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TETRA TECH

Final
Resource Conservation and Recovery Act Facility Investigation Report

SWMU 23 – Battery Shop

Naval Support Activity Crane
Crane, Indiana

Naval Facilities Engineering Command
MidLANT

Contract Number N62470-08-D-1001
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RESOURCE CONSERVATION AND RECOVERY ACT
FACILITY INVESTIGATION REPORT

SWMU 23 - BATTERY SHOP

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CRANE, INDIANA

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ACRONYMS AND ABBREVIATIONS

atm-m^3/mole	Atmospheres cubic meters per mole
ADAF	Age-dependent adjustment factor
ATSDR	Agency for Toxic Substances and Disease Registry
BAF	Bioaccumulation factor
BCF	Bioconcentration factor
BERA	Baseline ecological risk assessment
bgs	Below ground surface
Cal EPA	California Environmental Protection Agency
CCME	Canadian Council of Ministers of the Environment
CDI	Chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
cm^2	Square centimeters
CMS	Corrective Measures Study
COC	Chemical of concern
COPC	Chemical of potential concern
CSF	Cancer slope factor
CSM	Conceptual site model
CTE	Central tendency exposure
CTO	Contract Task Order
DA_{event}	Absorbed dose per event
DAF	Dilution attenuation factor
DNA	Deoxyribonucleic acid
DRO	Diesel range organics
EC_{50}	Median effective concentration
Eco SSL	Ecological soil screening level
EEQ	Ecological effects quotient
Eh	Redox potential
EMR	Environmental Monitoring Reports
EPC	Exposure point concentration
ERO	Extended range organics
ESL	Ecological screening level
ESRI	Environmental Systems Research Institute

EU	Exposure unit
FTMR	Field Task Modification Request
f_{oc}	Fraction of organic carbon
FR	Federal Register
GRO	Gasoline range organics
HEAST	Health Effects Assessment Summary Tables
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient
IA	Installation Assessment
IAS	Initial Assessment Study
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IEUBK	Integrated Exposure Uptake Biokinetic Model
ILCR	Incremental lifetime cancer risk
IM	Interim measure
IRIS	Integrated Risk Information System
IUR	Inhalation unit risk
K_d	Soil-water distribution coefficient
K_{oc}	Organic carbon partition coefficient
K_{ow}	Octanol/water partition coefficient
K_p	Dermal permeability coefficient
LANL	Los Alamos National Laboratory
LOAEL	Lowest observed adverse effect level
LOQ	Limit of quantitation
MCL	Maximum Contaminant Level
mg/kg	Milligram per kilogram
MidLANT	Mid-Atlantic
mm	Millimeter
MRL	Minimal Risk Level
msl	Mean sea level
NACIP	Navy Assessment and Control of Installation Pollutants
NAPL	Non-aqueous phase liquid
NAVFAC	Naval Facilities Engineering Command
NCEA	National Center for Environmental Assessment
NEESA	Naval Energy and Environmental Support Activity

NOAA	National Oceanic and Atmospheric Administration
NOAEL	No observed adverse effect level
NSA	Naval Support Activity
O/WS	Oil/water separator
ORNL	Oak Ridge National Laboratory
ORP	Oxidation-reduction potential
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEC	Probable effects concentration
PEF	Particulate emission factor
PEL	Probable effects level
PPRTV	Provisional Peer Reviewed Toxicity Value
PSL	Project screening level
RAGS	Risk Assessment Guidance for Superfund
RBA	Relative bioavailability
RCRA	Resource Conservation and Recovery Act
RfC	Reference concentration
RfD	Reference dose
RFI	Resource Conservation and Recovery Act Facility Investigation
RISC	Risk Integrated System of Closure
RME	Reasonable maximum exposure
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SEL	Severe effects level
SERA	Screening-level ecological risk assessment
SQG	Soil Quality Guideline
SQUIRT	Screening Quick Reference Tables
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit
TEC	Threshold effects concentration
TEF	Toxic equivalencyt factor
TEL	Threshold effects level
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
TRV	Toxicity reference value
TRW	Technical Workgroup

UCL	Upper confidence limit
µg/kg	Microgram per kilogram
µg/L	Microgram per liter
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UST	Underground storage rank
UTL	Upper tolerance limit
VOC	Volatile organic compound

EXECUTIVE SUMMARY

This Draft Final Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for Solid Waste Management Unit (SWMU) 23, Battery Shop, at the Naval Support Activity (NSA) Crane facility, located in Crane, Indiana was prepared for the Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic (MidLANT) under Contract Task Order (CTO) F274 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) V Contract Number N62470-08-D-1001.

The Draft RFI Report for SWMU 23 (Tetra Tech, 2013a) was prepared under CTO F27Q of the same contract. The Draft RFI Report documented previous site conditions that led to the decision to conduct an interim measure (IM) at the site. The IM, which was conducted in 2014, consisted of the removal of soil contaminated with lead and polycyclic aromatic hydrocarbon (PAHs) to reduce human health and ecological risks at SWMU 23.

PURPOSE OF RFI REPORT

The purpose of this Draft Final RFI Report is to briefly summarize all site activities, define the nature and extent of residual contamination (following the 2014 IM), evaluate the potential human health and ecological risks associated with exposure to residual contamination, and draw conclusions regarding whether further action is warranted. With the exception of the data that represent soil removed from the site during the IM, the risks presented in this report were estimated using the data from samples collected during the 2012 RFI and 2013 post-RFI supplemental sampling investigations. The post-RFI investigations were conducted to delineate the extent of contamination and to define excavation limits for the 2014 IM.

SITE DESCRIPTION

Building 36 is the Battery Shop where personnel perform maintenance operations on electric vehicles, primarily forklifts, for use at NSA Crane. From about 1940 to 1975, battery acid containing lead and sulfates was discharged onto the hillside behind the Battery Shop. In addition, waste oils, oily water, and solvents were also discharged onto the hillside. The oily wastes originated from the maintenance of non-electric forklifts and was processed through an oil/water separator (O/WS) adjacent to Building 36. After 1975, wastes generated at Building 36 were discharged through floor drains and the O/WS, which are connected to the NSA Crane industrial waste treatment system.

Miscellaneous debris, including concrete, reinforcement bar (rebar), metal cans, drums, chairs, tires, and battery components, has also been disposed of in an unevenly scattered manner on the hilliside in an area north of Building 36. This debris, which was removed from the site during a 1996 IM, covered an area approximately 160 feet wide and 100 feet long and extended to the bottom of the ravine. A small intermittent stream is located at the bottom of the ravine. The area is rugged and densely wooded, with rock outcrops protruding from the slope causing sudden drops in elevation of 12 to 14 feet.

RESIDUAL CONTAMINATION

Soil

The primary site-related contaminants in soil at SWMU 23 are PAHs and lead. Most of the PAH- and lead-contaminated soil at the site was excavated during the 2014 IM. However, residual concentrations of these contaminants remaining in soil at the site are greater than risk-based screening levels used to evaluate human and ecological risks. These concentrations are generally found along the edges of or near the areas excavated during IM activities.

Lead concentrations remaining in surface soil ranged from 2.33 to 345 mg/kg. Residual lead concentrations in subsurface soil samples were generally similar to NSA Crane background concentrations for subsurface soil.

PAH concentrations are best expressed in terms of benzo(a)pyrene equivalents. Residual benzo(a)pyrene equivalents concentrations in all surface soil samples (maximum concentration of 1.49 mg/kg) were less than 1.5 mg/kg, the concentration equal to the upper limit (1×10^{-4}) of the USEPA target cancer risk range. There is a remaining hotspot of PAH contamination greater than 1.5 mg/kg benzo(a)pyrene equivalents in subsurface soil at one location, 23SB068, at SWMU 23. Calculated benzo(a)equivalent concentrations for soil from 2 to 4 feet below ground surface (bgs) and 4 to 6 feet bgs were 9.36 and 19.1 mg/kg, respectively. However, benzo(a)pyrene equivalent concentrations for other subsurface soil locations ranged from non-detect to 0.55 mg/kg (23SB090 from 2 to 4 feet bgs), with an overall average benzo(a)pyrene equivalent of 0.56 mg/kg. The disparity between the benzo(a)pyrene equivalent concentrations at location 23SB068 in comparison to the other soil locations indicates that the elevated detections of PAHs at 23SB068 are isolated to a small area (ranging from approximately 2,050 to 2,405 square feet) and not indicative of PAH contamination across the entire site.

Drainageway Sediment and Surface Water

The chemicals most frequently detected in drainageway surface water and sediment at concentrations greater than screening levels are metals. However, most of the concentrations in sediment and all of the concentrations in surface water are likely related to off-site anthropogenic or background sources rather than site activities because, in general, the maximum metals concentrations were detected at the upstream sample location. Minor PAHs detections were observed in the drainageway southwest of SWMU 23 but appear to be from off-site anthropogenic sources. A slightly more significant detection of PAHs occurred in the drainage channel immediately downstream of the former debris disposal area, indicating that a limited amount of surface runoff has migrated to that channel. The concentrations of PAHs in drainageway sediment at SWMU 23 are low, although they exceed the human health screening level at two sediment locations; no PAHs were detected in surface water samples.

O/WS

Concentrations of organic and inorganic constituents in sediment from the O/WS are greater than concentrations of these chemicals in soil or drainageway sediment at SWMU 23. Sediment from the O/WS is contained within the structure and, under normal circumstances, this sediment would not be available for exposure. Consequently, data from the O/WS sediment sample were not used to estimate human health or ecological risks.

HUMAN HEALTH RISKS

The human health risk assessment (HHRA) for SWMU 23 was performed to characterize the potential risks for human receptors exposed to residual contamination under current and potential future land use. Potential receptors under current and future land use are industrial workers, construction workers, and trespassers. Potential receptors under future land use are child and adult recreational users and hypothetical child and adult residents. Potential future receptors were evaluated in the baseline HHRA primarily for decision-making purposes; future land use is likely to be the same as current industrial land use.

A summary of the quantitative estimates of noncarcinogenic and carcinogenic risks for these receptors is presented in Table ES-1. Cumulative HIs for all receptors under the RME and CTE scenarios were less than unity (1), indicating that adverse noncarcinogenic effects are not anticipated for these receptors under the defined exposure conditions. Cumulative ILCRs for all receptors, with the exception of hypothetical child and lifelong residents under the RME, were either within USEPA's and IDEM's target cancer risk range of 1×10^{-6} to 1×10^{-4} or less than 1×10^{-6}. ILCRs for hypothetical child and lifelong

residents exposed to subsurface soil were equal to the upper bound of USEPA's and IDEM's target cancer risk range, 1 x 10^{-4}; the most significant contributors to these ILCRs are PAHs in subsurface soil. However, risk estimates for PAHs are likely overstated by an order or magnitude because of the bias introduced by elevated PAH concentrations in subsurface soil at one location, 23SB068.

Lead was identified as a chemical of potential concern (COPC) for surface water at SWMU 23 because the maximum detected concentration in surface water (16.3 micrograms per liter [µg/L] at location 23SW001) slightly exceeded the IDEM screening level and federal Action Level of 15 µg/L promulgated under the Safe Drinking Water Act (for water used for domestic purposes). No methodology is available for estimating exposure to water that is not used for domestic purposes. Exposure to lead in surface water is not a significant exposure pathway at SWMU 23 because flow within the drainageways is intermittent, and anticipated exposure is expected to be infrequent.

An evaluation of the migration of soil chemicals to groundwater was also conducted in the HHRA. Although some chemical concentrations in surface soil and subsurface soil exceeded USEPA and IDEM criteria, no chemicals were retained as migration-to-groundwater chemicals of concern (COCs) because there is not a significant source of contamination at the site (i.e., exceedances were observed in only a few samples, metals concentrations were generally similar to NSA Crane background conditions, and elevated PAH concentrations are limited to a small area).

ECOLOGICAL RISKS

The screening-level ecological risk assessment (SERA) for SWMU 23 evaluated ecological exposure to residual contaminants present in surface soil, sediment, and surface water under current site conditions. Based on the initial screening of the chemical data, several chemicals were initially selected as COPCs in surface soil, sediment, and surface water because they were detected at concentrations that exceeded conservative screening levels, because they had ecological effects quotients (EEQs) greater than 1.0 in the conservative food-chain model, or because they did not have screening levels. These chemicals were then further evaluated to refine the list of COPCs and to better characterize risks to terrestrial plants, soil and sediment invertebrates, aquatic organisms, mammals, and birds. Based on the risk refinement, no COPCs were retained for any ecological receptor.

CONCLUSIONS AND RECOMMENDATIONS

The evaluations conducted in this RFI Report support the conclusion that the majority of contaminated soil was removed from SWMU 23 during 2014 IM activities. There is a hotspot of elevated PAH

contamination [greater than 1.5 mg/kg benzo(a)pyrene equivalents] remaining in subsurface soil at location 23SB068 from approximately 2 to 6 feet bgs. However, this contamination is isolated to a relatively small area, ranging from approximately 2,050 to 2,405 square feet.

No further action is recommended for SWMU 23. The residual concentrations at the site do not warrant an additional remedial action because they are isolated to a relatively small area of the site that is not expected to adversely impact human and ecological receptors or result in significant migration to groundwater.

TABLE ES-1

SUMMARY OF RISKS AND RECOMMENDATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Medium	Receptor	Current/Future Land Use	Future Land Use	Human Health Risk Evaluation							Ecological Risk Evaluation	Conclusions/Recommendations
				Quantitative Evaluation					Qualitative Evaluation			
				RME		CTE		Comments	Lead Exposure	Migration of Soil Chemicals to Groundwater		
				ILCR	HI	ILCR	HI					
Surface Soil	Construction Workers	✓		2E-06	0.09	1.E-06	0.03	NA	NA	A few detections exceeded screening criteria. However, none were identified as COCs because there is no significant site-related source of contamination -- most exceedances are only in a few samples, PAH exceedances are limited to a small area, and metals concentrations are similar to background levels.	NA	Residual concentrations in surface soil following IM activities do not pose unacceptable risks to human and ecological receptors. NFA is appropriate.
	Industrial Workers	✓		6E-06	0.02	9.E-07	0.01	NA	NA		NA	
	Adolescent Trespassers	✓		9E-07	0.006	2.E-07	0.001	NA	NA		NA	
	Child Recreational Users		✓	5E-06	0.03	4.E-07	0.006	NA	NA		NA	
	Adult Recreational Users		✓	9E-07	0.003	5.E-08	0.0006	NA	NA		NA	
	Lifelong Recreational Users[1]		✓	6E-06	NA	4.E-07	NA	NA	NA		NA	
	Child Residents		✓	6E-05	0.3	8.E-06	0.1	NA	NA		NA	
	Adult Residents		✓	1E-05	0.04	9.E-07	0.01	NA	NA		NA	
	Lifelong Residents[1]		✓	7E-05	NA	9.E-06	NA	NA	NA		NA	
	Plants and Soil Invertebrates	✓	✓	NA	NA	NA	NA	NA	NA	NA	Some chemicals exceeded screening criteria and/or EEQs exceeded 1. However, no COPCs were identified following the Step 3A risk refinement.	
	Mammals and Birds	✓	✓	NA	NA	NA	NA	NA	NA	NA		
Subsurface Soil	Construction Workers	✓		9E-07	0.1	3.E-07	0.04	PAHs contribute the most to the ILCRs. However, risk estimates for PAHs are overstated by an order of magnitude because of the bias introduced by elevated PAH concentrations [> 1.5 mg/kg benzo(a)pyrene equivalents] at one location, 23SB068. These concentrations are isolated to a small area (approximately ranging from 2,050 to 2,405 square feet) and not indicative of PAH contamination across the entire site.	NA	A few detections exceeded screening criteria. However, none were identified as COCs because there is no significant site-related source of contamination -- most exceedances are only in a few samples, PAH exceedances are limited to a small area, and metals concentrations are similar to background levels.	NA	Residual concentrations in subsurface soil following IM activities do not pose unacceptable risks to human and ecological receptors when uncertainties associated with the RME risk estimates are considered. NFA is appropriate.
	Industrial Workers	✓		1E-05	0.02	1.E-06	0.007		NA		NA	
	Adolescent Trespassers	✓		3E-06	0.004	5.E-07	0.0008		NA		NA	
	Child Recreational Users		✓	1E-05	0.02	1.E-06	0.004		NA		NA	
	Adult Recreational Users		✓	2E-06	0.003	1.E-07	0.0005		NA		NA	
	Lifelong Recreational Users[1]		✓	2E-05	NA	1.E-06	NA		NA		NA	
	Child Residents		✓	1E-04	0.2	2.E-05	0.08		NA		NA	
	Adult Residents		✓	3E-05	0.03	1.E-06	0.008		NA		NA	
	Lifelong Residents[1]		✓	1E-04	NA	2.E-05	NA		NA		NA	
Sediment	Adolescent Trespassers	✓		8E-07	0.02	1.E-07	0.005	NA	NA	NA	NA	Sediment and surface water concentrations in drainageways do not pose unacceptable risks to human and ecological receptors. NFA is appropriate.
	Child Recreational Users		✓	9E-06	0.2	7.E-07	0.06	NA	NA	NA	NA	
	Adult Recreational Users		✓	1E-06	0.02	1.E-07	0.006	NA	NA	NA	NA	
	Lifelong Recreational Users[1]		✓	1E-05	NA	9.E-07	NA	NA	NA	NA	NA	
	Child Residents		✓	9E-06	0.2	7.E-07	0.06	NA	NA	NA	NA	
	Adult Residents		✓	1E-06	0.02	9.E-08	0.006	NA	NA	NA	NA	
	Lifelong Residents[1]		✓	9E-06	NA	9.E-07	NA	NA	NA	NA	NA	
	Sediment Invertebrates	✓	✓	NA	NA	NA	NA	NA	NA	NA	Some chemicals exceeded screening criteria. However, no COPCs were identified following the Step 3A risk refinement.	
Surface Water	Adolescent Trespassers	✓		3E-06	0.007	7.E-07	0.001	NA	Max detect (16.3 µg/L at upstream location 23SW001) slightly exceeds Federal Action Level (15 µg/L for domestic water supplies). However, medium is not used for domestic purposes. Also, exposure pathway is insignificant because flow within drainageways is intermittent and exposure is infrequent.	NA	NA	
	Child Recreational Users		✓	5E-06	0.02	5.E-07	0.004	NA		NA	NA	
	Adult Recreational Users		✓	3E-06	0.006	2.E-07	0.001	NA		NA	NA	
	Lifelong Recreational Users[1]		✓	9E-06	NA	8.E-07	NA	NA		NA	NA	
	Child Residents		✓	5E-06	0.02	5.E-07	0.004	NA		NA	NA	
	Adult Residents		✓	3E-06	0.006	2.E-07	0.001	NA		NA	NA	
	Lifelong Residents[1]		✓	1E-05	NA	8.E-07	NA	NA		NA	NA	
	Aquatic Organisms	✓	✓	NA	NA	NA	NA	NA	NA	NA	Some chemicals exceeded screening criteria. However, no COPCs were identified following the Step 3A risk refinement.	
Groundwater	Groundwater sampling was not conducted at the site. Impacts to groundwater are not expected to be significant because of the limited potential for contaminant desorption from soil, limited total mass of residual contamination, and slow rate of contaminant migration to bedrock and groundwater. Consequently, site-related contaminants are not expected to be present in groundwater in appreciable quantities.											

Notes:
Cell is shaded because the ILCR is equal to the upper limit of USEPA's and IDEM's target cancer risk range (1 x 10^{-6} to 1 x 10^{-4}).
This table presents a summary of the human health and ecological risk evaluations for site conditions following IM soil removal activities.

Footnotes:
1 - Lifelong receptor includes exposure as a child and adult. Only carcinogenic risks are calculated for lifelong receptors.
Footnotes:
1 - Lifelong receptor includes exposure as a child and adult. Only carcinogenic risks are calculated for lifelong receptors.

Abbreviations:
COC - Chemical of concern
COPC - Chemical of potential concern
CTE - Central tendency exposure
EEQ - Ecological effects quotient
HI - Hazard index
IDEM - Indiana Department of Environmental Management
ILCR - Incremental lifetime cancer risk
mg/kg - Milligram per kilogram
NA - Not applicable
NA - Not applicable
NFA - No further action
PAH - Polycyclic aromatic hydrocarbon
RME - Reasonable maximum exposure
USEPA - United States Environmental Protection Agency
µg/L - Microgram per liter

1.0 INTRODUCTION

This Draft Final Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for Solid Waste Management Unit (SWMU) 23 – Battery Shop at the Naval Support Activity (NSA) Crane facility located in Crane, Indiana was prepared for the United States Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic (MidLANT) under Contract Task Order (CTO) F274 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) V Contract Number N62470-08-D-1001. The Draft RFI Report for SWMU 23 (Tetra Tech, 2013a) was prepared under CTO F27Q of the same contract.

RFI activities at SWMU 23 were conducted in accordance with applicable RCRA corrective action requirements. Investigation requirements are specified in the Indiana State RCRA Hazardous Waste Management Permit for NSA Crane (IN5170023498). Indiana Department of Environmental Management (IDEM) is the lead agency for RCRA corrective actions at SWMU 23.

Specific RFI activities conducted for SMWU 23 were performed in accordance with the site-specific Sampling and Analysis Plan (SAP) (Tetra Tech, 2012), which was approved by IDEM. The Draft RFI Report for SWMU 23 (Tetra Tech, 2013a) documented previous site conditions that led to the decision to conduct an interim measure (IM) to address soil contaminated with lead and polycyclic aromatic hydrocarbons (PAHs). Based on the findings of the Draft RFI Report and prior to completion of the IM, additional soil sampling, herein referred to as post-RFI supplemental sampling, was conducted in March and May 2013 to delineate the extent of contamination. An IM, consisting of the removal of lead- and PAH-contaminated soil, was conducted at the site in October to December 2014.

1.1 PURPOSE AND ORGANIZATION OF THIS REPORT

The purpose of this Draft Final RFI Report is to briefly summarize all site activities, define the nature and extent of residual contamination (following the IM), evaluate the potential human health and ecological risks associated with exposure to residual contamination, and draw conclusions regarding whether further action is warranted. With the exception of the data that represent soil removed from the site during the IM, the risks presented in this report were estimated using data collected during the October/November 2012 RFI, as presented in the Draft RFI Report (Tetra Tech, 2013a), and the March and May 2013 post-RFI supplemental sampling investigations, which were incorporated into the Final IM Work Plan (Tetra Tech, 2014).

This report is divided into the following sections:

- Section 1.0 is the introduction, including the purpose of this report and background information for the site.

- The nature and extent of residual contamination following the completion of IMs is described in Section 2.0.

- Section 3.0 contains a discussion of the fate and transport of residual contaminants and presents the conceptual site model (CSM).

- The human health and ecological risks associated with exposure to residual contamination at the site are described in Sections 4.0and 5.0, respectively.

- Section 6.0 includes conclusions and recommendations for the path forward.

- Supporting documentation for this report is included in Appendices A through D.

1.2 SITE BACKGROUND

1.2.1 Facility Location and Description

NSA Crane is located in a rural sparsely populated region of south-central Indiana, approximately 75 miles southwest of Indianapolis and 60 miles northwest of Louisville, Kentucky (Figure 1-1). NSA Crane encompasses approximately 62,463 acres (approximately 98 square miles) of the northern portion of Martin County and smaller portions of Greene and Lawrence Counties.

SWMU 23 is located in the north-central portion of NSA Crane and encompasses approximately 6.5 acres, as shown on Figure 1-1. As presented on Figure 1-2, SWMU 23 is bounded on the north and west by heavily wooded areas with steep hillsides. Building 36 is located within the site boundaries. Building 34 is located approximately 240 feet east of Building 36 and is presumed to be hydraulically upgradient of SWMU 23 based on topography. Ground surface elevations range from approximately 755 feet above mean sea level (msl) in the area of Building 36 to approximately 675 feet above msl in the northwestern area of the site.

1.2.2 Site History

Building 36 is the Battery Shop where personnel perform maintenance operations on electric vehicles, primarily forklifts, for use at NSA Crane. From about 1940 to 1975, approximately 150 gallons per month (2,000 gallons per year) of battery acid (presumable sulfuric acid) containing lead and sulfates were discharged onto the hillside behind the Battery Shop. After 1975, the practice was to neutralize the acid in a tank and then discharge the neutralized acid into the NSA Crane industrial waste treatment system. An epoxy-coated concrete sump, located outside Building 36 and connected to the industrial waste treatment system, was installed in 1980 to replace the open dumping of acids. Batteries are stored in the rear of Building 36 under a covered area; the area is partially bermed.

In addition to past battery-draining operations, wastewater containing oil originating from the maintenance of non-electric forklifts was processed through an oil/water separator (O/WS) adjacent to Building 36. Approximately 50 gallons per month of oil were removed from the separator for disposal/recycling. Waste oils and oily water were also discharged onto the hillside behind the Battery Shop [Naval Energy and Environmental Support Activity (NEESA), 1983]. After 1975, wastes generated at Building 36 were discharged through floor drains and the O/WS, which are connected to the NSA Crane industrial waste treatment system. One small solvent tank of unknown size and type of solvent stored was located in Building 36 at the time of the Navy Assessment and Control of Installation Pollutants (NACIP) Initial Assessment Study (IAS) (NEESA, 1983). Reportedly, 10 to 20 gallons of solvent were drained out of the tank twice per year and discharged onto the hillside behind Building 36. The specific points of discharge for the battery acid, waste oils, oily water, and solvents are unknown. Therefore, the entire edge of the ridge near SWMU 23 and the downslope areas were considered to be potentially affected by these discharges and subject to investigation during the RFI.

Miscellaneous debris, including concrete, reinforcement bar (rebar), metal cans, drums, chairs, tires, and battery components, was been found along the hillside behind Building 36. At the time of the IAS, approximately ten 10-gallon barrels and fifty 5-gallon barrels were identified at the base of the hillside; the IAS report did not state whether the barrels were empty nor did it identify the nature of the actual or potential contents. Miscellaneous debris was deposited in an unevenly scattered manner in an area north of Building 36. This debris covered an area approximately 160 feet wide and 100 feet long and extended to the bottom of the ravine, as shown on Figure 1-2. A small intermittent stream is located at the bottom of the ravine. The area is rugged and densely wooded, with rock outcrops causing sudden decreases in elevation of 12 to 14 feet.

Site features, including the O/WS, former underground storage tank (UST), and battery storage area, are illustrated on Figure 1-2. Photographs of the site are included in Appendix A.

1.2.3 Site Characteristics

A detailed discussion of the site characteristics for the NSA Crane facility was included in the Draft RFI Report (Tetra Tech, 2013a). The information pertinent to SWMU 23 is summarized below:

- The operational portion of SWMU 23, the area encompassing Building 36, is located within a relatively flat area at the top of a steep slope. The maximum elevation at SWMU 23 is approximately 755 feet above msl.

- Based on the classification scheme developed in the Base-Wide Background Soil Study (Tetra Tech, 2001), the soils encountered at SWMU 23 fall into two different soil groups. Surface soil, consisting of soil from 0 to 2 feet below ground surface (bgs), belongs to Soil Group 3, which includes Alluvial, Mississippian, and Pennsylvanian materials. Subsurface soil from depths ranging from 2 to 10 feet bgs belongs to Soil Group 8, which consists of Pennsylvanian subsurface clay and silt. Background soil data used to evaluate the SWMU 23 site data are discussed further in Section 2.2.

- SWMU 23 lies within the Furst Creek drainage basin, as shown on Figure 1-3. This basin drains roughly 60 percent of NSA Crane. Surface water drainageways are located along the northern, western, and southwestern peripheries of SWMU 23, as shown on Figure 1-2. These perennial drainageways converge and flow to the north-northwest, eventually discharging to Lake Greenwood, located approximately 3,200 feet north of the site.

- The land use of the flat area of SWMU 23 is industrial. The land immediately east of SWMU 23 is also used for industrial purposes. The land to the west and north of SWMU 23 consists of steep terrain and is heavily forested. No changes to the existing land use at SWMU 23 or the surrounding adjacent areas have been identified.

- SWMU 23 contains a large wooded hillside area that may support ecological receptors. The area near Building 36 is paved and does not provide a habitat to support ecological receptors. The wildlife habitats and vegetation types present at NSA Crane (many stages of forest succession, streams, ponds, Lake Greenwood, and grassy open spaces) support a diverse terrestrial and aquatic fauna. The current floristic components observed at the facility include two distinct vegetation classes, the Oak-Hickory and the Beech-Maple forest components of the Broadleaf Forest Classification (Kuchler, 1964).

1.2.4 Previous Investigations/Interim Measures

Several reports relating to environmental concerns have been prepared for SWMU 23. This section discusses the previous studies, investigations, and IMs.

1.2.4.1 Initial Assessment Study

The NACIP IAS (NEESA, 1983), conducted in 1981, identified the Battery Shop as Site 1. The report stated that vehicle maintenance activities conducted at Building 36 resulted in the discharge of battery acid, waste oils, oily water, and solvents onto the adjacent hillside. The report stated that the potential for lead salts to migrate to Lake Greenwood existed because surface water drainage from the hillside flows into surface water pathways that discharge to Lake Greenwood. Lake Greenwood, located approximately 3,200 feet north of Building 36, is the local drinking water source for NSA Crane. The report recommended that a Confirmation Study, consisting of the collection of surface soil samples for lead analysis, be conducted.

1.2.4.2 Preliminary Review/Visual Site Inspection

The Preliminary Review/Visual Site Inspection Report (A.T. Kearney, 1987) identified the “Battery Shop Dump” as an area of concern and concluded that the potential for past releases to soil/groundwater was high as a result of the open dumping of liquid waste onto the hillside near Building 36. The potential for generation of subsurface gas was regarded as low because of the open nature of the unit and the wastes managed. Although it was acknowledged that no significant levels of lead (i.e., associated with battery acid) were found in soil at the site or in the surface water of Lake Greenwood during the NACIP IAS, the Preliminary Review/Visual Site Inspection Report recommended that soil samples be collected from the hillside at Building 36 to verify the conclusions of the IAS.

1.2.4.3 Pre-RFI Interim Measure

A voluntary IM consisting of the removal and disposal of surface debris was conducted at SWMU 23 in February 1996 and documented in an IM Report (Morrison Knudsen, 2000). Figure 1-2 shows the location of the IM debris removal area. Approximately 4.5 tons of debris including construction debris (such as large sections of preformed concrete slabs), drums, cans, filters, and tires were removed from the site. Because the contour of the area was not significantly disturbed, no backfill was required.

The IM did not involve soil removal activities. Confirmation soil samples collected at the site following the debris removal activities contained concentrations of various metals and one pesticide (methyl parathion)

at levels greater than the interim cleanup levels identified in the associated SAP (Morrison Knudsen, 1995). Trichloroethene (in one sample) and various metals were detected in surface water samples collected from the intermittent stream located at the bottom of the ravine; no cleanup goals were established for surface water. The IM Report concluded that the goal of the interim remedial action was met (i.e., removal of debris); however, the recommendation was to proceed to an RFI to delineate the extent of contamination in soil at the site.

