units | Date Sampled | Date of Analysis | Method/Reference |
|---|---|---|---|---|---|---|---|
| Ammonia-N | 13373-019 | ND | 0.1 | mg/L as N | 06/22/05 | 06/28/05 1330 | APHA 4500-NH3 G |
| Ammonia-N | 13373-031 | ND | 0.1 | mg/L as N | 06/23/05 | 06/28/05 1338 | APHA 4500-NH3 G |
| Ammonia-N | 13373-037 | ND | 0.1 | mg/L as N | 06/24/05 | 06/28/05 1343 | APHA 4500-NH3 G |
| Ammonia-N | 13373-043 | ND | 0.1 | mg/L as N | 06/25/05 | 06/28/05 1528 | APHA 4500-NH3 G |
| Ammonia-N | 13373-049 | ND | 0.1 | mg/L as N | 06/26/05 | 06/28/05 1536 | APHA 4500-NH3 G |
| Ammonia-N | 13373-055 | ND | 0.1 | mg/L as N | 06/27/05 | 06/28/05 1543 | APHA 4500-NH3 G |
| Ammonia-N | 13373-061 | 0.14 | 0.1 | mg/L as N | 06/28/05 | 07/06/05 1201 | APHA 4500-NH3 G |
| Ammonia-N | 13373-067 | ND | 0.1 | mg/L as N | 06/29/05 | 07/06/05 1213 | APHA 4500-NH3 G |
| Ammonia-N | 13373-073 | ND | 0.1 | mg/L as N | 06/30/05 | 07/06/05 1218 | APHA 4500-NH3 G |
| Ammonia-N | 13373-079 | 0.14 | 0.1 | mg/L as N | 07/01/05 | 07/06/05 1226 | APHA 4500-NH3 G |
| Ammonia-N | 13373-094 | 0.11 | 0.1 | mg/L as N | 07/02/05 | 07/13/05 1108 | APHA 4500-NH3 G |

Report No: 13373
Project: TTNUS Ammonia

Sample ID: -004
Matrix: Water

| Parameter | Lab ID | Result | Quant Limit | Units | Date Sampled | Date of Analysis | Method/Reference |
|---|---|---|---|---|---|---|---|
| Ammonia-N | 13373-022 | ND | 0.1 | mg/L as N | 06/22/05 | 06/28/05 1331 | APHA 4500-NH3 G |
| Ammonia-N | 13373-032 | ND | 0.1 | mg/L as N | 06/23/05 | 06/28/05 1339 | APHA 4500-NH3 G |
| Ammonia-N | 13373-038 | ND | 0.1 | mg/L as N | 06/24/05 | 06/28/05 1344 | APHA 4500-NH3 G |
| Ammonia-N | 13373-044 | 0.19 | 0.1 | mg/L as N | 06/25/05 | 06/28/05 1529 | APHA 4500-NH3 G |
| Ammonia-N | 13373-050 | 0.13 | 0.1 | mg/L as N | 06/26/05 | 06/28/05 1537 | APHA 4500-NH3 G |
| Ammonia-N | 13373-056 | ND | 0.1 | mg/L as N | 06/27/05 | 06/28/05 1544 | APHA 4500-NH3 G |
| Ammonia-N | 13373-062 | ND | 0.1 | mg/L as N | 06/28/05 | 07/06/05 1202 | APHA 4500-NH3 G |
| Ammonia-N | 13373-068 | 0.15 | 0.1 | mg/L as N | 06/29/05 | 07/06/05 1214 | APHA 4500-NH3 G |
| Ammonia-N | 13373-074 | 0.12 | 0.1 | mg/L as N | 06/30/05 | 07/06/05 1221 | APHA 4500-NH3 G |
| Ammonia-N | 13373-080 | 0.12 | 0.1 | mg/L as N | 07/01/05 | 07/06/05 1226 | APHA 4500-NH3 G |
| Ammonia-N | 13373-097 | ND | 0.1 | mg/L as N | 07/02/05 | 07/13/05 1111 | APHA 4500-NH3 G |

Report No: 13373
Project: TTNUS Ammonia

Sample ID: -005
Matrix: Water

| Parameter | Lab ID | Result | Quant Limit | Units | Date Sampled | Date of Analysis | Method/Reference |
|---|---|---|---|---|---|---|---|
| Ammonia-N | 13373-025 | ND | 0.1 | mg/L as N | 06/22/05 | 06/28/05 1332 | APHA 4500-NH3 G |
| Ammonia-N | 13373-033 | ND | 0.1 | mg/L as N | 06/23/05 | 06/28/05 1340 | APHA 4500-NH3 G |
| Ammonia-N | 13373-039 | ND | 0.1 | mg/L as N | 06/24/05 | 06/28/05 1345 | APHA 4500-NH3 G |
| Ammonia-N | 13373-045 | 0.23 | 0.1 | mg/L as N | 06/25/05 | 06/28/05 1532 | APHA 4500-NH3 G |
| Ammonia-N | 13373-051 | ND | 0.1 | mg/L as N | 06/26/05 | 06/28/05 1537 | APHA 4500-NH3 G |
| Ammonia-N | 13373-057 | ND | 0.1 | mg/L as N | 06/27/05 | 06/28/05 1545 | APHA 4500-NH3 G |
| Ammonia-N | 13373-063 | 0.19 | 0.1 | mg/L as N | 06/28/05 | 07/06/05 1203 | APHA 4500-NH3 G |
| Ammonia-N | 13373-069 | ND | 0.1 | mg/L as N | 06/29/05 | 07/06/05 1215 | APHA 4500-NH3 G |
| Ammonia-N | 13373-075 | ND | 0.1 | mg/L as N | 06/30/05 | 07/06/05 1222 | APHA 4500-NH3 G |
| Ammonia-N | 13373-081 | 0.15 | 0.1 | mg/L as N | 07/01/05 | 07/06/05 1227 | APHA 4500-NH3 G |
| Ammonia-N | 13373-100 | ND | 0.1 | mg/L as N | 07/02/05 | 07/13/05 1116 | APHA 4500-NH3 G |

Report No: 13373
Project: TTNUS Ammonia

Sample ID: -007
Matrix: Water

| Parameter | Lab ID | Result | Quant Limit | Units | Date Sampled | Date of Analysis | Method/Reference |
|---|---|---|---|---|---|---|---|
| Ammonia-N | 13373-028 | 0.2 | 0.1 | mg/L as N | 06/22/05 | 06/28/05 1333 | APHA 4500-NH3 G |
| Ammonia-N | 13373-034 | ND | 0.1 | mg/L as N | 06/23/05 | 06/28/05 1340 | APHA 4500-NH3 G |
| Ammonia-N | 13373-040 | 0.15 | 0.1 | mg/L as N | 06/24/05 | 06/28/05 1348 | APHA 4500-NH3 G |
| Ammonia-N | 13373-046 | 0.36 | 0.1 | mg/L as N | 06/25/05 | 06/28/05 1533 | APHA 4500-NH3 G |
| Ammonia-N | 13373-052 | ND | 0.1 | mg/L as N | 06/26/05 | 06/28/05 1538 | APHA 4500-NH3 G |
| Ammonia-N | 13373-058 | ND | 0.1 | mg/L as N | 06/27/05 | 06/28/05 1546 | APHA 4500-NH3 G |
| Ammonia-N | 13373-064 | ND | 0.1 | mg/L as N | 06/28/05 | 07/06/05 1206 | APHA 4500-NH3 G |
| Ammonia-N | 13373-070 | ND | 0.1 | mg/L as N | 06/29/05 | 07/06/05 1215 | APHA 4500-NH3 G |
| Ammonia-N | 13373-076 | 0.24 | 0.1 | mg/L as N | 06/30/05 | 07/06/05 1223 | APHA 4500-NH3 G |
| Ammonia-N | 13373-082 | 0.1 | 0.1 | mg/L as N | 07/01/05 | 07/06/05 1233 | APHA 4500-NH3 G |
| Ammonia-N | 13373-103 | ND | 0.1 | mg/L as N | 07/02/05 | 07/13/05 1117 | APHA 4500-NH3 G |

Report No: 13373
Project: TTNUS Ammonia

Sample ID: MHR/POND
Matrix: Water

| Parameter | Lab ID | Result | Quant Limit | Units | Date Sampled | Date of Analysis | Method/Reference |
|---|---|---|---|---|---|---|---|
| Ammonia-N | 13373-010 | ND | 0.1 | mg/L as N | 06/22/05 | 06/28/05 1321 | APHA 4500-NH3 G |
| Ammonia-N | 13373-085 | ND | 0.1 | mg/L as N | 07/02/05 | 07/13/05 1105 | APHA 4500-NH3 G |

# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 8.00822 | 8.88539 | 0.01356 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86650 | 0.84420 | 0.02307 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0890373 | 0.0890373 | 1 | 5.95 | 0.02858 | Significant Effect |
| Error | 0.2093457 | 0.0149533 | 14 | | | |
| Total | 0.29838297 | 0.1039905 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-000 | | 13373-007 | -2.4402 | 1.76131 | 0.9857 | 0.10769 | Non-Significant Effect |

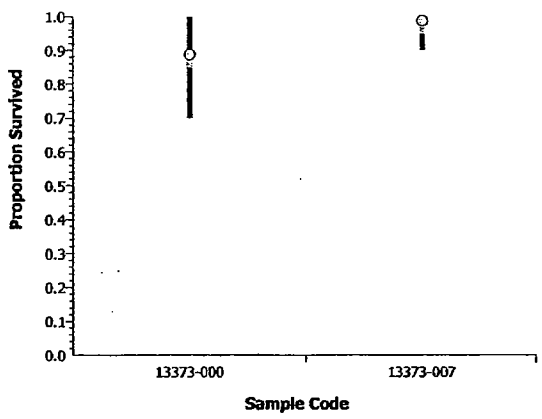
**Data Summary**

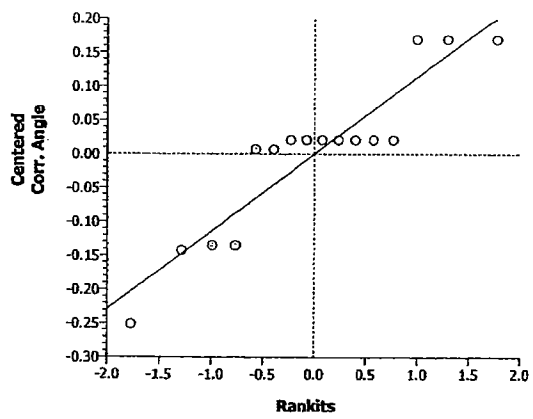
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-000 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.11260 | 1.24245 | 0.99116 | 1.41202 | 0.16305 |
| 13373-007 | 8 | 0.98750 | 0.90000 | 1.00000 | 0.03536 | 1.39164 | 1.24905 | 1.41202 | 0.05762 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 0.90000 | 1.00000 | 0.70000 | 1.00000 | | |
| 13373-007 | 1.00000 | 0.90000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.35042 | 8.88539 | 0.70185 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.88148 | 0.84420 | 0.04042 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0213036 | 0.0213036 | 1 | 0.92 | 0.35356 | Non-Significant Effect |
| Error | 0.3239197 | 0.0231371 | 14 | | | |
| Total | 0.34522326 | 0.0444407 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-005 | | 13373-001 | 0.95956 | 1.76131 | 0.1768 | 0.13396 | Non-Significant Effect |

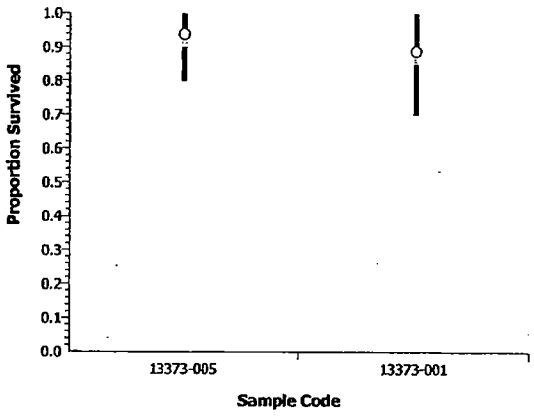
**Data Summary**

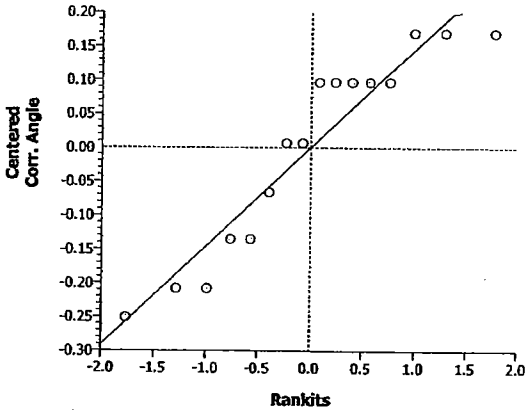
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-005 | 8 | 0.93750 | 0.80000 | 1.00000 | 0.09161 | 1.31543 | 1.10715 | 1.41202 | 0.14031 |
| 13373-001 | 8 | 0.88750 | 0.70000 | 1.00000 | 0.11260 | 1.24245 | 0.99116 | 1.41202 | 0.16305 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-005 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.80000 | 1.00000 | 0.80000 | 0.90000 | | |
| 13373-001 | 0.70000 | 0.90000 | 1.00000 | 1.00000 | 0.80000 | 0.80000 | 0.90000 | 1.00000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.89094 | 8.88539 | 0.41976 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.91117 | 0.84420 | 0.12166 | Normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.04314 | 0.04314 | 1 | 1.52 | 0.23852 | Non-Significant Effect |
| Error | 0.3984108 | 0.0284579 | 14 | | | |
| Total | 0.44155078 | 0.0715979 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-005 | | 13373-003 | 1.23123 | 1.76131 | 0.1193 | 0.14856 | Non-Significant Effect |

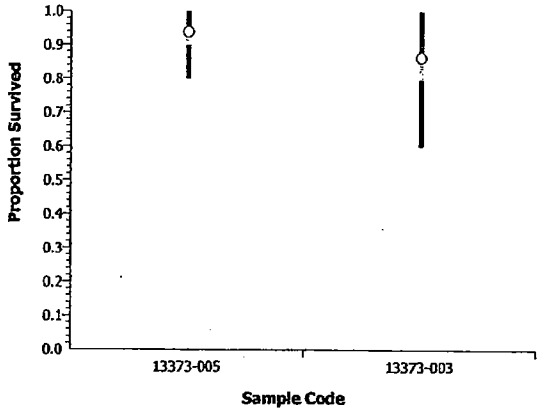
**Data Summary**

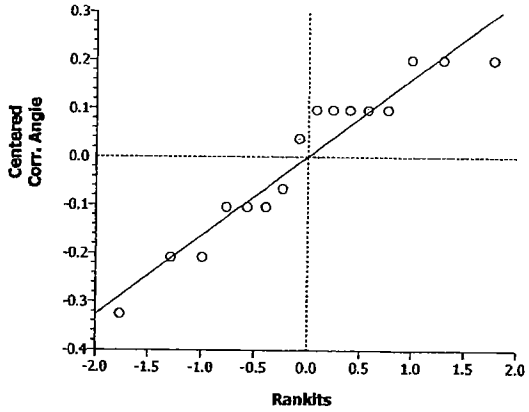
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-005 | 8 | 0.93750 | 0.80000 | 1.00000 | 0.09161 | 1.31543 | 1.10715 | 1.41202 | 0.14031 |
| 13373-003 | 8 | 0.86250 | 0.60000 | 1.00000 | 0.14079 | 1.21158 | 0.88608 | 1.41202 | 0.19295 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-005 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.80000 | 1.00000 | 0.80000 | 0.90000 | | |
| 13373-003 | 0.80000 | 0.80000 | 1.00000 | 0.90000 | 0.80000 | 1.00000 | 0.60000 | 1.00000 | | |