1.2.4.4 RFI

The RFI at SWMU 23 was designed to meet the following objectives: (1) delineate the nature and extent of contamination in soil, surface water, and sediment; (2) determine if the UST is still present behind Building 36 via the completion of a geophysical survey; (3) conduct a baseline human health risk assessment (HHRA) and screening-level ecological risk assessment (SERA); and (4) draw conclusions as to whether further investigative activities are warranted. In October/November 2012, soil (surface and subsurface), surface water, and sediment samples were collected from the site using the methodologies outlined in the RFI SAP (Tetra Tech, 2012). All samples were analyzed for volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), PAHs, and metals; polychlorinated biphenyl (PCB), sulfate, and pH analyses were also completed for some samples. Figures 1-4 (soil) and 1-5 (surface water and sediment) illustrate the locations sampled during the RFI. Figures 1-4 also shows additional soil locations sampled after the RFI to delineate contamination observed at the RFI sampling locations, as discussed in Section 1.2.4.5.

With the exception of a sediment sample collected from the O/WS, all samples were used to estimate potential human and ecological risks. In the HHRA, potential receptors under current and future land use included industrial workers, construction workers, and adolescent trespassers; hypothetical child and adult residents were also evaluated as potential receptors under future land use. Future land use at the site is likely to be the same as current land use, and development of the site for residential land use is unlikely; therefore, hypothetical residents were primarily evaluated for decision-making purposes. Risks for soil and sediment invertebrates, terrestrial plants, aquatic organisms, mammals, and birds were evaluated in the SERA.

Details of the RFI can be found in the Draft RFI Report (Tetra Tech, 2013a). The following is a summary of the findings:

- The results of the geophysical survey indicate that the UST is no longer present west of Building 36.

- Concentrations of VOCs, PAHs, metals, and TPH in the sediment sample from the O/WS were greater than project screening levels (PSLs) identified in the associated SAP (Tetra Tech, 2012), indicating that there is residual contamination present in the O/WS.

- Surface soils at the site had greater concentrations of PAHs and metals, mainly lead, than subsurface soils, indicating that surface releases were the primary release mechanisms of concern. Contamination in subsurface soil was very limited in extent; bedrock is less than 2 feet bgs in many locations, which physically limits the possible extent of soil contamination.

- Migration of site-related contaminants to surface water drainage areas was limited. PAH concentrations greater than PSLs were detected in a sediment sample immediately north of the former debris disposal area; however, the concentrations of PAHs in samples further downstream were less than PSLs. The presence of concentrations of metals greater than PSLs in the upstream samples indicated that these chemicals were likely related to off-site sources or naturally occurring background conditions rather than site activities. In addition, PAH detections in the drainageway southwest of SWMU 23 were considered to be associated with off-site sources or non-specific anthropogenic sources such as vehicular combustion from nearby roadways.

- Quantitative risk estimates [hazard indices (HIs) for non-carcinogens and incremental lifetime cancer risks (ILCRs) for carcinogens] were calculated for human receptors exposed to chemicals of potential concern (COPCs) under reasonable maximum exposure (RME) and central tendency exposure (CTE) scenarios. The risks associated with lead, a COPC for surface soil, were estimated for hypothetical residents using the USEPA Integrated Exposure Uptake Biokinetic Model (IEUBK) lead model and for construction workers, industrial workers, and adult recreational users using the USEPA Technical Workgroup (TRW) Adult Lead Model. Results of the HHRA are summarized as follows:

  - Non-carcinogenic risks for all human receptors under RME and CTE scenarios were acceptable (i.e., all HIs were less than 1).
  - With exception of hypothetical residents under the RME scenario, carcinogenic risks for all receptors under RME and cumulative ILCRs for all receptors were less than or within the USEPA and IDEM target risk range of 1×10^{-6} to 1×10^{-4}.
  - Unacceptable carcinogenic risks (i.e., cumulative ILCRs greater than 1×10^{-4}), primarily from incidental ingestion of surface soil, were identified for hypothetical child and lifelong residents under the RME scenario. PAHs, arsenic, and chromium were the major contributors to the unacceptable cancer risks for these receptors and were identified as chemicals of concern (COCs) for surface soil. Because chromium speciation was not performed, total chromium results were evaluated as

hexavalent chromium. However, hexavalent chromium is not expected to be present at the site based on known site activities at Building 36. If chromium was evaluated as trivalent chromium, chromium would not be identified as a COC for hypothetical child or lifelong residents.

- Results of the lead exposure analyses did not exceed the USEPA goal [i.e., no more than 5 percent of children (or fetuses of exposed woman) having blood-lead levels exceeding a 10 µg/L blood-lead level]. However, lead was retained as a COC because the concentrations of lead in two samples [23SS014-0002: 4,640 milligrams per kilogram (mg/kg); and 23SS017-002: 1,920 mg/kg] exceeded the USEPA and IDEM screening level by four times or more. These locations were considered to be hotspots for lead contamination.

- Several chemicals were initially selected as COPCs for ecological receptors exposed to surface soil, sediment, and surface water because they were detected at concentrations that exceeded conservative screening levels, had ecological effects quotients (EEQs) greater than 1.0 in the conservative food-chain model, or did not have screening levels. After these chemicals were further evaluated to refine the list of COPCs and to better characterize risks to ecological receptors, lead was the only chemical retained as a COPC for plants; no chemicals were retained as COPCs for soil and sediment invertebrates, aquatic organisms, mammals, or after the COPC refinement process. As mentioned above, two samples (23SS014-0002: 4,640 mg/kg; and 23SS017-002: 1,920 mg/kg) had lead concentrations many times greater than the plant screening level, so risks to plants in this area could not be ruled out. Impacts to plants in the other areas are less likely because the concentrations are not much greater than the conservative screening level and/or the areas are well bounded. However, because the portion of the site with the greatest lead concentrations is vegetated, there is uncertainty as to whether plants are being significantly impacted.

Based on the results of the Draft RFI Report, the Navy decided to conduct another IM to address PAH- and lead-contaminated soil at the site because these chemicals were considered to be the primary risk drivers at the site.

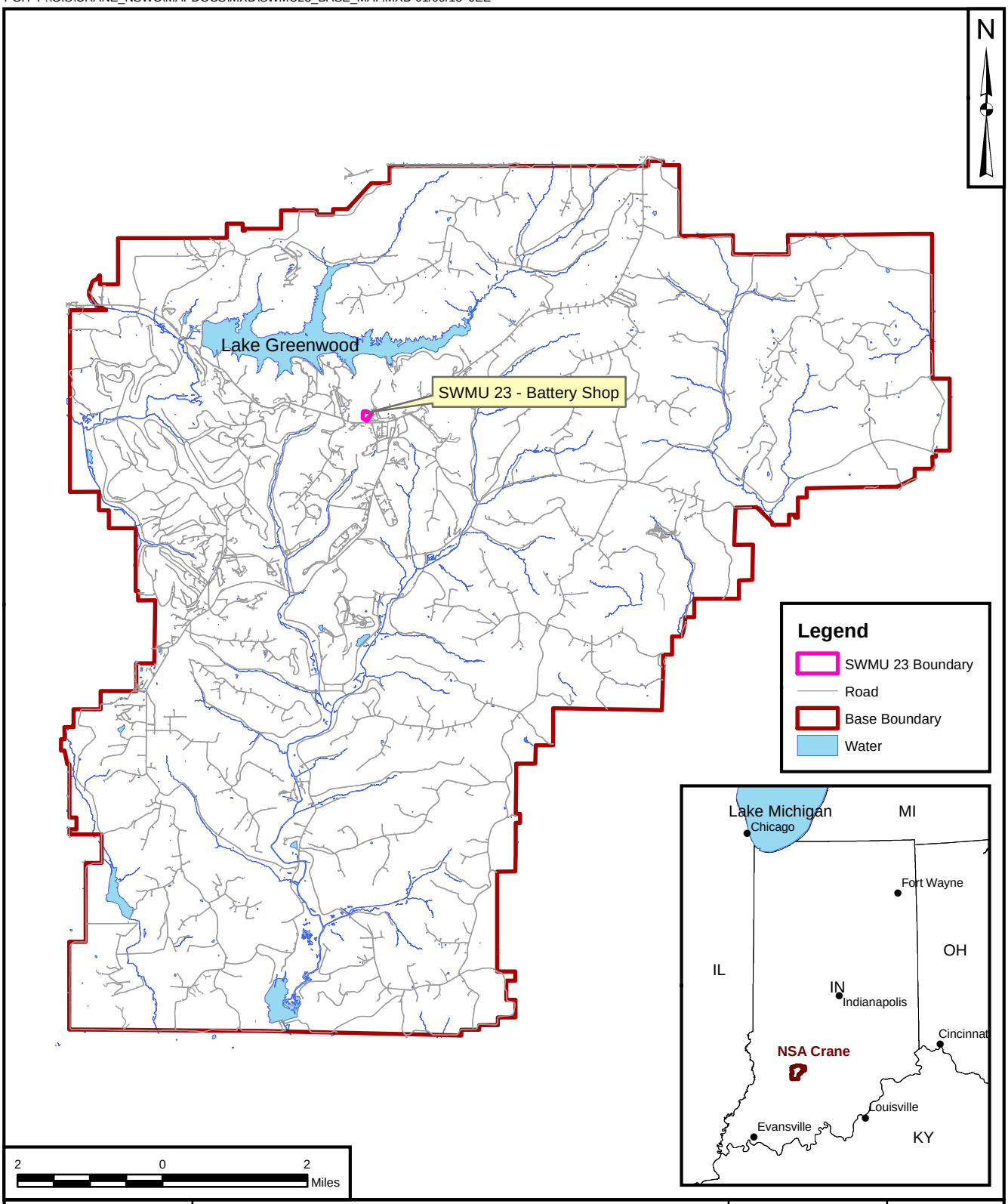
1.2.4.5 Post-RFI Supplemental Soil Sampling and Interim Measure

Prior to the completion of another IM at SMWU 23, supplemental soil sampling (at locations shown on Figure 1-4) was conducted in May 2013 and March 2014 to delineate the extent of PAH- and lead-contaminated soil. The post-RFI supplemental soil samples were collected according to the methodologies described in Field Task Modification Request (FTMR) No. 1 (Tetra Tech, 2013b) and FTMR No. 2 (Tetra Tech, 2013c). The results of the sampling efforts were documented in the IM Work Plan (Tetra Tech, 2014).

Figures 1-6 (PAH) and 1-7 (lead) illustrate the soil contamination at the site prior to the completion of the 2014 IM.

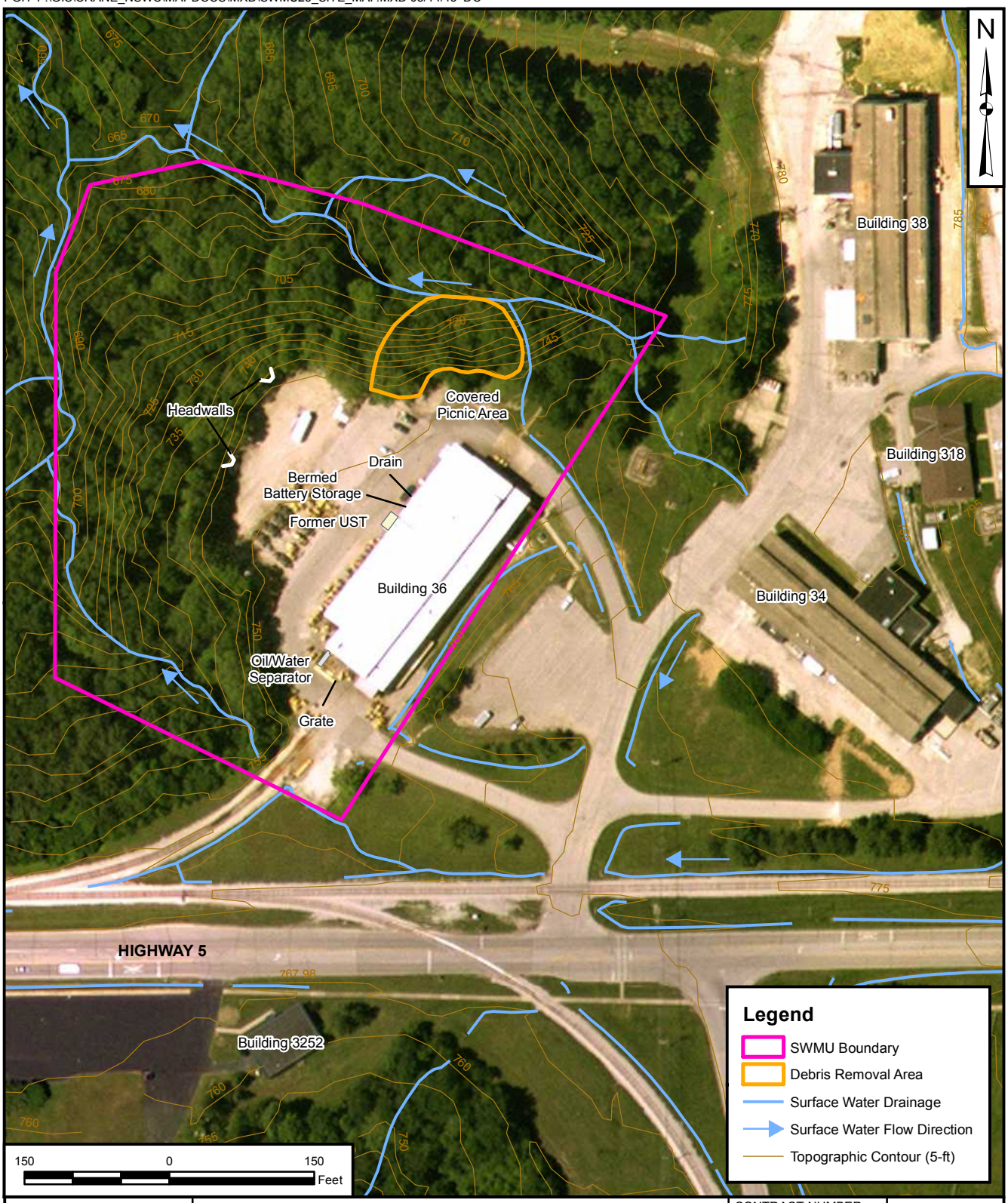
Results of post-RFI supplemental and RFI sampling were used to define the excavation limits (shown on Figures 1-6 and 1-7) for an IM. The objective of the IM, which was conducted from October to December 2014, was to mitigate unacceptable risks for human and ecological receptors exposed to PAH- and lead-contaminated soil. Approximately 2,400 tons of contaminated soil and other materials were removed from the site and disposed of off site at the Rumpke Landfill in Medora, Indiana. The excavation areas were backfilled with structural backfill material, and specific areas within the tree line at the site were covered with topsoil. Following the completion of backfilling activities, the excavation areas that were covered with topsoil were seeded. In addition, the asphalt apron located behind Building 36, which was removed during excavation activities, was reconstructed. IM activities were documented in an IM Report (Tetra Tech, 2015).

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_BASE_MAP.MXD 01/09/13 JEE



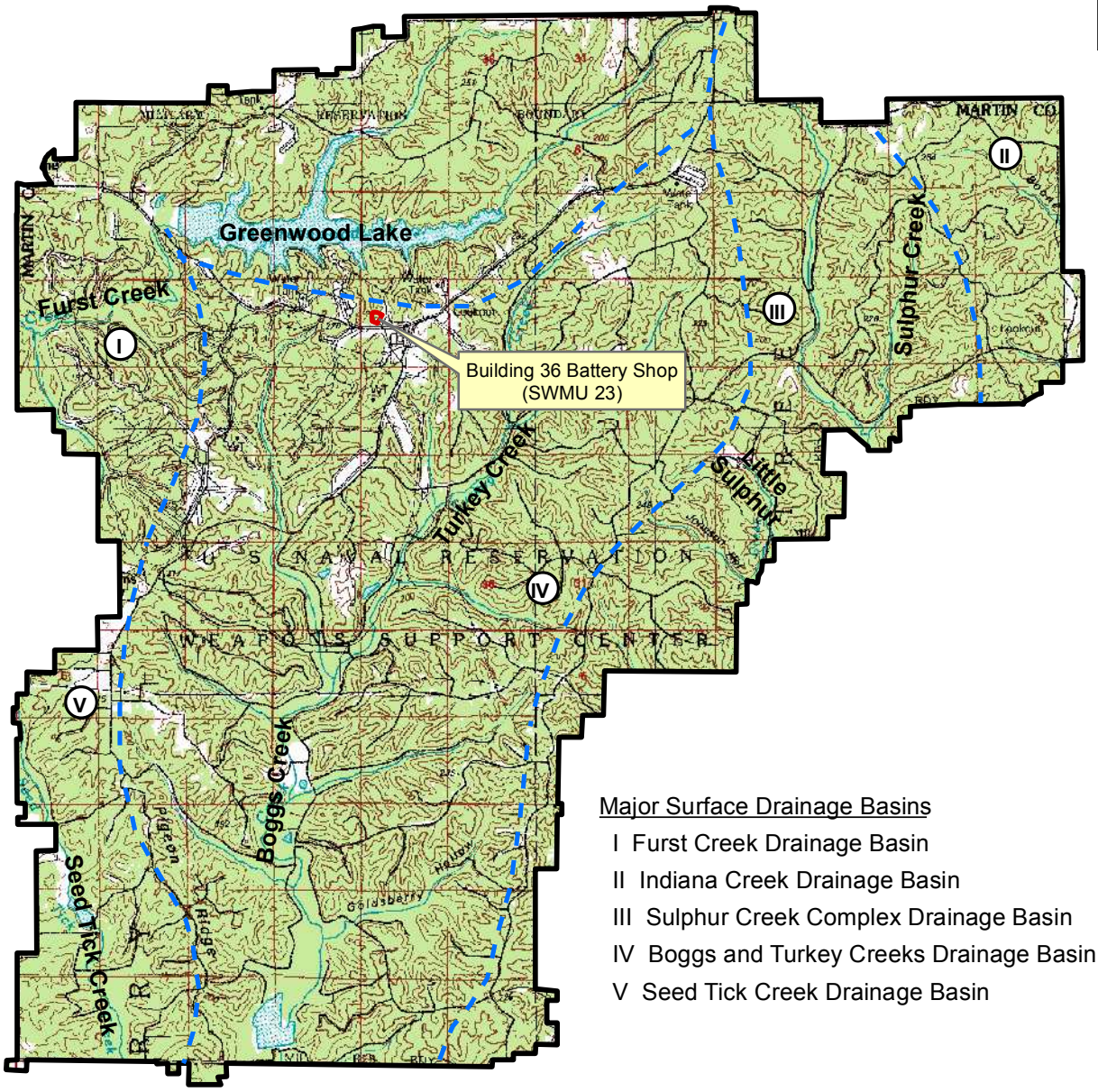
DRAWN BY K. MOORE	DATE 08/05/11	TETRA TECH	CONTRACT NUMBER 2122	CTO NUMBER F274
CHECKED BY J. DUCAR	DATE 01/09/13	BASE AND SITE LOCATION MAP SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA	APPROVED BY K. L ONS	DATE 07/09/15
REVISED BY J. ENGLISH	DATE 01/09/13		APPROVED BY	DATE
SCALE AS NOTED			FIGURE NO. FIGURE 1-1	REV 0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_SITE_MAP.MXD 08/14/13 DC



DRAWN BY K. MOORE	DATE 08/05/11	TETRA TECH	CONTRACT NUMBER 2122	CTO NUMBER F274
CHECKED BY J. DUCAR	DATE 08/14/13	SITE MAP SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA	APPROVED BY K. LYONS	DATE 07/09/15
REVISED BY D. COUCH	DATE 08/14/13		APPROVED BY ___	DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 1-2	REV 0

PGH:P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_DRAINAGE_BASIN.MXD 8/12/2013 DC



Major Surface Drainage Basins

I Furst Creek Drainage Basin

II Indiana Creek Drainage Basin

III Sulphur Creek Complex Drainage Basin

IV Boggs and 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.

2 0 2 Miles

Legend

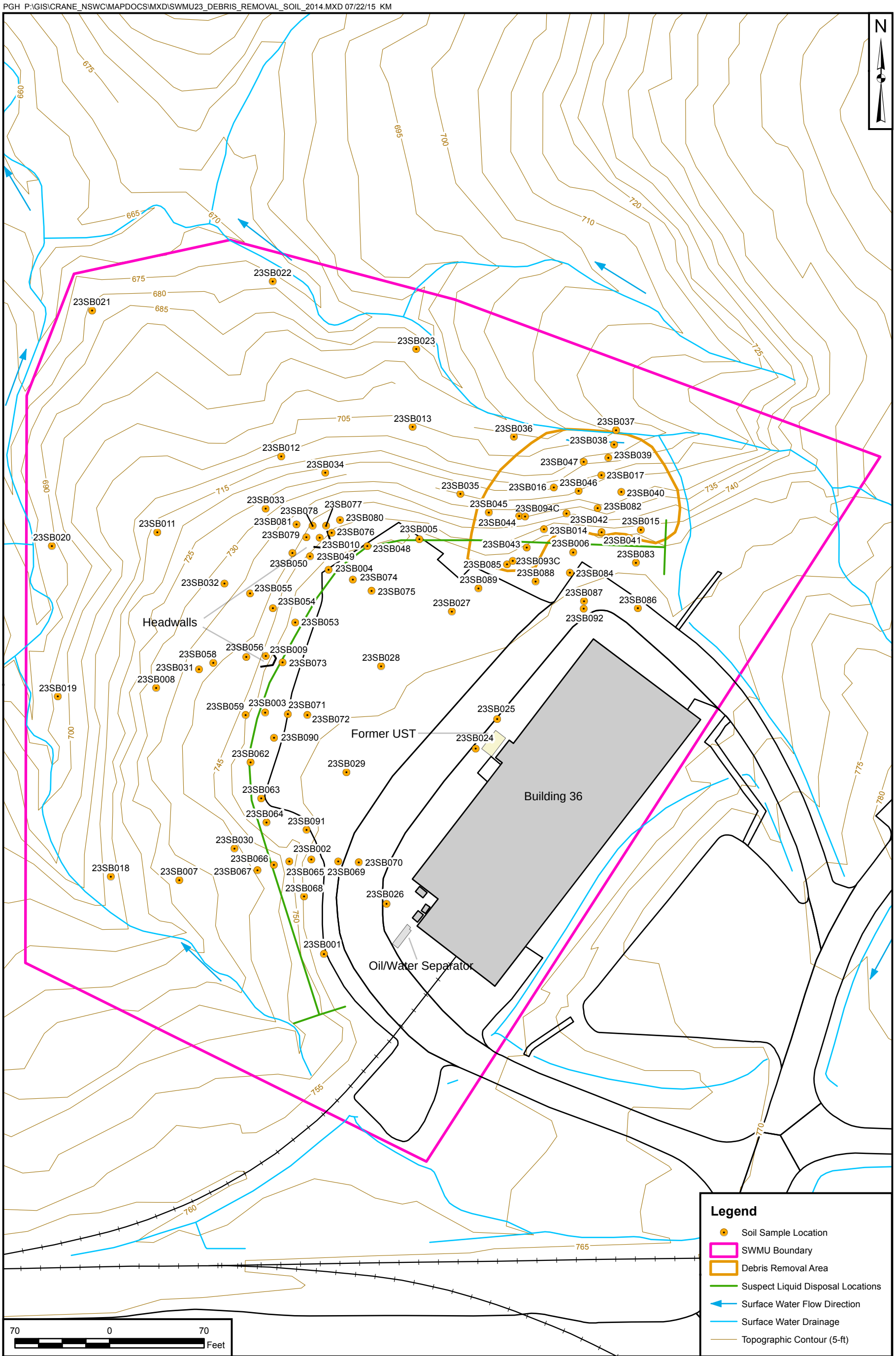
SWMU Boundary

DRAWN BY	DATE	CONTRACT NUMBER	CTO NUMBER
D. COUCH	08/08/13	2122	F274
CHECKED BY	DATE	APPROVED BY	DATE
J. DUCAR	08/12/13	K. LYONS	08/19/15
REVISED BY	DATE	APPROVED BY	DATE
—	—	—	—
SCALE		FIGURE NO.	REV
AS NOTED		FIGURE 1-3	0

NAVFAC

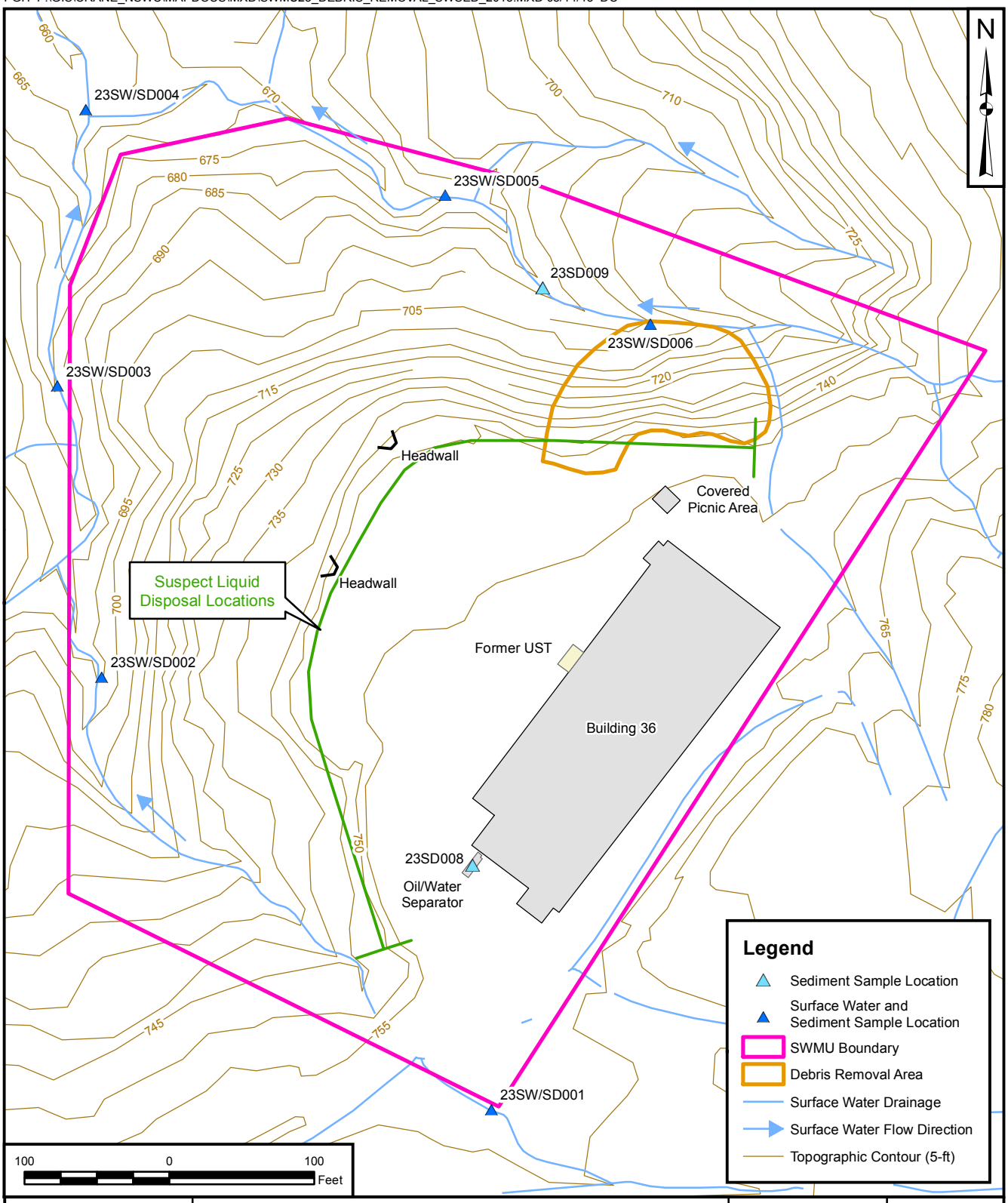
SITE LOCATION AND DRAINAGE BASINS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_DEBRIS_REMOVAL_SOIL_2014.MXD 07/22/15 KM



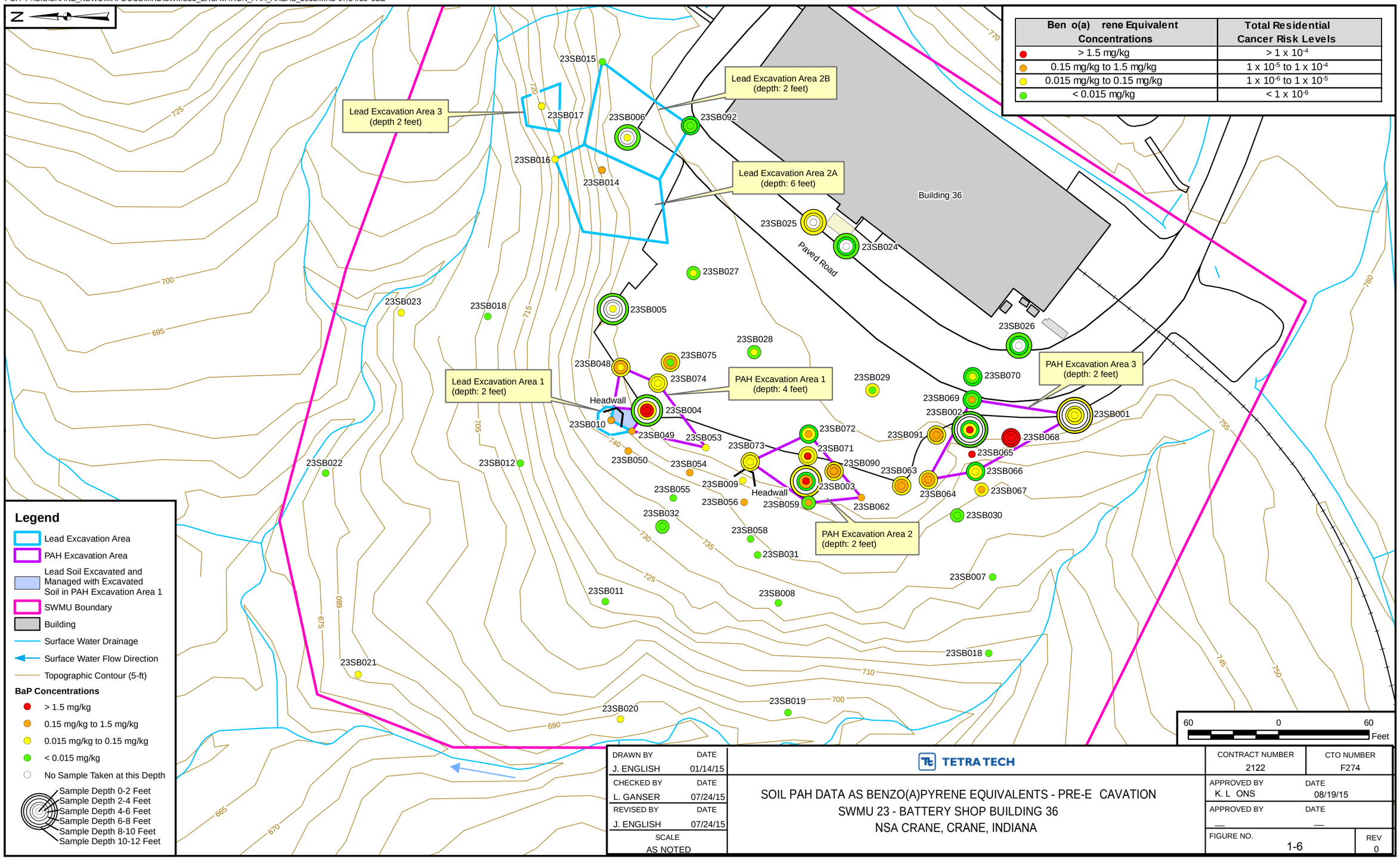
DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
K. MOORE	08/05/11		2122	F274
CHECKED BY	DATE	RFI AND POST-RFI SOIL SAMPLING LOCATIONS	APPROVED BY	DATE
L. GANSER	07/22/15	SWMU 23 - BATTERY SHOP	K. LYONS	08/19/15
REVISED BY	DATE	NSA CRANE, CRANE, INDIANA	APPROVED BY	DATE
K. MOORE	07/22/15		___	___
SCALE			FIGURE NO.	REV
AS NOTED			1-4	0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_DEBRIS_REMOVAL_SWSED_2013.MXD 08/14/13 DC



DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
K. MOORE	08/05/11		2122	F274
CHECKED BY	DATE	RFI SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS	APPROVED BY	DATE
J. DUCAR	08/14/13	SWMU 23 - BATTERY SHOP	K.LYONS	08/19/15
REVISED BY	DATE	NSA CRANE, INDIANA	APPROVED BY	DATE
D. COUCH	08/14/13		___	___
SCALE			FIGURE NO.	REV
AS NOTED			1-5	0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_EXCAVATION_PAH_AREAS_2015.MXD 07/24/15 JEE



Ben o(a) rene Equivalent Concentrations	Total Residential Cancer Risk Levels
> 1.5 mg/kg	> 1 x 10^{-4}
0.15 mg/kg to 1.5 mg/kg	1 x 10^{-5} to 1 x 10^{-4}
0.015 mg/kg to 0.15 mg/kg	1 x 10^{-6} to 1 x 10^{-5}
< 0.015 mg/kg	< 1 x 10^{-6}

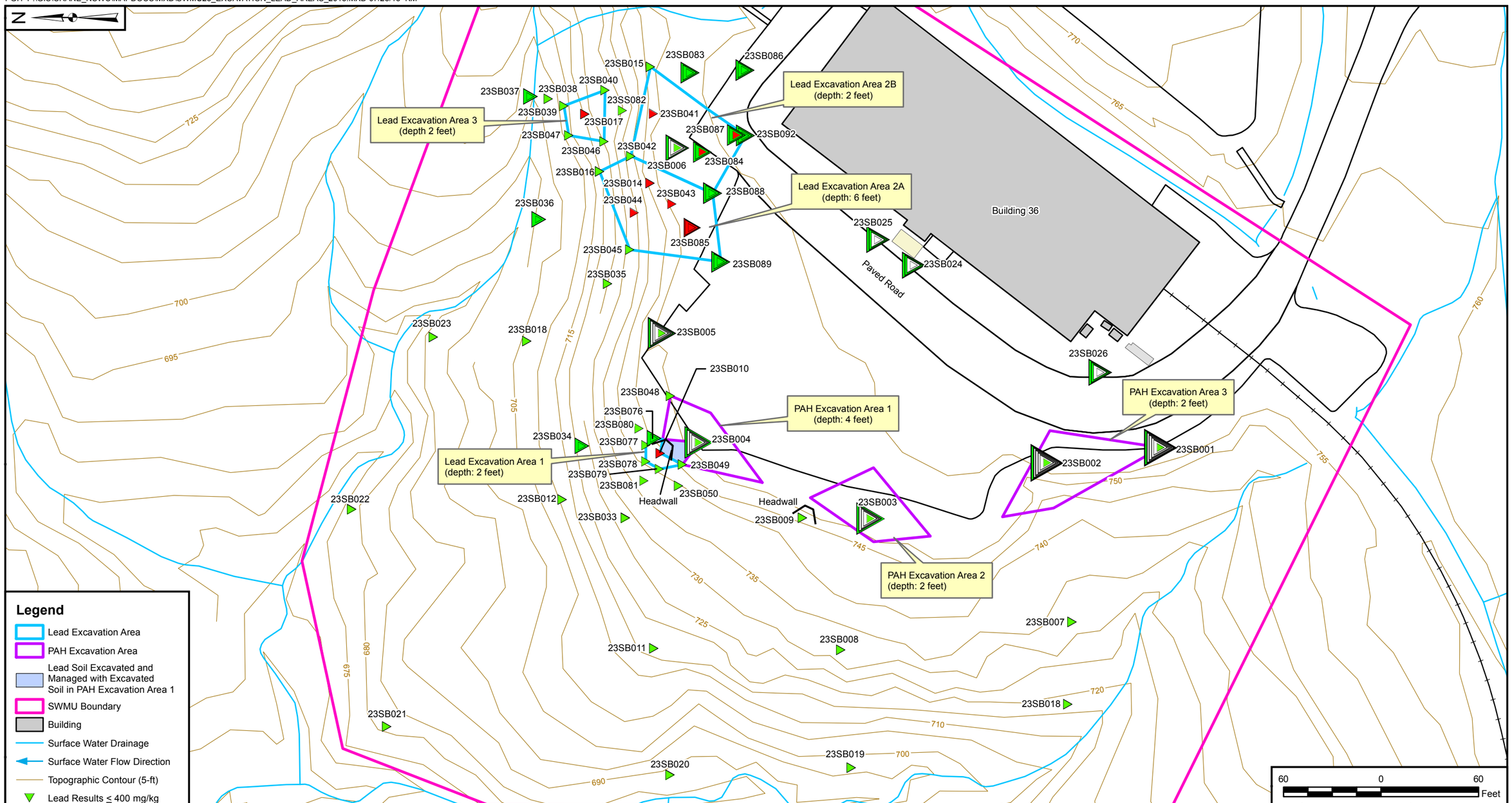
DRAWN BY	DATE
J. ENGLISH	01/14/15
CHECKED BY	DATE
L. GANSER	07/24/15
REVISED BY	DATE
J. ENGLISH	07/24/15
SCALE	
AS NOTED	

TETRA TECH

SOIL PAH DATA AS BENZO(A)PYRENE EQUIVALENTS - PRE-E CAVATION
SWMU 23 - BATTERY SHOP BUILDING 36
NSA CRANE, CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
2122	F274
APPROVED BY	DATE
K. L ONS	08/19/15
APPROVED BY	DATE
—	—
FIGURE NO.	REV
1-6	0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_EXCAVATION_LEAD_AREAS_2015.MXD 07/23/15 KM



Legend

- Lead Excavation Area
- PAH Excavation Area
- Lead Soil Excavated and Managed with Excavated Soil in PAH Excavation Area 1
- SWMU Boundary
- Building
- Surface Water Drainage
- Surface Water Flow Direction
- Topographic Contour (5-ft)
- Lead Results ≤ 400 mg/kg
- Lead Results > 400 mg/kg
- No Sample Taken at this Depth
- Sample Depth 10-12 feet
- Sample Depth 8-10 feet
- Sample Depth 6-8 feet
- Sample Depth 4-6 feet
- Sample Depth 0-2 feet
- Sample Depth 2-4 feet

DRAWN BY J. ENGLISH	DATE 01/14/15	TETRA TECH	CONTRACT NUMBER 2122 / CTO NUMBER F274
CHECKED BY L. GANSER	DATE 07/23/15	SOIL LEAD DATA - PRE-EXCAVATION SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA	APPROVED BY K. LYONS / DATE 08/19/15
REVISED BY K. MOORE	DATE 07/23/15		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. 1-7 / REV 0

2.0 NATURE AND EXTENT OF RESIDUAL CONTAMINATION

This section describes the nature and extent of contamination remaining at SWMU 23 following 2014 IM soil removal activities. Table 2-1 contains a summary of the soil, sediment, and surface water samples collected during the RFI and post-RFI supplemental field efforts and identifies whether soil from a location remains at the site. Soil remaining at the site is considered to be representative of current site conditions. Samples associated with soil locations that have been removed from the site are not discussed in text or presented in tabular format in this section. However, a complete data set of all RFI and post-RFI supplemental samples is presented in Appendix B; samples associated with soil that has been removed from the site are noted as such.

Multiple chemicals were detected in soil, sediment, and surface water at SWMU 23. The extent of contamination is best described by focusing on representative chemicals whose extent encompasses that of other chemicals. This reduces the complication associated with trying to track multiple chemicals when most chemicals have similar distribution patterns. Therefore, this section emphasizes chemicals that:

- Exceed screening levels used to identify COPCs in the human health and ecological risk assessments (described and evaluated further in Sections 4.0 and 5.0, respectively). These criteria were originally presented in the RFI SAP (Tetra Tech, 2012) but have been updated to reflect current information regarding toxicity.

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

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

- Were detected at environmentally significant concentrations although they may have been detected infrequently. For example, multiple chemicals of similar behavior or origin may have been detected at a small number of locations but were detected at elevated concentrations 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 degradation products that demonstrate changes in contaminant concentrations over time as a result of chemical or biochemical degradation.

- Were judged to adequately represent the nature and extent of similar contaminants at SWMU 23, based on the above considerations and possibly others (such as spatial concentration gradients).

Where it is feasible to do so, an attempt is also made to identify site-related contaminants as opposed to those that are attributable to background, upgradient, or anthropogenic sources.

2.1 BACKGROUND DATA

Prior to conducting the SWMU 23 RFI, soil samples from various locations throughout NSA Crane were collected and analyzed as part of a Base-Wide Background Soil Investigation to establish metals concentrations representative of the entire NSA Crane complex (Tetra Tech, 2001). All metals likely to be included in NSA Crane environmental investigations were analyzed. The result was a collection of data sets that are used to determine whether observed metals concentrations in site soil samples are similar to background concentrations or attributable to site activities. Because organic chemicals are assumed not to occur naturally, detections of organic compounds in site soil samples are 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.

After an extensive data analysis, background soil samples representing 16 potentially different soil types at NSA Crane were classified into nine soil groups that uniquely represent the following characteristics:

- Geological parent material (referred to as depositional environment in Tetra Tech, 2001)
- Depth (surface or subsurface)
- Grain size (sand, silt, or clay)

Background concentrations for NSA Crane were set at the 95 percent upper tolerance limits (UTLs), which means that 95 percent of all background concentrations are expected to be less than or equal to the UTL. There is a 5-percent probability that a single background sample would have a concentration greater than the UTL. Consequently, if a concentration greater than the UTL is detected in a site soil sample, it is most likely representative of a source rather than naturally occurring or anthropogenic sources. However, when multiple samples are collected from a site, the probability that any one of the samples would have a concentration greater than the UTL can be significantly greater, even if all of the samples are representative of background or anthropogenic conditions.

The combinations of depositional environment, depth, and soil grain size at SWMU 23 correspond to background Soil Group 3 for surface soil and background Soil Group 8 for subsurface soil. Tables 2-2 and 2-3 (adapted from Tetra Tech, 2001) summarize NSA Crane background metals data for these two groups. UTLs for these two soil groups are presented in Tables 2-2 and 2-3.

2.2 SOIL CONTAMINATION

The subsections below describe soil contamination patterns and the nature of observed soil contamination remaining at SWMU 23 following 2014 IM activities. Tables 2-4 (surface soil) and 2-5 (subsurface soil) present statistical summaries of chemicals detected in SWMU 23 soil under current post-excavation site conditions. Tables 2-6 provides a more detailed view and a comparison of detected concentrations in surface and subsurface soil to risk assessment screening levels and background UTLs. Figure 2-1 shows concentrations at locations where screening levels and background UTLs were exceeded. Red symbols identify soil sample locations where exceedances are detected; green symbols identify soil sample locations where no exceedances are detected. In addition, if the concentration of a detected metal did not exceed the background UTL and at least one of the three risk assessment screening values at a particular location, no results are presented for this metal.

2.2.1 Surface Soil Inorganics

The following metals were detected in surface soil at concentrations in excess of background UTLs and at least one risk assessment screening level:

- Arsenic
- Chromium
- Copper
- Lead
- Mercury
- Zinc

With the exception of lead, these metals were found to exceed background UTLs and screening levels in in only a few samples (i.e., three samples or less).

Although the majority of elevated lead concentrations in surface soil at the site were removed during the 2014 IM, residual lead concentrations in 18 surface soil samples exceeded the background UTL (27.0 mg/kg). Maximum lead concentrations (greater than 100 mg/kg) were detected at locations 23SB001 (125 mg/kg), 23SB013 (345 mg/kg), and 23SB046 (140 mg/kg). Borings 23SB001 (near PAH Excavation Area 3) and 23SB046 (near Lead Excavation Area 3) are located along the edges of IM excavation areas; location 23SB013 is northwest and sidegradient of the former debris disposal area.

Composite samples (from locations 23SB093 and 23SB094) collected from the two excavation areas near the covered picnic area after the IM have lead concentrations less than the background UTL. Figure 2-2 is an additional depiction of residual lead contamination at the site following IM activities. All lead concentrations in surface soil are less than 400 mg/kg, the risk-based human health screening level that was used as a cleanup goal for the 2014 IM.

2.2.2 Surface Soil Organics

Surface Soil VOCs – Three VOCs (1,2-dichloroethane, trans-1,4-dichloro-2-butene, and chloroform) had concentrations in surface soil that exceeded a risk assessment screening level, as summarized below:

- Concentrations of 1,2-dichloroethane exceeded the 0.00096 mg/kg protection-of-groundwater screening level at four locations: 23SB019 (0.00124 mg/kg), 23SB021 (0.00145 mg/kg), 23SB022 (0.00143 mg/kg), and 23SB023 (0.00153 mg/kg).

- One surface soil sample (from location 23SB023) had a trans-1,4-dichloro-2-butene concentration (0.004 mg/kg) that exceeded the 0.0000124 mg/kg screening level for the protection of groundwater.

- The chloroform concentration in the surface soil at location 23SB001 (0.00514 mg/kg) exceeded the protection-of-groundwater screening level (0.00122 mg/kg).

The exceedances are highlighted in Table 2-6 and on Figure 2-1. All of these results are qualified as estimated (with “J” flags) because the concentrations were less than the limits of quantitation (LOQs), indicating that there is some uncertainty associated with the result. These chemicals are very volatile, and their persistence is expected to be very limited; additional detail regarding the fate and transport of contaminants is provided in Section 3.0. Reported concentrations, which appear to be isolated detections not indicative of widespread VOC contamination, exceeded only protection-of-groundwater criteria and groundwater is not used as a drinking water source at SWMU 23. For these reasons, 1,2-dichloroethane, trans-1,4-dichloro-2-butene, and chloroform are not considered to be significant site contaminants.

Surface Soil TPH – There are no TPH screening levels; therefore, TPH results are not presented on Figure 2-1. There is some evidence that one or more petroleum product releases have occurred at SWMU 23. TPH was generally detectable across the site, with concentrations of diesel range organics (DRO) in surface soil ranging from 9.69 to 88.5 mg/kg. The TPH data reflect small oil leaks from vehicles. TPH concentrations near the former UST location were comparable to concentrations in other areas of the site.

Surface Soil PAHs – PAHs are site-related contaminants and were detected primarily at the edges of the paved area and in the vicinity of the former debris removal area. During 2014 IM activities, the majority of elevated PAH concentrations in surface soil were removed from the site. Residual concentrations of several PAHs, predominantly benzo(a)pyrene, exceeded screening levels at 26 surface soil sample locations. Most of these locations are along the edges of the IM excavation limits at the top of the steep slope behind Building 36. Soil from location 23SB091 (near PAH Excavation Area 3) had the greatest number and greatest concentrations of PAHs in surface soil following the 2014 IM. Overall PAH concentrations are best expressed as benzo(a)pyrene equivalents. As documented in the IM Work Plan (Tetra Tech, 2014), a benzo(a)pyrene equivalent concentration of 1.5 mg/kg is equal to the upper limit (1×10^{-4}) of the USEPA target risk range for a residential exposure scenario. The maximum residual benzo(a)pyrene equivalent concentration (using detected concentrations only and one-half of the non-detect results) for surface soil is equal to 1.49 mg/kg at location 23SB091, as shown in Table 2-6. Benzo(a)pyrene equivalents for other surface soil locations ranged from non-detect to 0.82 mg/kg (23SB072), with an overall average benzo(a)pyrene equivalent concentration of 0.15 mg/kg. Figure 2-3 is an additional depiction of the residual PAH contamination at the site following IM activities.

Surface Soil PCBs – Aroclor-1254 and Aroclor-1260 were the only PCBs detected in surface soil at the site. Aroclor-1254 concentrations, ranging from 0.00127 to 0.191 mg/kg, exceeded screening levels at six surface soil locations. Aroclor-1260 concentrations, ranging from 0.00208 to 0.186 mg/kg, exceeded screening levels at 10 surface soil locations. Maximum concentrations of both PCBs were detected at location 23SB001, approximately 50 feet southwest of Building 36 (near PAH Excavation Area 3).

Despite the observed screening level exceedances, PCB concentrations are no more than one-fifth of the residential and ecological cleanup level of 1 mg/kg total PCBs that is commonly used for PCB cleanup in soil for unrestricted use. Therefore, PCBs are not considered to be significant site-related contaminants.

2.2.3 Subsurface Soil Inorganics

Metals concentrations exceeded screening levels at only two subsurface soil sample locations, 23SB003 and 23SB024. As shown in Table 2-6 and on Figure 2-1, arsenic was the only metal detected in these subsurface soil samples at concentrations greater than the background UTL and screening levels.

Arsenic is not considered a significant site-related contaminant in subsurface soil based on the limited number of exceedances and relatively low concentrations compared to the background UTL. Arsenic was detected at location 23SB003 from 8 to 10 feet bgs at a concentration of 12.8 mg/kg and at location

23SB024 from 4 to 6 feet bgs at a concentration of 19.7 mg/kg. The 12.8 mg/kg arsenic result at location 23SB003 is virtually indistinguishable from the background UTL of 12.5 mg/kg, and the 19.7 mg/kg arsenic result at 23SB024 is less than two times the UTL.

Although lead is associated with site activities, the concentrations remaining in subsurface soil at the site are considered to be attributable to background conditions. Subsurface soil concentrations of lead at the following three locations slightly exceeded the NSA Crane subsurface soil background UTL of 19.6 mg/kg:

- 23SB036 from 2 to 4 feet bgs – 20.2 mg/kg
- 23SB083 from 2 to 4 feet bgs and 4 to 6 feet bgs; 24 and 22 mg/kg, respectively
- 23SB088 (from 2 to 4 feet bgs – 24 mg/kg

Concentrations of lead in the remaining subsurface soil samples were less than the UTL. Figure 2-2 is an additional depiction of residual lead contamination at the site following IM activities.

2.2.4 Subsurface Soil Organics

Subsurface Soil VOCs – The only VOC concentration in subsurface soil samples that exceeded a screening level was vinyl chloride, which was detected at location 23SB001 from 10 to 12 feet bgs at a concentration of 0.00144 mg/kg. This concentration is qualified as estimated (with a “J” flag) because the concentration is less than the LOQ, indicating that there is some degree of uncertainty with the result. This chemical is very volatile, and its persistence is expected to be very limited; additional detail regarding the fate and transport of contaminants is provided in Section 3.0. The isolated detection of this chemical in subsurface soil is not indicative of widespread VOC contamination. In addition, the concentration exceeded only the protection-of-groundwater criterion, and groundwater is not used as a drinking water source at SWMU 23. For these reasons, vinyl chloride is not considered to be a significant site contaminant.

Subsurface Soil TPH – There are no soil risk assessment screening levels for TPH; therefore, TPH results are not presented on Figure 2-1. There is some evidence of petroleum product releases or migration of TPH to subsurface soil at SWMU 23. For example, at location 23SB001, a concentration of 3,490 mg/kg DRO was detected at 10 to 12 feet bgs. The surface soil sample at this location had a concentration of 71.4 mg/kg DRO. However, this is an isolated occurrence because TPH concentrations in other locations at the site ranged from not detectable (LOQ = approximately 5 mg/kg) to less than 215 mg/kg.

Subsurface Soil PAHs – As discussed previously, PAHs are site-related contaminants and were detected primarily at the edges of the paved area and in the vicinity of the former debris removal area. During 2014 IM activities, the majority of elevated PAH concentrations in subsurface soil were removed from the site. Residual concentrations of various PAHs exceeded screening levels in 16 subsurface soil sample locations. Most of these locations are within or along the edges of the IM excavation limits at the top of the steep slope behind Building 36. Soil from location 23SB068 (within the boundaries of PAH Excavation Limit 3) at depths of 2 to 4 feet bgs and 4 to 6 feet bgs (actually 4 to 4.5 feet bgs due to bedrock refusal) had the greatest number and greatest concentrations of PAHs remaining in subsurface soil. As shown in Table 2-6, residual benzo(a)pyrene equivalent concentrations (using detected concentrations only and one-half of the non-detect results) at this location are equal to 9.36 mg/kg for the 2- to 4-foot bgs depth and 19.1 mg/kg for the 4- to 6-foot bgs depth. Both of these concentrations exceed 1.5 mg/kg, the concentration equal to the upper limit (1×10^{-4}) of USEPA's target cancer risk range. However, benzo(a)pyrene equivalents for other subsurface soil locations ranged from non-detect to 0.55 mg/kg (23SB090 from 2 to 4 feet bgs), with an overall average benzo(a)pyrene equivalent concentration of 0.56 mg/kg.

The disparity between benzo(a)pyrene equivalent concentrations at location 23SB068 and at other locations indicates that the elevated detections of PAHs at 23SB068 are isolated to a small area and not indicative of PAH contamination across the entire site. As shown on Figure 2-3, the hotspot of residual PAH contamination in subsurface soil at location 23SB068 is bounded by low benzo(a)pyrene equivalent concentrations (less than 0.01 mg/kg) at locations 23SB001, 23SB002, and 23SB066. These sampling points are located less than 50 feet away from location 23SB068 and bound the elevated PAH concentrations at location 23SB068.

Elevated PAH concentrations in subsurface soil at location 23SB068 likely represent an area ranging from approximately 2,050 (2 to 4 feet bgs) to 2,405 square feet (4 to 6 feet bgs); the top 2 feet of soil at this location were removed during the 2014 IM and backfilled with crushed stone. Thiessen polygons were generated using Environmental Systems Research Institute (ESRI) ArcGIS 10.0 (2012) to provide a depiction of the area represented by elevated PAH concentrations at depth at location 23SB068. The polygon boundaries (and areas) for the sample locations are defined relative to all other points (i.e., half-way points between sample locations). Figures 2-4 and 2-5 include the polygons for the 2- to 4-foot bgs interval and the 4- to 6-foot bgs interval, respectively. Appendix C.7 provides supporting documentation for development of the Thiessen polygons.

Subsurface Soil PCBs – PCBs were analyzed in subsurface soil at three locations, soil borings 23SB024, 23SB025, and 23SB026. No PCBs were detected in these samples, as noted in Table 2-6.

2.3 DRAINAGEWAY SEDIMENT AND SURFACE WATER CONTAMINATION

Samples collected from surface water and sediment locations 23SW/SD001 through 23SW/SD007 and 23SW/SD009 represent conditions in the drainageways located at the base of the steep slopes behind Building 36. Table 2-7 presents a statistical summary of chemicals detected in sediment samples, and Table 2-8 provides comparisons of detected concentrations in sediment to risk assessment screening values; sediment concentrations are also compared to the NSA Crane surface soil UTLs because flow in the drainageways is intermittent and conditions may be similar for surface soil. Tables 2-9 and 2-10 present similar information for surface water. The text below describes contamination patterns in the drainageways, which consist of small tributaries with intermittent flow.

Sediment Metals – Concentrations of the following metals exceeded risk assessment screening levels in at least one drainageway sediment sample:

- Arsenic
- Barium
- Chromium
- Cobalt
- Copper
- Lead
- Nickel
- Silver
- Zinc

The most upgradient/upstream sediment sampling location, 23SD001, has not been affected by SWMU 23 operations. The sediment sample from this location had the greatest concentrations of barium, cadmium, copper, lead, mercury, vanadium, and zinc, indicating that these presence of these chemicals in the other drainageway sediment samples is not attributable to site activities.

The remaining metals with concentrations exceeding screening levels (arsenic, beryllium, chromium, cobalt, nickel, and silver) may be attributable to site operations. Two locations, 23SD003 and 23SD004, where metals concentrations frequently exceeded screening levels are the most downstream sampling locations. However, with the exception of the maximum detections of nickel (location 23SD004) and silver (location 23SD002), all sediment concentrations are less than two times the surface soil background UTLs for NSA Crane (see Table 2-8). Although surface soil UTLs are not entirely comparable to sediment background concentrations, they provide some perspective on metals sediment

concentrations because the drainageways are intermittent, and surface soil erosion contributes significantly to drainageway sediment composition.

The conclusion that lead concentrations in drainageway sediments are not attributable to site activities is notable because this chemical was present in the site soil at concentrations that triggered soil removal activities during the 2014 IM. In addition, chemical concentrations in sediment are not significantly greater than surface soil background concentrations. Consequently, the migration of metals contamination from on-site sources via surface runoff is not considered to be significant.

Sediment VOCs – No drainageway sediment samples collected for the RFI had VOC concentrations greater than screening levels. In fact, the only VOC detected in sediment was trichloroethene at location 23SD009 at a concentrations of 0.00124 mg/kg. This concentration is qualified as estimated (with a "J" flag) because the concentration is less than the LOQ, indicating that there is some uncertainty associated with the result. This chemical is very volatile, and its persistence is expected to be very limited; additional detail regarding the fate and transport of contaminants is provided in Section 3.0. The isolated detection of this chemical in sediment is not indicative of widespread VOC contamination.

Sediment PAHs – Drainageway sediment detections of PAHs in excess of screening levels are limited to benzo(a)pyrene at locations 23SD001 (upstream location), 23SD002, and 23SD006 (location immediately downstream of the former debris disposal area) and several additional PAHs at location 23SD006, as shown in Table 2-8 and on Figure 2-6. The benzo(a)pyrene concentration at location 23SD002 is less than the concentration detected at the upstream location, 23SD001, indicating that the concentration is not attributable to site activities. However, PAH concentrations at location 23SD006 are considered to be attributable to site operations.

Sediment PCBs – No drainageway sediment samples had PCB concentrations greater than screening criteria. Although PCBs are evidence of anthropogenic releases, the PCBs are of limited environmental significance because of their low concentrations.

Surface Water Metals – Exceedances of surface water screening levels were observed at three of the six sample locations. Metals with surface water concentrations exceeding at least one screening level are arsenic, chromium, cobalt, copper, and lead (see Tables 2-9 and 2-10 and Figure 2-7). Chromium concentrations in surface water exceeded screening levels at three sampling locations. For all other metals found at concentrations in excess of screening levels, the exceedances occurred only at location 23SW001, which is believed not to have been affected by site operations, indicating that these metals are attributable to upgradient, off-site sources rather than site activities. Arsenic, chromium, cobalt, and lead

exceedances at locations 23SW001 were only detected in unfiltered surface water samples (i.e., total metals fraction). They were not detected in filtered samples. This is an indication that the metals present in surface water are predominantly adsorbed to suspended solids or are in a precipitated form. These solids are wholly or partially removed upon filtration. For metals such as chromium that occur in different oxidation states with greatly differing toxicities, the partitioning between solid and liquid phases is important. The particulate species are generally less soluble and tend to be less toxic. Chromium was not detected in any of the six surface water samples that were filtered to remove solids.

Surface Water PAHs – No surface water samples had PAH concentrations greater than screening levels.

2.4 OIL/WATER SEPARATOR SEDIMENT CONTAMINATION

Contaminant concentrations are described below for sediment in the O/WS. This sediment is contained within a concrete structure; therefore, under normal circumstances, it would not be a source of contamination to which ecological or human receptors would be exposed. Nevertheless, the analytical data are useful for determining whether cleanout of the sediment is warranted and may also be useful to indicate whether a potential subsurface contaminant source is present at SWMU 23. The sediment results for the O/WS were not used in the human health or ecological risk assessments.

O/WS Sediment Metals – Concentrations of the following metals exceeded screening levels in the O/WS sediment sample (23SD008-0006): antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, silver, and zinc (see Table 2-8, last column). It is possible that O/WS sediments could leach metals to surrounding soil (e.g., through cracks in the structure); however, results from subsurface soil samples collected from boring 23SB026 located near the O/WS do not indicate the presence of subsurface soil contamination.

O/WS Sediment VOCs – The only VOC concentrations in the sediment sample collected from within the O/WS that exceeded screening levels are ethylbenzene, toluene, and total xylenes. All three of these target analytes exceeded only the ecological screening levels. These three target analytes are components of fuel oil and gasoline, and their presence is an indication of residual volatile contamination from site operations.

O/WS Sediment PAHs – Several PAH concentrations exceeded screening levels in the O/WS separator sediment sample. PAHs are components of organic fuel and lubricating oils; hence, their presence is indicative of residual fuel-related contamination from site operations.

O/WS Sediment TPHs – The O/WS sediment sample contained 504 mg/kg of gasoline range organics (GRO), indicating that residual fuel-related contamination is present in the O/WS from site activities.

O/WS Sediment PCBs – The O/WS sediment sample did not have PCB concentrations greater than screening levels, indicating that PCBs probably were not released to the O/WS in any significant quantities.

2.5 RESIDUAL CONTAMINATION SUMMARY

2.5.1 Soil

The primary site-related contaminants in soil at SWMU 23 are PAHs and lead. Most elevated concentrations (i.e., greater than screening levels) in soil were excavated during the 2014 IM. However, there are residual concentrations of these contaminants remaining in the soil at the site. Residual concentrations of lead and PAHs greater than risk assessment screening levels are generally located along the edges of or near the areas excavated during IM activities.

Lead concentrations remaining in surface soil ranged from 2.33 to 345 mg/kg. Although some of these concentrations exceed the NSA Crane background UTL for surface soil (27.0 mg/kg), all lead concentrations in surface soil are less than 400 mg/kg, the risk-based human health screening level that was used as a cleanup goal for the 2014 IM. Residual lead concentrations in subsurface soil samples were generally similar to the NSA Crane background subsurface soil UTL.

Residual benzo(a)pyrene equivalent concentrations for all surface soil samples were less than 1.5 mg/kg, the concentration equal to the upper limit (1×10^{-4}) of the USEPA target cancer risk range, with the maximum benzo(a)pryene equivalent concentration (1.49 mg/kg) found at location 23SB091. There is a remaining hotspot of PAH contamination greater than 1.5 mg/kg benzo(a)pyrene equivalents in subsurface soil at one location, 23SB068, at SWMU 23. Benzo(a)pyrene equivalent concentrations for soil from 2 to 4 feet bgs and 4 to 6 feet bgs were 9.36 and 19.1 mg/kg, respectively. However, benzo(a)pyrene equivalent concentrations for other subsurface soil locations ranged from non-detect to 0.55 mg/kg (23SB090 from 2 to 4 feet bgs) with an overall average benzo(a)pyrene equivalent concentration of 0.56 mg/kg. The disparity between benzo(a)pyrene equivalent concentrations at location 23SB068 and at other soil locations indicates that the elevated detections of PAHs at 23SB068 are isolated to a small area and not indicative of PAH contamination across the entire site.

2.5.2 Drainageway Sediment and Surface Water

The chemicals most frequently detected in drainageway surface water and sediment at concentrations greater than screening levels are metals. However, most of the concentrations in sediment and all of the concentrations in surface water are likely related to off-site anthropogenic or background sources rather than site activities because, in general, maximum metals concentrations were found in the upstream sample location. Minor PAHs detections in the drainageway southwest of SWMU 23 appear to be attributable to off-site anthropogenic sources. A slightly more significant detection of PAHs occurred in the drainage channel immediately downstream of the former debris disposal area, indicating that a limited amount of contamination has migrated to that channel via surface erosion. Concentrations of PAHs in drainageway sediment at SWMU 23 are low, although they exceed the human health screening level at two locations; no PAHs were detected in surface water samples.

2.5.3 Oil/Water Separator Sediment

The sediment in the O/WS is contained within the structure. Human health and ecological receptors are not expected to be exposed to this sediment, which is more contaminated with organic and inorganic constituents than any of the soil or drainageway sediment at SWMU 23. Results from the subsurface soil sample collected near the O/WS do not indicate the presence of subsurface soil contamination.

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Soil													
23SB001	23SS001-0002	10/07/12	DPT	X	X	X	X	X	X	--	--	--	Remains on site
	23SB001-0204	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB001-0406	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB001-1012	10/07/12	DPT	X	X	X	X	--	--	--	--	--	Remains on site
23SB002	23SS002-0002	10/07/12	DPT	X	X	X	X	X	X	--	--	--	Removed
	23SB002-0204	03/26/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB002-0406	03/26/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB002-1012	10/07/12	DPT	X	X	X	X	--	--	--	--	--	Remains on site
23SB003	23SS003-0002	10/07/12	DPT	X	X	X	X	X	X	--	--	--	Removed
	23SB003-0204	03/26/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB003-0406	03/26/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB003-0810	10/07/12	DPT	X	X	X	X	--	--	--	--	--	Remains on site
23SB004	23SS004-0002	10/07/12	DPT	X	X	X	X	X	X	--	--	--	Removed
	23SS004-0204	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Removed
	23SS004-0406	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB004-0810	10/07/12	DPT	X	X	X	X	--	--	--	--	--	Remains on site
23SB005	23SS005-0002	10/07/12	DPT	X	X	X	X	X	X	--	--	--	Remains on site
	23SB005-0810	10/07/12	DPT	X	X	X	X	--	--	--	--	--	Remains on site
23SB006	23SS006-0002	10/07/12	DPT	X	X	X	X	X	X	--	--	--	Removed
	23SB006-0608	10/07/12	DPT	X	X	X	X	--	--	--	--	Strong fuel - like odor	Remains on site
23SB007	23SS007-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Refusal 1.8 feet bgs	Remains on site

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Soil (cont.)													
23SB008	23SS008-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Refusal 0.8 foot bgs	Remains on site
23SB009	23SS009-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Refusal 1.2 feet bgs	Remains on site
23SB010	23SS010-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Refusal 1.6 feet bgs	Removed
23SB011	23SS011-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Refusal 1.8 feet bgs	Remains on site
23SB012	23SS012-0002	11/01/12	HA	X	X	X	X	X	X	--	--	--	Remains on site
23SB013	23SS013-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Refusal 1.9 feet bgs	Remains on site
23SB014	23SS014-0002	10/31/12	HA	X	X	X	X	X	X	--	--	Refusal 0.5 foot bgs	Removed
23SB015	23SS015-0002	10/31/12	HA	X	X	X	X	X	X	--	--	Refusal 0.8 foot bgs	Remains on site
23SB016	23SS016-0002	10/31/12	HA	X	X	X	X	X	X	--	--	Refusal 0.3 foot bgs	Remains on site
23SB017	23SS017-0002	10/31/12	HA	X	X	X	X	X	X	--	--	Refusal 1.3 feet bgs	Removed
23SB018	23SS018-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Refusal 1.6 feet bgs	Remains on site
23SB019	23SS019-0002	11/01/12	HA	X	X	X	X	X	X	--	--	--	Remains on site
23SB020	23SS020-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Bedrock refusal 1.6 feet bgs	Remains on site
23SB021	23SS021-0002	11/01/12	HA	X	X	X	X	X	X	--	--	--	Remains on site
23SB022	23SS022-0002	11/01/12	HA	X	X	X	X	X	X	--	--	Bedrock refusal 1.8 feet bgs	Remains on site
23SB023	23SS023-0002	11/01/12	HA	X	X	X	X	X	X	--	--	--	Remains on site
23SB024	23SB024-0406	10/07/12	DPT	X	X	X	X	X	X	--	--	Gravel from 0-4 feet bgs	Remains on site
	23SB024-0608	10/07/12	DPT	X	X	X	X	X	X	--	--	--	Remains on site

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Soil (cont.)													
23SB025	23SB025-0406	10/07/12	DPT	X	X	X	X	X	X	--	--	Gravel from 0-4 feet bgs	Remains on site
	23SB025-0608	10/07/12	DPT	X	X	X	X	X	X	--	--	--	Remains on site
23SB026	23SB026-0406	10/07/12	DPT	X	X	X	X	X	X	--	--	Gravel from 0-4 feet bgs; strong fuel-like odor 4-6 feet bgs	Remains on site
	23SB026-0608	10/07/12	DPT	X	X	X	X	X	X	--	--	Slight fuel-like odor 6-8 feet bgs	Remains on site
23SB027	23SS027-0002	05/18/13	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB027-0204	05/18/13	DPT	--	--	X	--	--	--	--	--	--	Remains on site
23SB028	23SS028-0002	05/18/13	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB028-0204	05/18/13	DPT	--	--	X	--	--	--	--	--	--	Remains on site
23SB029	23SS029-0002	05/18/13	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB029-0204	05/18/13	DPT	--	--	X	--	--	--	--	--	--	Remains on site
23SB030	23SS030-0002	05/19/13	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB030-0204	05/19/13	HA	--	--	X	--	--	--	--	--	Refusal 3 feet bgs	Remains on site
23SB031	23SS031-0002	05/19/13	HA	--	--	X	--	--	--	--	--	Refusal 1.5 feet bgs	Remains on site
23SB032	23SS032-0002	05/19/13	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB032-0204	05/19/13	HA	--	--	X	--	--	--	--	--	Refusal 3 feet bgs	Remains on site
23SB033	23SS033-0002	05/19/13	HA	--	--	--	X	--	--	--	--	Refusal 1 foot bgs	Remains on site
23SB034	23SS034-0002	05/19/13	HA	--	--	--	X	--	--	--	--	--	Remains on site
	23SB034-0204	05/19/13	HA	--	--	--	X	--	--	--	--	--	Remains on site
23SB035	23SS035-0002	05/19/13	HA	--	--	--	X	--	--	--	--	Refusal 1 foot bgs	Remains on site

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Soil (cont.)													
23SB036	23SS036-0002	05/19/13	HA	--	--	--	X	--	--	--	--	--	Remains on site
	23SB036-0204	05/19/13	HA	--	--	--	X	--	--	--	--	--	Remains on site
23SB037	23SS037-0002	05/19/13	HA	--	--	--	X	--	--	--	--	--	Remains on site
	23SB037-0204	05/19/13	HA	--	--	--	X	--	--	--	--	--	Remains on site
23SB038	23SS038-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB039	23SS039-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB040	23SS040-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB041	23SS041-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Removed
23SB042	23SS042-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB043	23SS043-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Removed
23SB044	23SS044-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Removed
23SB045	23SS045-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB046	23SS046-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB047	23SS047-0002	03/28/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB048	23SS048-0002	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SS048-0204	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SS048-0406	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
23SB049	23SS049-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB050	23SS050-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB053	23SS053-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB054	23SS054-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB055	23SS055-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Soil (cont.)													
23SB056	23SS056-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB058	23SS058-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB059	23SS059-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB059-0204	05/23/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB062	23SS062-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB063	23SS063-0002	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB063-0204	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB063-0406	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB064	23SS064-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB064-0204	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB064-0406	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB065	23SS065-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Removed
23SB066	23SS066-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB066-0204	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB066-0406	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB067	23SS067-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB067-0204	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB068	23SS068-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Removed
	23SB068-0204	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB068-0406	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB069	23SS069-0002	03/21/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB069-0204	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Soil (cont.)													
23SB069	23SB069-0406	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB070	23SS070-0002	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB070-0204	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB070-0406	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB071	23SS071-0002	03/26/14	HA	--	--	X	--	--	--	--	--	--	Removed
	23SB071-0204	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB071-0406	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB072	23SS072-0002	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB072-0204	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB072-0406	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB073	23SS073-0002	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB073-0204	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB073-0406	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
23SB074	23SS074-0002	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB074-0204	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB074-0406	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB075	23SS075-0002	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB075-0204	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
	23SB075-0406	03/26/14	HA	--	--	X	--	--	--	--	--	--	Remains on site
23SB076	23SS076-0002	04/17/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB076-0203	04/17/14	HA	--	--	--	X(1)	--	--	--	--	Refusal 1.5 feet bgs	Remains on site
23SB077	23SS077-0002	04/17/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Soil (cont.)													
23SB078	23SS078-0001	04/17/14	HA	--	--	--	X(1)	--	--	--	--	Refusal 0.8 foot bgs	Remains on site
23SB079	23SS079-0002	04/17/14	HA	--	--	--	X(1)	--	--	--	--	Refusal 1.4 feet bgs	Remains on site
23SB080	23SS080-0002	04/17/14	HA	--	--	--	X(1)	--	--	--	--	Refusal 1.5 feet bgs	Remains on site
23SB081	23SS081-0002	04/17/14	HA	--	--	--	X(1)	--	--	--	--	Refusal 0.8 foot bgs	Remains on site
23SB082	23SS082-0002	05/23/14	HA	--	--	--	X(1)	--	--	--	--	Refusal 1.5 feet bgs	Remains on site
23SB083	23SS083-0002	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB083-0204	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB083-0406	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB084	23SS084-0002	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Removed
	23SB084-0204	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB084-0406	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB085	23SS085-0002	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Removed
	23SB085-0204	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Removed
	23SB085-0406	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Removed
23SB086	23SS086-0002	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB086-0204	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB086-0406	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB087	23SS087-0002	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Removed
	23SB087-0204	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB087-0406	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB088	23SS088-0002	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB088-0204	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Soil (cont.)													
23SB088	23SB088-0406	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB089	23SS089-0002	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB089-0204	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
	23SB089-0406	05/23/14	DPT	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB090	23SS090-0002	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Removed
	23SB090-0204	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB090-0406	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
23SB091	23SS091-0002	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SB091-0204	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
	23SS091-0406	05/23/14	DPT	--	--	X	--	--	--	--	--	--	Remains on site
23SB092	23SS092-002	05/23/14	DPT	--	--	X	X(1)	--	--	--	--	--	Remains on site
	23SB092-0204	05/23/14	DPT	--	--	X	X(1)	--	--	--	--	--	Remains on site
	23SB092-0406	05/23/14	DPT	--	--	X	X(1)	--	--	--	--	--	Remains on site
23SB093	23SB093C	12/09/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
23SB094	23SB094C	12/09/14	HA	--	--	--	X(1)	--	--	--	--	--	Remains on site
Sediment													
23SW/SD001	23SD001-0006	10/08/12	PT	X	--	X	X	X	--	X	--	--	NA
23SW/SD002	23SD002-0006	10/08/12	PT	X	--	X	X	X	--	X	--	--	NA
23SW/SD003	23SD003-0006	10/08/12	PT	X	--	X	X	X	--	X	--	--	NA
23SW/SD004	23SD004-0006	10/08/12	PT	X	--	X	X	X	--	X	--	--	NA
23SW/SD005	23SD005-0006	10/08/12	PT	X	--	X	X	X	--	X	--	--	NA
23SW/SD006	23SD006-0006	10/08/12	PT	X	X	X	X	X	--	X	--	--	NA

TABLE 2-1

RFI AND POST-RFI SAMPLE COLLECTION AND ANALYSIS SUMMARY
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Sample Location	Sample ID	Sample Date	Sample Method	Analyses								Comments	Post-IM Soil Status
				VOCs	TPH (GRO/ ERO/DRO)	PAHs	Metals	PCBs	Sulfate/pH	TOC	Hardness		
Sediment (cont.)													
23SW/SD008	23SD008-0006	10/08/12	PT	X	--	X	X	X	--	X	--	Collected from 0-4 inches below top of residue; strong fuel-like odor	NA
23SW/SD009	23SD000-0006	05/19/13	PT	X	--	X	X	--	--	--	--	--	NA
Surface Water													
23SW/SD001	23SW001	10/08/12	DF	--	--	X	X(2)	--	--	--	X	--	NA
23SW/SD002	23SW002	10/08/12	DF	--	--	X	X(2)	--	--	--	X	--	NA
23SW/SD003	23SW003	10/08/12	DF	--	--	X	X(2)	--	--	--	X	--	NA
23SW/SD004	23SW004	10/08/12	DF	--	--	X	X(2)	--	--	--	X	--	NA
23SW/SD005	23SW005	10/08/12	DF	--	--	X	X(2)	--	--	--	X	--	NA
23SW/SD006	23SW006	10/08/12	DF	--	--	X	X(2)	--	--	--	X	--	NA

Abbreviations:

-- - Parameter not analyzed
bgs – Below ground surface
DF – Direct fill
DPT – Direct-push technology
DRO - Disele range organics
ERO - Extended range organics
GRO - Gasoline range organics
HA - Hand Auger
ID - Identifier
IM - Interim measure
NA - Not applicable
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
PT - Plastic trowel
TOC - Total organic carbon
TPH - Total petroleum hydrocarbons
VOCs - Volatile organic compounds

Footnotes:

1 - Lead only.
2 - Total and dissolved.

TABLE 2-2

STATISTICAL SUMMARY OF BASE-WIDE BACKGROUND INVESTIGATION ANALYTICAL RESULTS
SOIL GROUP 3 - ALLUVIAL, MISSISSIPPIAN, AND PENNSYLVANIAN SURFACE SOIL
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Average of All Results (mg/kg)	Average of Detected Concentrations (mg/kg)	Location of Maximum Detection	Distribution of Data	95% Upper Tolerance Limit (mg/kg)
Aluminum	15/15	6,770	17,400	10,238	10,238	BG1SBP0801	Lognormal	19,900
Antimony	2/15	1.4	5.6	0.83	3.50	BG3SBM0401	Lognormal	6.9
Arsenic	15/15	2.4	10.2	6.11	6.11	BG3SBM0701	Normal	11.83
Barium	15/15	46.1	153	89.0	89.0	BG3SBM0601	Lognormal	211
Beryllium	1/15	0.49	0.49	0.40	0.49	BG3SBA0101-MAX	Lognormal	0.93
Cadmium	10/15	0.1	3.6	0.63	0.88	BG3SBM0201	Lognormal	6.05
Calcium	14/15	115	35,300	2,730	2,920	BG3SBM0601	Lognormal	55,200
Chromium	15/15	8.5	21.7	14.6	14.6	BG1SBA0101	Lognormal	28.7
Cobalt	15/15	6	27.1	12.9	12.9	BG3SBM0701	Lognormal	32.4
Copper	15/15	5.4	17.1	8.85	8.85	BG1SBP0801	Lognormal	17.6
Iron	15/15	10,700	36,200	16,800	16,800	BG1SBA0101	Lognormal	37,400
Lead	15/15	9.4	21.5	15.0	15.0	BG1SBA0101	Lognormal	27.0
Lithium	14/14	9.1	29.9	14.8	14.8	BG1SBP0901	Lognormal	30.0
Magnesium	15/15	620	2,250	1,200	1,200	BG1SBP0801	Lognormal	2,800
Manganese	15/15	268	3,040	1,140	1,140	BG3SBM0701	Lognormal	5,700
Mercury	7/15	0.04	0.07	0.037	0.051	BG1SBP0601-MAX	Normal	0.077
Nickel	15/15	9.2	20	13.4	13.4	BG1SBA0101	Lognormal	22.1
Potassium	15/15	418	1,490	847	847	BG1SBP0801	Lognormal	1,970
Selenium	5/15	0.51	0.64	0.48	0.58	BG1SBP0901	Normal	0.81
Silver	15/15	0.05	0.11	0.065	0.065	BG1SBP0401	Lognormal	0.130
Sodium	6/15	9.4	23.7	8.11	15.6	BG3SBM0601	Normal	28
Strontium	14/14	7.4	63.2	14.3	14.3	BG3SBM0601	Lognormal	46.4
Thallium	15/15	0.1	0.27	0.19	0.19	BG1SBP0601-MAX	Normal	0.31
Tin	0/15	NA	NA	0.36 (1)	NA	NA	NA	NA
Thorium	14/14	5.3	8.5	6.86	6.86	BG1SBP0801	Lognormal	10.2
Vanadium	15/15	17.1	40	25.4	25.4	BG1SBP0801	Lognormal	51.2
Zinc	14/15	24.4	60.2	37.0	38.6	BG3SBM0701	Normal	65.6

Abbreviations:
NA - Not available

References:
Tetra Tech, 2001

Footnotes:
1 - This value is the average of all non-detected values. Non-detected values were represented by using one-half the limit of detection. This value was used for used for statistical analysis when no detections were encountered.

TABLE 2-3

STATISTICAL SUMMARY OF BASE-WIDE BACKGROUND INVESTIGATION ANALYTICAL RESULTS
SOIL GROUP 8 - PENNSYLVANIAN SUBSURFACE CLAY AND SILT
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Average of All Results (mg/kg)	Average of Positive Detections (mg/kg)	Location of Maximum	Distribution of Data	95% Upper Tolerance Limit (mg/kg)
Aluminum	9/9	9,070	16,200	13,019	13,019	BG1SBP0206	Normal	20,600
Antimony	1/9	11.3	11.3	1.83	11.30	BG1SBP0505	Lognormal	40.3
Arsenic	9/9	1.4	8.5	5.51	5.51	BG1SBP0204	Normal	12.5
Barium	9/9	25.1	83.4	57.0	57.0	BG1SBP0505	Normal	115
Beryllium	0/9	NA	NA	0.36 (3)	NA	NA	NA	NA
Cadmium	8/9	0.05	0.64	0.26	0.28	BG1SBP0206	Normal	0.8
Calcium	9/9	85.2	970	470	470	BG1SBP0505	Lognormal	4,640
Chromium	9/9	14.2	27.1	19.9	19.9	BG1SBP0206	Normal	33.0
Cobalt	9/9	5.2	12.5	8.32	8.32	BG1SBP0206	Lognormal	21.2
Copper	9/9	11	23.8	15.3	15.3	BG1SBP0305	Lognormal	33.3
Iron	9/9	14,800	40,800	24,422	24,422	BG1SBP0305	Lognormal	60,200
Lead	9/9	8.6	15.2	11.8	11.8	BG1SBP0603	Normal	19.6
Lithium	9/9	13.7	46.6	23.2	23.2	BG1SBP0305	Lognormal	80.0
Magnesium	9/9	1,100	2,870	1,958	1,958	BG1SBP0204	Normal	3,410
Manganese	9/9	29	457	263	263	BG1SBP0804	Normal	704
Mercury	1/9	0.14	0.14	0.037	0.140	BG1SBP0103	Lognormal	0.18
Nickel	9/9	10	23.7	13.6	13.6	BG1SBP0305	Lognormal	29.6
Potassium	9/9	718	1290	974	974	BG1SBP0204, BG1SBP0305	Lognormal	1,890
Selenium	8/9	0.37	0.88	0.47	0.51	BG1SBP0206	Normal	1.07
Silver	8/9	0.05	0.1	0.053	0.056	BG1SBP0206	Lognormal	0.14
Sodium	6/9	10	205	64.0	79.1	BG1SBP0406-MAX	Lognormal	1,070
Strontium	9/9	10	20.3	13.8	13.8	BG1SBP0406-MAX	Lognormal	30.9
Thallium	9/9	0.14	0.25	0.20	0.20	BG1SBP0204, BG1SBP0206	Lognormal	0.33
Tin	0/9	NA	NA	0.35 (1)	NA	NA	NA	NA
Thorium	9/9	7.1	11.7	9.02	9.02	BG1SBP0305	Normal	14.9
Vanadium	9/9	20.9	48.5	33.2	33.2	BG1SBP0206	Lognormal	69.1
Ainc	9/9	24.3	58.2	37.1	37.1	BG1SBP0305	Lognormal	83.3

Abbreviations:
NA - Not available

References:
Tetra Tech, 2001

Footnotes:
1 - This value is the average of all non-detected values. Non-detected values were represented by using one-half the limit of detection. This value was used for statistical analysis when no detections were encountered.

TABLE 2-4

SUMMARY STATISTICS FOR CHEMICALS DETECTED IN SURFACE SOIL - POST-EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Minimum Detection	Maximum Detection	Location of Maximum Detection	Range of Non-Detects	Average of Detections	Overall Average	Standard Deviation
Volatile Organic Compounds (mg/kg)								
1,2-Dichloroethane	4/16	0.00124 J	0.00153 J	23SB023	0.00244 - 0.108	0.00140	0.00470	0.01
2-Butanone	3/16	0.00592 J	0.0405 J	23SB001	0.00483 - 0.216	0.0190	0.0120	0.03
Acetone	9/16	0.00733 J	0.234 J	23SB001	0.00967 - 0.433	0.0540	0.0460	0.08
Benzene	1/21	0.0018 J	0.0018 J	23SB001	0.00242 - 0.108	0.0018	0.00420	0.01
Carbon Disulfide	1/16	0.00888 J	0.00888 J	23SB001	0.00242 - 0.108	0.00890	0.00510	0.01
Chloroform	1/16	0.00514 J	0.00514 J	23SB001	0.00242 - 0.108	0.00510	0.00490	0.01
Tetrachloroethene	1/16	0.00539 J	0.00539 J	23SB001	0.00242 - 0.108	0.00540	0.00490	0.01
Toluene	1/21	0.0094 J	0.0094 J	23SB001	0.00242 - 0.108	0.0094	0.0045	0.01
Trans-1,4-Dichloro-2-butene	1/16	0.004 J	0.004 J	23SB023	0.00242 - 0.108	0.0040	0.0049	0.01
Polycyclic Aromatic Hydrocarbons (mg/kg)								
1-Methylnaphthalene	1/22	2.5	2.5	23SB070	0.0038 - 0.043	2.5	0.13	0.53
2-Methylnaphthalene	1/49	6.8	6.8	23SB070	0.00366 - 0.162	6.8	0.16	0.97
Acenaphthene	2/49	0.082 J	0.15	23SB091	0.00366 - 0.162	0.12	0.021	0.03
Acenaphthylene	3/49	0.0041 J	0.0077	23SB074	0.00366 - 0.162	0.0054	0.017	0.02
Anthracene	6/49	0.041 J	0.37	23SB091	0.00367 - 0.162	0.13	0.030	0.06
Benzo(a)pyrene Equivalents-Halfnd	37/49	0.00444	1.49	23SB091	0.0038 - 0.162	0.18	0.15	0.26
Benzo(a)pyrene Equivalents-Pos	37/49	5.31E-06	1.49	23SB091	0.0038 - 0.162	0.17	0.14	0.26
Benzo(a)anthracene	27/49	0.0041 J	0.99	23SB091	0.0038 - 0.162	0.13	0.08	0.16
Benzo(a)pyrene	30/49	0.0023 J	0.97	23SB091	0.00373 - 0.162	0.15	0.10	0.17
Benzo(b)fluoranthene	35/49	0.0043 J	1.3	23SB091	0.0038 - 0.162	0.20	0.15	0.25
Benzo(g,h,i)perylene	27/49	0.00568 J	0.71	23SB091	0.00373 - 0.162	0.14	0.086	0.14
Benzo(k)fluoranthene	31/49	0.0024 J	0.63	23SB091	0.00373 - 0.162	0.085	0.064	0.10
Chrysene	30/49	0.0041 J	1	23SB091	0.0038 - 0.162	0.15	0.10	0.18
Dibenzo(a,h)anthracene	13/49	0.00671 J	0.23	23SB091	0.00373 - 0.162	0.061	0.030	0.04
Fluoranthene	33/49	0.0047 J	1.9	23SB091	0.0038 - 0.162	0.19	0.14	0.31
Fluorene	2/49	0.099	0.17	23SB091	0.00366 - 0.162	0.13	0.022	0.03
Indeno(1,2,3-cd)pyrene	26/49	0.00493 J	0.5	23SB091	0.00373 - 0.162	0.083	0.056	0.09
Naphthalene	1/49	0.95	0.95	23SB070	0.00366 - 0.162	0.95	0.036	0.14
Phenanthrene	18/49	0.0044 J	1.4	23SB091	0.0038 - 0.162	0.19	0.081	0.22
Pyrene	30/49	0.0081	2 J	23SB091	0.0038 - 0.162	0.21	0.14	0.31
Polychlorinated Biphenyls (mg/kg)								
Aroclor-1254	6/16	0.00127 J	0.191 J	23SB001	0.00184 - 0.0384	0.0330	0.0140	0.05
Aroclor-1260	10/16	0.00208 J	0.186 J	23SB001	0.00184 - 0.00204	0.0430	0.0270	0.06

TABLE 2-4

SUMMARY STATISTICS FOR CHEMICALS DETECTED IN SURFACE SOIL - POST-EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Minimum Detection	Maximum Detection	Location of Maximum Detection	Range of Non-Detects	Average of Detections	Overall Average	Standard Deviation
Metals (mg/kg)								
Arsenic	26/26	2.3	17.8	23SB035	-	5.3	5.3	3.5
Barium	26/26	12.4	115	23SB007	-	65.6	65.6	34
Beryllium	20/26	0.327 J	0.963 J	23SB020	0.362 - 0.572	0.560	0.480	0.20
Cadmium	2/26	0.0645 J	0.345 J	23SB013	0.118 - 0.704	0.200	0.250	0.10
Chromium	26/26	4.92	29.5 J	23SB001	-	12.5	12.5	6.8
Cobalt	26/26	2.5	15.4 J	23SB037	-	7.80	7.80	3.7
Copper	26/26	3.35	39.8	23SB001	-	10.8	10.8	9.0
Lead	48/48	2.33	345	23SB013	-	37.5	37.5	54
Mercury	20/26	0.0209 J	0.692 J	23SB001	0.0332 - 0.249	0.0860	0.0910	0.13
Nickel	26/26	5.33	19.4	23SB020	-	11.1	11.1	4.3
Selenium	6/26	0.169 J	0.425 J	23SB033	0.294 - 1.76	0.210	0.580	0.29
Vanadium	26/26	5.8	38.3	23SB009	-	16.1	16.1	7.6
Zinc	26/26	11.1	127 J	23SB001	-	39.3	39.3	24
Miscellaneous Parameters								
Sulfate (mg/kg)	5/16	9.87 J	38.7 J	23SB001	11.4 - 13.9	16.7	9.6	8.1
Petroleum Hydrocarbons (mg/kg)								
DRO - C08-C28	15/16	9.69 J	69	23SB012	7.49	23.7	22.4	16
DRO - C08-C34	16/16	12 J	88.5	23SB012	-	48.4	48.4	24
Gasoline Range Organics	1/16	55.3	55.3	23SB013	4.33 - 6.38	55.3	6.1	13

Abbreviations:
DRO - Diesel range organics
Halfnd - Calculated using one-half the non-detect value
J - Estimated concentration
mg/kg - Milligram per kilogram
Pos - Calculated using positive results only

TABLE 2-5

SUMMARY STATISTICS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL - POST-EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Minimum Detection	Maximum Detection	Location of Maximum Detection	Sample with Maximum Detection	Range of Non-Detects	Average of Detections	Overall Average	Standard Deviation
Volatile Organic Compounds (mg/kg)									
2-Butanone	2/12	0.0043 J	0.00553 J	23SB003	23SB003-0810	0.00444 - 0.273	0.00492	0.0722	0.06
Acetone	4/12	0.00666 J	0.101	23SB003	23SB003-0810	0.00889 - 0.546	0.0366	0.1541	0.11
Carbon Disulfide	1/12	0.00113 J	0.00113 J	23SB001	23SB001-1012	0.00222 - 0.136	0.00113	0.0359	0.03
Cis-1,2-Dichloroethene	1/12	0.0012 J	0.0012 J	23SB001	23SB001-1012	0.00222 - 0.136	0.00120	0.0359	0.03
Methylene Chloride	1/12	0.00486 J	0.00486 J	23SB006	23SB006-0608	0.00425 - 0.273	0.00486	0.0719	0.06
Toluene	2/14	0.00178 J	0.00378 J	23SB001	23SB001-1012	0.00222 - 0.136	0.00278	0.0313	0.03
Vinyl Chloride	1/12	0.00144 J	0.00144 J	23SB001	23SB001-1012	0.00222 - 0.136	0.00144	0.0359	0.03
Polycyclic Aromatic Hydrocarbons (mg/kg)									
1-Methylnaphthalene	2/39	0.048 J	0.37 J	23SB068	23SB068-0406	0.0038 - 0.07	0.21	0.024	0.06
2-Methylnaphthalene	7/58	0.0041 J	0.5 J	23SB068	23SB068-0406	0.00358 - 0.162	0.10	0.024	0.07
Acenaphthene	3/58	0.0046 J	3.6 J	23SB068	23SB068-0406	0.00358 - 0.162	1.3	0.081	0.47
Acenaphthylene	7/58	0.00554 J	1 J	23SB068	23SB068-0204	0.00358 - 0.162	0.25	0.042	0.15
Anthracene	6/58	0.00427 J	7.6 J	23SB068	23SB068-0406	0.00358 - 0.162	1.5	0.17	1.0
BAP Equivalent-Halfnd	31/58	0.00484	19.1	23SB068	23SB068-0406	0.00358 - 0.162	1.0	0.56	2.8
BAP Equivalent-Pos	31/58	7.8E-05	19.1	23SB068	23SB068-0406	0.00358 - 0.162	1.0	0.55	2.8
Benzo(a)anthracene	18/58	0.0046 J	17 J	23SB068	23SB068-0406	0.00358 - 0.162	1.4	0.43	2.3
Benzo(a)pyrene	27/58	0.0045 J	12 J	23SB068	23SB068-0406	0.00358 - 0.162	0.75	0.35	1.7
Benzo(b)fluoranthene	27/58	0.004 J	18 J	23SB068	23SB068-0406	0.00358 - 0.162	1.1	0.53	2.6
Benzo(g,h,i)perylene	23/58	0.0093	7.6 J	23SB068	23SB068-0406	0.00358 - 0.162	0.60	0.25	1.1
Benzo(k)fluoranthene	21/58	0.0025 J	7.2 J	23SB068	23SB068-0406	0.00358 - 0.162	0.60	0.22	1.1
Chrysene	26/58	0.0043 J	16 J	23SB068	23SB068-0406	0.00358 - 0.162	0.92	0.42	2.2
Dibenzo(a,h)anthracene	7/58	0.0077 J	2.6 J	23SB068	23SB068-0406	0.00358 - 0.162	0.62	0.086	0.39
Fluoranthene	24/58	0.0053 J	33 J	23SB068	23SB068-0406	0.00358 - 0.162	1.8	0.75	4.4
Fluorene	3/58	0.0046 J	5 J	23SB068	23SB068-0406	0.00358 - 0.162	1.9	0.11	0.66
Indeno(1,2,3-cd)pyrene	15/58	0.0068 J	8.9 J	23SB068	23SB068-0406	0.00358 - 0.162	0.98	0.26	1.3
Naphthalene	3/58	0.0045 J	0.54 J	23SB068	23SB068-0406	0.00358 - 0.162	0.22	0.024	0.07
Phenanthrene	24/58	0.0032 J	31 J	23SB068	23SB068-0406	0.00358 - 0.162	1.5	0.62	4.1
Pyrene	28/58	0.0056 J	25 J	23SB068	23SB068-0406	0.00358 - 0.162	1.3	0.63	3.4
Metals (mg/kg)									
Arsenic	17/17	1.28 J	19.7	23SB024	23SB024-0406	-	7.04	7.04	4.7
Barium	17/17	8.52 J	88.4	23SB001	23SB001-1012	-	50.0	50.0	28
Beryllium	12/17	0.287	0.795 J	23SB025	23SB025-0608	0.362 - 0.582	0.497	0.421	0.17
Cadmium	1/17	0.618 J	0.618 J	23SB025	23SB025-0608	0.113 - 0.643	0.618	0.263	0.12
Chromium	17/17	4.92	29.8	23SB003	23SB003-0810	-	15.4	15.4	7.4
Cobalt	15/17	2.16 J	11.4	23SB025	23SB025-0608	2.57 - 2.78	4.54	4.16	2.6
Copper	17/17	3.35	41.3	23SB024	23SB024-0406	-	12.2	12.2	9.3
Lead	32/32	2.33	29 J	23SB088	23SB088-0204	-	13.2	13.2	6.0
Mercury	15/17	0.022 J	0.0882	23SB024	23SB024-0406	0.249	0.0483	0.0572	0.03
Nickel	17/17	2.14 J	18	23SB025	23SB025-0608	-	8.99	8.99	4.3
Selenium	2/17	0.169 J	0.169 J	23SB085	23SB085-0204, 23SB085-0406	0.282 - 1.61	0.169	0.578	0.25
Silver	1/17	0.122 J	0.122 J	23SB037	23SB037-0204	0.113 - 1.45	0.122	0.309	0.17
Vanadium	17/17	5.8	51.2	23SB003	23SB003-0810	-	22.4	22.4	14
Zinc	15/17	11.1	74.3	23SB025	23SB025-0608	3.85 - 7.59	30.1	26.9	19
Miscellaneous Parameters									

TABLE 2-5

SUMMARY STATISTICS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL - POST-EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Minimum Detection	Maximum Detection	Location of Maximum Detection	Sample with Maximum Detection	Range of Non-Detects	Average of Detections	Overall Average	Standard Deviation
Sulfate (mg/kg)	3/3	21.2 J	95.9 J	23SB025	23SB025-0406	-	50.2	50.2	NA[1]
Petroleum Hydrocarbons (mg/kg)									
DRO - C08-C28	4/12	11.5 J	2220	23SB001	23SB001-1012	7.15 - 8.06	589	199	637
DRO - C08-C34	12/12	8.53 J	3490	23SB001	23SB001-1012	-	321	321	1000
Gasoline Range Organics	2/12	4.75 J	5.03 J	23SB026	23SB026-0608	4.28 - 5.46	4.89	2.85	0.97

Abbreviations:
DRO - Diesel range organics
Halfnd - Calculated using one-half the non-detect value
J - Estimated concentration
mg/kg - Milligram per kilogram
NA - Not available/not applicable
Pos - Calculated using positive results only

Footnotes:
1 - Standard deviation was not calculated because of the limited data set (i.e., only 3 samples were available).