**Graphics**



# CETIS Analysis Detail

**Hyalella 10-d Survival and Growth Sediment Test** — EnviroSystems, Inc.

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Proportion Survived | Comparison | 09-7361-7778 | 09-7361-7778 | 05 Jul-05 11:41 AM | CETISv1.026 |

| Method | Alt H | Data Transform | Z | NOEL | LOEL | Toxic Units | ChV | MSDp |
|---|---|---|---|---|---|---|---|---|
| Mann-Whitney U | C > T | Angular (Corrected) | | | | N/A | | |

**ANOVA Assumptions**

| Attribute | Test | Statistic | Critical | P Level | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio | 1.16482 | 8.88539 | 0.84565 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.72137 | 0.84420 | 0.00009 | Non-normal Distribution |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P Level | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 4.194E-05 | 4.194E-05 | 1 | 0.00 | 0.96524 | Non-Significant Effect |
| Error | 0.298341 | 0.0213101 | 14 | | | |
| Total | 0.29838298 | 0.0213520 | 15 | | | |

**Group Comparisons**

| Sample | vs | Sample | Statistic | Critical | P Level | Ties | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| 13373-005 | | 13373-004 | 31.5 | | 0.4796 | 3 | Non-Significant Effect |

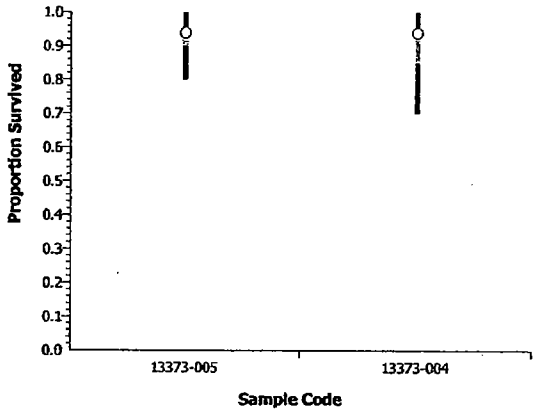
**Data Summary**

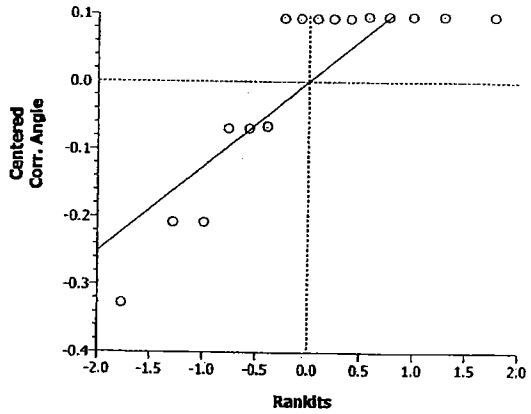
| | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Code | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 13373-005 | 8 | 0.93750 | 0.80000 | 1.00000 | 0.09161 | 1.31543 | 1.10715 | 1.41202 | 0.14031 |
| 13373-004 | 8 | 0.93750 | 0.70000 | 1.00000 | 0.10607 | 1.31867 | 0.99116 | 1.41202 | 0.15143 |

**Data Detail**

| Sample Code | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 | Rep 6 | Rep 7 | Rep 8 | Rep 9 | Rep 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13373-005 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.80000 | 1.00000 | 0.80000 | 0.90000 | | |
| 13373-004 | 0.90000 | 0.70000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.90000 | | |

**Graphics**



# LABORATORY SAMPLE RECEIVING LOG

ESI Project Number: 13373 Date/Time Received: 6/9/05 1100

Client Name and Address: TTNUS

Method of Shipment/ Pick Up: From: Client

Via: Fed Ex

Description of Shipping / Packing Containers(s)
(Number, Type, Size)

| Sample ID | ESI # | # Containers/Vol/Wt | Other | Sampled |
|---|---|---|---|---|
| 155D020 | -001 | 1x1g | | 6/7/05 |
| 155D021 | -002 | | | |
| 155D022 | -003 | | | |
| 155D023 | -004 | | | |
| 155D026 | -005 | | | |
| 155D025 | -006 | | | |
| 155D024 | -007 | | | |
| | | | | |
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| | | | | |

Sample Storage Location and Required Storage Conditions Refrigerator "F" Locked, 4°C & Dark

Signature: [signature] Date: 6/9/05

Notes:

Date and Description of Final Sample Removal / Disposal:

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER 3258 | PAGE 1 OF 1

| PROJECT NO: | FACILITY: | PROJECT MANAGER | PHONE NUMBER | LABORATORY NAME AND CONTACT: |
|---|---|---|---|---|
| CTO 0331 1245 | NSWC CRAN | RALPH BASINSKI | (412) 921-8308 | ENVIROSYSTEMS, INC / PETRA KARBE |
| SAMPLERS (SIGNATURE) | | FIELD OPERATIONS LEADER | PHONE NUMBER | ADDRESS |
| Terry Rojahn | | TERRY ROJAHN | (412) 921-8857 | 1 LAFAYETTE ROAD |
| | | CARRIER/WAYBILL NUMBER | | CITY, STATE |
| | | FED. EX. AB# 8447 8135 4848 | | HAMPTON, NH 03843 |

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): R
PRESERVATIVE USED: 4°C

| DATE YEAR 2005 | 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 | TYPE OF ANALYSIS: Toxicity * | | | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/7 | 1215 | 15SD020 0006 ~~08~~ (TR) | 15SW SD020 | 0 | 4 | SD | G | 1 | 1 | | | | | | | | 13373-001 |
| 6/7 | 1305 | 15SD021 0006 | 15SW SD21 | 0 | 4 | SD | G | 1 | 1 | | | | | | | | -002 |
| 6/7 | 1340 | 15SD022 0006 | 15SW SD 22 | 0 | 4 | SD | G | 1 | 1 | | | | | | | | -003 |
| 6/7 | 1430 | 15SD023 0006 | 15SW SD 23 | 0 | 4 | SD | G | 1 | 1 | | | | | | | | -004 |
| 6/7 | 1435 | 15SD026 0006 | 15SW SD26 | 0 | 4 | SD | G | 1 | 1 | | | | | | | | -005 |
| 6/7 | 1500 | 15SD025 0006 | 15SW SD25 | 0 | 4 | SD | G | 1 | 1 | | | | | | | | -006 |
| 6/7 | 1510 | 15SD024 0006 | 15SW SD24 | 0 | 4 | SD | G | 1 | 1 | | | | | | | | -007 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. RELINQUISHED BY Terry Rojahn | DATE 6/08/05 | TIME 1030 | 1. RECEIVED BY FEDERAL EXPRESS | DATE 6/08/05 | TIME 1030 |
| 2. RELINQUISHED BY | DATE | TIME | 2. RECEIVED BY [signature] | DATE 6/9/05 | TIME 1100 |
| 3. RELINQUISHED BY | DATE | TIME | 3. RECEIVED BY | DATE | TIME |

COMMENTS * 10-DAY HYALELLA AZTECA SEDIMENT TOXICITY Rec'd on ice 4°C

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

**TABLE J.5-1**

**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 | 0.01687 | 0.01525 | 0.01921 | 0.0103 | 0.0162 | 0.0038 | 0.0043 | 0.0002142 | 0.000337 | 0.97 | 0.97 | 0.97 |
| Meadow Vole | 0.03663 | 0.0329 | 0.0391 | 0.0119 | 0.0128 | 0.0064 | 0.0077 | 0.00008568 | 0.00009216 | 0.16 | 0.03 | 1.06 |
| Mink | 1.02 | 0.55 | 1.734 | 0.1606 | 0.2243 | 0.0805 | 0.1907 | 0.000522 | 0.002411 | 35 | 19 | 50 |

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).

**TABLE J.5-2**

**MAMMALIAN TRVS USED IN THE CONSERVATIVE SCENARIO FOOD-CHAIN MODELS**

| Parameter | Mammals | | | | Short-tailed Shrew | | Meadow Vole | | Mink | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOAEL | LOAEL | Test Species | Body Weight (kg) | NOAEL | LOAEL | NOAEL | LOAEL | NOAEL | LOAEL |
| **SEMIVOLATILES (mg/kg)** | | | | | | | | | | |
| Acenaphthene | 17.5 | 35 | mouse | 0.03 | 27.3 | 54.7 | 13.4 | 26.9 | 0.3 | 0.6 |
| Acenaphthylene | 70 | 700 | mouse | 0.03 | 109.3 | 1093.2 | 53.7 | 537.1 | 1.2 | 12.1 |
| Anthracene | 100 | 1000 | mouse | 0.03 | 156 | 1562 | 77 | 767.3 | 2 | 17 |
| Benzo(a)anthracene | 0.17 | 1.7 | mouse | 0.03 | 0.3 | 2.7 | 0.13 | 1.3 | 0.00 | 0.0 |
| Benzo(a)pyrene | 1 | 10 | mouse | 0.03 | 1.6 | 15.6 | 0.77 | 7.7 | 0.02 | 0.2 |
| Benzo(g,h,i)perylene | 7.2 | 72 | mouse | 0.03 | 11.2 | 112.4 | 5.52 | 55.2 | 0.12 | 1.2 |
| Benzo(k)fluoranthene | 7.2 | 72 | mouse | 0.03 | 11.2 | 112.4 | 5.52 | 55.2 | 0.12 | 1.2 |
| Chrysene | 0.17 | 1.7 | mouse | 0.03 | 0.3 | 2.7 | 0.13 | 1.3 | 0.00 | 0.0 |
| Dibenzo(a,h)anthracene | 1.33 | 13.3 | mouse | 0.03 | 2.1 | 20.8 | 1.02 | 10.2 | 0.02 | 0.2 |
| Fluoranthene | 12.5 | 25 | mouse | 0.03 | 19.5 | 39.0 | 9.6 | 19.2 | 0.2 | 0.4 |
| Fluorene | 12.5 | 25 | mouse | 0.03 | 19.5 | 39.0 | 9.6 | 19.2 | 0.2 | 0.4 |
| Indeno(1,2,3-cd)pyrene | 7.2 | 72 | mouse | 0.03 | 11.2 | 112.4 | 5.52 | 55.2 | 0.12 | 1.2 |
| Pentachlorophenol | 0.24 | 2.4 | rat | 0.35 | 4.4 | 43.7 | 2.1 | 21.5 | 0.0 | 0.5 |
| Phenanthrene | 1 | 10 | mouse | 0.03 | 1.6 | 15.6 | 0.8 | 7.7 | 0.0 | 0.2 |
| Pyrene | 7.5 | 12.5 | mouse | 0.03 | 11.7 | 19.5 | 5.8 | 9.6 | 0.1 | 0.2 |
| **PESTICIDES/PCBs (mg/kg)** | | | | | | | | | | |
| 4,4'-DDD | 0.8 | 4 | rat | 0.35 | 14.6 | 72.9 | 7.2 | 35.8 | 0.16 | 0.8 |
| 4,4'-DDE | 0.8 | 4 | rat | 0.35 | 14.6 | 72.9 | 7.2 | 35.8 | 0.16 | 0.8 |
| 4,4'-DDT | 0.8 | 4 | rat | 0.35 | 14.6 | 72.9 | 7.2 | 35.8 | 0.16 | 0.8 |
| Alpha-Chlordane | 4.58 | 9.16 | mouse | 0.03 | 7.2 | 14.3 | 3.5 | 7.0 | 0.1 | 0.2 |
| Aroclor-1254 | 0.068 | 0.68 | Oldfield mouse | 0.014 | 0.05 | 0.50 | 0.02 | 0.2 | 0.00 | 0.01 |
| Aroclor-1260 | 0.068 | 0.68 | Oldfield mouse | 0.014 | 0.05 | 0.50 | 0.02 | 0.2 | 0.00 | 0.01 |
| Gamma-Chlordane | 4.58 | 9.16 | mouse | 0.03 | 7.2 | 14.3 | 3.5 | 7.0 | 0.1 | 0.2 |
| **INORGANICS (mg/kg)** | | | | | | | | | | |
| Arsenic | 0.126 | 1.26 | mouse | 0.03 | 0.20 | 2.0 | 0.10 | 1.0 | 0.00 | 0.02 |
| Cadmium | 1 | 10 | rat | 0.303 | 15.77 | 157.7 | 7.7 | 77.5 | 0.2 | 1.7 |
| Chromium | 3.28 | 13.14 | rat | 0.35 | 59.8 | 239.4 | 29.4 | 117.6 | 0.7 | 2.7 |
| Copper | 11.71 | 15.14 | mink | 1 | 609.6 | 788.1 | 299.5 | 387.2 | 6.8 | 8.7 |
| Lead | 8 | 80 | rat | 0.35 | 145.8 | 1458 | 71.6 | 716.1 | 1.6 | 16.1 |
| Mercury | 0.032 | 0.16 | mink | 1 | 1.7 | 8.3 | 0.8 | 4.1 | 0.0 | 0.1 |
| Nickel | 40 | 80 | rat | 0.35 | 728.8 | 1458 | 358.1 | 716.1 | 8.1 | 16.1 |
| Selenium | 0.2 | 0.33 | rat | 0.35 | 3.6 | 6.0 | 1.8 | 3.0 | 0.0 | 0.1 |
| Zinc | 160 | 320 | rat | 0.35 | 2915.1 | 5830 | 1432 | 2864.5 | 32.3 | 65 |

**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 |
| Mink: | 1.734 |

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)

Only the chemicals for which NOAELs and LOAELs are available are shown. Chemicals not having NOAELs and LOAELs are not included in this table.