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB001				23SB002			23SB003			23SB004		23SB005
SAMPLE ID						23SS001-0002	23SB001-0204	23SB001-0406	23SB001-1012	23SB002-0204	23SB002-0406	23SB002-1012	23SB003-0204	23SB003-0406	23SB003-0810	23SB004-0406	23SB004-0810	23SS005-0002
SAMPLE DATE						20121007	20140523	20140523	20121007	20140326	20140326	20121007	20140326	20140326	20121007	20140523	20121007	20121007
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SS	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SS
TOP DEPTH (FEET BGS)						0	2	4	10	2	4	10	2	4	8	4	8	0
BOTTOM DEPTH (FEET BGS)						2	4	6	12	4	6	12	4	6	10	6	10	2
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	0.00346 UJ	NA	NA	0.00212 UJ	NA	NA	0.114 UJ	NA	NA	0.0024 UJ	NA	0.00222 UJ	0.108 UJ
2-BUTANONE	24	2700	89.6	NA	NA	0.0405 J	NA	NA	0.0043 J	NA	NA	0.227 UJ	NA	NA	0.00553 J	NA	0.00444 U	0.216 UJ
ACETONE	58	6100	2.5	NA	NA	0.234 J	NA	NA	0.024	NA	NA	0.455 UJ	NA	NA	0.101	NA	0.00889 U	0.433 UJ
BENZENE	0.0046	1.2	0.255	NA	NA	0.0018 J	NA	NA	0.00212 U	NA	NA	0.114 UJ	NA	NA	0.0024 U	NA	0.00222 U	0.108 UJ
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	0.00888 J	NA	NA	0.00113 J	NA	NA	0.114 UJ	NA	NA	0.0024 U	NA	0.00222 U	0.108 UJ
CHLOROFORM	0.00122	0.32	1.19	NA	NA	0.00514 J	NA	NA	0.00212 U	NA	NA	0.114 UJ	NA	NA	0.0024 U	NA	0.00222 U	0.108 UJ
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	0.00346 UJ	NA	NA	0.0012 J	NA	NA	0.114 UJ	NA	NA	0.0024 U	NA	0.00222 U	0.108 UJ
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	0.00691 UJ	NA	NA	0.00425 U	NA	NA	0.227 UJ	NA	NA	0.0048 U	NA	0.00444 U	0.216 UJ
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	0.00539 J	NA	NA	0.00212 U	NA	NA	0.114 UJ	NA	NA	0.0024 U	NA	0.00222 U	0.108 UJ
TOLUENE	15.2	490	5.45	NA	NA	0.0094 J	NA	NA	0.00378 J	NA	NA	0.114 UJ	NA	NA	0.00178 J	NA	0.00222 U	0.108 UJ
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	0.00346 UJ	NA	NA	0.00212 U	NA	NA	0.114 UJ	NA	NA	0.0024 U	NA	0.00222 U	0.108 UJ
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	0.00346 UJ	NA	NA	0.00144 J	NA	NA	0.114 UJ	NA	NA	0.0024 UJ	NA	0.00222 UJ	0.108 UJ
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	NA	0.037 U	0.048 J	NA	0.046 U	0.0041 U	NA	0.037 U	0.004 U	NA	0.039 U	NA	NA
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	0.0187 U	0.037 U	0.058 J	0.0185 U	0.046 U	0.0041 U	0.00383 U	0.037 U	0.004 U	0.00391 U	0.039 U	0.00369 U	0.00367 U
ACENAPHTHENE	110	360	20	NA	NA	0.0187 U	0.037 U	0.038 U	0.0185 U	0.046 U	0.0041 U	0.00383 U	0.037 U	0.004 U	0.00391 U	0.039 UJ	0.00369 U	0.00367 U
ACENAPHTHYLENE	110	360	20	NA	NA	0.0187 U	0.037 U	0.038 U	0.0546	0.046 U	0.0041 U	0.00383 U	0.037 U	0.004 U	0.0105	0.039 U	0.00369 U	0.00432 J
ANTHRACENE	1160	1800	29	NA	NA	0.0187 U	0.037 U	0.038 U	0.0185 U	0.046 U	0.0041 U	0.00383 U	0.037 U	0.004 U	0.00427 J	0.039 U	0.00369 U	0.00367 U
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	0.11	0.055	0.038 U	0.0185 U	0.089	0.0082	0.00383 U	0.52	0.004 U	0.085	0.11	0.00369 U	0.041
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	0.097	0.032	0.038 U	0.0185 U	0.061	0.0059	0.00383 U	0.52	0.004 U	0.085	0.091	0.00369 U	0.041
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	0.0463 J	0.037 U	0.038 U	0.0185 U	0.046 U	0.005 J	0.00383 U	0.24	0.004 U	0.0299	0.052 J	0.00369 U	0.0155
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	0.0757	0.028 J	0.038 U	0.0185 U	0.051 J	0.0045 J	0.00383 U	0.33	0.004 U	0.0565	0.075 J	0.00369 U	0.0273
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	0.0963	0.041 J	0.038 U	0.0185 U	0.098	0.0087	0.00383 U	0.66	0.004 U	0.0643	0.1	0.00369 U	0.0319
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	0.0844	0.037 U	0.091	0.043	0.046 J	0.0041 U	0.00383 U	0.26	0.004 U	0.0578	0.058 J	0.00369 U	0.0207
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	0.0574 J	0.037 U	0.038 U	0.0185 U	0.031 J	0.0025 J	0.00383 U	0.2	0.004 U	0.0445	0.068 J	0.00369 U	0.0211
CHRYSENE	24	16	1.1	NA	NA	0.0647 J	0.037 U	0.038 U	0.0185 U	0.05 J	0.0066 J	0.00383 U	0.36	0.004 U	0.0431	0.071 J	0.00369 U	0.0255
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	0.0187 U	0.037 UJ	0.038 UJ	0.0185 U	0.046 U	0.0041 U	0.00383 U	0.08	0.004 U	0.0142	0.039 UJ	0.00369 U	0.00671 J
FLUORANTHENE	1780	240	29	NA	NA	0.0577 J	0.064 J	0.038 U	0.0185 U	0.046 U	0.0053 J	0.00383 U	0.28	0.004 U	0.041	0.094 J	0.00369 U	0.0223
FLUORENE	108	240	29	NA	NA	0.0187 U	0.037 U	0.038 U	0.0185 U	0.046 U	0.0041 U	0.00383 U	0.037 U	0.004 U	0.00391 U	0.039 U	0.00369 U	0.00367 U
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	0.0684	0.037 UJ	0.038 UJ	0.0185 U	0.046 UJ	0.0041 U	0.00383 U	0.16 J	0.004 U	0.0467	0.039 UJ	0.00369 U	0.0172
NAPHTHALENE	0.011	3.8	1	NA	NA	0.0187 U	0.037 U	0.038 UJ	0.0185 U	0.046 U	0.0041 U	0.00383 U	0.037 U	0.004 U	0.00391 U	0.039 U	0.00369 U	0.00367 U
PHENANTHRENE	260	180	29	NA	NA	0.0324 J	0.034 J	0.047 J	0.0185 U	0.046 U	0.0041 U	0.00383 U	0.055 J	0.004 U	0.00944	0.048 J	0.00369 U	0.00644 J
PYRENE	260	180	1.1	NA	NA	0.0656 J	0.073 J	0.087	0.0597	0.075 J	0.0056 J	0.00383 U	0.49 J	0.004 U	0.0467	0.11 J	0.00369 U	0.0235
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	0.191 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00184 UJ
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	0.186 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00184 UJ
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	2.44 U	NA	NA	2.38 U	NA	NA	2.24 UJ	NA	NA	2.47 U	NA	2.24 U	2.29 U
ARSENIC	0.03	0.68	17	11.83	12.5	8.07	NA	NA	9.5	NA	NA	9.4 J	NA	NA	**12.8**	NA	5.05	7.77
BARIUM	3200	1500	330	211	115	67.4	NA	NA	88.4	NA	NA	41.9	NA	NA	77.5	NA	48.7	39.4
BERYLLIUM	380	16	10	0.93	NA	0.46 J	NA	NA	0.593 J	NA	NA	0.494 J	NA	NA	0.605 J	NA	0.352 J	0.572 U
CADMIUM	14	7.1	0.36	6.05	0.8	0.61 U	NA	NA	0.595 U	NA	NA	0.559 U	NA	NA	0.619 U	NA	0.561 U	0.572 U
CHROMIUM	0.013	0.3	0.4	28.7	33	**29.5 J**	NA	NA	19	NA	NA	16.9 J	NA	NA	29.8	NA	21.5	22.9
COBALT	5.4	2.3	13	32.4	21.2	7.38	NA	NA	7.63	NA	NA	2.46 J	NA	NA	5.69	NA	4.28	2.92 J
COPPER	560	310	28	17.6	33.3	**39.8**	NA	NA	14.6	NA	NA	10.9	NA	NA	20.7	NA	12.7	9.17
LEAD	280	400	11	27	19.6	**125 J**	NA	NA	18.3	NA	NA	11.8	NA	NA	14.7	NA	8.73	23
MERCURY	0.66	2.3	0.013	0.077	0.18	**0.692 J**	NA	NA	0.0475	NA	NA	0.0642	NA	NA	0.0384 J	NA	0.0265 J	0.0305 J
NICKEL	520	150	38	22.1	29.6	13.8 J	NA	NA	11.2	NA	NA	5.15	NA	NA	16.8	NA	11.3	9.04
SELENIUM	10.4	39	0.52	0.81	1.07	1.53 U	NA	NA	1.49 U	NA	NA	1.4 U	NA	NA	1.55 U	NA	1.4 U	1.43 U
SILVER	16	39	4.2	0.13	0.14	0.61 U	NA	NA	0.595 U	NA	NA	0.559 U	NA	NA	0.619 U	NA	0.561 U	0.572 U
VANADIUM	1720	39	7.8	51.2	69.1	19.5	NA	NA	33.1	NA	NA	22.4	NA	NA	51.2	NA	32.1	15.4
ZINC	7400	2300	46	65.6	83.3	**127 J**	NA	NA	34.4	NA	NA	12.1	NA	NA	54	NA	27.7	51.9
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	38.7 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 J
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	35.7 J	NA	NA	2220	NA	NA	7.56 U	NA	NA	7.96 U	NA	7.66 U	7.49 U
DRO (C08-C34)	NA	NA	NA	NA	NA	71.4 J	NA	NA	3490	NA	NA	8.53 J	NA	NA	10.6 J	NA	9.53 J	12 J
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	5.29 U	NA	NA	4.75 J	NA	NA	4.55 U	NA	NA	4.75 U	NA	4.62 U	4.33 U

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
Value exceeds HH, ECO, and Crane Background UTL
Value exceeds Protection of GW, HH, ECO, and Crane Background UTL

Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an estimated value
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the data

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB005	23SB006	23SB007	23SB008	23SB009	23SB011	23SB012	23SB013	23SB015	23SB016	23SB018	23SB019	23SB020
SAMPLE ID						23SB005-0810	23SB006-0608	23SS007-0002	23SS008-0002	23SS009-0002	23SS011-0002	23SS012-0002	23SS013-0002	23SS015-0002	23SS016-0002	23SS018-0002	23SS019-0002	23SS020-0002
SAMPLE DATE						20121007	20121007	20121101	20121101	20121101	20121101	20121101	20121101	20121031	20121031	20121101	20121101	20121101
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SB	SB	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
TOP DEPTH (FEET BGS)						8	6	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH (FEET BGS)						10	8	1.8	0.8	1.2	1.8	2	1.9	0.8	0.3	1.6	2	1.6
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	0.00227 UJ	0.00247 UJ	0.00298 U	0.00346 U	0.00279 U	0.00244 U	0.00256 U	0.00267 U	0.00257 U	0.00274 U	0.00257 U	0.00124 J	0.00327 U
2-BUTANONE	24	2700	89.6	NA	NA	0.00453 U	0.00494 U	0.00596 U	0.00692 U	0.00559 U	0.00489 U	0.00512 U	0.00533 U	0.00514 U	0.00549 U	0.00515 U	0.00483 U	0.00654 U
ACETONE	58	6100	2.5	NA	NA	0.00666 J	0.0148 J	0.00733 J	0.0379 J	0.0112 UJ	0.0114 J	0.0102 UJ	0.0107 UJ	0.0103 UJ	0.011 UJ	0.00942 J	0.00967 UJ	0.0132 J
BENZENE	0.0046	1.2	0.255	NA	NA	0.00227 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00244 U	0.00256 U	0.00267 U	0.00257 U	0.00274 U	0.00257 U	0.00242 U	0.00327 U
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	0.00227 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00244 U	0.00256 U	0.00267 U	0.00257 U	0.00274 U	0.00257 U	0.00242 U	0.00327 U
CHLOROFORM	0.00122	0.32	1.19	NA	NA	0.00227 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00244 U	0.00256 U	0.00267 U	0.00257 U	0.00274 U	0.00257 U	0.00242 U	0.00327 U
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	0.00227 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00244 U	0.00256 U	0.00267 U	0.00257 U	0.00274 U	0.00257 U	0.00242 U	0.00327 U
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	0.00453 U	0.00486 J	0.00596 U	0.00692 U	0.00559 U	0.00489 U	0.00512 U	0.00533 U	0.00514 U	0.00549 U	0.00515 U	0.00483 U	0.00654 U
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	0.00227 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00244 U	0.00256 U	0.00267 U	0.00257 U	0.00274 U	0.00257 U	0.00242 U	0.00327 U
TOLUENE	15.2	490	5.45	NA	NA	0.00227 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00244 U	0.00256 U	0.00267 U	0.00257 U	0.00274 U	0.00257 U	0.00242 U	0.00327 U
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	0.00227 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00244 U	0.00256 U	0.00267 U	0.00257 U	0.00274 U	0.00257 U	0.00242 U	0.00327 U
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	0.00227 UJ	0.00247 UJ	0.00298 UJ	0.00346 UJ	0.00279 UJ	0.00244 UJ	0.00256 UJ	0.00267 UJ	0.00257 UJ	0.00274 UJ	0.00257 UJ	0.00242 U	0.00327 U
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	0.00365 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.00384 U	0.00373 U	0.00422 U	0.00366 U	0.00412 U	0.00422 U	0.00392 U	0.00436 U
ACENAPHTHENE	110	360	20	NA	NA	0.00365 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.00384 U	0.00373 U	0.00422 U	0.00366 U	0.00412 U	0.00422 U	0.00392 U	0.00436 U
ACENAPHTHYLENE	110	360	20	NA	NA	0.00365 U	0.00554 J	0.00417 U	0.00402 U	0.00431 U	0.00384 U	0.00373 U	0.00422 U	0.00366 U	0.00412 U	0.00422 U	0.00392 U	0.00436 U
ANTHRACENE	1160	1800	29	NA	NA	0.00365 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.00384 U	0.00373 U	0.00422 U	0.00767 U	0.00412 U	0.00422 U	0.00392 U	0.00436 U
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	0.00365 U	0.0055	0.012	0.0056	0.046	0.0044	0.0058	0.011	0.065	0.032	0.0052	0.00392 U	0.020
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	0.00365 U	0.0009	0.010	0.0013	0.046	0.0000053	0.0018	0.0063	0.065	0.030	0.00049	0.00392 U	0.017
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	0.00365 U	0.00414 U	0.00417 U	0.00402 U	0.0156	0.00384 U	0.00505 J	0.0206	0.0306	0.0113	0.00422 U	0.00392 U	0.00436 U
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	0.00365 U	0.00414 U	0.00825 J	0.00402 U	0.0251	0.00384 U	0.00373 U	0.00422 U	0.0396	0.025	0.00422 U	0.00392 U	0.0149
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	0.00365 U	0.00414 U	0.0123	0.00775 J	0.0299	0.00384 U	0.0133	0.0249	0.0379	0.0144	0.00492 J	0.00392 U	0.0102
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	0.00365 U	0.018	0.00568 J	0.00402 U	0.0308	0.00384 U	0.00373 U	0.0173	0.0381	0.0219	0.00422 U	0.00392 U	0.01
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	0.00365 U	0.00414 U	0.0071 J	0.00499 J	0.0236	0.00384 U	0.00373 U	0.0206	0.0317	0.0169	0.00422 U	0.00392 U	0.00711 J
CHRYSENE	24	16	1.1	NA	NA	0.00365 U	0.00663 J	0.00417 U	0.00694 J	0.0215	0.00531 J	0.00751	0.0291	0.0396	0.0176	0.00422 U	0.00392 U	0.00436 U
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	0.00365 U	0.00414 U	0.00417 U	0.00402 U	0.0132	0.00384 U	0.00373 U	0.00422 U	0.0143	0.00412 U	0.00422 U	0.00392 U	0.00436 U
FLUORANTHENE	1780	240	29	NA	NA	0.00365 U	0.0147	0.0172 J	0.0125 U	0.0263 J	0.0103 U	0.0107 U	0.037 J	0.0923 J	0.0305 J	0.00892 U	0.00481 U	0.017 J
FLUORENE	108	240	29	NA	NA	0.00365 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.00384 U	0.00373 U	0.00422 U	0.00366 U	0.00412 U	0.00422 U	0.00392 U	0.00436 U
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	0.00365 U	0.00935	0.00493 J	0.00501 J	0.027	0.00384 U	0.00373 U	0.0155	0.0346	0.0189	0.00422 U	0.00392 U	0.0112
NAPHTHALENE	0.011	3.8	1	NA	NA	0.00365 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.00384 U	0.00373 U	0.00422 U	0.00366 U	0.00412 U	0.00422 U	0.00392 U	0.00436 U
PHENANTHRENE	260	180	29	NA	NA	0.00365 U	0.0158	0.00417 U	0.00606 U	0.0162 U	0.00455 U	0.00541 U	0.015 U	0.0431 U	0.016 U	0.0057 U	0.00392 U	0.00818 U
PYRENE	260	180	1.1	NA	NA	0.00365 U	0.0223	0.0146 J	0.00878 U	0.0254 J	0.00771 U	0.00969 U	0.0336 J	0.0723 J	0.0258 J	0.00706 U	0.00392 U	0.0144 J
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	0.00214 U	0.00201 UJ	0.00225 UJ	0.00192 U	0.00193 UJ	0.00293 J	0.0384 U	0.00212 U	0.00127 J	0.00162 J	0.00223 U
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	0.00262 J	0.00201 UJ	0.0054 J	0.00192 U	0.00193 UJ	0.165	0.0341	0.0046 J	0.00384 J	0.00195 U	0.00398 J
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	2.32 U	2.57 U	2.75 U	2.54 U	2.82 U	2.42 U	2.43 U	2.59 U	2.39 U	2.52 U	2.61 U	2.46 U	2.76 U
ARSENIC	0.03	0.68	17	11.83	12.5	5.27	11.2	5.13	2.5 J	10.8	7.69	2.49 J	4.7	6.19	9.32	5.3	3.64	5.67
BARIUM	3200	1500	330	211	115	78.8	80.5	115	62.9	84	54.4	62	103	73.4	104	96.1	63.1	113
BERYLLIUM	380	16	10	0.93	NA	0.436 J	0.494 J	0.612 J	0.389 J	0.603 J	0.509 J	0.429 J	0.791 J	0.511 J	0.666 J	0.606 J	0.585 J	0.963 J
CADMIUM	14	7.1	0.36	6.05	0.8	0.579 U	0.643 U	0.688 U	0.636 U	0.704 U	0.604 U	0.607 U	0.345 J	0.597 U	0.631 U	0.653 U	0.614 U	0.689 U
CHROMIUM	0.013	0.3	0.4	28.7	33	16.2	24.3	13.1	9.56	27.4	19.1	7.31	12.3	19.9	18.9	13.5	11.2	12.7
COBALT	5.4	2.3	13	32.4	21.2	4.47	5.64	8.95	6.96	7.22	10.4	6.36	8.8	7.38	9.12	8.61	11.6	9.82
COPPER	560	310	28	17.6	33.3	10.6	19.9	8.96	5.89	15.6	7.15	5.71	16.7	26.5	19	8.62	7.92	12.2
LEAD	280	400	11	27	19.6	11.2	13.7	20.5	13.1	25.6	13.8	9.98	**345**	**79**	**70.2**	18.5	11.6	22.9
MERCURY	0.66	2.3	0.013	0.077	0.18	0.067	0.0586	0.0566	0.0481	0.0332 U	0.0356 J	0.0438 J	0.0683	**0.123**	**0.0784**	0.0562	0.0411 J	0.0685
NICKEL	520	150	38	22.1	29.6	9.62	13	9.96	6.94	15.2	9.03	7.98	16.9	12.5	15.6	10	11.5	19.4
SELENIUM	10.4	39	0.52	0.81	1.07	1.45 U	1.61 U	1.72 U	1.59 U	1.76 U	1.51 U	1.52 U	1.62 U	1.49 U	1.58 U	1.63 U	1.54 U	1.72 U
SILVER	16	39	4.2	0.13	0.14	0.579 U	0.643 U	0.688 U	0.636 U	0.704 U	0.604 U	0.607 U	0.647 U	0.597 U	0.631 U	0.653 U	0.614 U	0.689 U
VANADIUM	1720	39	7.8	51.2	69.1	12.3	40.2	20.1	13.7	38.3	26.5	11.8	15.6	26.6	23.4	21.7	14.9	20.4
ZINC	7400	2300	46	65.6	83.3	24.9	49.7	42.1	30	53.3	33.2	24.7	48.4	63.3	53.2	37.7	40.4	51.1
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	13.1 U	12.5 U	12.1 J	12 U	11.7 U	12.6 U	11.4 U	12.9 U	12.7 U	9.87 J	13.4 U
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	7.53 U	108	16 J	17.2	15.7 J	9.69 J	69	43	28.8	13.7 J	20.2	11.3 J	18.9
DRO (C08-C34)	NA	NA	NA	NA	NA	11 J	215	30.1	33.6	30.2	20.1	88.5	75.6	61.2	27.9	42.3	24.2	54.6
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	4.28 U	4.91 U	5.52 U	6.38 U	5.16 U	4.75 U	5.81 U	55.3	5.62 U	6.36 U	6.27 U	5.54 U	6.32 U