**TABLE J.5-3**

**MAMMALIAN TRVS USED IN THE AVERAGE EXPOSURE SCENARIO FOOD-CHAIN MODELS**

| Parameter | Mammals | | | | Short-tailed Shrew | | Meadow Vole | | Mink | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOAEL | LOAEL | Test Species | Body Weight (kg) | NOAEL | LOAEL | NOAEL | LOAEL | NOAEL | LOAEL |
| **SEMIVOLATILES (mg/kg)** | | | | | | | | | | |
| Acenaphthene | 17.5 | 35 | mouse | 0.03 | 31.1 | 62.2 | 14.3 | 28.7 | 0.5 | 1.0 |
| Acenaphthylene | 70 | 700 | mouse | 0.03 | 124.5 | 1244.8 | 57.3 | 573.3 | 2.1 | 20.6 |
| Anthracene | 100 | 1000 | mouse | 0.03 | 178 | 1778 | 82 | 819 | 3 | 29 |
| Benzo(a)anthracene | 0.17 | 1.7 | mouse | 0.03 | 0.3 | 3.0 | 0.14 | 1.4 | 0.01 | 0.1 |
| Benzo(a)pyrene | 1 | 10 | mouse | 0.03 | 1.8 | 17.8 | 0.82 | 8.2 | 0.03 | 0.3 |
| Benzo(g,h,i)perylene | 7.2 | 72 | mouse | 0.03 | 12.8 | 128.0 | 5.90 | 59.0 | 0.21 | 2.1 |
| Benzo(k)fluoranthene | 7.2 | 72 | mouse | 0.03 | 12.8 | 128.0 | 5.90 | 59.0 | 0.21 | 2.1 |
| Chrysene | 0.17 | 1.7 | mouse | 0.03 | 0.3 | 3.0 | 0.14 | 1.4 | 0.01 | 0.1 |
| Dibenzo(a,h)anthracene | 1.33 | 13.3 | mouse | 0.03 | 2.4 | 23.7 | 1.09 | 10.9 | 0.04 | 0.4 |
| Fluoranthene | 12.5 | 25 | mouse | 0.03 | 22.2 | 44.5 | 10.2 | 20.5 | 0.4 | 0.7 |
| Fluorene | 12.5 | 25 | mouse | 0.03 | 22.2 | 44.5 | 10.2 | 20.5 | 0.4 | 0.7 |
| Indeno(1,2,3-cd)pyrene | 7.2 | 72 | mouse | 0.03 | 12.8 | 128.0 | 5.9 | 59.0 | 0.2 | 2.1 |
| Pentachlorophenol | 0.24 | 2.4 | rat | 0.35 | 5.0 | 49.8 | 2.3 | 22.9 | 0.1 | 0.8 |
| Phenanthrene | 1 | 10 | mouse | 0.03 | 1.8 | 17.8 | 0.8 | 8.2 | 0.0 | 0.3 |
| Pyrene | 7.5 | 12.5 | mouse | 0.03 | 13.3 | 22.2 | 6.1 | 10.2 | 0.2 | 0.4 |
| **PESTICIDES/PCBs (mg/kg)** | | | | | | | | | | |
| 4,4'-DDD | 0.8 | 4 | rat | 0.35 | 16.6 | 83.0 | 7.6 | 38.2 | 0.27 | 1.4 |
| 4,4'-DDE | 0.8 | 4 | rat | 0.35 | 16.6 | 83.0 | 7.6 | 38.2 | 0.27 | 1.4 |
| 4,4'-DDT | 0.8 | 4 | rat | 0.35 | 16.6 | 83.0 | 7.6 | 38.2 | 0.27 | 1.4 |
| Alpha-Chlordane | 4.58 | 9.16 | mouse | 0.03 | 8.1 | 16.3 | 3.8 | 7.5 | 0.1 | 0.3 |
| Aroclor-1254 | 0.068 | 0.68 | Oldfield mouse | 0.014 | 0.06 | 0.56 | 0.03 | 0.3 | 0.00 | 0.01 |
| Aroclor-1260 | 0.068 | 0.68 | Oldfield mouse | 0.014 | 0.06 | 0.56 | 0.03 | 0.3 | 0.00 | 0.01 |
| Gamma-Chlordane | 4.58 | 9.16 | mouse | 0.03 | 8.1 | 16.3 | 3.8 | 7.5 | 0.1 | 0.3 |
| **INORGANICS (mg/kg)** | | | | | | | | | | |
| Arsenic | 0.126 | 1.26 | mouse | 0.03 | 0.22 | 2.2 | 0.10 | 1.0 | 0.00 | 0.04 |
| Cadmium | 1 | 10 | rat | 0.303 | 18.0 | 179.6 | 8.3 | 82.7 | 0.3 | 3.0 |
| Chromium | 3.28 | 13.14 | rat | 0.35 | 68.0 | 272.6 | 31.3 | 125.6 | 1.1 | 4.5 |
| Copper | 11.71 | 15.14 | mink | 1 | 694.1 | 897.5 | 319.7 | 413.3 | 11.5 | 14.9 |
| Lead | 8 | 80 | rat | 0.35 | 166.0 | 1660 | 76.4 | 764 | 2.7 | 27.5 |
| Mercury | 0.032 | 0.16 | mink | 1 | 1.90 | 9.48 | 0.87 | 4.37 | 0.03 | 0.16 |
| Nickel | 40 | 80 | rat | 0.35 | 829.9 | 1660 | 382.2 | 764 | 13.7 | 27.5 |
| Selenium | 0.2 | 0.33 | rat | 0.35 | 4.15 | 6.85 | 1.91 | 3.15 | 0.07 | 0.11 |
| Zinc | 160 | 320 | rat | 0.35 | 3320 | 6639 | 1529 | 3058 | 54.9 | 110 |

**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 |
| Mink: | 1.0195 |

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)

Only the chemicals for which NOAELs and LOAELs are available are shown. Chemicals not having NOAELs and LOAELs are not included in this table.

**TABLE J.5-4**

**NOAELS AND LOAELS FOR BIRDS**
**NAVAL SURFACE WARFARE CENTER CRANE, INDIANA**

| Parameter | NOAEL | LOAEL |
|---|---|---|
| **SEMIVOLATILES (mg/kg)** | | |
| Acenaphthene | 2 | 20 |
| Acenaphthylene | 2 | 20 |
| Anthracene | 2 | 20 |
| Benzo(a)anthracene | 2 | 20 |
| Benzo(a)pyrene | 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 |
| Fluorene | 2 | 20 |
| Indeno(1,2,3-cd)pyrene | 2 | 20 |
| Pentachlorophenol | NV | NV |
| Phenanthrene | 2 | 20 |
| Pyrene | 2 | 20 |
| **PESTICIDES/PCBs (mg/kg)** | | |
| 4,4'-DDD | 0.009 | 0.052 |
| 4,4'-DDE | 0.009 | 0.052 |
| 4,4'-DDT | 0.009 | 0.052 |
| Alpha-Chlordane | 2.14 | 10.7 |
| Aroclor-1254 | 0.18 | 1.8 |
| Aroclor-1260 | 0.18 | 1.8 |
| Gamma-Chlordane | 2.14 | 10.7 |
| **INORGANICS (mg/kg)** | | |
| 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**
**NAVAL WARFARE CENTER, CRANE, INDIANA**

| Parameters | Concentration (mg/kg-day) | Endpoint | Effect | Chronic/ Subchronic | Species | Primary Reference | Source of Reference |
|---|---|---|---|---|---|---|---|
| **Semivolatiles Organics** | | | | | | | |
| Acenaphthene | 175 | NOAEL | systemic | subchronic | mouse | USEPA, 1989a | IRIS, 2002 |
| Acenaphthene | 350 | LOAEL | systemic | subchronic | mouse | USEPA, 1989a | IRIS, 2002 |
| Acenaphthylene | 700 | NOAEL | mortality/BW | subchronic | mouse | USEPA, 1989a | PRC, 1996 |
| 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(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 |
| Fluorene | 125 | NOAEL | systemic | subchronic | mouse | USEPA, 1989c | IRIS, 2002 |
| Fluorene | 250 | LOAEL | systemic | subchronic | mouse | USEPA, 1989c | IRIS, 2002 |
| Indeno(1,2,3-cd)pyrene | 72 | LOAEL | carcinogenic | chronic | rodent | Simms and Overcash, 1983 | PRC, 1996 |
| Pentachlorophenol | 0.24 | NOAEL | reproductive | chronic | rat | Schwetz et al., 1978 | Sample et.al., 1996 |
| Pentachlorophenol | 2.4 | LOAEL | reproductive | chronic | rat | Schwetz et al., 1978 | Sample et.al., 1996 |
| Pyrene | 75 | NOAEL | systemic | subchronic | mouse | USEPA, 1989c | IRIS, 2002 |
| Pyrene | 125 | LOAEL | systemic | subchronic | mouse | USEPA, 1989c | IRIS, 2002 |
| **Pesticides** | | | | | | | |
| Chlordane | 2.14 | NOAEL | mortality | chronic | red-winged blackbird | Stickel et al., 1983 | Sample et.al., 1996 |
| Chlordane | 10.7 | LOAEL | mortality | chronic | red-winged blackbird | Stickel et al., 1983 | Sample et.al., 1996 |
| Chlordane | 4.58 | NOAEL | reproduction | chronic | mouse | WHO, 1984 | Sample et.al., 1996 |
| Chlordane | 9.16 | LOAEL | reproduction | chronic | mouse | WHO, 1984 | Sample et.al., 1996 |
| 4,4'-DDT | 0.8 | NOAEL | reproductive | chronic | rat | Fitzhugh, 1948 | Sample et.al., 1996 |
| 4,4'-DDT | 4 | LOAEL | reproductive | chronic | rat | Fitzhugh, 1948 | Sample et.al., 1996 |
| 4,4'-DDT | 0.052[(1)] | LOAEL | reproduction | chronic | brown pelican | Anderson et al., 1975 | USEPA, 1995 |
| 4,4'-DDT | 0.009[(1)] | NOAEL | reproduction | chronic | brown pelican | Anderson et al., 1975 | USEPA, 1995 |
| Aroclor-1254 | 1.8 | LOAEL | reproductive | chronic | pheasant | Dahlgren et al., 1972 | Sample et.al., 1996 |
| Aroclor-1254 | 0.68 | LOAEL | reproduction | chronic | mouse | McCoy et al., 1995 | 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 |

**TETRA TECH NUS, INC.** **CALCULATION WORKSHEET** PAGE 1 OF 1

| | |
|---|---|
| CLIENT SWMU 15, Crane | JOB NUMBER |
| SUBJECT percent lipid calculation | |
| BASED ON USEPA, 1997. (EPA 823-R-97-006). | DRAWING NUMBER |
| BY R. Young / CHECKED BY A. Berhardt | APPROVED BY / DATE 9/23/05 |

Percent lipid content in fish:

| Species | Whole fish % lipid content * |
|---|---|
| Redbreast sunfish | 3.6 |
| Green sunfish | 3.2 |
| Pumpkinseed | 3.9 |
| Longear sunfish | 2.8 |
| Bluegill sunfish | 3.5 |
| Bluegill sunfish | 4.4 |
| | 3.566 ≈ 3.6% |

wet-weight lipid for fish

To adjust lipid for fish to dry-weight, divide by 25%, which is the percent solids of fish from Sample et al., 1997.

$$\frac{3.6}{25} \times 100 = 14.4\%$$ dry-weight lipid for fish

* Values taken from Appendix C, Table C-3b, USEPA, 1997. The Incidence and Severity of Sediment Contamination in Surface Waters of the United States.

Sample, BE, MS Aplin, RA Efroymson, GW Suter + CJE Welsh, 1997. Methods and Tools for Estimation of the Exposure of Terrestrial Wildlife to Contaminants. Oak Ridge National Laboratory. October. ORNL/TM-13391.

**MEADOW VOLE - CONSERVATIVE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatiles** | | | | | | | | | | | | |
| BENZO(A)ANTHRACENE | 8.50E-01 | 1.84E-03 | 1.90E-02 | 1.62E-02 | 1.59E-03 | 4.31E-04 | 9.42E-04 | 2.96E-03 | 1.30E-01 | 1.30E+00 | 2.27E-02 | 2.27E-03 |
| BENZO(A)PYRENE | 1.10E+00 | 2.38E-03 | 1.10E-02 | 1.21E-02 | 2.05E-03 | 5.57E-04 | 7.06E-04 | 3.32E-03 | 7.67E-01 | 7.67E+00 | 4.32E-03 | 4.32E-04 |
| BENZO(K)FLUORANTHENE | 2.20E+00 | 1.72E-03 | 4.30E-03 | 9.46E-03 | 4.11E-03 | 4.03E-04 | 5.52E-04 | 5.06E-03 | 5.52E+00 | 5.52E+01 | 9.17E-04 | 9.17E-05 |
| CHRYSENE | 1.10E+00 | 4.46E-03 | 1.90E-02 | 2.09E-02 | 2.05E-03 | 1.04E-03 | 1.22E-03 | 4.32E-03 | 1.30E-01 | 1.30E+00 | 3.31E-02 | 3.31E-03 |
| DIBENZO(A,H)ANTHRACENE | 2.50E-01 | 4.60E-04 | 4.30E-03 | 1.08E-03 | 4.67E-04 | 1.08E-04 | 6.27E-05 | 6.37E-04 | 1.02E+00 | 1.02E+01 | 6.24E-04 | 6.24E-05 |
| FLUORANTHENE | 9.40E-01 | 1.19E-02 | 5.50E-02 | 5.17E-02 | 1.76E-03 | 2.79E-03 | 3.02E-03 | 7.56E-03 | 9.59E+00 | 1.92E+01 | 7.88E-04 | 3.94E-04 |
| PHENANTHRENE | 5.20E-01 | 4.73E-03 | 8.20E-02 | 4.26E-02 | 9.71E-04 | 1.11E-03 | 2.49E-03 | 4.57E-03 | 7.67E-01 | 7.67E+00 | 5.95E-03 | 5.95E-04 |
| PYRENE | 1.60E+00 | 8.61E-03 | 5.50E-02 | 8.80E-02 | 2.99E-03 | 2.02E-03 | 5.14E-03 | 1.01E-02 | 5.75E+00 | 9.59E+00 | 1.76E-03 | 1.06E-03 |
| **Pesticides** | | | | | | | | | | | | |
| 4,4'-DDT | 1.40E-02 | 0.00E+00 | 7.80E-03 | 1.09E-04 | 2.61E-05 | 0.00E+00 | 6.37E-06 | 3.25E-05 | 7.16E+00 | 3.58E+01 | 4.54E-06 | 9.08E-07 |
| **PCBs** | | | | | | | | | | | | |
| AROCLOR-1260 | 3.20E-02 | 0.00E+00 | 2.90E-03 | 9.28E-05 | 5.98E-05 | 0.00E+00 | 5.42E-06 | 6.52E-05 | 2.43E-02 | 2.43E-01 | 2.68E-03 | 2.68E-04 |
| **Herbicides** | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 2.80E-02 | 7.50E-05 | 1.40E-02 | 3.92E-04 | 5.23E-05 | 1.76E-05 | 2.29E-05 | 9.27E-05 | 2.15E+00 | 2.15E+01 | 4.32E-05 | 4.32E-06 |
| **Inorganics** | | | | | | | | | | | | |
| ARSENIC | 2.07E+01 | 1.40E-03 | 1.10E+00 | 2.28E+01 | 3.87E-02 | 3.28E-04 | 1.33E+00 | 1.37E+00 | 9.67E-02 | 9.67E-01 | 1.42E+01 | 1.42E+00 |
| CADMIUM | 6.90E+00 | 3.60E-04 | 3.25E+00 | 2.24E+01 | 1.29E-02 | 8.43E-05 | 1.31E+00 | 1.32E+00 | 7.75E+00 | 7.75E+01 | 1.71E-01 | 1.71E-02 |
| CHROMIUM | 4.97E+01 | 3.60E-03 | 8.39E-02 | 4.17E+00 | 9.28E-02 | 8.43E-04 | 2.43E-01 | 3.37E-01 | 2.94E+01 | 1.18E+02 | 1.15E-02 | 2.87E-03 |
| COPPER | 2.01E+01 | 8.10E-03 | 6.25E-01 | 1.26E+01 | 3.75E-02 | 1.90E-03 | 7.33E-01 | 7.73E-01 | 2.99E+02 | 3.87E+02 | 2.58E-03 | 2.00E-03 |
| LEAD | 1.55E+02 | 2.90E-03 | 4.68E-01 | 7.25E+01 | 2.89E-01 | 6.79E-04 | 4.23E+00 | 4.52E+00 | 7.16E+01 | 7.16E+02 | 6.32E-02 | 6.32E-03 |
| MERCURY | 1.30E-01 | 0.00E+00 | 5.00E+00 | 6.50E-01 | 2.43E-04 | 0.00E+00 | 3.79E-02 | 3.82E-02 | 8.18E-01 | 4.09E+00 | 4.66E-02 | 9.33E-03 |
| NICKEL | 3.16E+01 | 8.00E-03 | 1.41E+00 | 4.46E+01 | 5.90E-02 | 1.87E-03 | 2.60E+00 | 2.66E+00 | 3.58E+02 | 7.16E+02 | 7.44E-03 | 3.72E-03 |
| SELENIUM | 1.10E+00 | 1.30E-03 | 3.01E+00 | 3.31E+00 | 2.05E-03 | 3.04E-04 | 1.93E-01 | 1.96E-01 | 1.79E+00 | 2.95E+00 | 1.09E-01 | 6.63E-02 |
| ZINC | 6.26E+02 | 1.02E-01 | 1.82E+00 | 1.14E+03 | 1.17E+00 | 2.39E-02 | 6.65E+01 | 6.77E+01 | 1.43E+03 | 2.86E+03 | 4.73E-02 | 2.36E-02 |

Cells are shaded if the EEQ is greater than 1.0.
Benzo(a)anthracene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, phenanthrene, and pyrene were COPCs in surface water only.
Cadmium was detected in the dissolved metals samples only.

| | | |
|---|---|---|
| Body Weight = (BW) | 3.290E-02 | kg |
| Food Ingestion Rate = (If) | 1.920E-03 | kg/day |
| Water Ingestion Rate = (Iw) | 7.700E-03 | L/day |
| Soil Ingestion Rate = (Is) | 6.144E-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 is available

**MEADOW VOLE - AVERAGE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 | 8.62E+00 | 4.08E-04 | 3.75E-02 | 3.23E-01 | 5.04E-03 | 7.12E-05 | 1.58E-02 | 2.09E-02 | 1.03E-01 | 1.03E+00 | 2.02E-01 | 2.02E-02 |

Cells are shaded if the EEQ is greater than 1.0.
Benzo(a)anthracene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, phenanthrene, and pyrene were COPCs in surface water only.
Cadmium was detected in the dissolved metals samples only.

| | | |
|---|---|---|
| Body Weight = (BW) | 3.663E-02 | kg |
| Food Ingestion Rate = (If) | 1.785E-03 | kg/day |
| Water Ingestion Rate = (Iw) | 6.400E-03 | L/day |
| Soil Ingestion Rate = (Is) | 2.142E-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) | | |

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 is available

**SHORT-TAILED SHREW - CONSERVATIVE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatiles** | | | | | | | | | | | | |
| BENZO(A)ANTHRACENE | 8.50E-01 | 1.84E-03 | 6.69E-01 | 5.69E-01 | 4.33E-03 | 5.19E-04 | 9.67E-02 | 1.02E-01 | 2.65E-01 | 2.65E+00 | 3.82E-01 | 3.82E-02 |
| BENZO(A)PYRENE | 1.10E+00 | 2.38E-03 | 6.69E-01 | 7.36E-01 | 5.61E-03 | 6.71E-04 | 1.25E-01 | 1.31E-01 | 1.56E+00 | 1.56E+01 | 8.41E-02 | 8.41E-03 |
| BENZO(K)FLUORANTHENE | 2.20E+00 | 1.72E-03 | 6.69E-01 | 1.47E+00 | 1.12E-02 | 4.85E-04 | 2.50E-01 | 2.62E-01 | 1.12E+01 | 1.12E+02 | 2.33E-02 | 2.33E-03 |
| CHRYSENE | 1.10E+00 | 4.46E-03 | 6.69E-01 | 7.36E-01 | 5.61E-03 | 1.26E-03 | 1.25E-01 | 1.32E-01 | 2.65E-01 | 2.65E+00 | 4.97E-01 | 4.97E-02 |
| DIBENZO(A,H)ANTHRACENE | 2.50E-01 | 4.60E-04 | 6.69E-01 | 1.67E-01 | 1.27E-03 | 1.30E-04 | 2.84E-02 | 2.98E-02 | 2.08E+00 | 2.08E+01 | 1.44E-02 | 1.44E-03 |
| FLUORANTHENE | 9.40E-01 | 1.19E-02 | 6.69E-01 | 6.29E-01 | 4.79E-03 | 3.36E-03 | 1.07E-01 | 1.15E-01 | 1.95E+01 | 3.90E+01 | 5.89E-03 | 2.95E-03 |
| PHENANTHRENE | 5.20E-01 | 4.73E-03 | 6.69E-01 | 3.48E-01 | 2.65E-03 | 1.33E-03 | 5.91E-02 | 6.31E-02 | 1.56E+00 | 1.56E+01 | 4.04E-02 | 4.04E-03 |
| PYRENE | 1.60E+00 | 8.61E-03 | 6.69E-01 | 1.07E+00 | 8.16E-03 | 2.43E-03 | 1.82E-01 | 1.93E-01 | 1.17E+01 | 1.95E+01 | 1.64E-02 | 9.86E-03 |
| **Pesticides** | | | | | | | | | | | | |
| 4,4'-DDT | 1.40E-02 | 0.00E+00 | 1.30E+01 | 1.82E-01 | 7.14E-05 | 0.00E+00 | 3.09E-02 | 3.10E-02 | 1.46E+01 | 7.29E+01 | 2.13E-03 | 4.25E-04 |
| **PCBs** | | | | | | | | | | | | |
| AROCLOR-1260 | 3.20E-02 | 0.00E+00 | 1.59E+01 | 5.09E-01 | 1.63E-04 | 0.00E+00 | 8.65E-02 | 8.67E-02 | 4.96E-02 | 4.96E-01 | 1.75E+00 | 1.75E-01 |
| **Herbicides** | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 2.80E-02 | 7.50E-05 | 1.00E+00 | 2.80E-02 | 1.43E-04 | 2.11E-05 | 4.76E-03 | 4.92E-03 | 4.37E+00 | 4.37E+01 | 1.13E-03 | 1.13E-04 |
| **Inorganics** | | | | | | | | | | | | |
| ARSENIC | 2.07E+01 | 1.40E-03 | 5.23E-01 | 1.08E+01 | 1.06E-01 | 3.95E-04 | 1.84E+00 | 1.95E+00 | 1.97E-01 | 1.97E+00 | 9.89E+00 | 9.89E-01 |
| CADMIUM | 6.90E+00 | 3.60E-04 | 4.07E+01 | 2.81E+02 | 3.52E-02 | 1.02E-04 | 4.77E+01 | 4.78E+01 | 1.58E+01 | 1.58E+02 | 3.03E+00 | 3.03E-01 |
| CHROMIUM | 4.97E+01 | 3.60E-03 | 3.16E+00 | 1.57E+02 | 2.53E-01 | 1.02E-03 | 2.67E+01 | 2.70E+01 | 5.98E+01 | 2.39E+02 | 4.51E-01 | 1.13E-01 |
| COPPER | 2.01E+01 | 8.10E-03 | 1.53E+00 | 3.08E+01 | 1.02E-01 | 2.28E-03 | 5.23E+00 | 5.34E+00 | 6.10E+02 | 7.88E+02 | 8.75E-03 | 6.77E-03 |
| LEAD | 1.55E+02 | 2.90E-03 | 1.52E+00 | 2.36E+02 | 7.90E-01 | 8.18E-04 | 4.01E+01 | 4.09E+01 | 1.46E+02 | 1.46E+03 | 2.81E-01 | 2.81E-02 |
| MERCURY | 1.30E-01 | 0.00E+00 | 2.06E+01 | 2.68E+00 | 6.63E-04 | 0.00E+00 | 4.56E-01 | 4.56E-01 | 1.67E+00 | 8.33E+00 | 2.74E-01 | 5.48E-02 |
| NICKEL | 3.16E+01 | 8.00E-03 | 4.73E+00 | 1.49E+02 | 1.61E-01 | 2.26E-03 | 2.54E+01 | 2.56E+01 | 7.29E+02 | 1.46E+03 | 3.51E-02 | 1.75E-02 |
| SELENIUM | 1.10E+00 | 1.30E-03 | 1.34E+00 | 1.47E+00 | 5.61E-03 | 3.67E-04 | 2.51E-01 | 2.57E-01 | 3.64E+00 | 6.01E+00 | 7.04E-02 | 4.27E-02 |
| ZINC | 6.26E+02 | 1.02E-01 | 1.29E+01 | 8.07E+03 | 3.19E+00 | 2.88E-02 | 1.37E+03 | 1.37E+03 | 2.92E+03 | 5.83E+03 | 4.71E-01 | 2.36E-01 |

Cells are shaded if the EEQ is greater than 1.0.
Benzo(a)anthracene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, phenanthrene, and pyrene were COPCs in surface water only.
Cadmium was detected in the dissolved metals samples only.

| | | |
|---|---|---|
| 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) | 7.776E-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 (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
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NV = No Value is available

**SHORT-TAILED SHREW - AVERAGE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PCBs** | | | | | | | | | | | | |
| AROCLOR-1260 | 7.54E-03 | 0.00E+00 | 6.67E+00 | 5.03E-02 | 6.63E-06 | 0.00E+00 | 4.91E-03 | 4.92E-03 | 5.64E-02 | 5.64E-01 | 8.71E-02 | 8.71E-03 |
| **Inorganics** | | | | | | | | | | | | |
| ARSENIC | 8.62E+00 | 4.08E-04 | 2.24E-01 | 1.93E+00 | 7.58E-03 | 9.18E-05 | 1.89E-01 | 1.96E-01 | 2.24E-01 | 2.24E+00 | 8.76E-01 | 8.76E-02 |
| CADMIUM | 6.85E-01 | 7.45E-05 | 7.71E+00 | 5.28E+00 | 6.02E-04 | 1.68E-05 | 5.16E-01 | 5.16E-01 | 1.80E+01 | 1.80E+02 | 2.87E-02 | 2.87E-03 |

Cells are shaded if the EEQ is greater than 1.0.
Benzo(a)anthracene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, phenanthrene, and pyrene were COPCs in surface water only.
Cadmium was detected in the dissolved metals samples only.

| | | |
|---|---|---|
| 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) | 1.483E-05 | 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
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NV = No Value is available

**BOBWHITE QUAIL - CONSERVATIVE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatiles** | | | | | | | | | | | | |
| BENZO(A)ANTHRACENE | 8.50E-01 | 1.84E-03 | 1.90E-02 | 1.62E-02 | 1.79E-03 | 2.62E-04 | 2.45E-04 | 2.30E-03 | 2.00E+00 | 2.00E+01 | 1.15E-03 | 1.15E-04 |
| BENZO(A)PYRENE | 1.10E+00 | 2.38E-03 | 1.10E-02 | 1.21E-02 | 2.32E-03 | 3.39E-04 | 1.84E-04 | 2.84E-03 | 2.00E+00 | 2.00E+01 | 1.42E-03 | 1.42E-04 |
| BENZO(K)FLUORANTHENE | 2.20E+00 | 1.72E-03 | 4.30E-03 | 9.46E-03 | 4.64E-03 | 2.45E-04 | 1.44E-04 | 5.03E-03 | 2.00E+00 | 2.00E+01 | 2.52E-03 | 2.52E-04 |
| CHRYSENE | 1.10E+00 | 4.46E-03 | 1.90E-02 | 2.09E-02 | 2.32E-03 | 6.36E-04 | 3.17E-04 | 3.28E-03 | 2.00E+00 | 2.00E+01 | 1.64E-03 | 1.64E-04 |
| DIBENZO(A,H)ANTHRACENE | 2.50E-01 | 4.60E-04 | 4.30E-03 | 1.08E-03 | 5.28E-04 | 6.56E-05 | 1.63E-05 | 6.10E-04 | 2.00E+00 | 2.00E+01 | 3.05E-04 | 3.05E-05 |
| FLUORANTHENE | 9.40E-01 | 1.19E-02 | 5.50E-02 | 5.17E-02 | 1.98E-03 | 1.70E-03 | 7.85E-04 | 4.47E-03 | 2.00E+00 | 2.00E+01 | 2.23E-03 | 2.23E-04 |
| PHENANTHRENE | 5.20E-01 | 4.73E-03 | 8.20E-02 | 4.26E-02 | 1.10E-03 | 6.74E-04 | 6.47E-04 | 2.42E-03 | 2.00E+00 | 2.00E+01 | 1.21E-03 | 1.21E-04 |
| PYRENE | 1.60E+00 | 8.61E-03 | 5.50E-02 | 8.80E-02 | 3.38E-03 | 1.23E-03 | 1.34E-03 | 5.94E-03 | 2.00E+00 | 2.00E+01 | 2.97E-03 | 2.97E-04 |
| **Pesticides** | | | | | | | | | | | | |
| 4,4'-DDT | 1.40E-02 | 0.00E+00 | 7.80E-03 | 1.09E-04 | 2.96E-05 | 0.00E+00 | 1.66E-06 | 3.12E-05 | 9.00E-03 | 5.20E-02 | 3.47E-03 | 6.00E-04 |
| **PCBs** | | | | | | | | | | | | |
| AROCLOR-1260 | 3.20E-02 | 0.00E+00 | 2.90E-03 | 9.28E-05 | 6.75E-05 | 0.00E+00 | 1.41E-06 | 6.90E-05 | 1.80E-01 | 1.80E+00 | 3.83E-04 | 3.83E-05 |
| **Herbicides** | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 2.80E-02 | 7.50E-05 | 1.40E-02 | 3.92E-04 | 5.91E-05 | 1.07E-05 | 5.95E-06 | 7.57E-05 | NV | NV | NA | NA |
| **Inorganics** | | | | | | | | | | | | |
| ARSENIC | 2.07E+01 | 1.40E-03 | 1.10E+00 | 2.28E+01 | 4.37E-02 | 2.00E-04 | 3.47E-01 | 3.91E-01 | 2.46E+00 | 7.38E+00 | 1.59E-01 | 5.29E-02 |
| CADMIUM | 6.90E+00 | 3.60E-04 | 3.25E+00 | 2.24E+01 | 1.46E-02 | 5.13E-05 | 3.41E-01 | 3.55E-01 | 1.45E+00 | 2.00E+01 | 2.45E-01 | 1.78E-02 |
| CHROMIUM | 4.97E+01 | 3.60E-03 | 8.39E-02 | 4.17E+00 | 1.05E-01 | 5.13E-04 | 6.33E-02 | 1.69E-01 | 1.00E+00 | 5.00E+00 | 1.69E-01 | 3.37E-02 |
| COPPER | 2.01E+01 | 8.10E-03 | 6.25E-01 | 1.26E+01 | 4.24E-02 | 1.16E-03 | 1.91E-01 | 2.34E-01 | 4.70E+01 | 6.17E+01 | 4.99E-03 | 3.80E-03 |
| LEAD | 1.55E+02 | 2.90E-03 | 4.68E-01 | 7.25E+01 | 3.27E-01 | 4.14E-04 | 1.10E+00 | 1.43E+00 | 1.13E+00 | 1.13E+01 | 1.26E+00 | 1.26E-01 |
| MERCURY | 1.30E-01 | 0.00E+00 | 5.00E+00 | 6.50E-01 | 2.74E-04 | 0.00E+00 | 9.87E-03 | 1.01E-02 | 6.40E-03 | 6.40E-02 | 1.59E+00 | 1.59E-01 |
| NICKEL | 3.16E+01 | 8.00E-03 | 1.41E+00 | 4.46E+01 | 6.67E-02 | 1.14E-03 | 6.77E-01 | 7.45E-01 | 7.74E+01 | 1.07E+02 | 9.62E-03 | 6.96E-03 |
| SELENIUM | 1.10E+00 | 1.30E-03 | 3.01E+00 | 3.31E+00 | 2.32E-03 | 1.85E-04 | 5.03E-02 | 5.28E-02 | 4.00E-01 | 8.00E-01 | 1.32E-01 | 6.60E-02 |
| ZINC | 6.26E+02 | 1.02E-01 | 1.82E+00 | 1.14E+03 | 1.32E+00 | 1.45E-02 | 1.73E+01 | 1.86E+01 | 1.45E+01 | 1.31E+02 | 1.29E+00 | 1.42E-01 |