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
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Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB021	23SB022	23SB023	23SB024		23SB025		23SB026		23SB027		23SB028	
SAMPLE ID						23SS021-0002	23SS022-0002	23SS023-0002	23SB024-0406	23SB024-0608	23SB025-0406	23SB025-0608	23SB026-0406	23SB026-0608	23SS027-0002	23SB027-0204	23SS028-0002	23SB028-0204
SAMPLE DATE						20121101	20121101	20121101	20121007	20121007	20121007	20121007	20121007	20121007	20130518	20130518	20130518	20130518
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SS	SS	SS	SB	SB	SB	SB	SB	SB	SS	SB	SS	SB
TOP DEPTH (FEET BGS)						0	0	0	4	6	4	6	4	6	0	2	0	2
BOTTOM DEPTH (FEET BGS)						2	1.8	2	6	8	6	8	6	8	2	4	2	4
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	0.00145 J	0.00143 J	0.00153 J	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	0.00557 U	0.0118	0.00592 J	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	0.0114 J	0.0693 J	0.0912 J	0.532 UJ	0.491 UJ	0.52 UJ	0.546 UJ	0.443 UJ	0.41 UJ	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	0.00279 U	0.00274 U	0.004 J	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.0444	0.00477 J	0.0187 U	0.00384 U	0.0677 U	0.00418 U
ACENAPHTHENE	110	360	20	NA	NA	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
ACENAPHTHYLENE	110	360	20	NA	NA	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
ANTHRACENE	1160	1800	29	NA	NA	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	0.015	0.014	0.017	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.082	0.00418 U
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	0.012	0.012	0.015	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0071	0.00418 U
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	0.00408 U	0.00812 J	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	0.0115	0.00919	0.0122	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	0.00713 J	0.00955	0.0143	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0714 J	0.00418 U
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	0.00408 U	0.00702 J	0.0109	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	0.00619 J	0.00695 J	0.0122	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
CHRYSENE	24	16	1.1	NA	NA	0.00408 U	0.0109	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
FLUORANTHENE	1780	240	29	NA	NA	0.0157 J	0.0213 J	0.0283 J	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0725 J	0.00418 U
FLUORENE	108	240	29	NA	NA	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	0.00408 U	0.00684 J	0.00897 J	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
NAPHTHALENE	0.011	3.8	1	NA	NA	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
PHENANTHRENE	260	180	29	NA	NA	0.00923 U	0.0117 U	0.0167 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U
PYRENE	260	180	1.1	NA	NA	0.0137 J	0.0169 J	0.023 J	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0693 J	0.00418 U
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	0.00204 UJ	0.00185 J	0.00158 J	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	0.00204 UJ	0.00208 J	0.018	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	2.6 U	2.56 U	2.72 U	2.22 U	2.06 U	2.33 U	2.37 U	2.49 UJ	2.23 U	NA	NA	NA	NA
ARSENIC	0.03	0.68	17	11.83	12.5	3.94	3.51	4.11	**19.7**	3.51	1.28 J	6.82	6.85 J	10.1	NA	NA	NA	NA
BARIUM	3200	1500	330	211	115	66	51.2	114	11.8	8.52 J	31.5	74.9	54.3 J	33.7	NA	NA	NA	NA
BERYLLIUM	380	16	10	0.93	NA	0.47 J	0.571 J	0.663 J	0.556 U	0.515 U	0.582 U	0.795 J	0.514 J	0.603 J	NA	NA	NA	NA
CADMIUM	14	7.1	0.36	6.05	0.8	0.65 U	0.64 U	0.679 U	0.556 U	0.515 U	0.582 U	0.618 J	0.624 U	0.558 U	NA	NA	NA	NA
CHROMIUM	0.013	0.3	0.4	28.7	33	12.3	9.94	8.65	12.6	7.4	7.06	21.2	15.4 J	24	NA	NA	NA	NA
COBALT	5.4	2.3	13	32.4	21.2	12.8	14.6	8.22	2.78 U	2.57 U	2.71 J	11.4	2.16 J	3.23 J	NA	NA	NA	NA
COPPER	560	310	28	17.6	33.3	8.29	6.74	9.67	41.3	4.81	5.26	18.4	10.1 J	10	NA	NA	NA	NA
LEAD	280	400	11	27	19.6	16.5	12.7	**27.4**	17.7	5.56	11.2	19.3	10.6	12.9	NA	NA	NA	NA
MERCURY	0.66	2.3	0.013	0.077	0.18	0.0462	0.065	0.0762	0.0882	0.0448	0.0263 J	0.022 J	0.0462	0.0774	NA	NA	NA	NA
NICKEL	520	150	38	22.1	29.6	14.8	14.2	11.9	4.3	2.14 J	6.09	18	6.28 J	9.23	NA	NA	NA	NA
SELENIUM	10.4	39	0.52	0.81	1.07	1.63 U	1.6 U	1.7 U	1.39 U	1.29 U	1.46 U	1.48 U	1.56 U	1.4 U	NA	NA	NA	NA
SILVER	16	39	4.2	0.13	0.14	0.65 U	0.64 U	0.679 U	0.556 U	0.515 U	0.582 U	0.593 U	0.624 U	0.558 U	NA	NA	NA	NA
VANADIUM	1720	39	7.8	51.2	69.1	19.4	14.2	12.9	16	6.39	6.23	31.3	20.4 J	40.2	NA	NA	NA	NA
ZINC	7400	2300	46	65.6	83.3	45.1	45.1	44.7	7.59 U	3.85 U	15.8	74.3	20.4 J	25.9	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	13 J	13 U	13.9 U	33.4 J	NA	95.9 J	NA	21.2 J	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	19.8	14.7 J	21.1	7.58 U	7.15 U	11.5 J	18.3	8.06 U	7.29 U	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	76	65.4	61.6	10.3 J	9.11 J	32.7	33.3	10.6 J	11.1 J	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	5.78 U	5.96 U	6.15 U	5.32 U	4.91 U	5.2 U	5.46 U	4.77 U	5.03 J	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
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Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB029		23SB030		23SB031	23SB032		23SB033	23SB034		23SB035	23SB036	
SAMPLE ID						23SS029-0002	23SB029-0204	23SS030-0002	23SB030-0204	23SS031-0002	23SS032-0002	23SB032-0204	23SS033-0002	23SS034-0002	23SB034-0204	23SS035-0002	23SS036-0002	23SB036-0204
SAMPLE DATE						20130518	20130518	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SS	SB	SS	SB	SS	SS	SB	SS	SS	SB	SS	SS	SB
TOP DEPTH (FEET BGS)						0	2	0	2	0	0	2	0	0	2	0	0	2
BOTTOM DEPTH (FEET BGS)						2	4	2	3	1.5	2	3	1	2	4	1	2	4
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
ACENAPHTHENE	110	360	20	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	110	360	20	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
ANTHRACENE	1160	1800	29	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
CHRYSENE	24	16	1.1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
FLUORANTHENE	1780	240	29	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
FLUORENE	108	240	29	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
NAPHTHALENE	0.011	3.8	1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
PHENANTHRENE	260	180	29	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
PYRENE	260	180	1.1	NA	NA	0.0188 U	0.00395 U	0.00407 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	NA	NA	NA	NA	NA	NA	NA	0.486 UJ	0.471 UJ	0.452 UJ	0.901 UJ	0.992 UJ	1.01 UJ
ARSENIC	0.03	0.68	17	11.83	12.5	NA	NA	NA	NA	NA	NA	NA	3.78	2.63	2.81	**17.6**	6.65	4.82
BARIUM	3200	1500	330	211	115	NA	NA	NA	NA	NA	NA	NA	62.5	65.8	52.9	52	83.7	80.2
BERYLLIUM	380	16	10	0.93	NA	NA	NA	NA	NA	NA	NA	NA	0.421	0.365	0.287	0.327 J	0.586 J	0.457 J
CADMIUM	14	7.1	0.36	6.05	0.8	NA	NA	NA	NA	NA	NA	NA	0.0645 J	0.118 U	0.113 U	0.225 U	0.248 U	0.253 U
CHROMIUM	0.013	0.3	0.4	28.7	33	NA	NA	NA	NA	NA	NA	NA	9.48	6.89	7.73	15.6	9.93	12.3
COBALT	5.4	2.3	13	32.4	21.2	NA	NA	NA	NA	NA	NA	NA	8.09 J	6.44 J	6.21 J	7.39 J	10.9 J	4.34 J
COPPER	560	310	28	17.6	33.3	NA	NA	NA	NA	NA	NA	NA	6.29	4.19	4.79	**28.9**	11	8.88
LEAD	280	400	11	27	19.6	NA	NA	NA	NA	NA	NA	NA	9.02	6.01	6.15	**27.8**	**31.2**	20.2
MERCURY	0.66	2.3	0.013	0.077	0.18	NA	NA	NA	NA	NA	NA	NA	0.0427	0.0368 J	0.0454	0.0445	0.0481	0.0364 J
NICKEL	520	150	38	22.1	29.6	NA	NA	NA	NA	NA	NA	NA	8.3	7.75	7.95	17.7	14.3	10.5
SELENIUM	10.4	39	0.52	0.81	1.07	NA	NA	NA	NA	NA	NA	NA	0.425 J	0.294 U	0.282 U	0.563 U	0.62 U	0.634 U
SILVER	16	39	4.2	0.13	0.14	NA	NA	NA	NA	NA	NA	NA	0.122 U	0.118 U	0.113 U	0.225 U	0.248 U	0.253 U
VANADIUM	1720	39	7.8	51.2	69.1	NA	NA	NA	NA	NA	NA	NA	15.5	10.5	13.1	16.5	15.1	16.5
ZINC	7400	2300	46	65.6	83.3	NA	NA	NA	NA	NA	NA	NA	33.9	22.5	25.8	47.8	44.6	34.8
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
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Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB037		23SB038	23SB039	23SB040	23SB042	23SB045	23SB046	23SB047	23SB048			23SB049
SAMPLE ID						23SS037-0002	23SB037-0204	23SS038-0002	23SS039-0002	23SS040-0002	23SS042-0002	23SS045-0002	23SS046-0002	23SS047-0002	23SS048-0002	23SB048-0204	23SB048-0406	23SS049-0002
SAMPLE DATE						20130519	20130519	20140328	20140328	20140328	20140328	20140328	20140328	20140328	20140326	20140523	20140523	20140321
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SS	SB	SS	SS	SS	SS	SS	SS	SS	SS	SB	SB	SS
TOP DEPTH (FEET BGS)						0	2	0	0	0	0	0	0	0	0	2	4	0
BOTTOM DEPTH (FEET BGS)						2	4	2	2	2	2	2	2	2	2	4	6	2
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.041 U
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.041 U
ACENAPHTHENE	110	360	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.082 J
ACENAPHTHYLENE	110	360	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.061 J	0.038 U	0.041 U
ANTHRACENE	1160	1800	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.21
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.087	0.50	0.11	0.48
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.064	0.50	0.087	0.48
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.26	0.075 J	0.41
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.053 J	0.33	0.068 J	0.33
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11	0.52	0.11	0.44
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.042 J	0.2	0.05 J	0.17
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.039 J	0.26	0.041 J	0.17
CHRYSENE	24	16	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.044 J	0.3	0.083	0.41
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.071 J	0.038 UJ	0.049 J
FLUORANTHENE	1780	240	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.045 J	0.22	0.11	0.84
FLUORENE	108	240	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.099
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.14 J	0.038 UJ	0.13
NAPHTHALENE	0.011	3.8	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.041 U
PHENANTHRENE	260	180	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.032 J	0.068 J	0.7
PYRENE	260	180	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.36	0.15	0.62
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	0.944 UJ	0.949 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	0.03	0.68	17	11.83	12.5	5.37	6.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	3200	1500	330	211	115	110	62	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	380	16	10	0.93	NA	0.644	0.331 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	14	7.1	0.36	6.05	0.8	0.236 U	0.237 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	0.013	0.3	0.4	28.7	33	10.7	16.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	5.4	2.3	13	32.4	21.2	15.4 J	2.9 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	560	310	28	17.6	33.3	6.06	8.47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	280	400	11	27	19.6	9.28	6.23	**41**	22	23	**87**	27	**140**	**61**	**40**	NA	NA	21
MERCURY	0.66	2.3	0.013	0.077	0.18	0.0209 J	0.0349 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	520	150	38	22.1	29.6	14.3	10.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	10.4	39	0.52	0.81	1.07	0.59 U	0.593 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	16	39	4.2	0.13	0.14	0.236 U	0.122 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	1720	39	7.8	51.2	69.1	17.6	28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	7400	2300	46	65.6	83.3	27	29.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
Value exceeds HH, ECO, and Crane Background UTL
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Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB050	23SB053	23SB054	23SB055	23SB056	23SB058	23SB059		23SB062	23SB063			23SB064
SAMPLE ID						23SS050-0002	23SS053-0002	23SS054-0002	23SS055-0002	23SS056-0002	23SS058-0002	23SS059-0002	23SB059-0204	23SS062-0002	23SS063-0002	23SB063-0204	23SB063-0406	23SS064-0002
SAMPLE DATE						20140321	20140321	20140321	20140321	20140321	20140321	20140321	20140523	20140321	20140326	20140326	20140326	20140321
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SS	SS	SS	SS	SS	SS	SS	SB	SS	SS	SB	SB	SS
TOP DEPTH (FEET BGS)						0	0	0	0	0	0	0	2	0	0	2	4	0
BOTTOM DEPTH (FEET BGS)						2	2	2	2	2	2	2	4	2	2	4	6	2
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U	0.0044 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U	0.0044 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U
ACENAPHTHENE	110	360	20	NA	NA	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U	0.0044 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U
ACENAPHTHYLENE	110	360	20	NA	NA	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U	0.0044 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U
ANTHRACENE	1160	1800	29	NA	NA	0.037 UJ	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.043 J	0.0044 U	0.037 U	0.039 U	0.041 U	0.042 U	0.041 J
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	0.36	0.13	0.22	0.0077	0.22	0.0051	0.26	0.014	0.21	0.49	0.16	0.054	0.19
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	0.36	0.12	0.20	0.0053	0.20	0.0023	0.24	0.012	0.21	0.49	0.14	0.028	0.17
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	0.21 J	0.059 J	0.11	0.0042 J	0.068 J	0.0043 U	0.12	0.0044 U	0.045 J	0.28	0.081 J	0.042 U	0.07 J
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	0.23	0.088	0.16	0.0042 J	0.16	0.0023 J	0.18	0.01	0.09	0.34	0.11	0.024 J	0.14
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	0.44 J	0.17	0.22	0.0067 J	0.23	0.0043 U	0.35	0.017	0.17	0.56	0.16	0.043 J	0.21
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	0.15	0.091	0.17	0.0042 U	0.23	0.0043 U	0.16	0.0093	0.15	0.22	0.076 J	0.042 U	0.091
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	0.14 J	0.05 J	0.096	0.0043 J	0.071 J	0.0043 U	0.13	0.009	0.057 J	0.21	0.066 J	0.042 U	0.13
CHRYSENE	24	16	1.1	NA	NA	0.28 J	0.088	0.16	0.01	0.11	0.0043 U	0.2	0.009	0.07 J	0.35	0.1	0.042 U	0.14
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	0.058 J	0.035 U	0.039 U	0.0042 UJ	0.043 U	0.0043 U	0.039 U	0.0044 UJ	0.095	0.052 J	0.041 U	0.042 U	0.04 UJ
FLUORANTHENE	1780	240	29	NA	NA	0.36 J	0.079	0.16	0.057	0.092	0.0047 J	0.22	0.0044 U	0.083	0.28	0.074 J	0.042 U	0.17
FLUORENE	108	240	29	NA	NA	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U	0.0044 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	0.099	0.049 J	0.097	0.0042 UJ	0.1	0.0043 U	0.093	0.0044 UJ	0.063 J	0.14 J	0.042 J	0.042 U	0.054 J
NAPHTHALENE	0.011	3.8	1	NA	NA	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U	0.0044 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U
PHENANTHRENE	260	180	29	NA	NA	0.12	0.035 U	0.068 J	0.0071 J	0.043 U	0.0043 U	0.066 J	0.0056 J	0.038 J	0.058 J	0.041 U	0.042 U	0.067 J
PYRENE	260	180	1.1	NA	NA	0.32	0.084	0.15	0.011	0.087	0.0043 U	0.21	0.014	0.082	0.53 J	0.15 J	0.042 U	0.16
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	0.03	0.68	17	11.83	12.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	3200	1500	330	211	115	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	380	16	10	0.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	14	7.1	0.36	6.05	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	0.013	0.3	0.4	28.7	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	5.4	2.3	13	32.4	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	560	310	28	17.6	33.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	280	400	11	27	19.6	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MERCURY	0.66	2.3	0.013	0.077	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	520	150	38	22.1	29.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	10.4	39	0.52	0.81	1.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	16	39	4.2	0.13	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	1720	39	7.8	51.2	69.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	7400	2300	46	65.6	83.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
Value exceeds HH, ECO, and Crane Background UTL
Value exceeds Protection of GW, HH, ECO, and Crane Background UTL

Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB064		23SB066			23SB067		23SB068		23SB069			23SB070
SAMPLE ID						23SB064-0204	23SB064-0406	23SS066-0002	23SB066-0204	23SB066-0406	23SS067-0002	23SB067-0204	23SB068-0204	23SB068-0406	23SS069-0002	23SB069-0204	23SB069-0406	23SS070-0002
SAMPLE DATE						20140321	20140321	20140321	20140321	20140321	20140321	20140321	20140321	20140321	20140326	20140326	20140326	20140326
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX						SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SB	SB	SS	SB	SB	SS	SB	SB	SB	SS	SB	SB	SS
TOP DEPTH (FEET BGS)						2	4	0	2	4	0	2	2	4	0	2	4	0
BOTTOM DEPTH (FEET BGS)						4	6	2	4	6	2	4	4	6	2	4	6	2
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	0.038 UJ	0.039 UJ	0.041 U	0.042 UJ	0.0041 UJ	0.042 U	0.0043 U	0.07 UJ	0.37 J	0.034 U	0.0038 U	0.0039 U	2.5
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	0.038 UJ	0.039 UJ	0.041 U	0.042 UJ	0.0041 J	0.042 U	0.0043 U	0.073 J	0.5 J	0.034 U	0.0038 U	0.0039 U	6.8
ACENAPHTHENE	110	360	20	NA	NA	0.038 UJ	0.039 UJ	0.041 U	0.042 UJ	0.0041 UJ	0.042 U	0.0043 U	0.39 J	3.6 J	0.034 U	0.0038 U	0.0039 U	0.068 U
ACENAPHTHYLENE	110	360	20	NA	NA	0.038 UJ	0.039 UJ	0.041 U	0.042 UJ	0.0041 UJ	0.042 U	0.0043 U	1 J	0.59 J	0.034 U	0.0038 U	0.0039 U	0.068 U
ANTHRACENE	1160	1800	29	NA	NA	0.038 UJ	0.039 UJ	0.041 U	0.042 UJ	0.0041 UJ	0.042 J	0.0043 U	1.3 J	7.6 J	0.034 U	0.0038 U	0.0039 U	0.068 U
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	0.18	0.048	0.13	0.064	0.011	0.53	0.018	9.36	19.1	0.31	0.0038 U	0.0049	0.15
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	0.16	0.022	0.10	0.039	0.0085	0.53	0.015542	9.36	19.1	0.31	0.0038 U	0.00058	0.11
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	0.093 J	0.039 UJ	0.065 J	0.042 UJ	0.0046 J	0.25	0.0088	**5.7 J**	**17 J**	0.061 J	0.0038 U	0.0039 U	0.097
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	0.12 J	0.022 J	0.083 J	0.033 J	0.0062 J	0.37	0.012	**5.9 J**	**12 J**	0.19	0.0038 U	0.0039 U	0.088
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	0.21 J	0.039 UJ	0.13	0.055 J	0.01 J	0.65	0.019	**8.7 J**	**18 J**	0.23	0.0038 U	0.0052 J	0.12 J
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	0.1 J	0.039 UJ	0.045 J	0.042 UJ	0.012 J	0.23	0.011	4.5 J	7.6 J	0.34	0.0038 U	0.0039 U	0.068 U
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	0.078 J	0.039 UJ	0.042 J	0.042 UJ	0.0041 UJ	0.22 J	0.0068 J	**3.9 J**	**7.2 J**	0.079	0.0038 U	0.0051 J	0.068 U
CHRYSENE	24	16	1.1	NA	NA	0.1 J	0.039 UJ	0.1	0.042 UJ	0.0068 J	0.42 J	0.014	5.7 J	16 J	0.098	0.0038 U	0.0099	0.11
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	0.038 UJ	0.039 UJ	0.041 U	0.042 UJ	0.0041 UJ	0.055 J	0.0043 U	**1.5 J**	**2.6 J**	0.075	0.0038 U	0.0039 U	0.068 U
FLUORANTHENE	1780	240	29	NA	NA	0.1 J	0.039 UJ	0.21	0.064 J	0.012 J	0.85 J	0.031	7.5 J	33 J	0.04 J	0.0038 U	0.0039 UJ	0.15
FLUORENE	108	240	29	NA	NA	0.038 UJ	0.039 UJ	0.041 U	0.042 UJ	0.0041 UJ	0.042 U	0.0043 U	0.55 J	5 J	0.034 U	0.0038 U	0.0039 U	0.068 U
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	0.085 J	0.039 UJ	0.041 U	0.042 UJ	0.0084 J	0.12	0.0068 J	**4.8 J**	**8.9 J**	0.14 J	0.0038 UJ	0.0039 U	0.068 U
NAPHTHALENE	0.011	3.8	1	NA	NA	0.038 UJ	0.039 UJ	0.041 U	0.042 UJ	0.0045 J	0.042 U	0.0043 U	0.12 J	0.54 J	0.034 U	0.0038 U	0.0039 U	0.95
PHENANTHRENE	260	180	29	NA	NA	0.032 J	0.039 UJ	0.12	0.032 J	0.0086 J	0.41 J	0.017	3.5 J	31 J	0.034 U	0.0038 U	0.0058 J	0.16
PYRENE	260	180	1.1	NA	NA	0.13 J	0.039 UJ	0.2	0.066 J	0.013 J	0.65	0.024	7 J	25 J	0.11 J	0.0038 UJ	0.0039 U	0.068 U
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	0.03	0.68	17	11.83	12.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	3200	1500	330	211	115	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	380	16	10	0.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	14	7.1	0.36	6.05	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	0.013	0.3	0.4	28.7	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	5.4	2.3	13	32.4	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	560	310	28	17.6	33.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	280	400	11	27	19.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MERCURY	0.66	2.3	0.013	0.077	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	520	150	38	22.1	29.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	10.4	39	0.52	0.81	1.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	16	39	4.2	0.13	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	1720	39	7.8	51.2	69.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	7400	2300	46	65.6	83.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
Value exceeds HH, ECO, and Crane Background UTL
Value exceeds Protection of GW, HH, ECO, and Crane Background UTL

Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB070		23SB071		23SB072			23SB073			23SB074		
SAMPLE ID						23SB070-0204	23SB070-0406	23SB071-0204	23SB071-0406	23SS072-0002	23SB072-0204	23SB072-0406	23SS073-0002	23SB073-0204	23SB073-0406	23SS074-0002	23SB074-0204	23SB074-0406
SAMPLE DATE						20140326	20140326	20140326	20140326	20140326	20140326	20140326	20140326	20140523	20140523	20140326	20140326	20140326
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SB	SB	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB
TOP DEPTH (FEET BGS)						2	4	2	4	0	2	4	0	2	4	0	2	4
BOTTOM DEPTH (FEET BGS)						4	6	4	6	2	4	6	2	4	6	2	4	6
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	0.0039 U	0.0049 U	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	0.0039 U	0.0049 U	0.038 U	0.047 J	0.037 U	0.038 U	0.0041 U	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U
ACENAPHTHENE	110	360	20	NA	NA	0.0039 U	0.0049 U	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U
ACENAPHTHYLENE	110	360	20	NA	NA	0.0039 U	0.0049 U	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U	0.0041 J	0.039 U	0.036 U	0.0077	0.039 U	0.039 U
ANTHRACENE	1160	1800	29	NA	NA	0.0039 U	0.0049 U	0.038 U	0.039 U	0.051 J	0.038 U	0.0041 U	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	0.0039 U	0.0049 U	0.15	0.039 U	0.82	0.060	0.0041 U	0.082	0.074	0.078	0.11	0.043	0.039 U
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	0.0039 U	0.0049 U	0.13	0.039 U	0.82	0.037	0.0041 U	0.082	0.053	0.058	0.11	0.017	0.039 U
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	0.0039 U	0.0049 U	0.11	0.039 U	0.33	0.038 U	0.0041 U	0.041	0.039 U	0.044 J	0.048	0.039 U	0.039 U
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	0.0039 U	0.0049 U	0.099	0.039 U	0.54	0.032 J	0.0041 U	0.056	0.04 J	0.046 J	0.079	0.017 J	0.039 U
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	0.0039 U	0.0049 U	0.17	0.039 U	0.95	0.048 J	0.0041 U	0.087	0.08	0.073 J	0.16	0.039 U	0.039 U
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	0.0039 U	0.0049 U	0.052 J	0.039 U	0.55	0.038 U	0.0041 U	0.046	0.054 J	0.041 J	0.074	0.039 U	0.039 U
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	0.0039 U	0.0049 U	0.046 J	0.039 U	0.28	0.038 U	0.0041 U	0.035	0.039 U	0.033 J	0.043	0.039 U	0.039 U
CHRYSENE	24	16	1.1	NA	NA	0.0039 U	0.0049 U	0.11	0.039 U	0.59	0.04 J	0.0041 U	0.058	0.039 J	0.054 J	0.088	0.039 U	0.039 U
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	0.0039 U	0.0049 U	0.038 U	0.039 U	0.12	0.038 U	0.0041 U	0.01	0.039 U	0.036 UJ	0.0084	0.039 U	0.039 U
FLUORANTHENE	1780	240	29	NA	NA	0.0039 UJ	0.0049 UJ	0.15	0.039 UJ	0.25	0.07 J	0.0041 UJ	0.058	0.052 J	0.052 J	0.069	0.039 U	0.039 U
FLUORENE	108	240	29	NA	NA	0.0039 U	0.0049 U	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	0.0039 U	0.0049 U	0.038 UJ	0.039 U	0.29 J	0.038 U	0.0041 U	0.028 J	0.047 J	0.036 UJ	0.046 J	0.039 U	0.039 UJ
NAPHTHALENE	0.011	3.8	1	NA	NA	0.0039 U	0.0049 U	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U
PHENANTHRENE	260	180	29	NA	NA	0.0039 U	0.0049 U	0.12	0.039 U	0.072 J	0.034 J	0.0041 U	0.017	0.039 U	0.036 U	0.013	0.039 U	0.039 U
PYRENE	260	180	1.1	NA	NA	0.0039 U	0.0049 U	0.23 J	0.039 U	0.53 J	0.072 J	0.0041 U	0.097 J	0.058 J	0.081	0.12 J	0.039 U	0.039 UJ
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	0.03	0.68	17	11.83	12.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	3200	1500	330	211	115	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	380	16	10	0.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	14	7.1	0.36	6.05	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	0.013	0.3	0.4	28.7	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	5.4	2.3	13	32.4	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	560	310	28	17.6	33.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	280	400	11	27	19.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MERCURY	0.66	2.3	0.013	0.077	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	520	150	38	22.1	29.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	10.4	39	0.52	0.81	1.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	16	39	4.2	0.13	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	1720	39	7.8	51.2	69.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	7400	2300	46	65.6	83.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
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Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB075			23SB076		23SB077	23SB078	23SB079	23SB080	23SB081	23SB082	23SB083	
SAMPLE ID						23SS075-0002	23SB075-0204	23SB075-0406	23SS076-0002	23SB076-0203	23SS077-0002	23SS078-0001	23SS079-0002	23SS080-0002	23SS081-0002	23SS082-0002	23SS083-0002	23SB083-0204
SAMPLE DATE						20140326	20140326	20140326	20140417	20140417	20140417	20140417	20140417	20140417	20140417	20140523	20140523	20140523
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SS	SB	SB	SS	SB	SS	SS	SS	SS	SS	SS	SS	SB
TOP DEPTH (FEET BGS)						0	2	4	0	2	0	0	0	0	0	0	0	2
BOTTOM DEPTH (FEET BGS)						2	4	6	2	3	2	1	2	2	2	2	2	4
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHENE	110	360	20	NA	NA	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	110	360	20	NA	NA	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	1160	1800	29	NA	NA	0.0038 U	0.036 J	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	0.0038 U	0.18	0.048	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	0.0038 U	0.16	0.048	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	0.0038 U	0.12	0.033	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	0.0038 U	0.12	0.031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	0.0038 U	0.21	0.045	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	0.0038 U	0.088	0.018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	0.0038 U	0.08	0.018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	24	16	1.1	NA	NA	0.0038 U	0.14	0.033	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	0.0038 U	0.036 U	0.0077 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	1780	240	29	NA	NA	0.0038 UJ	0.22	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORENE	108	240	29	NA	NA	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	0.0038 U	0.077 J	0.012 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	0.011	3.8	1	NA	NA	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	260	180	29	NA	NA	0.0038 U	0.15	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PYRENE	260	180	1.1	NA	NA	0.0038 U	0.3 J	0.041 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	0.03	0.68	17	11.83	12.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	3200	1500	330	211	115	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	380	16	10	0.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	14	7.1	0.36	6.05	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	0.013	0.3	0.4	28.7	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	5.4	2.3	13	32.4	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	560	310	28	17.6	33.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	280	400	11	27	19.6	NA	NA	NA	**59**	15	**58**	**29**	19	12	21	**41**	**54**	24
MERCURY	0.66	2.3	0.013	0.077	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	520	150	38	22.1	29.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	10.4	39	0.52	0.81	1.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	16	39	4.2	0.13	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	1720	39	7.8	51.2	69.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	7400	2300	46	65.6	83.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
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Value exceeds ECO and Crane Background UTL
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Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB083	23SB084		23SB086			23SB087		23SB088			23SB089	
SAMPLE ID						23SB083-0406	23SB084-0204	23SB084-0406	23SS086-0002	23SB086-0204	23SB086-0406	23SB087-0204	23SB087-0406	23SS088-0002	23SB088-0204	23SB088-0406	23SS089-0002	23SB089-0204
SAMPLE DATE						20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523
SAMPLE CODE						ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX						SB	SB	SB	SS	SB	SB	SB	SB	SS	SB	SB	SS	SB
TOP DEPTH (FEET BGS)						4	2	4	0	2	4	2	4	0	2	4	0	2
BOTTOM DEPTH (FEET BGS)						6	4	6	2	4	6	4	6	2	4	6	2	4
VOLATILES (MG/KG)																		
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHENE	110	360	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	110	360	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	1160	1800	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	24	16	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	1780	240	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORENE	108	240	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	0.011	3.8	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	260	180	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PYRENE	260	180	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	7	3.1	0.27	6.9	40.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	0.03	0.68	17	11.83	12.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	3200	1500	330	211	115	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	380	16	10	0.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	14	7.1	0.36	6.05	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	0.013	0.3	0.4	28.7	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	5.4	2.3	13	32.4	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	560	310	28	17.6	33.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	280	400	11	27	19.6	22 J	13	14	14	12	4.9	18 J	14 J	11	29 J	14 J	15 J	13 J
MERCURY	0.66	2.3	0.013	0.077	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	520	150	38	22.1	29.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	10.4	39	0.52	0.81	1.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	16	39	4.2	0.13	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	1720	39	7.8	51.2	69.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	7400	2300	46	65.6	83.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DRO (C08-C28)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
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Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-6

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SOIL SAMPLE - POST_EXCAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	Risk Assessment Screening Level			Crane Background UTL		23SB089	23SB090		23SB091			23SB092			23SB093	23SB094
SAMPLE ID						23SB089-0406	23SB090-0204	23SB090-0406	23SS091-0002	23SB091-0204	23SB091-0406	23SS092-0002	23SB092-0204	23SB092-0406	23SB093C	23SB094C
SAMPLE DATE						20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20141209	20141209
SAMPLE CODE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	Protection of Groundwater	HH	ECO (surface soil only)	Soil Group 3, Surface Soil	Soil Group 8, Subsurface Soil	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE						NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	COMPOSITE	COMPOSITE
SUBMATRIX						SB	SB	SB	SS	SB	SB	SS	SB	SB	NA	NA
TOP DEPTH (FEET BGS)						4	2	4	0	2	4	0	2	4	NA	NA
BOTTOM DEPTH (FEET BGS)						6	4	6	2	4	6	2	4	6	NA	NA
VOLATILES (MG/KG)																
1,2-DICHLOROETHANE	0.00096	0.46	0.85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	24	2700	89.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	58	6100	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	0.0046	1.2	0.255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	4.8	77	0.0941	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	0.00122	0.32	1.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.22	16	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.0582	35	4.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.102	8.1	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	15.2	490	5.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.0000124	0.0074	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00013	0.059	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																
1-METHYLNAPHTHALENE	0.12	18	29	NA	NA	NA	0.035 U	0.038 U	0.036 U	0.036 U	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA
2-METHYLNAPHTHALENE	3.8	24	29	NA	NA	NA	0.035 U	0.038 U	0.036 U	0.036 U	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA
ACENAPHTHENE	110	360	20	NA	NA	NA	0.035 U	0.038 U	0.15	0.036 U	0.037 U	0.0038 U	0.0046 J	0.004 U	NA	NA
ACENAPHTHYLENE	110	360	20	NA	NA	NA	0.06 J	0.038 U	0.036 U	0.036 U	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA
ANTHRACENE	1160	1800	29	NA	NA	NA	0.058 J	0.038 U	0.37	0.082	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA
BENZO(A)PYRENE EQUIVALENTS-HALFND	0.08	0.016	NC	NA	NA	NA	0.55	0.044	1.49	0.30	0.037 U	0.0049	0.0048	0.004 U	NA	NA
BENZO(A)PYRENE EQUIVALENTS -POS	0.08	0.016	NC	NA	NA	NA	0.55	0.000078	1.49	0.28	0.037 U	0.00087	0.00044	0.004 U	NA	NA
BENZO(A)ANTHRACENE	0.085	0.16	0.8	NA	NA	NA	0.28	0.038 U	0.99	0.22	0.037 U	0.0041 J	0.004 U	0.004 U	NA	NA
BENZO(A)PYRENE	0.08	0.016	1.1	NA	NA	NA	0.36	0.038 U	0.97	0.22	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA
BENZO(B)FLUORANTHENE	0.82	0.16	1.1	NA	NA	NA	0.58	0.038 U	1.3	0.24	0.037 U	0.0043 J	0.004 J	0.004 U	NA	NA
BENZO(G,H,I)PERYLENE	260	180	1.1	NA	NA	NA	0.23	0.038 U	0.71	0.21	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA
BENZO(K)FLUORANTHENE	8	1.6	1.1	NA	NA	NA	0.26	0.038 U	0.63	0.18	0.037 U	0.0024 J	0.0037 J	0.004 U	NA	NA
CHRYSENE	24	16	1.1	NA	NA	NA	0.37	0.078	1	0.26	0.037 U	0.0041 J	0.0043 J	0.004 U	NA	NA
DIBENZO(A,H)ANTHRACENE	0.26	0.016	1.1	NA	NA	NA	0.085 J	0.038 UJ	0.23	0.036 U	0.037 U	0.0038 UJ	0.004 UJ	0.004 UJ	NA	NA
FLUORANTHENE	1780	240	29	NA	NA	NA	0.48	0.053 J	1.9	0.4	0.037 U	0.006 J	0.004 U	0.004 U	NA	NA
FLUORENE	108	240	29	NA	NA	NA	0.035 U	0.038 U	0.17	0.036 U	0.037 U	0.0038 U	0.0046 J	0.004 U	NA	NA
INDENO(1,2,3-CD)PYRENE	2.6	0.16	1.1	NA	NA	NA	0.17 J	0.038 UJ	0.5	0.15	0.037 U	0.0038 UJ	0.004 UJ	0.004 UJ	NA	NA
NAPHTHALENE	0.011	3.8	1	NA	NA	NA	0.035 U	0.038 U	0.036 U	0.036 U	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA
PHENANTHRENE	260	180	29	NA	NA	NA	0.073	0.038 U	1.4	0.28	0.037 U	0.0044 J	0.0048 J	0.0032 J	NA	NA
PYRENE	260	180	1.1	NA	NA	NA	0.71	0.095	2 J	0.45 J	0.037 UJ	0.0081	0.004 U	0.004 U	NA	NA
PESTICIDES/PCBS (MG/KG)																
AROCLOR-1254	0.04	0.12	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.11	0.24	0.000332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																
ANTIMONY	7	3.1	0.27	6.9	40.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	0.03	0.68	17	11.83	12.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	3200	1500	330	211	115	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	380	16	10	0.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	14	7.1	0.36	6.05	0.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	0.013	0.3	0.4	28.7	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	5.4	2.3	13	32.4	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	560	310	28	17.6	33.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	280	400	11	27	19.6	13 J	NA	NA	NA	NA	NA	12	14	11	22	18
MERCURY	0.66	2.3	0.013	0.077	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	520	150	38	22.1	29.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	10.4	39	0.52	0.81	1.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	16	39	4.2	0.13	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	1720	39	7.8	51.2	69.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	7400	2300	46	65.6	83.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																
DRO (C08-C28)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DRO (C08-C34)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Value exceeds Protection of GW and Crane Background UTL
Value exceeds HH and Crane Background UTL
Value exceeds ECO and Crane Background UTL
Value exceeds Protection of GW, HH, and Crane Background UTL
Value exceeds Protection of GW, ECO, and Crane Background UTL
Value exceeds HH, ECO, and Crane Background UTL
Value exceeds Protection of GW, HH, ECO, and Crane Background UTL