Cells are shaded if the EEQ is greater than 1.0.
Benzo(a)anthracene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, phenanthrene, and pyrene were COPCs in surface water only.
Cadmium was detected in the dissolved metals samples only.
NA = Not Applicable
NV = No Value Available

| | | |
|---|---|---|
| Body Weight = (BW) | 1.620E-01 | kg |
| Food Ingestion Rate = (If) | 2.460E-03 | kg/day |
| Water Ingestion Rate = (Iw) | 2.310E-02 | L/day |
| Soil Ingestion Rate = (Is) | 3.419E-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 is available

**BOBWHITE QUAIL - AVERAGE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 | 2.34E+01 | 1.15E-03 | 3.89E-02 | 9.09E-01 | 1.74E-02 | 1.20E-04 | 1.11E-02 | 2.86E-02 | 1.13E+00 | 1.13E+01 | 2.53E-02 | 2.53E-03 |
| MERCURY | 3.66E-02 | 0.00E+00 | 6.52E-01 | 2.38E-02 | 2.72E-05 | 0.00E+00 | 2.91E-04 | 3.18E-04 | 6.40E-03 | 6.40E-02 | 4.97E-02 | 4.97E-03 |
| ZINC | 7.24E+01 | 2.75E-02 | 3.66E-01 | 2.65E+01 | 5.39E-02 | 2.85E-03 | 3.23E-01 | 3.80E-01 | 1.45E+01 | 1.31E+02 | 2.62E-02 | 2.90E-03 |

Cells are shaded if the EEQ is greater than 1.0.
Benzo(a)anthracene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, phenanthrene, and pyrene were COPCs in surface water only.
Cadmium was detected in the dissolved metals samples only.
NA = Not Applicable
NV = No Value Available

| | | |
|---|---|---|
| Body Weight = (BW) | 1.770E-01 | kg |
| Food Ingestion Rate = (If) | 2.160E-03 | kg/day |
| Water Ingestion Rate = (Iw) | 1.840E-02 | L/day |
| Soil Ingestion Rate = (Is) | 1.318E-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)

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 is available

**AMERICAN WOODCOCK - CONSERVATIVE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatiles** | | | | | | | | | | | | |
| BENZO(A)ANTHRACENE | 8.50E-01 | 1.84E-03 | 6.69E-01 | 5.69E-01 | 2.55E-02 | 2.36E-04 | 1.04E-01 | 1.30E-01 | 2.00E+00 | 2.00E+01 | 6.48E-02 | 6.48E-03 |
| BENZO(A)PYRENE | 1.10E+00 | 2.38E-03 | 6.69E-01 | 7.36E-01 | 3.30E-02 | 3.05E-04 | 1.34E-01 | 1.68E-01 | 2.00E+00 | 2.00E+01 | 8.38E-02 | 8.38E-03 |
| BENZO(K)FLUORANTHENE | 2.20E+00 | 1.72E-03 | 6.69E-01 | 1.47E+00 | 6.59E-02 | 2.21E-04 | 2.69E-01 | 3.35E-01 | 2.00E+00 | 2.00E+01 | 1.67E-01 | 1.67E-02 |
| CHRYSENE | 1.10E+00 | 4.46E-03 | 6.69E-01 | 7.36E-01 | 3.30E-02 | 5.72E-04 | 1.34E-01 | 1.68E-01 | 2.00E+00 | 2.00E+01 | 8.40E-02 | 8.40E-03 |
| DIBENZO(A,H)ANTHRACENE | 2.50E-01 | 4.60E-04 | 6.69E-01 | 1.67E-01 | 7.49E-03 | 5.90E-05 | 3.05E-02 | 3.81E-02 | 2.00E+00 | 2.00E+01 | 1.90E-02 | 1.90E-03 |
| FLUORANTHENE | 9.40E-01 | 1.19E-02 | 6.69E-01 | 6.29E-01 | 2.82E-02 | 1.53E-03 | 1.15E-01 | 1.45E-01 | 2.00E+00 | 2.00E+01 | 7.23E-02 | 7.23E-03 |
| PHENANTHRENE | 5.20E-01 | 4.73E-03 | 6.69E-01 | 3.48E-01 | 1.56E-02 | 6.07E-04 | 6.35E-02 | 7.97E-02 | 2.00E+00 | 2.00E+01 | 3.99E-02 | 3.99E-03 |
| PYRENE | 1.60E+00 | 8.61E-03 | 6.69E-01 | 1.07E+00 | 4.79E-02 | 1.10E-03 | 1.96E-01 | 2.45E-01 | 2.00E+00 | 2.00E+01 | 1.22E-01 | 1.22E-02 |
| **Pesticides** | | | | | | | | | | | | |
| 4,4'-DDT | 1.40E-02 | 0.00E+00 | 1.30E+01 | 1.82E-01 | 4.19E-04 | 0.00E+00 | 3.32E-02 | 3.37E-02 | 9.00E-03 | 5.20E-02 | 3.74E+00 | 6.47E-01 |
| **PCBs** | | | | | | | | | | | | |
| AROCLOR-1260 | 3.20E-02 | 0.00E+00 | 1.59E+01 | 5.09E-01 | 9.59E-04 | 0.00E+00 | 9.30E-02 | 9.39E-02 | 1.80E-01 | 1.80E+00 | 5.22E-01 | 5.22E-02 |
| **Herbicides** | | | | | | | | | | | | |
| PENTACHLOROPHENOL | 2.80E-02 | 7.50E-05 | 1.00E+00 | 2.80E-02 | 8.39E-04 | 9.62E-06 | 5.11E-03 | 5.96E-03 | NV | NV | NA | NA |
| **Inorganics** | | | | | | | | | | | | |
| ARSENIC | 2.07E+01 | 1.40E-03 | 5.23E-01 | 1.08E+01 | 6.20E-01 | 1.80E-04 | 1.98E+00 | 2.60E+00 | 2.46E+00 | 7.38E+00 | 1.06E+00 | 3.52E-01 |
| CADMIUM | 6.90E+00 | 3.60E-04 | 4.07E+01 | 2.81E+02 | 2.07E-01 | 4.62E-05 | 5.13E+01 | 5.15E+01 | 1.45E+00 | 2.00E+01 | 3.55E+01 | 2.57E+00 |
| CHROMIUM | 4.97E+01 | 3.60E-03 | 3.16E+00 | 1.57E+02 | 1.49E+00 | 4.62E-04 | 2.87E+01 | 3.02E+01 | 1.00E+00 | 5.00E+00 | 3.02E+01 | 6.04E+00 |
| COPPER | 2.01E+01 | 8.10E-03 | 1.53E+00 | 3.08E+01 | 6.02E-01 | 1.04E-03 | 5.62E+00 | 6.22E+00 | 4.70E+01 | 6.17E+01 | 1.33E-01 | 1.01E-01 |
| LEAD | 1.55E+02 | 2.90E-03 | 1.52E+00 | 2.36E+02 | 4.64E+00 | 3.72E-04 | 4.31E+01 | 4.77E+01 | 1.13E+00 | 1.13E+01 | 4.22E+01 | 4.22E+00 |
| MERCURY | 1.30E-01 | 0.00E+00 | 2.06E+01 | 2.68E+00 | 3.89E-03 | 0.00E+00 | 4.90E-01 | 4.94E-01 | 6.40E-03 | 6.40E-02 | 7.71E+01 | 7.71E+00 |
| NICKEL | 3.16E+01 | 8.00E-03 | 4.73E+00 | 1.49E+02 | 9.47E-01 | 1.03E-03 | 2.73E+01 | 2.82E+01 | 7.74E+01 | 1.07E+02 | 3.65E-01 | 2.64E-01 |
| SELENIUM | 1.10E+00 | 1.30E-03 | 1.34E+00 | 1.47E+00 | 3.30E-02 | 1.67E-04 | 2.69E-01 | 3.02E-01 | 4.00E-01 | 8.00E-01 | 7.56E-01 | 3.78E-01 |
| ZINC | 6.26E+02 | 1.02E-01 | 1.29E+01 | 8.07E+03 | 1.88E+01 | 1.31E-02 | 1.47E+03 | 1.49E+03 | 1.45E+01 | 1.31E+02 | 1.03E+02 | 1.14E+01 |

Cells are shaded if the EEQ is greater than 1.0.
Benzo(a)anthracene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, phenanthrene, and pyrene were COPCs in surface water only.
Cadmium was detected in the dissolved metals samples only.
NA = Not Applicable
NV = No Value Available

| | | |
|---|---|---|
| Body Weight = (BW) | 1.660E-01 | kg |
| Food Ingestion Rate = (If) | 3.032E-02 | kg/day |
| Water Ingestion Rate = (Iw) | 2.130E-02 | L/day |
| Soil Ingestion Rate = (Is) | 4.972E-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
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NV = No Value is available

**AMERICAN WOODCOCK - AVERAGE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pesticides** | | | | | | | | | | | | |
| 4,4'-DDT | 1.45E-03 | 0.00E+00 | 1.30E+01 | 1.88E-02 | 1.24E-05 | 0.00E+00 | 2.51E-03 | 2.52E-03 | 9.00E-03 | 5.20E-02 | 2.80E-01 | 4.85E-02 |
| **Inorganics** | | | | | | | | | | | | |
| ARSENIC | 8.62E+00 | 4.08E-04 | 2.24E-01 | 1.93E+00 | 7.36E-02 | 4.09E-05 | 2.57E-01 | 3.31E-01 | 2.46E+00 | 7.38E+00 | 1.35E-01 | 4.49E-02 |
| CADMIUM | 6.85E-01 | 7.45E-05 | 7.71E+00 | 5.28E+00 | 5.84E-03 | 7.47E-06 | 7.04E-01 | 7.09E-01 | 1.45E+00 | 2.00E+01 | 4.89E-01 | 3.55E-02 |
| CHROMIUM | 2.44E+01 | 1.47E-03 | 3.06E-01 | 7.48E+00 | 2.09E-01 | 1.47E-04 | 9.97E-01 | 1.21E+00 | 1.00E+00 | 5.00E+00 | 1.21E+00 | 2.41E-01 |
| LEAD | 2.34E+01 | 1.15E-03 | 2.66E-01 | 6.22E+00 | 1.99E-01 | 1.16E-04 | 8.29E-01 | 1.03E+00 | 1.13E+00 | 1.13E+01 | 9.10E-01 | 9.10E-02 |
| MERCURY | 3.66E-02 | 0.00E+00 | 1.69E+00 | 6.19E-02 | 3.12E-04 | 0.00E+00 | 8.25E-03 | 8.56E-03 | 6.40E-03 | 6.40E-02 | 1.34E+00 | 1.34E-01 |
| ZINC | 7.24E+01 | 2.75E-02 | 3.20E+00 | 2.32E+02 | 6.18E-01 | 2.75E-03 | 3.09E+01 | 3.15E+01 | 1.45E+01 | 1.31E+02 | 2.17E+00 | 2.41E-01 |

Cells are shaded if the EEQ is greater than 1.0.
Benzo(a)anthracene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, phenanthrene, and pyrene were COPCs in surface water only.
Cadmium was detected in the dissolved metals samples only.
NA = Not Applicable
NV = No Value Available

| | | |
|---|---|---|
| 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) | 1.617E-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)

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
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NV = No Value is available

**MINK - CONSERVATIVE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, INDIANA**

| Parameter | Max Sediment Concentration (mg/kg) | Max SW Concentration (mg/L) | Biotransfer Factor (sed to fish)(1) | Fish Concentration (mg/kg) | Dose (mg/kg/day) from: Sediment | Surface Water | Fish | Total Dose (mg/kg/day) | Site Use Factor of 10% | NOAEL (mg/kg/day) | LOAEL (mg/kg/day) | NOAEL EEQ 100% SUF | LOAEL EEQ 100% SUF | NOAEL EEQ 10% SUF | LOAEL EEQ 10% SUF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics** | | | | | | | | | | | | | | | |
| ACENAPHTHENE | 8.50E-01 | 3.30E-04 | 2.90E-01 | 2.73E+00 | 3.73E-03 | 1.14E-04 | 2.78E-01 | 2.82E-01 | 2.82E-02 | 3.03E-01 | 6.06E-01 | 9.32E-01 | 4.66E-01 | 9.32E-02 | 4.66E-02 |
| ACENAPHTHYLENE | 4.80E-02 | 4.30E-04 | 2.90E-01 | 1.54E-01 | 2.10E-04 | 1.49E-04 | 1.57E-02 | 1.61E-02 | 1.61E-03 | 1.21E+00 | 1.21E+01 | 1.33E-02 | 1.33E-03 | 1.33E-03 | 1.33E-04 |
| ANTHRACENE | 1.80E+00 | 3.60E-04 | 2.90E-01 | 5.78E+00 | 7.89E-03 | 1.25E-04 | 5.90E-01 | 5.98E-01 | 5.98E-02 | 1.73E+00 | 1.73E+01 | 3.45E-01 | 3.45E-02 | 3.45E-02 | 3.45E-03 |
| BENZO(A)ANTHRACENE | 3.70E+00 | 1.84E-03 | 2.90E-01 | 1.19E+01 | 1.62E-02 | 6.38E-04 | 1.21E+00 | 1.23E+00 | 1.23E-01 | 2.94E-03 | 2.94E-02 | 4.18E+02 | 4.18E+01 | 4.18E+01 | 4.18E+00 |
| BENZO(A)PYRENE | 4.50E+00 | 2.38E-03 | 2.90E-01 | 1.45E+01 | 1.97E-02 | 8.25E-04 | 1.47E+00 | 1.49E+00 | 1.49E-01 | 1.73E-02 | 1.73E-01 | 8.64E+01 | 8.64E+00 | 8.64E+00 | 8.64E-01 |
| BENZO(G,H,I)PERYLENE | 3.80E+00 | 2.46E-03 | 2.90E-01 | 1.22E+01 | 1.67E-02 | 8.53E-04 | 1.24E+00 | 1.26E+00 | 1.26E-01 | 1.25E-01 | 1.25E+00 | 1.01E+01 | 1.01E+00 | 1.01E+00 | 1.01E-01 |
| BENZO(K)FLUORANTHENE | 2.00E+00 | 1.72E-03 | 2.90E-01 | 6.42E+00 | 8.77E-03 | 5.96E-04 | 6.55E-01 | 6.64E-01 | 6.64E-02 | 1.25E-01 | 1.25E+00 | 5.33E+00 | 5.33E-01 | 5.33E-01 | 5.33E-02 |
| CHRYSENE | 4.50E+00 | 4.46E-03 | 2.90E-01 | 1.45E+01 | 1.97E-02 | 1.55E-03 | 1.47E+00 | 1.50E+00 | 1.50E-01 | 2.94E-03 | 2.94E-02 | 5.08E+02 | 5.08E+01 | 5.08E+01 | 5.08E+00 |
| DIBENZO(A,H)ANTHRACENE | 7.00E-01 | 4.60E-04 | 2.90E-01 | 2.25E+00 | 3.07E-03 | 1.59E-04 | 2.29E-01 | 2.32E-01 | 2.32E-02 | 2.30E-02 | 2.30E-01 | 1.01E+01 | 1.01E+00 | 1.01E+00 | 1.01E-01 |
| FLUORANTHENE | 1.20E+01 | 1.19E-02 | 2.90E-01 | 3.85E+01 | 5.26E-02 | 4.13E-03 | 3.93E+00 | 3.99E+00 | 3.99E-01 | 2.16E-01 | 4.33E-01 | 1.84E+01 | 9.22E+00 | 1.84E+00 | 9.22E-01 |
| FLUORENE | 8.20E-01 | 3.40E-04 | 2.90E-01 | 2.63E+00 | 3.59E-03 | 1.18E-04 | 2.69E-01 | 2.72E-01 | 2.72E-02 | 2.16E-01 | 4.33E-01 | 1.26E+00 | 6.29E-01 | 1.26E-01 | 6.29E-02 |
| INDENO(1,2,3-CD)PYRENE | 3.10E+00 | 2.09E-03 | 2.90E-01 | 9.96E+00 | 1.36E-02 | 7.25E-04 | 1.02E+00 | 1.03E+00 | 1.03E-01 | 1.25E-01 | 1.25E+00 | 8.27E+00 | 8.27E-01 | 8.27E-01 | 8.27E-02 |
| PHENANTHRENE | 9.10E+00 | 4.73E-03 | 2.90E-01 | 2.92E+01 | 3.99E-02 | 1.64E-03 | 2.98E+00 | 3.02E+00 | 3.02E-01 | 1.73E-02 | 1.73E-01 | 1.75E+02 | 1.75E+01 | 1.75E+01 | 1.75E+00 |
| PYRENE | 1.80E+01 | 8.61E-03 | 2.90E-01 | 5.78E+01 | 7.89E-02 | 2.99E-03 | 5.90E+00 | 5.98E+00 | 5.98E-01 | 1.30E-01 | 2.16E-01 | 4.61E+01 | 2.76E+01 | 4.61E+00 | 2.76E+00 |
| **Pesticides** | | | | | | | | | | | | | | | |
| 4,4'-DDD | 3.50E-02 | 0.00E+00 | 2.80E-01 | 1.09E-01 | 1.53E-04 | 0.00E+00 | 1.11E-02 | 1.12E-02 | 1.12E-03 | 1.61E-01 | 8.07E-01 | 6.95E-02 | 1.39E-02 | 6.95E-03 | 1.39E-03 |
| 4,4'-DDE | 7.60E-02 | 0.00E+00 | 7.70E+00 | 6.48E+00 | 3.33E-04 | 0.00E+00 | 6.61E-01 | 6.61E-01 | 6.61E-02 | 1.61E-01 | 8.07E-01 | 4.09E+00 | 8.19E-01 | 4.09E-01 | 8.19E-02 |
| 4,4'-DDT | 1.00E-01 | 0.00E+00 | 1.67E+00 | 1.85E+00 | 4.38E-04 | 0.00E+00 | 1.89E-01 | 1.89E-01 | 1.89E-02 | 1.61E-01 | 8.07E-01 | 1.17E+00 | 2.34E-01 | 1.17E-01 | 2.34E-02 |
| ALPHA-CHLORDANE | 3.10E-02 | 0.00E+00 | 4.77E+00 | 1.64E+00 | 1.36E-04 | 0.00E+00 | 1.67E-01 | 1.67E-01 | 1.67E-02 | 7.92E-02 | 1.58E-01 | 2.11E+00 | 1.05E+00 | 2.11E-01 | 1.05E-01 |
| GAMMA-CHLORDANE | 2.80E-02 | 0.00E+00 | 2.22E+00 | 6.89E-01 | 1.23E-04 | 0.00E+00 | 7.02E-02 | 7.03E-02 | 7.03E-03 | 7.92E-02 | 1.58E-01 | 8.87E-01 | 4.44E-01 | 8.87E-02 | 4.44E-02 |
| **PCBs** | | | | | | | | | | | | | | | |
| AROCLOR-1254 | 2.30E-01 | 0.00E+00 | 1.85E+00 | 4.71E+00 | 1.01E-03 | 0.00E+00 | 4.81E-01 | 4.82E-01 | 4.82E-02 | 5.49E-04 | 5.49E-03 | 8.77E+02 | 8.77E+01 | 8.77E+01 | 8.77E+00 |
| AROCLOR-1260 | 3.30E-01 | 0.00E+00 | 1.85E+00 | 6.76E+00 | 1.45E-03 | 0.00E+00 | 6.89E-01 | 6.91E-01 | 6.91E-02 | 5.49E-04 | 5.49E-03 | 1.26E+03 | 1.26E+02 | 1.26E+02 | 1.26E+01 |
| **Inorganics** | | | | | | | | | | | | | | | |
| ARSENIC | 3.38E+01 | 1.40E-03 | 6.90E-01 | 2.33E+01 | 1.48E-01 | 4.85E-04 | 2.38E+00 | 2.53E+00 | 2.53E-01 | 2.18E-03 | 2.18E-02 | 1.16E+03 | 1.16E+02 | 1.16E+02 | 1.16E+01 |
| CHROMIUM | 7.01E+01 | 3.60E-03 | 4.68E-01 | 3.28E+01 | 3.07E-01 | 1.25E-03 | 3.34E+00 | 3.65E+00 | 3.65E-01 | 6.62E-01 | 2.65E+00 | 5.52E+00 | 1.38E+00 | 5.52E-01 | 1.38E-01 |
| LEAD | 1.33E+02 | 2.90E-03 | 6.07E-01 | 8.07E+01 | 5.83E-01 | 1.01E-03 | 8.23E+00 | 8.81E+00 | 8.81E-01 | 1.61E+00 | 1.61E+01 | 5.46E+00 | 5.46E-01 | 5.46E-01 | 5.46E-02 |
| NICKEL | 3.54E+01 | 8.00E-03 | 2.32E+00 | 8.21E+01 | 1.55E-01 | 2.77E-03 | 8.37E+00 | 8.53E+00 | 8.53E-01 | 8.07E+00 | 1.61E+01 | 1.06E+00 | 5.28E-01 | 1.06E-01 | 5.28E-02 |
| SELENIUM | 8.00E-01 | 1.30E-03 | 1.00E+00 | 8.00E-01 | 3.51E-03 | 4.51E-04 | 8.16E-02 | 8.55E-02 | 8.55E-03 | 4.04E-02 | 6.66E-02 | 2.12E+00 | 1.28E+00 | 2.12E-01 | 1.28E-01 |
| ZINC | 1.63E+02 | 1.02E-01 | 7.53E+00 | 1.23E+03 | 7.15E-01 | 3.54E-02 | 1.25E+02 | 1.26E+02 | 1.26E+01 | 3.23E+01 | 6.46E+01 | 3.90E+00 | 1.95E+00 | 3.90E-01 | 1.95E-01 |

Cells are shaded if the EEQ is greater than 1.0.
(1) - The sediment to invertebrate BAF was used for metals because no sediment to fish BAFs were available for metals.

| | | |
|---|---|---|
| Body Weight = (BW) | 5.500E-01 | kg |
| Food Ingestion Rate = (If) | 5.608E-02 | kg/day |
| Water Ingestion Rate = (Iw) | 1.907E-01 | L/day |
| Sediment Ingestion Rate = (Is) | 2.411E-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 (sediment) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (fish) = (Cf * If)(H)/BW
Total Dose = Dose (sediment) + Dose (surface water) + Dose (fish)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Cf = Contaminant concentration in fish
Metals = sediment concentration * BAF
Organics = (sediment concentration * BSAF * %lipids)/(% total organic carbon)
Where:
% Lipids = 14.4 % (see Appendix J.4)
% TOC = 1.3 %

**MINK - AVERAGE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, INDIANA**

| Parameter | Avg Sediment Concentration (mg/kg) | Avg SW Concentration (mg/L) | Biotransfer Factor (sed to fish)(1) | Fish Concentration (mg/kg) | Dose (mg/kg/day) from: Sediment | Surface Water | Fish | Total Dose (mg/kg/day) | Site Use Factor of 10% | NOAEL (mg/kg/day) | LOAEL (mg/kg/day) | NOAEL EEQ 100% SUF | LOAEL EEQ 100% SUF | NOAEL EEQ 10% SUF | LOAEL EEQ 10% SUF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics** | | | | | | | | | | | | | | | |
| BENZO(A)ANTHRACENE | 1.08E+00 | 2.71E-04 | 2.90E-01 | 3.46E+00 | 5.52E-04 | 2.14E-05 | 1.36E-01 | 1.37E-01 | 1.37E-02 | 5.00E-03 | 5.00E-02 | 2.74E+01 | 2.74E+00 | 2.74E+00 | 2.74E-01 |
| BENZO(A)PYRENE | 1.18E+00 | 3.53E-04 | 2.90E-01 | 3.79E+00 | 6.04E-04 | 2.79E-05 | 1.49E-01 | 1.50E-01 | 1.50E-02 | 2.94E-02 | 2.94E-01 | 5.09E+00 | 5.09E-01 | 5.09E-01 | 5.09E-02 |
| BENZO(G,H,I)PERYLENE | 1.12E+00 | 3.66E-04 | 2.90E-01 | 3.61E+00 | 5.75E-04 | 2.89E-05 | 1.42E-01 | 1.43E-01 | 1.43E-02 | 2.12E-01 | 2.12E+00 | 6.73E-01 | 6.73E-02 | 6.73E-02 | 6.73E-03 |
| BENZO(K)FLUORANTHENE | 6.34E-01 | 2.50E-04 | 2.90E-01 | 2.04E+00 | 3.24E-04 | 1.98E-05 | 8.02E-02 | 8.05E-02 | 8.05E-03 | 2.12E-01 | 2.12E+00 | 3.80E-01 | 3.80E-02 | 3.80E-02 | 3.80E-03 |
| CHRYSENE | 1.31E+00 | 6.32E-04 | 2.90E-01 | 4.21E+00 | 6.71E-04 | 4.99E-05 | 1.66E-01 | 1.66E-01 | 1.66E-02 | 5.00E-03 | 5.00E-02 | 3.33E+01 | 3.33E+00 | 3.33E+00 | 3.33E-01 |
| DIBENZO(A,H)ANTHRACENE | 2.18E-01 | 7.56E-05 | 2.90E-01 | 7.01E-01 | 1.12E-04 | 5.97E-06 | 2.76E-02 | 2.77E-02 | 2.77E-03 | 3.91E-02 | 3.91E-01 | 7.08E-01 | 7.08E-02 | 7.08E-02 | 7.08E-03 |
| FLUORANTHENE | 2.85E+00 | 1.53E-03 | 2.90E-01 | 9.14E+00 | 1.46E-03 | 1.21E-04 | 3.60E-01 | 3.61E-01 | 3.61E-02 | 3.68E-01 | 7.36E-01 | 9.82E-01 | 4.91E-01 | 9.82E-02 | 4.91E-02 |
| FLUORENE | 1.96E-01 | 5.14E-05 | 2.90E-01 | 6.31E-01 | 1.01E-04 | 4.05E-06 | 2.48E-02 | 2.49E-02 | 2.49E-03 | 3.68E-01 | 7.36E-01 | 6.78E-02 | 3.39E-02 | 6.78E-03 | 3.39E-03 |
| INDENO(1,2,3-CD)PYRENE | 9.34E-01 | 3.11E-04 | 2.90E-01 | 3.00E+00 | 4.78E-04 | 2.45E-05 | 1.18E-01 | 1.19E-01 | 1.19E-02 | 2.12E-01 | 2.12E+00 | 5.60E-01 | 5.60E-02 | 5.60E-02 | 5.60E-03 |
| PHENANTHRENE | 2.56E+00 | 6.59E-04 | 2.90E-01 | 8.21E+00 | 1.31E-03 | 5.20E-05 | 3.23E-01 | 3.25E-01 | 3.25E-02 | 2.94E-02 | 2.94E-01 | 1.10E+01 | 1.10E+00 | 1.10E+00 | 1.10E-01 |
| PYRENE | 4.28E+00 | 1.27E-03 | 2.90E-01 | 1.37E+01 | 2.19E-03 | 1.00E-04 | 5.41E-01 | 5.43E-01 | 5.43E-02 | 2.21E-01 | 3.68E-01 | 2.46E+00 | 1.48E+00 | 2.46E-01 | 1.48E-01 |
| **Pesticides** | | | | | | | | | | | | | | | |
| 4,4'-DDE | 1.33E-02 | 0.00E+00 | 7.70E+00 | 1.13E+00 | 6.80E-06 | 0.00E+00 | 4.46E-02 | 4.46E-02 | 4.46E-03 | 2.75E-01 | 1.37E+00 | 1.62E-01 | 3.25E-02 | 1.62E-02 | 3.25E-03 |
| 4,4'-DDT | 1.73E-02 | 0.00E+00 | 1.67E+00 | 3.21E-01 | 8.87E-06 | 0.00E+00 | 1.26E-02 | 1.26E-02 | 1.26E-03 | 2.75E-01 | 1.37E+00 | 4.60E-02 | 9.19E-03 | 4.60E-03 | 9.19E-04 |
| ALPHA-CHLORDANE | 4.27E-03 | 0.00E+00 | 4.77E+00 | 2.26E-01 | 2.19E-06 | 0.00E+00 | 8.89E-03 | 8.89E-03 | 8.89E-04 | 1.35E-01 | 2.70E-01 | 6.60E-02 | 3.30E-02 | 6.60E-03 | 3.30E-03 |
| **PCBs** | | | | | | | | | | | | | | | |
| AROCLOR-1254 | 3.05E-02 | 0.00E+00 | 1.85E+00 | 6.26E-01 | 1.56E-05 | 0.00E+00 | 2.46E-02 | 2.47E-02 | 2.47E-03 | 9.34E-04 | 9.34E-03 | 2.64E+01 | 2.64E+00 | 2.64E+00 | 2.64E-01 |
| AROCLOR-1260 | 3.52E-02 | 0.00E+00 | 1.85E+00 | 7.21E-01 | 1.80E-05 | 0.00E+00 | 2.84E-02 | 2.84E-02 | 2.84E-03 | 9.34E-04 | 9.34E-03 | 3.04E+01 | 3.04E+00 | 3.04E+00 | 3.04E-01 |
| **Inorganics** | | | | | | | | | | | | | | | |
| ARSENIC | 8.82E+00 | 4.08E-04 | 1.43E-01 | 1.26E+00 | 4.51E-03 | 3.22E-05 | 4.96E-02 | 5.42E-02 | 5.42E-03 | 3.71E-03 | 3.71E-02 | 1.46E+01 | 1.46E+00 | 1.46E+00 | 1.46E-01 |
| CHROMIUM | 2.41E+01 | 1.47E-03 | 1.00E-01 | 2.41E+00 | 1.24E-02 | 1.16E-04 | 9.50E-02 | 1.08E-01 | 1.08E-02 | 1.13E+00 | 4.51E+00 | 9.55E-02 | 2.38E-02 | 9.55E-03 | 2.38E-03 |
| LEAD | 2.79E+01 | 1.15E-03 | 7.10E-02 | 1.98E+00 | 1.43E-02 | 9.10E-05 | 7.80E-02 | 9.23E-02 | 9.23E-03 | 2.75E+00 | 2.75E+01 | 3.36E-02 | 3.36E-03 | 3.36E-03 | 3.36E-04 |
| NICKEL | 1.86E+01 | 3.09E-03 | 4.86E-01 | 9.02E+00 | 9.50E-03 | 2.44E-04 | 3.55E-01 | 3.65E-01 | 3.65E-02 | 1.37E+01 | 2.75E+01 | 2.66E-02 | 1.33E-02 | 2.66E-03 | 1.33E-03 |
| SELENIUM | 3.44E-01 | 2.89E-04 | 1.00E+00 | 3.44E-01 | 1.76E-04 | 2.28E-05 | 1.35E-02 | 1.37E-02 | 1.37E-03 | 6.87E-02 | 1.13E-01 | 2.00E-01 | 1.21E-01 | 2.00E-02 | 1.21E-02 |
| ZINC | 6.22E+01 | 2.75E-02 | 1.94E+00 | 1.20E+02 | 3.18E-02 | 2.17E-03 | 4.74E+00 | 4.77E+00 | 4.77E-01 | 5.49E+01 | 1.10E+02 | 8.69E-02 | 4.34E-02 | 8.69E-03 | 4.34E-03 |