Abbreviations:

bgs - Below ground surface
DRO - Diesel range organics
ECO - Ecological risk assessment screening level
GW - Groundwater
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
ND - Not detected
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an es
UTL - 95-percent upper tolerance limit with 95-percent coverage of the population represented by the

TABLE 2-7

SUMMARY STATISTICS FOR CHEMICALS DETECTED IN DRAINEWAY SEDIMENT
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemcial	Frequency of Detection	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Location of Maximum Detection	Sample with Maximum Detection	Range of Non-Detects (mg/kg)	Average of Detections (mg/kg)	Overall Average (mg/kg)	Standard Deviation
Volatile Organic Compounds									
Trichloroethene	1/7	0.00124 J	0.00124 J	23SW/SD009	23SD009-0006	0.13 - 0.43	0.00124	0.138	0.08
Polycyclic Aromatic Hydrocarbons									
2-Methylnaphthalene	1/7	0.00834	0.00834	23SW/SD004	23SD004-0006	0.00418 - 0.0347	0.00830	0.0162	0.01
Acenaphthylene	1/7	0.00685 J	0.00685 J	23SW/SD006	23SD006-0006	0.00392 - 0.0392	0.00685	0.0160	0.01
Benzo(a)pyrene	5/7	0.00604 J	0.255	23SW/SD006	23SD006-0006	0.0187 - 0.0392	0.0623	0.0591	0.89
Benzo(b)fluoranthene	6/7	0.00583 J	0.254	23SW/SD006	23SD006-0006	0.0187 - 0.0392	0.0741	0.0662	0.09
Benzo(g,h,i)perylene	4/7	0.00998	0.185	23SW/SD006	23SD006-0006	0.00424 - 0.0392	0.0792	0.0516	0.06
Benzo(k)fluoranthene	4/7	0.00476 J	0.141	23SW/SD006	23SD006-0006	0.0187 - 0.0392	0.0582	0.0421	0.05
Chrysene	3/7	0.00854	0.0989	23SW/SD001	23SD001-0006	0.00418 - 0.0216	0.0457	0.0266	0.03
Dibenzo(a,h)anthracene	1/7	0.0884	0.0884	23SW/SD006	23SD006-0006	0.00392 - 0.0392	0.0884	0.0276	0.03
Fluoranthene	6/7	0.0084	0.101	23SW/SD001	23SD001-0006	0.0187 - 0.0187	0.0322	0.0303	0.03
Indeno(1,2,3-cd)pyrene	5/7	0.00492 J	0.164	23SW/SD006	23SD006-0006	0.0187 - 0.0216	0.0527	0.0434	0.06
Phenanthrene	1/7	0.012	0.012	23SW/SD004	23SD004-0006	0.00418 - 0.0347	0.0120	0.0167	0.01
Pyrene	6/7	0.00948	0.0929	23SW/SD001	23SD001-0006	0.0187 - 0.0187	0.0407	0.0375	0.03
Polychlorinated Biphenyls									
Aroclor-1254	1/6	0.00298 J	0.00298 J	23SW/SD005	23SD005-0006	0.00203 - 0.00341	0.00298	0.00250	0.0006
Aroclor-1260	5/6	0.00224 J	0.0108 J	23SW/SD002	23SD002-0006	0.00217 - 0.00217	0.00650	0.00580	0.004
Metals									
Arsenic	7/7	4.59	12.3	23SW/SD003	23SD003-0006	-	8.60	8.60	3.0
Barium	7/7	20.9	219	23SW/SD001	23SD001-0006	-	84.6	84.6	71
Beryllium	7/7	0.46	1.48 J	23SW/SD004	23SD004-0006	-	0.850	0.850	0.39
Cadmium	2/7	0.478 J	0.76 J	23SW/SD001	23SD001-0006	0.586 - 0.684	0.620	0.640	0.09
Chromium	7/7	9.63	35.2	23SW/SD004	23SD004-0006	-	20.0	20.0	8.5
Cobalt	7/7	4.65	62	23SW/SD003	23SD003-0006	-	22.1	22.1	24
Copper	7/7	6.1	34.4	23SW/SD001	23SD001-0006	-	14.3	14.3	10
Lead	7/7	9.19	52.3	23SW/SD001	23SD001-0006	-	29.8	29.8	13
Mercury	7/7	0.0171 J	0.14	23SW/SD001	23SD001-0006	-	0.0523	0.0523	0.04
Nickel	7/7	17.4	48.1	23SW/SD004	23SD004-0006	-	27.1	27.1	11
Silver	1/7	0.959 J	0.959 J	23SW/SD002	23SD002-0006	0.586 - 1.1	0.959	0.753	0.20
Vanadium	7/7	9.1	35.2	23SW/SD001	23SD001-0006	-	22.5	22.5	10
Zinc	7/7	42.1	207	23SW/SD001	23SD001-0006	-	85.8	85.8	57
Miscellaneous Parameters									
Total Organic Carbon	6/6	4710	46200	23SW/SD001	23SD001-0006	-	21190	21190	14760

Abbreviations:
J - Estimated concentration
mg/kg - Milligram per kilogram

Notes:
Results for 23SW/SD008 is not included in this table because the sample was collected from the oil/water separator at the site.

TABLE 2-8

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SEDIMENT SAMPLE
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

				Drainageway Sediment								O/WS Sediment
LOCATION	Risk Assessment Screening Level		Crane Surface Soil Group 3 Background UTL[1]	23SW/SD001	23SW/SD002	23SW/SD003	23SW/SD004	23SW/SD005	23SW/SD006	23SW/SD009	23SW/SD008	23SW/SD009
SAMPLE ID				23SD001-0006	23SD002-0006	23SD003-0006	23SD004-0006	23SD005-0006	23SD006-0006	23SD009-0006	23SD008-0006	23SD009-0006
SAMPLE DATE				20121008	20121008	20121008	20121008	20121008	20121008	20130519	20121008	20130519
SAMPLE CODE	HH	ECO		ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	ORIG
TOP DEPTH (FEET BGS)				0	0	0	0	0	0	0	0	0
BOTTOM DEPTH (FEET BGS)				0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5
Volatile Organic Compounds (mg/kg)												
Ethylbenzene	5.8	0.175	NA	0.276 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.00196 U	**4.76 J**	0.00196 U
Toluene	490	1.22	NA	0.276 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.00196 U	**2.64 J**	0.00196 U
Total Xylenes	65	0.433	NA	0.828 UJ	0.443 UJ	0.39 UJ	0.396 UJ	0.407 UJ	0.418 UJ	0.00587 U	**30.5 J**	0.00587 U
Trichloroethene	0.41	0.112	NA	0.276 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.00124 J	0.43 UJ	0.00124 J
Polycyclic Aromatic Compounds (mg/kg)												
2-Methylnaphthalene	24	0.0202	NA	0.0347 U	0.0217 U	0.00424 U	0.00834	0.0216 U	0.00418 U	0.0187 U	**26.5**	0.0187 U
Acenaphthene	360	0.00671	NA	0.0347 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00418 U	0.0187 U	**1.54**	0.0187 U
Acenaphthylene	360	0.00587	NA	0.0347 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	**0.00685 J**	0.0187 U	0.0392 U	0.0187 U
Benzo(a)anthracene	0.16	0.108	NA	0.0347 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00418 U	0.0187 U	**0.61**	0.0187 U
Benzo(a)pyrene	0.016	0.15	NA	**0.0734**	**0.0303 J**	0.00604 J	0.00889	0.0216 U	**0.255**	0.0187 U	0.0392 U	0.0187 U
Benzo(b)fluoranthene	0.16	10.4	NA	0.114	0.0399 J	0.00583 J	0.00846	0.0226 J	**0.254**	0.0187 U	0.0392 U	0.0187 U
Benzo(g,h,i)perylene	180	0.17	NA	0.0858	0.036 J	0.00424 U	0.00998	0.0216 U	**0.185**	0.0187 U	0.0392 U	0.0187 U
Benzo(k)fluoranthene	1.6	0.24	NA	0.082	0.0217 U	0.00493 J	0.00476 J	0.0216 U	0.141	0.0187 U	0.0392 U	0.0187 U
Chrysene	16	0.166	NA	0.0989	0.0297 J	0.00424 U	0.00854	0.0216 U	0.00418 U	0.0187 U	**0.962**	0.0187 U
Dibenzo(a,h)anthracene	0.016	0.033	NA	0.0347 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	**0.0884**	0.0187 U	0.0392 U	0.0187 U
Fluoranthene	240	0.423	NA	0.101	0.04 J	0.0119	0.00901	0.0231 J	0.0084	0.0187 U	**1.5**	0.0187 U
Indeno(1,2,3-cd)pyrene	0.16	0.2	NA	0.0634 J	0.0257 J	0.00492 J	0.00526 J	0.0216 U	**0.164**	0.0187 U	**0.23**	0.0187 U
Naphthalene	3.8	0.176	NA	0.0347 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00418 U	0.0187 U	**12.2**	0.0187 U
Phenanthrene	180	0.204	NA	0.0347 U	0.0217 U	0.00424 U	0.012	0.0216 U	0.00418 U	0.0187 U	**4.24**	0.0187 U
Pyrene	180	0.195	NA	0.0929	0.0397 J	0.00948	0.0157	0.0234 J	0.0628	0.0187 U	**2.56**	0.0187 U
Polychlorinated Biphenyls (mg/kg)												
Aroclor-1254	0.12	0.0598	NA	0.00341 UJ	0.00208 UJ	0.00209 UJ	0.00203 UJ	0.00298 J	0.00217 UJ	NA	0.00974 J	NA
Aroclor-1260	0.24	0.0598	NA	0.0105 J	0.0108 J	0.0063 J	0.00264 J	0.00224 J	0.00217 UJ	NA	0.00386 UJ	NA
Metals (mg/kg)												
Antimony	3.1	2	6.9	4.42 U	2.58 U	2.74 U	2.52 U	2.66 U	2.59 U	2.34 UJ	**12.4**	2.34 UJ
Arsenic	0.68	9.79	11.83	**9.84**	**7.16**	**12.3**	**12.2**	**4.59**	**8.22**	**5.88**	**8.24**	**5.88**
Barium	1500	48	211	**219**	**79.8**	**108**	**112**	20.9	25.3	27.3	**2290**	27.3
Beryllium	16	NC	0.93	0.766 J	0.7 J	1.32 J	1.48 J	0.526 J	0.672 J	0.46	1.27 U	0.46
Cadmium	7.1	0.99	6.05	0.76 J	0.478 J	0.684 U	0.629 U	0.665 U	0.648 U	0.586 U	**29.7**	0.586 U
Chromium	0.3	43.4	28.7	**22**	**20.5**	**24.2**	**35.2**	**9.63**	**15.2**	**13.3 J**	**79.4**	**13.3 J**
Cobalt	2.3	50	32.4	**12.2**	**12.7**	**62**	**52.4**	**5.11**	**4.65**	**5.55**	**10.4**	**5.55**
Copper	310	31.6	17.6	**34.4**	14.1	13.8	17.5	6.1	7.21	7.2	**553**	7.2
Lead	400	35.8	27	**52.3**	32.6	28.1	28.4	29.8	9.19	28.3 J	**287**	28.3 J
Mercury	2.3	0.174	0.077	0.14	0.0526	0.0578	0.0385 J	0.0196 J	0.0406 J	0.0171 J	**0.211**	0.0171 J
Nickel	150	22.7	22.1	18.3	17.4	**35.7**	**48.1**	19.5	**24.5**	**25.9**	**34.4**	**25.9**
Silver	39	0.5	0.13	1.1 U	**0.959 J**	0.684 U	0.629 U	0.665 U	0.648 U	0.586 U	**9.08**	0.586 U
Vanadium	39	NC	51.2	35.2	19.8	26.1	33.9	9.1	17.8	15.6	15	15.6
Zinc	2300	121	65.6	**207**	67.2	80	103	42.1	47.6	53.8	**1940**	53.8
Miscellaneous Parameters (mg/kg)												
Total Organic Carbon	NA	NA	NA	46200	26300	24200	9830	4710	15900	NA	89300	NA
Petroleum Hydrocarbons (mg/kg)												
Gasoline Range Organics	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	504	NA

Notes:

Value exceeds HH only
Value exceeds ECO only
Value exceeds HH and ECO

Foonotes:

1 - NSA Crane background UTL for surface soil is used for comparison purposes because flow in the drainageways is intermittent and conditions may be similar to surface soil.

Abbreviations:

bgs - Below ground surface
ECO - Ecological risk assessment screening level
J - Estimated concentration
HH - Human health risk assessment screening level
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an estimated value
UTL - Upper tolerance limit

TABLE 2-9

SUMMARY STATISTICS FOR CHEMICALS DETECTED IN SURFACE WATER
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Minimum Detection	Maximum Detection	Location of Maximum Detection	Sample with Maximum Detection	Range of Non-Detects	Average of Detections	Overall Average	Standard Deviation
Total Metals (µg/L)									
Arsenic	1/6	2.16 J	2.16 J	23SW/SD001	23SW001	1.5	2.16	0.985	0.58
Barium	6/6	39	144	23SW/SD001	23SW001	-	63.2	63.2	40
Chromium	3/6	0.56 J	3.21 J	23SW/SD001	23SW001	1	1.48	0.992	1.1
Cobalt	1/6	3.44	3.44	23SW/SD001	23SW001	2.5	3.44	1.62	0.89
Copper	4/6	1.26 J	10.7	23SW/SD001	23SW001	2	3.77	2.84	3.9
Lead	3/6	0.685 J	16.3	23SW/SD001	23SW001	0.75	5.93	3.15	6.4
Nickel	6/6	1.08 J	12.8	23SW/SD006	23SW006	-	4.48	4.48	4.4
Vanadium	1/6	7.29 J	7.29 J	23SW/SD001	23SW001	2.5	7.29	2.26	2.5
Zinc	6/6	1.31 J	62.6 J	23SW/SD001	23SW001	-	14.7	14.7	24
Dissolved Metals (µg/L)									
Barium	6/6	38.9	73	23SW/SD001	23SW001	-	50.6	50.6	12
Copper	3/6	1.42 J	2.46 J	23SW/SD004	23SW004	2	1.83	1.41	0.57
Nickel	6/6	0.907 J	12.2	23SW/SD006	23SW006	-	3.88	3.88	4.4
Zinc	5/6	1.82 J	14	23SW/SD006	23SW006	2.5	5.54	4.82	4.7
Miscellaneous Parameters (mg/L)									
Hardness as $CaCO_3$	6/6	162	321	23SW/SD005	23SW005	-	238	238	60

Notes:
$CaCO_3$ - Calcium carbonate
J - Estimated concentration
mg/L - Milligram per liter
µg/L - Microgram per liter

TABLE 2-10

RESULTS FOR CHEMICALS DETECTED IN AT LEAST ONE SURFACE WATER SAMPLE
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE	**Risk Assessment Screening Level**		**23SW/SD001** **23SW001** **20121008** **ORIG**	**23SW/SD002** **23SW002** **20121008** **NORMAL**	**23SW/SD003** **23SW003** **20121008** **NORMAL**	**23SW/SD004** **23SW004** **20121008** **NORMAL**	**23SW/SD005** **23SW005** **20121008** **NORMAL**	**23SW/SD006** **23SW006** **20121008** **NORMAL**
	HH	**ECO**						
Total Metals (µg/L)								
Arsenic	0.052	150	**2.16 J**	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Barium	380	220	144	56.4	47.8	47.9	43.9	39
Chromium	0.035	11	**3.21 J**	1 UJ	**0.56 J**	**0.681 J**	1 UJ	1 UJ
Cobalt	0.6	24	**3.44**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Copper	80	9	**10.7**	1.79 J	1.31 J	1.26 J	2 U	2 U
Lead	15	2.5	**16.3**	0.75 U	0.75 U	0.685 J	0.814	0.75 U
Nickel	39	52	4.26	1.25 J	1.08 J	2.59	4.9	12.8
Vanadium	8.6	12	7.29 J	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
Zinc	600	120	62.6 J	1.93 J	1.31 J	2.87 J	6.37 J	13.3 J
Dissolved Metals (µg/L)								
Barium	380	220	73	54.4	47.8	47.4	42	38.9
Copper	80	9	1.42 J	1.6 J	2 U	2.46 J	2 U	2 U
Nickel	39	52	0.907 J	1.06 J	0.959 J	3.92	4.25	12.2
Zinc	600	120	1.82 J	2.5 J	2.5 U	4.75 J	4.62 J	14
Miscellaneous Parameters (mg/L)								
Hardness as $CaCO_3$	NA	NA	228	193	162	226	321	295

Notes:

Value exceeds HH only

Value exceeds ECO only

Value exceeds HH and ECO

Abbreviations:

$CaCO_3$ - Calcium carbonate
ECO - Ecological risk assessment screening level
J - Estimated concentration
HH - Human health risk assessment screening level
ID - Identifier
mg/L - Milligram per liter
NA - Not available/not analyzed
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an estimated value
µg/L - Microgram per liter

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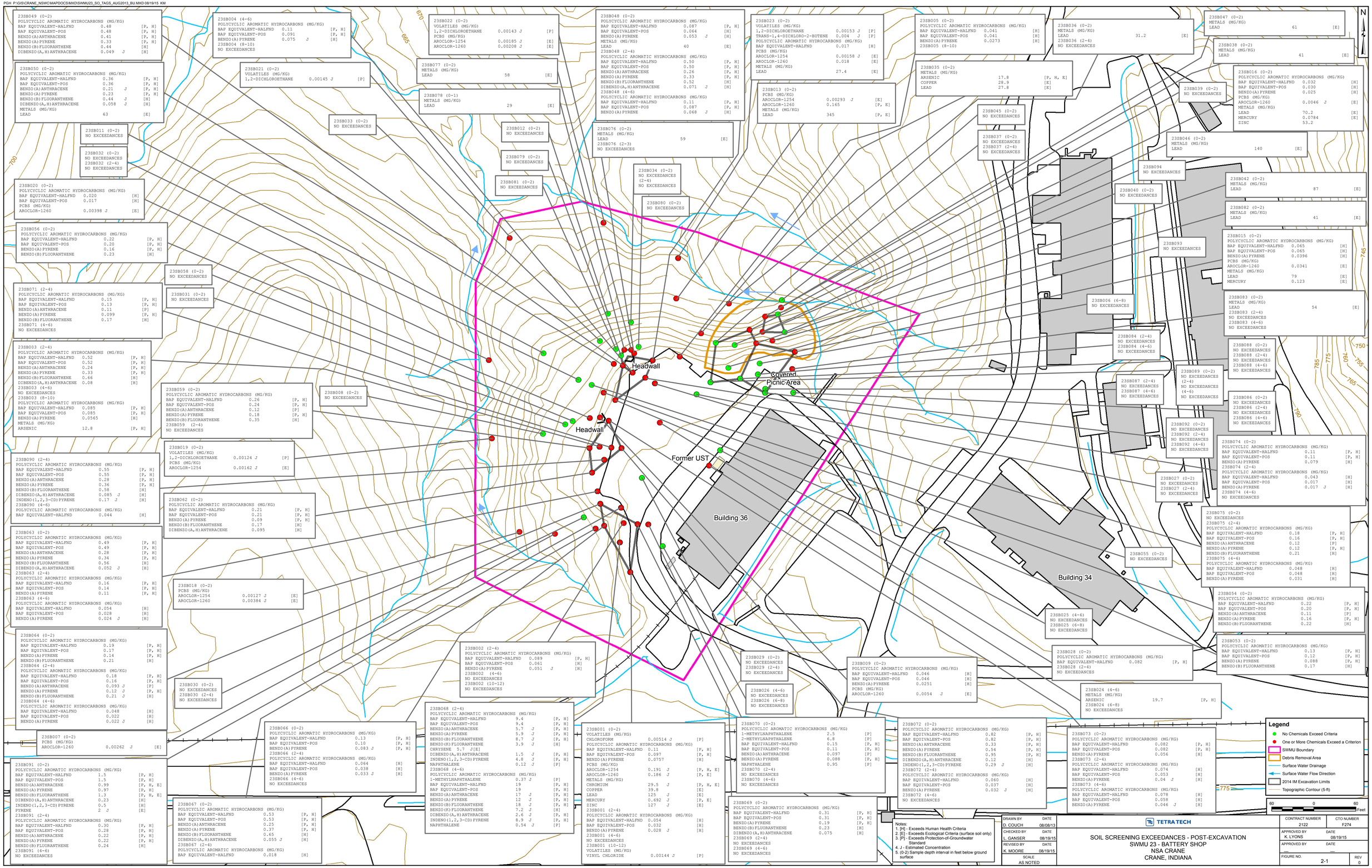

Notes:
1. [H] - Exceeds Human Health Criteria
2. [E] - Exceeds Ecological Criteria (surface soil only)
3. [P] - Exceeds Protection-of-Groundwater Standard
4. J - Estimated Concentration
5. (0-2) Sample depth interval in feet below ground surface

DRAWN BY D. COUCH	DATE 08/08/13	TETRA TECH
CHECKED BY L. GANSER	DATE 08/19/15	SOIL SCREENING EXCEEDANCES - POST-EXCAVATION SWMU 23 - BATTERY SHOP NSA CRANE CRANE, INDIANA
REVISED BY K. MOORE	DATE 08/19/15	
SCALE AS NOTED		

CONTRACT NUMBER 2122	CTO NUMBER F274
APPROVED BY K. LYONS	DATE 08/19/15
APPROVED BY —	DATE —
FIGURE NO. 2-1	REV 0

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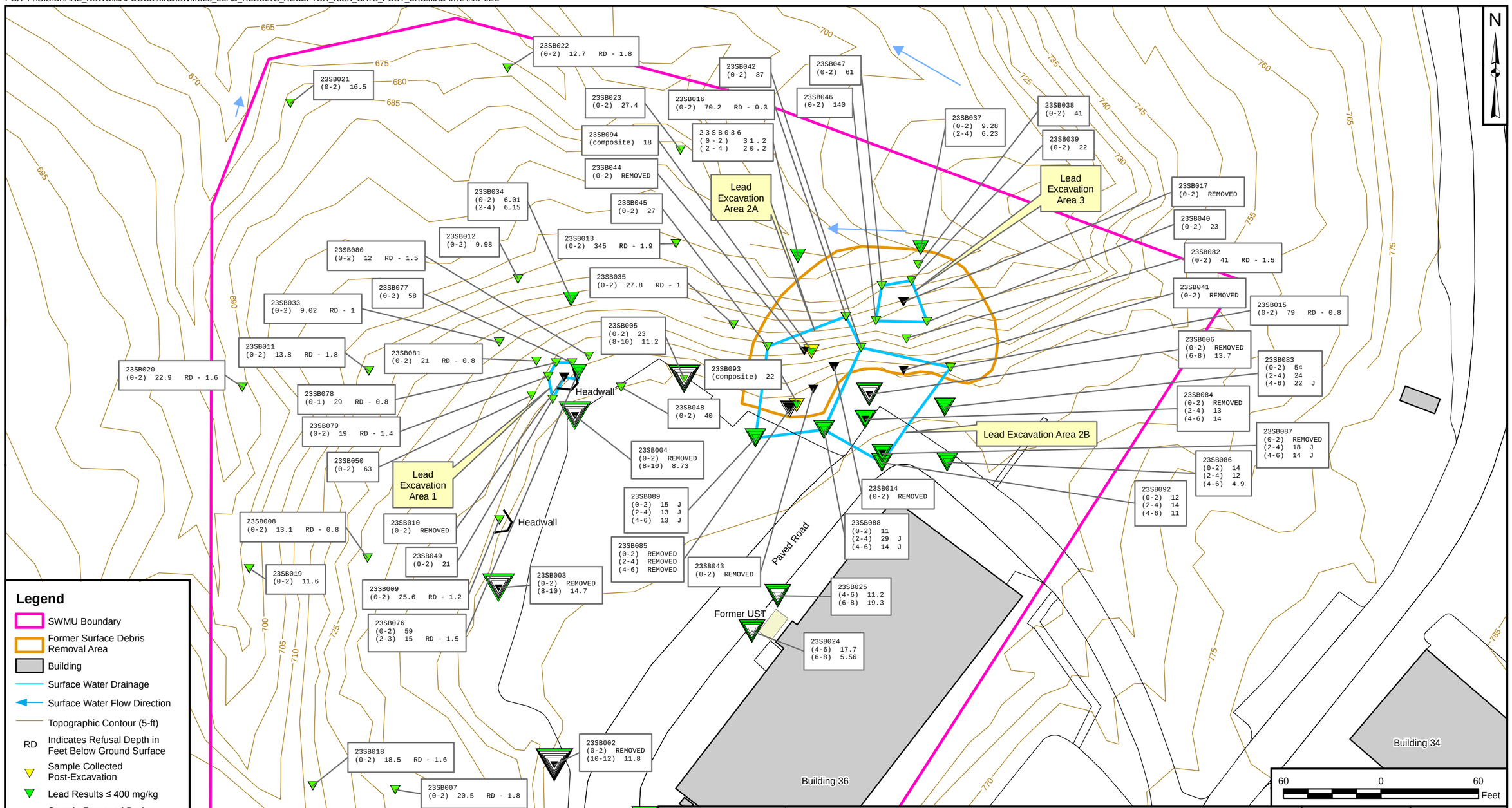

DRAWN BY J. ENGLISH	DATE 01/15/15	TETRA TECH	CONTRACT NUMBER 2122 / CTO NUMBER F274
CHECKED BY L. GANSER	DATE 07/24/15	SOIL LEAD DATA - POST-E CAVATION SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA	APPROVED BY K. L ONS / DATE 08/19/15
REVISED BY J. ENGLISH	DATE 07/24/15		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. 2-2 / REV 0

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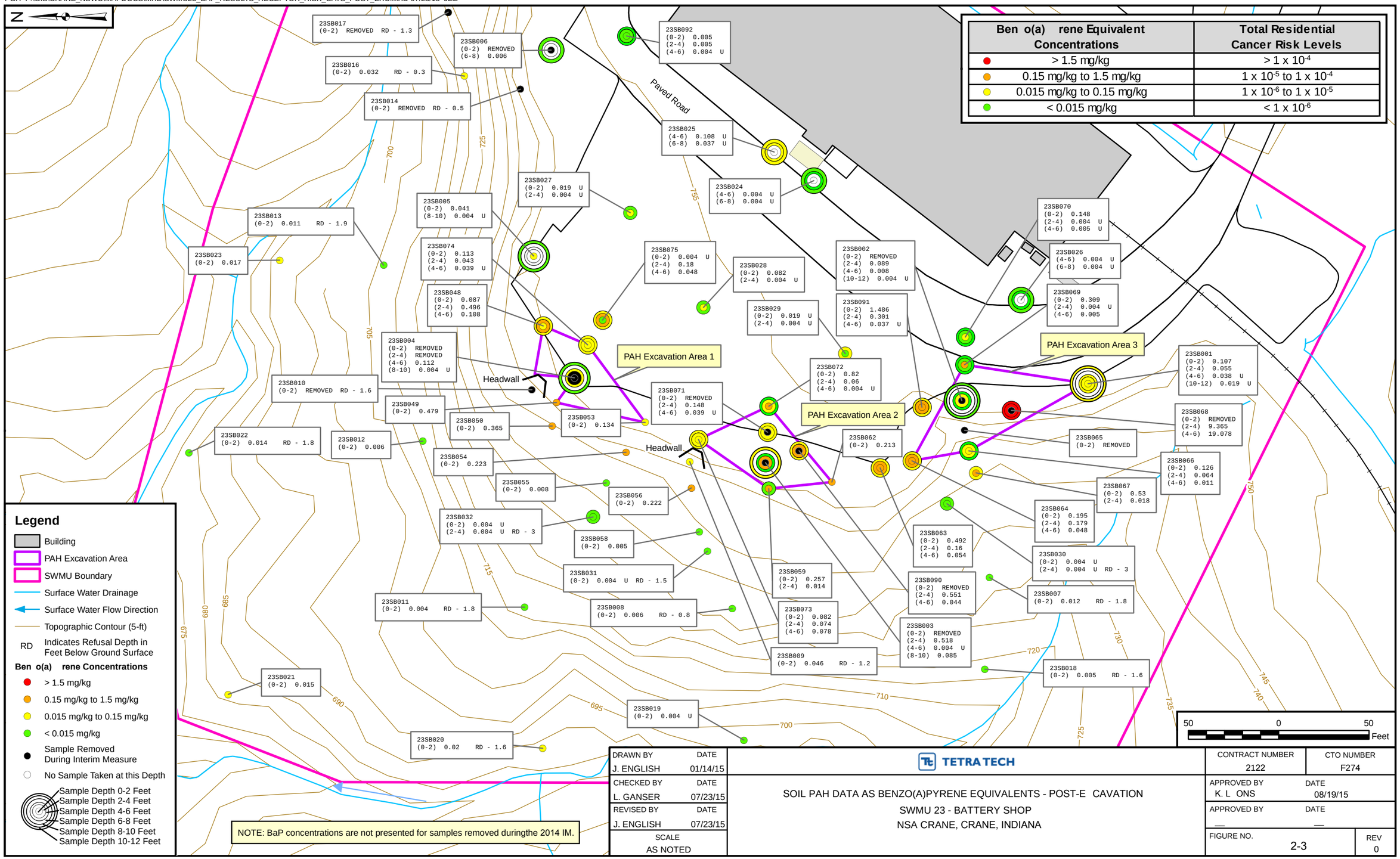

DRAWN BY	DATE
J. ENGLISH	01/14/15
CHECKED BY	DATE
L. GANSER	07/23/15
REVISED BY	DATE
J. ENGLISH	07/23/15
SCALE	
AS NOTED	

TETRA TECH

SOIL PAH DATA AS BENZO(A)PYRENE EQUIVALENTS - POST-E CAVATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
2122	F274
APPROVED BY	DATE
K. L ONS	08/19/15
APPROVED BY	DATE
—	—
FIGURE NO.	REV
2-3	0