Cells are shaded if the EEQ is greater than 1.0.
(1) - The sediment to invertebrate BAF was used for metals because no sediment to fish BAFs were available for metals.

| | | |
|---|---|---|
| Body Weight = (BW) | 1.020E+00 | kg |
| Food Ingestion Rate = (If) | 4.015E-02 | kg/day |
| Water Ingestion Rate = (Iw) | 8.050E-02 | L/day |
| Sediment Ingestion Rate = (Is) | 5.220E-04 | kg/day |
| Home Range = (HR) | 3.484E+01 | acres |
| Contaminated Area = (CA) | Assume equal to home range | |
| H=HR/CA (Assume = to 1 for maximum exposure) | | |

Dose (sediment) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (fish) = (Cf * If)(H)/BW
Total Dose = Dose (sediment) + Dose (surface water) + Dose (fish)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Cf = Contaminant concentration in fish
Metals = sediment concentration * BAF
Organics = (sediment concentration * BSAF * %lipids)/(% total organic carbon)
Where:
% Lipids = 14.4 % (see Appendix J.4)
% TOC = 1.3 %

**BELTED KINGFISHER - CONSERVATIVE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, INDIANA**

| Parameter | Max Sediment Concentration (mg/kg) | Max SW Concentration (mg/L) | Biotransfer Factor (sed to fish)[1] | Fish Concentration (mg/kg) | Dose (mg/kg/day) from: Sediment | Surface Water | Fish | Total Dose (mg/kg/day) | Site Use Factor of 10% | NOAEL (mg/kg/day) | LOAEL (mg/kg/day) | NOAEL EEQ 100% SUF | LOAEL EEQ 100% SUF | NOAEL EEQ 10% SUF | LOAEL EEQ 10% SUF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics** | | | | | | | | | | | | | | | |
| ACENAPHTHENE | 8.50E-01 | 3.30E-04 | 2.90E-01 | 2.73E+00 | 3.91E-03 | 4.54E-05 | 3.80E-01 | 3.84E-01 | 3.84E-02 | 2.00E+00 | 2.00E+01 | 1.92E-01 | 1.92E-02 | 1.92E-02 | 1.92E-03 |
| ACENAPHTHYLENE | 4.80E-02 | 4.30E-04 | 2.90E-01 | 1.54E-01 | 2.21E-04 | 5.91E-05 | 2.15E-02 | 2.18E-02 | 2.18E-03 | 2.00E+00 | 2.00E+01 | 1.09E-02 | 1.09E-03 | 1.09E-03 | 1.09E-04 |
| ANTHRACENE | 1.80E+00 | 3.60E-04 | 2.90E-01 | 5.78E+00 | 8.28E-03 | 4.95E-05 | 8.06E-01 | 8.14E-01 | 8.14E-02 | 2.00E+00 | 2.00E+01 | 4.07E-01 | 4.07E-02 | 4.07E-02 | 4.07E-03 |
| BENZO(A)ANTHRACENE | 3.70E+00 | 1.84E-03 | 2.90E-01 | 1.19E+01 | 1.70E-02 | 2.53E-04 | 1.66E+00 | 1.67E+00 | 1.67E-01 | 2.00E+00 | 2.00E+01 | 8.37E-01 | 8.37E-02 | 8.37E-02 | 8.37E-03 |
| BENZO(A)PYRENE | 4.50E+00 | 2.38E-03 | 2.90E-01 | 1.45E+01 | 2.07E-02 | 3.27E-04 | 2.01E+00 | 2.04E+00 | 2.04E-01 | 2.00E+00 | 2.00E+01 | 1.02E+00 | 1.02E-01 | 1.02E-01 | 1.02E-02 |
| BENZO(G,H,I)PERYLENE | 3.80E+00 | 2.46E-03 | 2.90E-01 | 1.22E+01 | 1.75E-02 | 3.38E-04 | 1.70E+00 | 1.72E+00 | 1.72E-01 | 2.00E+00 | 2.00E+01 | 8.59E-01 | 8.59E-02 | 8.59E-02 | 8.59E-03 |
| BENZO(K)FLUORANTHENE | 2.00E+00 | 1.72E-03 | 2.90E-01 | 6.42E+00 | 9.20E-03 | 2.37E-04 | 8.95E-01 | 9.05E-01 | 9.05E-02 | 2.00E+00 | 2.00E+01 | 4.52E-01 | 4.52E-02 | 4.52E-02 | 4.52E-03 |
| CHRYSENE | 4.50E+00 | 4.46E-03 | 2.90E-01 | 1.45E+01 | 2.07E-02 | 6.13E-04 | 2.01E+00 | 2.04E+00 | 2.04E-01 | 2.00E+00 | 2.00E+01 | 1.02E+00 | 1.02E-01 | 1.02E-01 | 1.02E-02 |
| DIBENZO(A,H)ANTHRACENE | 7.00E-01 | 4.60E-04 | 2.90E-01 | 2.25E+00 | 3.22E-03 | 6.33E-05 | 3.13E-01 | 3.17E-01 | 3.17E-02 | 2.00E+00 | 2.00E+01 | 1.58E-01 | 1.58E-02 | 1.58E-02 | 1.58E-03 |
| FLUORANTHENE | 1.20E+01 | 1.19E-02 | 2.90E-01 | 3.85E+01 | 5.52E-02 | 1.64E-03 | 5.37E+00 | 5.43E+00 | 5.43E-01 | 2.00E+00 | 2.00E+01 | 2.71E+00 | 2.71E-01 | 2.71E-01 | 2.71E-02 |
| FLUORENE | 8.20E-01 | 3.40E-04 | 2.90E-01 | 2.63E+00 | 3.77E-03 | 4.68E-05 | 3.67E-01 | 3.71E-01 | 3.71E-02 | 2.00E+00 | 2.00E+01 | 1.85E-01 | 1.85E-02 | 1.85E-02 | 1.85E-03 |
| INDENO(1,2,3-CD)PYRENE | 3.10E+00 | 2.09E-03 | 2.90E-01 | 9.96E+00 | 1.43E-02 | 2.87E-04 | 1.39E+00 | 1.40E+00 | 1.40E-01 | 2.00E+00 | 2.00E+01 | 7.01E-01 | 7.01E-02 | 7.01E-02 | 7.01E-03 |
| PHENANTHRENE | 9.10E+00 | 4.73E-03 | 2.90E-01 | 2.92E+01 | 4.18E-02 | 6.50E-04 | 4.07E+00 | 4.12E+00 | 4.12E-01 | 2.00E+00 | 2.00E+01 | 2.06E+00 | 2.06E-01 | 2.06E-01 | 2.06E-02 |
| PYRENE | 1.80E+01 | 8.61E-03 | 2.90E-01 | 5.78E+01 | 8.28E-02 | 1.18E-03 | 8.06E+00 | 8.14E+00 | 8.14E-01 | 2.00E+00 | 2.00E+01 | 4.07E+00 | 4.07E-01 | 4.07E-01 | 4.07E-02 |
| **Pesticides** | | | | | | | | | | | | | | | |
| 4,4'-DDD | 3.50E-02 | 0.00E+00 | 2.80E-01 | 1.09E-01 | 1.61E-04 | 0.00E+00 | 1.51E-02 | 1.53E-02 | 1.53E-03 | 9.00E-03 | 5.20E-02 | 1.70E+00 | 2.94E-01 | 1.70E-01 | 2.94E-02 |
| 4,4'-DDE | 7.60E-02 | 0.00E+00 | 7.70E+00 | 6.48E+00 | 3.49E-04 | 0.00E+00 | 9.03E-01 | 9.04E-01 | 9.04E-02 | 9.00E-03 | 5.20E-02 | 1.00E+02 | 1.74E+01 | 1.00E+01 | 1.74E+00 |
| 4,4'-DDT | 1.00E-01 | 0.00E+00 | 1.67E+00 | 1.85E+00 | 4.60E-04 | 0.00E+00 | 2.58E-01 | 2.58E-01 | 2.58E-02 | 9.00E-03 | 5.20E-02 | 2.87E+01 | 4.97E+00 | 2.87E+00 | 4.97E-01 |
| ALPHA-CHLORDANE | 3.10E-02 | 0.00E+00 | 4.77E+00 | 1.64E+00 | 1.43E-04 | 0.00E+00 | 2.28E-01 | 2.28E-01 | 2.28E-02 | 2.14E+00 | 1.07E+01 | 1.07E-01 | 2.13E-02 | 1.07E-02 | 2.13E-03 |
| GAMMA-CHLORDANE | 2.80E-02 | 0.00E+00 | 2.22E+00 | 6.89E-01 | 1.29E-04 | 0.00E+00 | 9.59E-02 | 9.61E-02 | 9.61E-03 | 2.14E+00 | 1.07E+01 | 4.49E-02 | 8.98E-03 | 4.49E-03 | 8.98E-04 |
| **PCBs** | | | | | | | | | | | | | | | |
| AROCLOR-1254 | 2.30E-01 | 0.00E+00 | 1.85E+00 | 4.71E+00 | 1.06E-03 | 0.00E+00 | 6.57E-01 | 6.58E-01 | 6.58E-02 | 1.80E-01 | 1.80E+00 | 3.65E+00 | 3.65E-01 | 3.65E-01 | 3.65E-02 |
| AROCLOR-1260 | 3.30E-01 | 0.00E+00 | 1.85E+00 | 6.76E+00 | 1.52E-03 | 0.00E+00 | 9.42E-01 | 9.44E-01 | 9.44E-02 | 1.80E-01 | 1.80E+00 | 5.24E+00 | 5.24E-01 | 5.24E-01 | 5.24E-02 |
| **Inorganics** | | | | | | | | | | | | | | | |
| ARSENIC | 3.38E+01 | 1.40E-03 | 6.90E-01 | 2.33E+01 | 1.55E-01 | 1.93E-04 | 3.25E+00 | 3.41E+00 | 3.41E-01 | 2.46E+00 | 7.38E+00 | 1.38E+00 | 4.61E-01 | 1.38E-01 | 4.61E-02 |
| CHROMIUM | 7.01E+01 | 3.60E-03 | 4.68E-01 | 3.28E+01 | 3.22E-01 | 4.95E-04 | 4.57E+00 | 4.89E+00 | 4.89E-01 | 1.00E+00 | 5.00E+00 | 4.89E+00 | 9.79E-01 | 4.89E-01 | 9.79E-02 |
| LEAD | 1.33E+02 | 2.90E-03 | 6.07E-01 | 8.07E+01 | 6.12E-01 | 3.99E-04 | 1.12E+01 | 1.19E+01 | 1.19E+00 | 1.13E+00 | 1.13E+01 | 1.05E+01 | 1.05E+00 | 1.05E+00 | 1.05E-01 |
| NICKEL | 3.54E+01 | 8.00E-03 | 2.32E+00 | 8.21E+01 | 1.63E-01 | 1.10E-03 | 1.14E+01 | 1.16E+01 | 1.16E+00 | 7.74E+01 | 1.07E+02 | 1.50E-01 | 1.08E-01 | 1.50E-02 | 1.08E-02 |
| SELENIUM | 8.00E-01 | 1.30E-03 | 1.00E+00 | 8.00E-01 | 3.68E-03 | 1.79E-04 | 1.11E-01 | 1.15E-01 | 1.15E-02 | 4.00E-01 | 8.00E-01 | 2.88E-01 | 1.44E-01 | 2.88E-02 | 1.44E-02 |
| ZINC | 1.63E+02 | 1.02E-01 | 7.53E+00 | 1.23E+03 | 7.50E-01 | 1.40E-02 | 1.71E+02 | 1.72E+02 | 1.72E+01 | 1.45E+01 | 1.31E+02 | 1.19E+01 | 1.31E+00 | 1.19E+00 | 1.31E-01 |

Cells are shaded if the EEQ is greater than 1.0.
(1) - The sediment to invertebrate BAF was used for metals because no sediment to fish BAFs were available for metals.
NA = Not Applicable
NV = No Value Available

| | | |
|---|---|---|
| Body Weight = (BW) | 1.360E-01 | kg |
| Food Ingestion Rate = (If) | 1.895E-02 | kg/day |
| Water Ingestion Rate = (Iw) | 1.870E-02 | L/day |
| Sediment Ingestion Rate = (Is) | 6.254E-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 (sediment) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (fish) = (Cf * If)(H)/BW
Total Dose = Dose (sediment) + Dose (surface water) + Dose (fish)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Cf = Contaminant concentration in fish
Metals = sediment concentration * BAF
Organics = (sediment concentration * BSAF * %lipids)/(% total organic carbon)
Where:
% Lipids = 14.4 % (see Appendix J.4)
% TOC = 1.3 %

**BELTED KINGFISHER - AVERAGE INPUTS**
**TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION**
**SWMU 15 (ROADS AND GROUNDS AREA)**
**NSWC CRANE, INDIANA**

| Parameter | Avg Sediment Concentration (mg/kg) | Avg SW Concentration (mg/L) | Biotransfer Factor (sed to fish)(1) | Fish Concentration (mg/kg) | Dose (mg/kg/day) from: Sediment | Surface Water | Fish | Total Dose (mg/kg/day) | Site Use Factor of 10% | NOAEL (mg/kg/day) | LOAEL (mg/kg/day) | NOAEL EEQ 100% SUF | LOAEL EEQ 100% SUF | NOAEL EEQ 10% SUF | LOAEL EEQ 10% SUF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semivolatile Organics** | | | | | | | | | | | | | | | |
| BENZO(A)PYRENE | 1.18E+00 | 3.53E-04 | 2.90E-01 | 3.79E+00 | 4.41E-03 | 3.88E-05 | 4.30E-01 | 4.34E-01 | 4.34E-02 | 2.00E+00 | 2.00E+01 | 2.17E-01 | 2.17E-02 | 2.17E-02 | 2.17E-03 |
| CHRYSENE | 1.31E+00 | 6.32E-04 | 2.90E-01 | 4.21E+00 | 4.90E-03 | 6.94E-05 | 4.77E-01 | 4.82E-01 | 4.82E-02 | 2.00E+00 | 2.00E+01 | 2.41E-01 | 2.41E-02 | 2.41E-02 | 2.41E-03 |
| FLUORANTHENE | 2.85E+00 | 1.53E-03 | 2.90E-01 | 9.14E+00 | 1.06E-02 | 1.68E-04 | 1.04E+00 | 1.05E+00 | 1.05E-01 | 2.00E+00 | 2.00E+01 | 5.23E-01 | 5.23E-02 | 5.23E-02 | 5.23E-03 |
| PHENANTHRENE | 2.56E+00 | 6.59E-04 | 2.90E-01 | 8.21E+00 | 9.56E-03 | 7.24E-05 | 9.30E-01 | 9.40E-01 | 9.40E-02 | 2.00E+00 | 2.00E+01 | 4.70E-01 | 4.70E-02 | 4.70E-02 | 4.70E-03 |
| PYRENE | 4.28E+00 | 1.27E-03 | 2.90E-01 | 1.37E+01 | 1.60E-02 | 1.39E-04 | 1.56E+00 | 1.57E+00 | 1.57E-01 | 2.00E+00 | 2.00E+01 | 7.86E-01 | 7.86E-02 | 7.86E-02 | 7.86E-03 |
| **Pesticides** | | | | | | | | | | | | | | | |
| 4,4'-DDD | 8.05E-03 | 0.00E+00 | 2.80E-01 | 2.50E-02 | 3.01E-05 | 0.00E+00 | 2.83E-03 | 2.86E-03 | 2.86E-04 | 9.00E-03 | 5.20E-02 | 3.18E-01 | 5.50E-02 | 3.18E-02 | 5.50E-03 |
| 4,4'-DDE | 1.33E-02 | 0.00E+00 | 7.70E+00 | 1.13E+00 | 4.97E-05 | 0.00E+00 | 1.28E-01 | 1.28E-01 | 1.28E-02 | 9.00E-03 | 5.20E-02 | 1.43E+01 | 2.47E+00 | 1.43E+00 | 2.47E-01 |
| 4,4'-DDT | 1.73E-02 | 0.00E+00 | 1.67E+00 | 3.21E-01 | 6.48E-05 | 0.00E+00 | 3.63E-02 | 3.64E-02 | 3.64E-03 | 9.00E-03 | 5.20E-02 | 4.04E+00 | 7.00E-01 | 4.04E-01 | 7.00E-02 |
| **PCBs** | | | | | | | | | | | | | | | |
| AROCLOR-1254 | 3.05E-02 | 0.00E+00 | 1.85E+00 | 6.26E-01 | 1.14E-04 | 0.00E+00 | 7.09E-02 | 7.10E-02 | 7.10E-03 | 1.80E-01 | 1.80E+00 | 3.95E-01 | 3.95E-02 | 3.95E-02 | 3.95E-03 |
| AROCLOR-1260 | 3.52E-02 | 0.00E+00 | 1.85E+00 | 7.21E-01 | 1.32E-04 | 0.00E+00 | 8.18E-02 | 8.19E-02 | 8.19E-03 | 1.80E-01 | 1.80E+00 | 4.55E-01 | 4.55E-02 | 4.55E-02 | 4.55E-03 |
| **Inorganics** | | | | | | | | | | | | | | | |
| ARSENIC | 8.82E+00 | 4.08E-04 | 1.43E-01 | 1.26E+00 | 3.30E-02 | 4.48E-05 | 1.43E-01 | 1.76E-01 | 1.76E-02 | 2.46E+00 | 7.38E+00 | 7.15E-02 | 2.38E-02 | 7.15E-03 | 2.38E-03 |
| CHROMIUM | 2.41E+01 | 1.47E-03 | 1.00E-01 | 2.41E+00 | 9.03E-02 | 1.61E-04 | 2.74E-01 | 3.64E-01 | 3.64E-02 | 1.00E+00 | 5.00E+00 | 3.64E-01 | 7.28E-02 | 3.64E-02 | 7.28E-03 |
| LEAD | 2.79E+01 | 1.15E-03 | 7.10E-02 | 1.98E+00 | 1.04E-01 | 1.27E-04 | 2.24E-01 | 3.29E-01 | 3.29E-02 | 1.13E+00 | 1.13E+01 | 2.91E-01 | 2.91E-02 | 2.91E-02 | 2.91E-03 |
| ZINC | 6.22E+01 | 2.75E-02 | 1.94E+00 | 1.20E+02 | 2.33E-01 | 3.02E-03 | 1.36E+01 | 1.39E+01 | 1.39E+00 | 1.45E+01 | 1.31E+02 | 9.58E-01 | 1.06E-01 | 9.58E-02 | 1.06E-02 |

Cells are shaded if the EEQ is greater than 1.0.
(1) - The sediment to invertebrate BAF was used for metals because no sediment to fish BAFs were available for metals.
NA = Not Applicable
NV = No Value Available

| | | |
|---|---|---|
| Body Weight = (BW) | 1.520E-01 | kg |
| Food Ingestion Rate = (If) | 1.723E-02 | kg/day |
| Water Ingestion Rate = (Iw) | 1.670E-02 | L/day |
| Sediment Ingestion Rate = (Is) | 5.684E-04 | kg/day |
| Home Range = (HR) | 1.160E+00 | km |
| Contaminated Area = (CA) | Assume equal to home range | |

H=HR/CA (Assume = to 1 for maximum exposure)

Dose (sediment) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (fish) = (Cf * If)(H)/BW
Total Dose = Dose (sediment) + Dose (surface water) + Dose (fish)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Cf = Contaminant concentration in fish
Metals = sediment concentration * BAF
Organics = (sediment concentration * BSAF * %lipids)/(% total organic carbon)
Where:
% Lipids = 14.4 % (see Appendix J.4)
% TOC = 1.3 %

# 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


October 10, 2006

Mr. Doug Griffin
Office of Land Quality
Indiana Department of Environmental Management
100 N. Senate Ave.
Indianapolis, Indiana 46206-6015

Dear Mr. Griffin:

This regards your September 12, 2006 email request that Dan Sparks of my staff participate in an ecological review of the "R & G area" stream on the Crane Naval facility located in Martin, County, Indiana. On October 3, 2006, we participated in a joint site visit. The purpose of this effort was to evaluate habitat quality and determine whether remediation is warranted based on the concentrations of PAHs and the incidence of sediment toxicity.

This letter has been prepared pursuant to our role as providers of biological and technical assistance to EPA under the Fish and Wildlife Coordination Act (16 USC 661 et seq.) and is 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 recent chemical and sediment toxicity data provided during our meeting. These comments are based on that data, our site visit observations and the knowledge we have gained during our sediment toxicity studies from other Indiana locations.

It is clear from our site visit that discharges or spills from the historical asphalt plant (prior to the 1980s) did deposit asphalt materials (along with PAHs) along the high gradient, gravel and bedrock stream. The bedrock, tree roots and gravel are darkly stained by historical discharges. And although PAHs were somewhat elevated at a few locations, concentrations do not appear to be toxic to *Hyalella* during a 10-day toxicity test. Although we have not fully analyzed the data provided, it is likely that the more toxic fraction of the PAHs associated with historical asphalt plant discharges have long since photodegraded leaving the larger, less toxic PAH compounds behind. In addition, it appears that a few cubic yards of coal residues had been deposited on the south bank of this stream at least a few decades ago. We did not observe any aquatic life in the stream in the areas that we visited on October 3, 2006 but this could be due to the fact that the stream may be ephemeral in this area. We visited within hours of 0.5" of rain, and already the stream was only inches deep in most places.

At another study site in Lake County, Indiana, we have seen the lack of *Hyalella* toxicity where higher molecular weight PAHs were dominant. At that particular site, photodegradation and volatilization likely played a role in the reduction of PAH toxicity. At the R & G area,

weathering of the historic releases of PAHs has also likely occurred which would explain the lack of toxicity.

The PAHs detected in the streambed could also be related to the seal coating of the asphalt parking lot which apparently took place in the months (less than a year) prior to this PAH sampling event. Episodic runoff events could suppress the benthic community of the stream without necessarily causing the toxicity testing effort to document toxicity in the sediments.

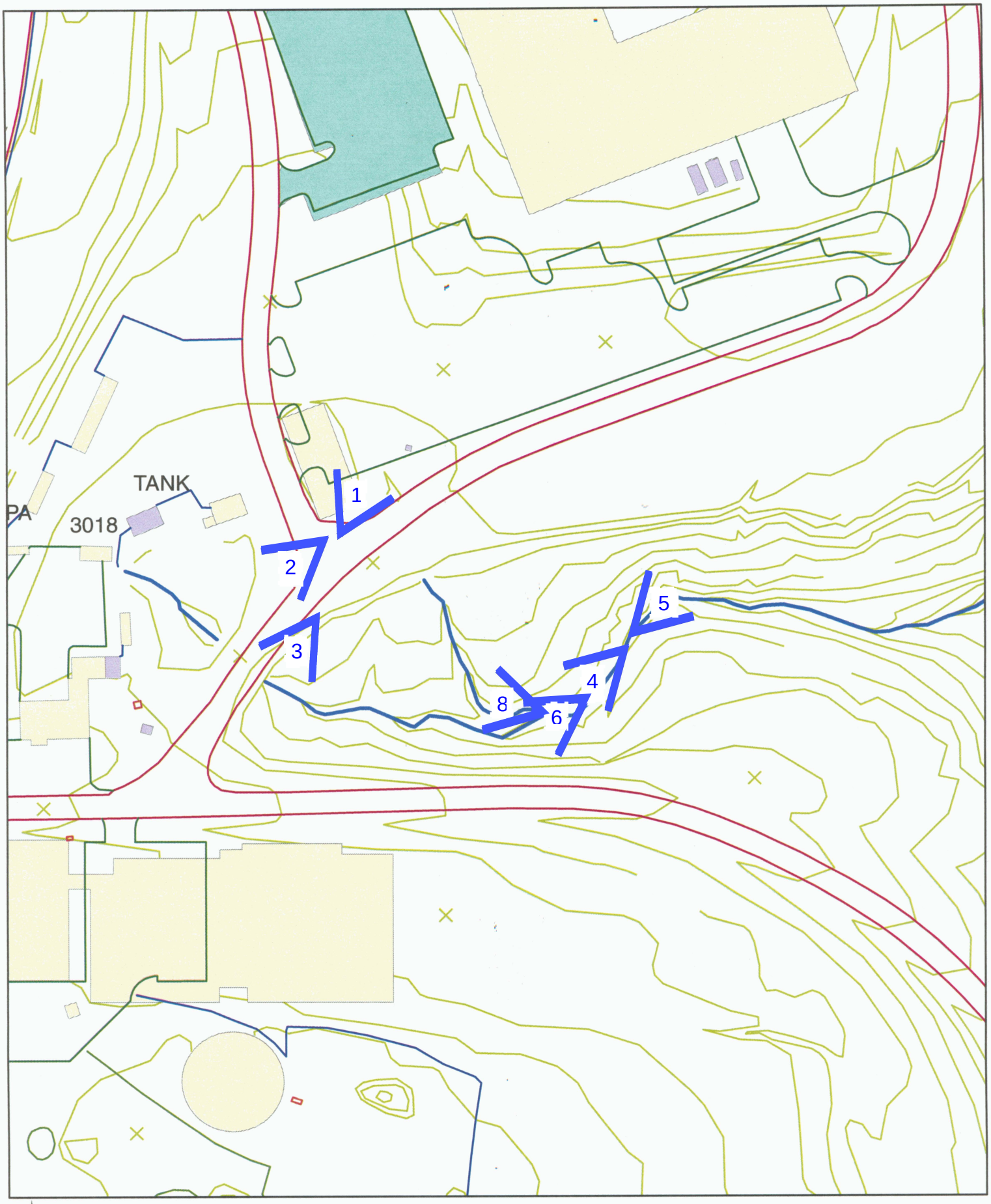
It might be worthwhile to characterize the aquatic community further downstream of the site than we looked on October 3, 2006 to assess where the aquatic community begins to recover from the historic and perhaps non-point runoff impacts. However, there are several factors involved with this stream area that argue against taking any kind of expansive remedial effort: it is forested, steep banked, rock and bedrock streambed with very little sediment capable of being removed. Although the aquatic community of the stream is not providing any net primary productivity, the forested area is providing some limited wildlife habitat on the edge of an urbanized area. There are a few cosmetic activities that could be undertaken such as the removal of large 30 year old chunks of tar, and some of the surficial coal waste materials. This sort of removal would have to be done manually, and would not likely result in any measurable benefit to the stream.

Thank you for allowing us to help protect and restore this nation's natural resources. If you have any questions regarding this information, please contact Dan Sparks of my staff at (812) 334-4261, extension 219.

Sincerely Yours,

Scott E. Pruitt
Field Supervisor

cc: Tom Brent, Crane Naval Facility, IN
Dan Mazur, USEPA, Chicago, IL




0 40 80 160 240 320 Feet

R&GA Photos