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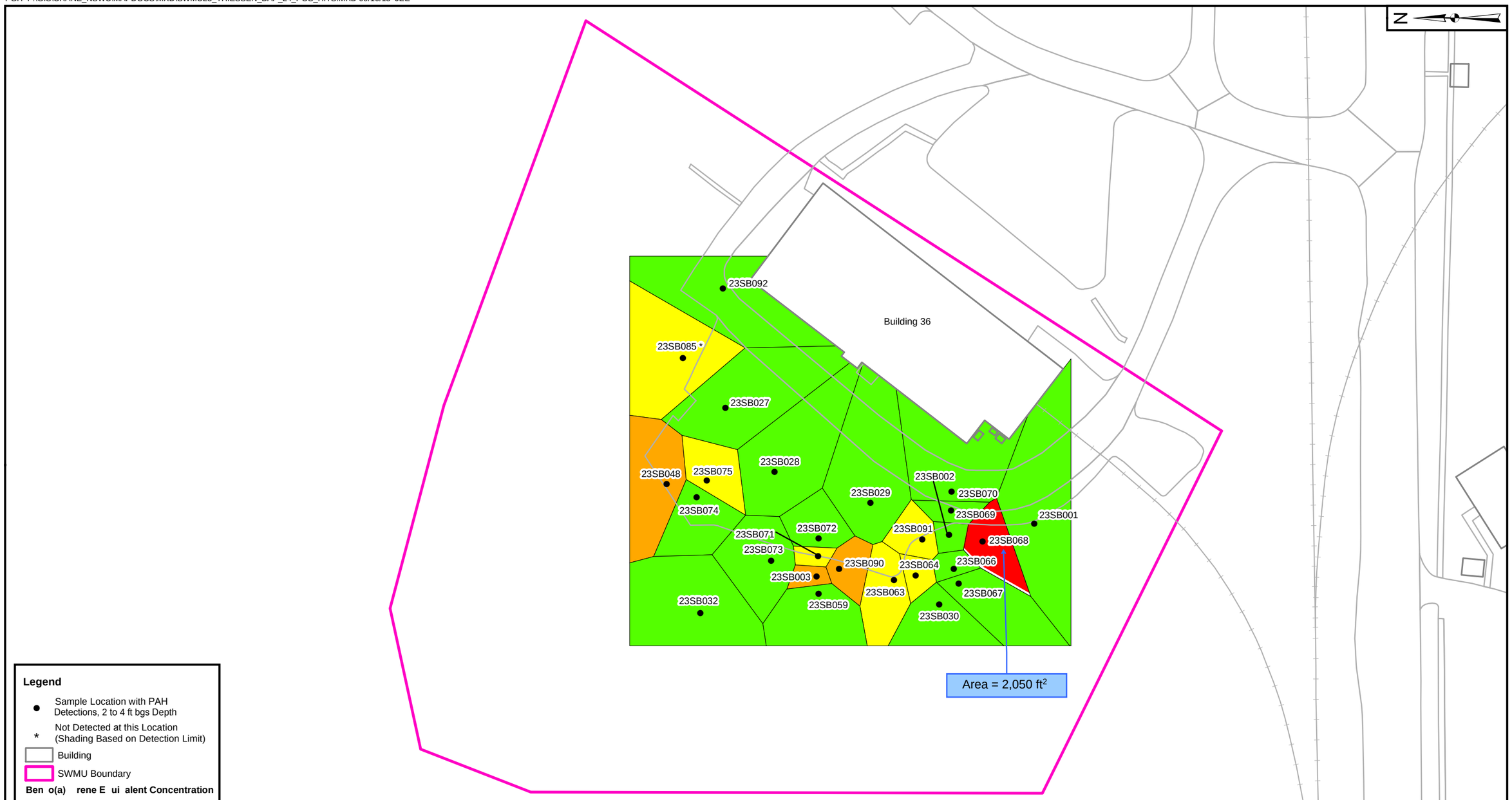


Legend

- ● Sample Location with PAH Detections, 2 to 4 ft bgs Depth
- * Not Detected at this Location (Shading Based on Detection Limit)
- Building
- SWMU Boundary

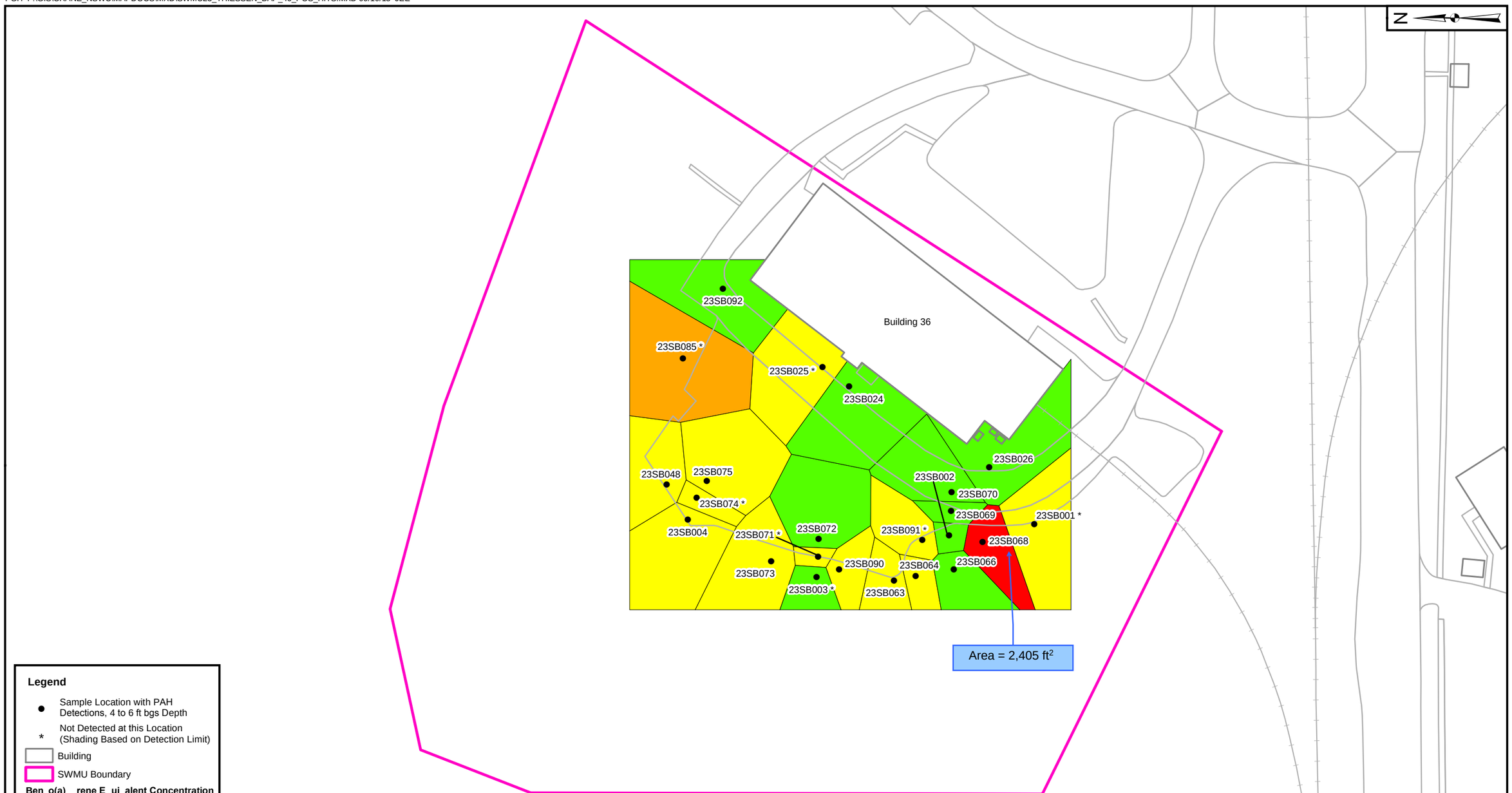
Ben o(a) rene E ui alent Concentration

- > 1.5 mg/kg
- 0.15 mg/kg to 1.5 mg/kg
- 0.015 mg/kg to 0.15 mg/kg
- < 0.015 m/kg

80 0 80 Feet

DRAWN BY J. ENGLISH	DATE 09/09/15	TETRA TECH	CONTRACT NUMBER 2122 / CTO NUMBER F274
CHECKED BY B. JUPIN	DATE 09/10/15	BENZO(A)PYRENE E UIVALENT THIESSEN POLYGONS, 2 TO 4 FEET SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA	APPROVED BY K. L ONS / DATE 09/22/15
REVISED BY —	DATE —		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 2-4 / REV 0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_THIESSEN_BAP_46_POS_HITS.MXD 09/10/15 JEE



Legend

- ● Sample Location with PAH Detections, 4 to 6 ft bgs Depth
- * Not Detected at this Location (Shading Based on Detection Limit)
- Building
- SWMU Boundary

Ben o(a) rene E ui alent Concentration

- > 1.5 mg/kg
- 0.15 mg/kg to 1.5 mg/kg
- 0.015 mg/kg to 0.15 mg/kg
- < 0.015 m/kg

80 0 80 Feet

DRAWN BY J. ENGLISH	DATE 09/09/15	TETRA TECH	CONTRACT NUMBER 2122 / CTO NUMBER F274
CHECKED BY B. JUPIN	DATE 09/10/15	BENZO(A)PYRENE E UIVALENT THIESSEN POLYGONS, 4 TO 6 FEET SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA	APPROVED BY K. L ONS / DATE 09/22/15
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			FIGURE NO. FIGURE 2-5 / REV 0

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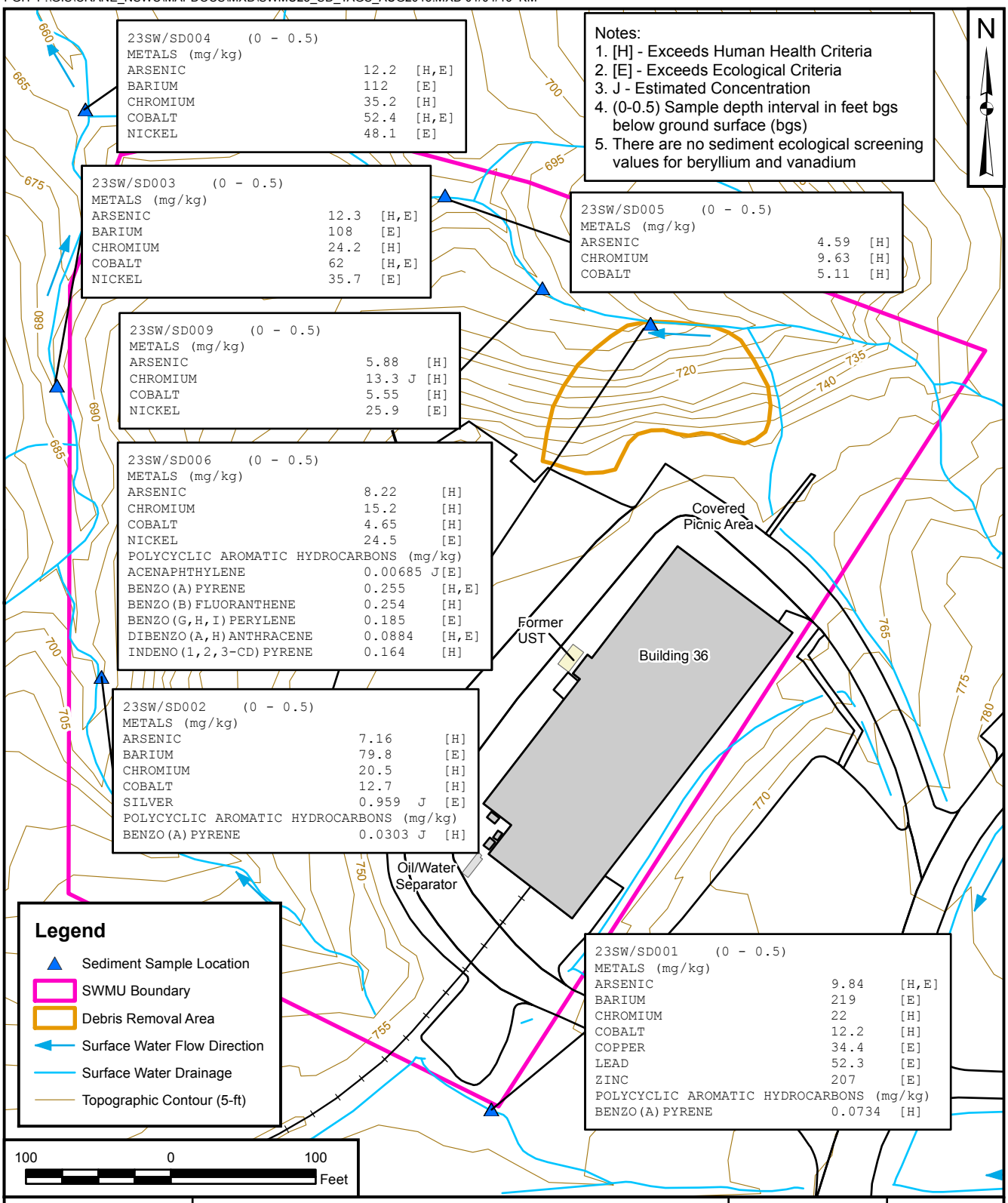

DRAWN BY	DATE		CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	01/28/13		2122	F274
CHECKED BY	DATE	SEDIMENT SCREENING EXCEEDANCES - CURRENT CONDITIONS SWMU 23 - BATTERY SHOP NSA CRANE CRANE, INDIANA	APPROVED BY	DATE
K. LYONS	01/04/16		K. LYONS	01/04/16
REVISED BY	DATE		APPROVED BY	DATE
K. MOORE	01/04/16		___	___
SCALE			FIGURE NO.	REV
AS NOTED			2-6	0

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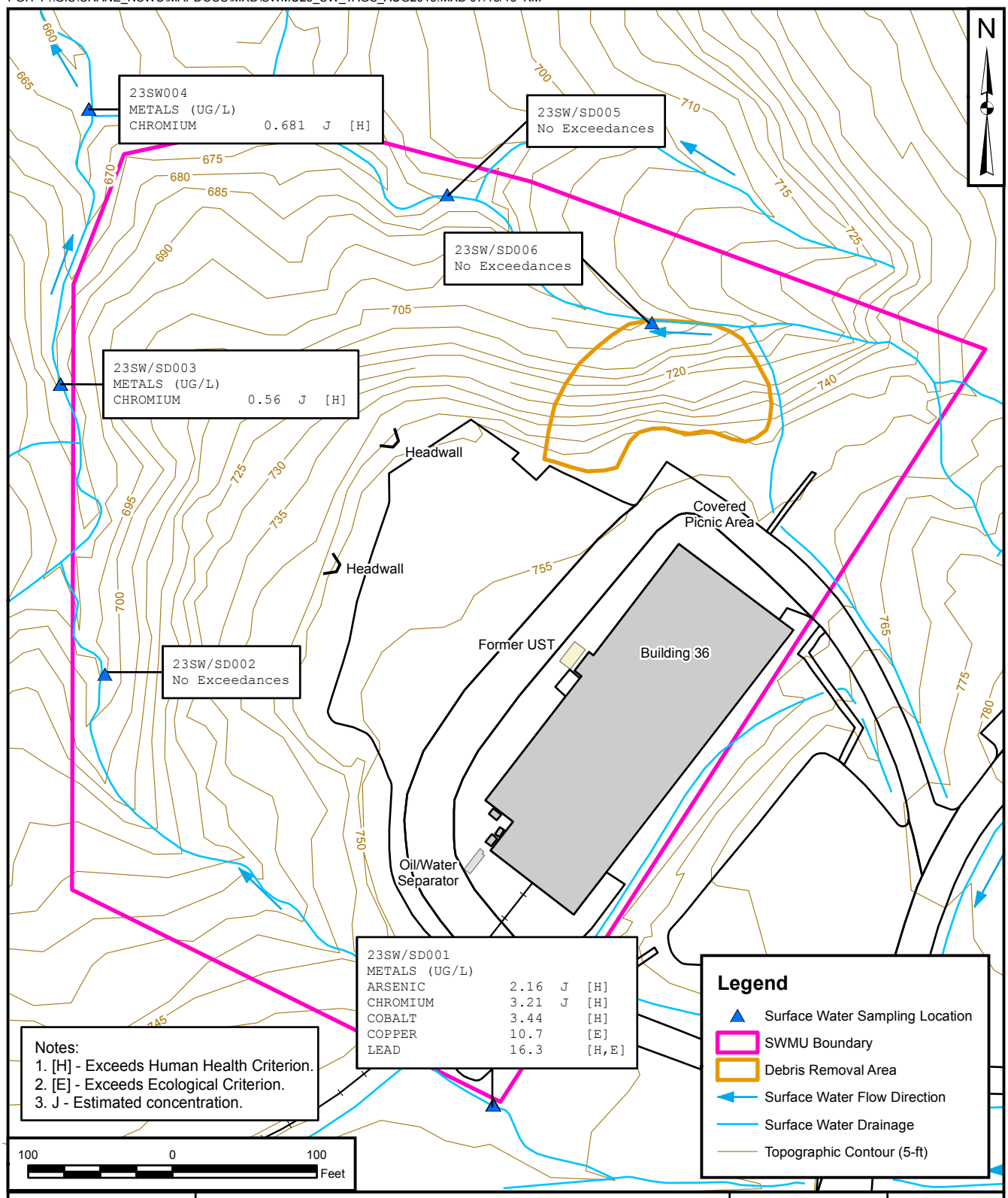


DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	01/28/13		2122	F274
CHECKED BY	DATE	SURFACE WATER SCREENING EXCEEDANCES - CURRENT CONDITIONS	APPROVED BY	DATE
L. GANSER	07/15/15	SWMU 23 - BATTERY SHOP	K. LYONS	08/19/15
REVISED BY	DATE	NSA CRANE, CRANE, INDIANA	APPROVED BY	DATE
K. MOORE	07/15/15		___	___
SCALE			FIGURE NO.	REV
AS NOTED			2-7	0

3.0 CONTAMINANT FATE AND TRANSPORT

This section presents an overview of the migration of contaminants at SWMU 23 among the environmental media. The focus is placed on site-related contaminant groups (i.e., metals, petroleum hydrocarbons, PAHs, PCBs, and VOCs) remaining in environmental media at SWMU 23. The information presented in this section is used to:

- Provide information on the chemical and physical properties that affect the mobility, migration, biodegradation, and persistence of the principal COPCs at SWMU 23.
- Assist in evaluating human health and ecological risks presented in Sections 4.0 and 5.0.
- Assist in risk management decisions.
- Assess whether movement of residual contaminants among environmental media will result in significant future changes to exposure point concentrations (EPCs) to receptors or in significant exposure to receptors or at locations not currently exposed.
- Assess whether the potential exists for residual contaminant concentrations to decrease over time in various media.
- Develop a CSM that identifies contamination sources, contaminant migration pathways, and potential receptors.

3.1 CHEMICAL AND PHYSICAL PROPERTIES AFFECTING COPC MOBILITY

Table 3-1 presents physical and chemical properties of the COPCs. These properties can be used to estimate the environmental mobility and fate of site contaminants. The properties discussed in this subsection include the following:

- Specific gravity
- Vapor pressure
- Water solubility
- Henry's Law constant
- Octanol-Water Partition Coefficient (K_{ow})

- Soil organic carbon-water partition coefficient (K_{oc})
- Soil-water distribution coefficient (K_d)
- Bioconcentration Factor (BCF)

Empirically determined literature values of most of these properties are presented in Table 3-1, when available. Calculated values, which were obtained using approximation methods, are presented when literature values were not available. Some additional characteristics such as mobility are described in generic terms.

A discussion of the environmental significance of each of these parameters follows.

3.1.1 Specific Gravity

Specific gravity is the ratio of the weight of a given volume of pure chemical at a specified temperature to the weight of the same volume of water at a given temperature. Its primary use is to determine whether a chemical will have a tendency to float or sink in water if it is present as a pure chemical or at very high concentrations. Chemicals with specific gravities greater than 1 when present as a separate phase (including halogenated aliphatics, metals, PCBs and PAHs) will tend to sink in water. Conversely, chemicals with specific gravities less than 1 (e.g., non-halogenated petroleum products) tend to float. This parameter becomes important only when the chemicals are at very high concentrations and are liquid or solid when they are in pure phase. Except for the O/WS sediment sample, none of the COPCs at SWMU 23 are present at high enough concentrations to suspect that there is a non-aqueous-phase liquid (NAPL). Therefore, specific gravity is not a major factor in contaminant migration at SWMU 23. Numerical estimates of specific gravity are not presented in Table 3-1.

3.1.2 Vapor Pressure

Vapor pressure provides an indication of the rate at which a chemical volatilizes from both soil and water. It is of primary importance at environmental interfaces such as surface soil/air and surface water/air. Volatilization from stream sediments could also be significant under low-flow conditions (i.e., during summer months and drought conditions) when sediments are exposed to the atmosphere in a dry creek bed. Volatilization is a significant process that causes loss of VOCs from surface water, particularly during hot summer weather and turbulent high-flow conditions. Volatilization is not as important when evaluating contaminated groundwater and subsurface soils that are not exposed to the atmosphere. Vapor pressures for ketones and halogenated aliphatics (e.g., acetone and 1,2-dichloroethane) are generally many times greater than vapor pressures for PAHs and PCBs. In general, the lower molecular

weight compounds in a particular chemical group (e.g., PCBs) have greater vapor pressures and are more volatile than the larger molecular weight compounds in the same group. Chemicals with greater vapor pressures are expected to enter the atmosphere much more readily than chemicals with lower vapor pressures. Volatilization is more significant for VOCs in surface water and surface soil. Volatilization is not significant for metals or PAHs. Sporadic low concentrations of VOCs (i.e., less than or slightly above LOQs) were detected in soil and sediment at SWMU 23. For VOCs present at such low concentrations, volatilization is no longer likely to be an important loss mechanism, although it is possible that previously released VOCs have nearly completely volatilized. Because vapor pressure is not an important fate and transport consideration at SMWU 23, numerical estimates of vapor pressure are not presented in Table 3-1.

3.1.3 Water Solubility

The rate at which a chemical is leached from a waste deposit or contaminated soils by infiltrating precipitation is proportional to its water solubility. More soluble chemicals are more readily leached than less soluble chemicals. The water solubilities presented in Table 3-1 indicate that the VOCs detected at SWMU 23 (ketones and halogenated aliphatics) are usually several orders of magnitude more water soluble than PAHs and PCBs. Chemicals with the greatest solubilities tend to migrate at rates equal to the groundwater in which they are dissolved. Molecular interactions between solute molecules and the geologic matrix though which they migrate retards the movement of less soluble species, so groundwater flows more rapidly than the contaminants. In surface water, the difference in migration rates for soluble and less soluble species is likely to be much less pronounced because the water interacts less with the geologic matrix.

3.1.4 Henry's Law Constant

Both vapor pressure and water solubility are of use in determining volatilization rates from surface water bodies and from groundwater. Vapor pressure is generally of interest only for organic chemicals and perhaps for elemental mercury. The ratio of vapor pressure and solubility (Henry's Law constant) is used to calculate the equilibrium chemical concentrations in the vapor phase compared to the liquid phase for the dilute solutions commonly encountered in environmental settings. In general, organic chemicals having Henry's Law constants of less than 1×10^{-5} atmosphere-cubic meter per mole (atm-m^3/mole), such as higher molecular weight PAHs [e.g., benzo(a)pyrene], should volatilize very little and should be present only in minute amounts in the atmosphere or soil gas. For chemicals with Henry's Law constants greater than 5×10^{-3} atm-m^3/mole (such as carbon disulfide), volatilization and diffusion into soil gas could be significant. The volatilities of lower molecular weight PAHs (e.g., 2-methylnaphthalene) and PCBs are

between these two groups. Sorbed species such as sorbed PAHs and PCBs are much less volatile than the same species when dissolved.

3.1.5 Octanol/Water Partition Coefficient

The K_{ow} is a measure of the equilibrium partitioning of chemicals between octanol and water. A linear relationship between the K_{ow} and the uptake of chemicals by fatty tissues of animal and human receptors (the BCF) has been established (Lyman et al., 1990). K_{ow} is also useful in characterizing the sorption of compounds by organic soils where experimental values are not available. PCBs and aromatic compounds, such as benzene and PAHs that lack functional groups that enhance water solubility, are several orders of magnitude more likely to partition to fatty tissues than the more soluble VOCs.

3.1.6 Soil Organic Carbon-Water Partition Coefficient

The K_{oc} indicates the tendency of a chemical to adhere to organic matter contained in soils. Chemicals with high K_{oc} values generally have low water solubilities and vice versa. This parameter may be used to infer the relative rates at which the more mobile chemicals (e.g., ketones and halogenated aliphatics) can be transported in groundwater. Many organic compounds, such as most PAHs and PCBs, are relatively immobile in soil and are preferentially bound to the soil. These relatively immobile compounds are not subject to groundwater transport to the same degree as compounds with higher water solubilities and frequently lower molecular weights, such as VOCs. Nevertheless, chemicals adsorbed to shallow surface soil or sediment can be transported by erosional processes. Several factors affect the measured value of K_{oc}. For example, values of K_{oc} usually decrease with increasing temperature. The fine silt and clay fractions of soil and sediments have greater tendencies to adsorb chemicals because they often have greater concentrations of organic matter (hence, a greater number of adsorption sites per unit volume).

3.1.7 Soil-Water Distribution Coefficient

The K_d is a measure of the equilibrium distribution of a chemical in soil-water systems. The K_d of organic chemicals is a function of both the K_{oc} and fraction of organic carbon (f_{oc}) in the soil:

$$K_d = K_{oc} \times f_{oc}$$

The degree to which chemicals sorb to soils is a very important consideration for assessing migration potential. If a chemical tends to sorb strongly to soil, there is much less probability that the chemical will reach groundwater and affect groundwater quality. The K_d values for metals COPCs at SWMU 23 are summarized in Table 3-1.

Table 3-1 presents K_{oc} values for organic compounds and K_d values for inorganic compounds. As a consequence of low migration potential, there is a very low probability that chemicals with very high K_{oc} or K_d values (i.e., PAHs, PCBs, lead, and mercury) would reach surface water bodies via groundwater flow. However, if PAHs or PCBs are present at the ground surface, erode, and are transported in surface runoff with soil particles (as a sorbed phase), there is potential for the compounds to reach surface water. The available data show that there is some potential for migration of PAHs and PCBs in surface water because of the detections of PAHs and PCBs in sediment downstream from SWMU 23, but the degree of transport to date has been limited.

Six drainageway sediment samples were analyzed for total organic carbon (TOC). Values of TOC ranged from 4,710 to 60,000 mg/kg. This amount of TOC in sediment provides a relatively large capacity for sorption of organic compounds. The most upstream sediment sample (from location 23SW/SD001) had the maximum TOC concentration and many of the maximum metals concentrations. This is an indication that drainageway sediment downstream of 23SW/SD0001 has not been significantly impacted by site activities.

3.1.8 Bioconcentration Factor

The BCFs presented in Table 3-1 represent ratios of fish-tissue concentrations to water concentrations. The ratios are both chemical and species specific. When site-specific values are not measured, literature values are used or the BCF is derived from the K_{ow}. Most of the values presented in Table 3-1 were experimentally measured. Many of the PCBs (BCF values not available) and PAHs will bioconcentrate at levels three to five orders of magnitude greater than those concentrations found in the water, but VOCs are not as readily bioconcentrated. This is evident from the much larger BCF values for PAHs than for VOCs.

3.1.9 Overall Mobility

Of the organic chemicals detected at SWMU 23, chlorinated solvents and ketones generally are considered extremely mobile. Lighter molecular weight PAHs, such as naphthalene, are considered slightly mobile. Heavier molecular weight PAHs [e.g., benzo(a)pyrene] and PCBs are considered very immobile.

The solubilities and mobilities of metals are strongly influenced by their valence states and mineral forms present in soils (e.g., silicates, hydroxides, oxides, carbonates, etc.). The solubility of a metal also

depends on pH, Eh (redox potential), oxidation-reduction potential (ORP), temperature, and other ionic species in solution according to the Debye-Huckel theory (Castellan, 1971). Nearly all metals are more soluble at water pH values less than 5.0. Arsenic, iron, manganese, selenium, and chromium are metals that have more than one valence and are more soluble in the reduced valence states. As a result, these metals are more soluble under reducing conditions. The solubility products reported in the literature vary with the type of complex formed; however, generally, cadmium and copper complexes are more soluble than lead and nickel complexes.

K_d values for metals vary over several orders of magnitude because the K_d is dependent on the size and charge of the ion and the soil properties governing exchange sites on soil surfaces.

Two different species of chromium, trivalent and hexavalent, are commonly encountered in environmental investigations. Hexavalent chromium is much more toxic and mobile than trivalent chromium; however, naturally occurring geological conditions generally favor chemical reduction of hexavalent chromium to the much less toxic trivalent chromium. Hexavalent chromium is not likely to be present in environmental media at SWMU 23 because there is no history of hexavalent chromium use at Building 36.

3.2 PROPERTIES AFFECTING ATTENUATION AND PERSISTENCE

The primary chemical and biological factors that affect the attenuation and persistence of chemicals are solubility, adsorption, desorption, biodegradation, photolysis, and plant uptake. These processes and their effects on fate and transport are discussed below.

3.2.1 Solubilities and Adsorption/Desorption Properties

Literature values and regulatory guidance values for solubilities, K_{oc}, K_d, and other factors affecting chemical fate and transport are summarized in Table 3-1. In many instances, the range of tabulated parameter values for each chemical is large; therefore, the best estimates are represented. The values listed in Table 3-1 may not be accurate, or entirely applicable, to the SWMU 23 setting; however, they are useful for comparing COPCs in terms of their relative mobilities and biodegradation potential.

As shown in Table 3-1, PCBs and PAHs have the lowest solubilities and generally have the greatest affinities for sorbing to organic carbon and soil. Like PCBs and PAHs, many of the metals selected as COPCs at SWMU 23 also have high affinities for sorbing to soil (e.g., beryllium, chromium, lead, mercury, silver, and zinc). For these chemicals, concentrations dissolved in groundwater should be low and rates of migration through surface water, soil, and groundwater systems should be very slow or insignificant.

The remaining metals COPCs (antimony, arsenic, barium, cadmium, cobalt, copper, nickel, and vanadium) and VOCs have moderate affinities for sorption to soil and therefore can move through the environment more quickly than the chemicals listed above. However, their mobility and migration rates are still impeded by sorption and in some cases solubility constraints.

The K_d values for metals COPCs are intermediate to high and indicate that the metals are relatively immobile. However, the natural soils and groundwater associated with Pennsylvanian rocks in southern Indiana are slightly too strongly acidic because:

- The Pennsylvanian shales, coals, and sandstone units typically contain pyrite, which forms sulfuric acid when oxidized.

- The near-surface rocks have undergone chemical and physical weathering through a very long period of geologic time, which has allowed the oxidation of pyrite and the leaching and removal of any carbonate minerals that may have once been present in the rocks.

- The residual soils and near-surface rock units have been subjected to acid rain in recent decades.

Because of lower pH values in soils, bedrock, and groundwater, the solubilities of most metals are generally higher than would be expected at near-neutral pH values. In addition, the K_d values of most of the metals are depressed under these conditions.

Another factor that can greatly affect solubilities and mobilities of metals is the metal's valence state. Each metal can assume more than one valence state, which in nature is subject to changes in solubility according to the pH and oxidation-reduction conditions of the soil, bedrock, groundwater, or surface water systems where these metals reside. Chromium, for example, is more soluble and mobile under oxidizing conditions (i.e., surface soils and surface waters), although natural conditions generally favor formation of trivalent chromium, which is much less soluble than hexavalent chromium.

Although the PAHs, PCBs, and many of the metals have high affinities for adsorption to soil and sediment, they can still move through the environment away from a source area via erosion and sediment transport (i.e., surface water pathway) or via wind erosion and transport.

3.2.2 Biodegradation

Biodegradation half-lives for PAHs are on the order of 2 to 10 years. Lower molecular weight PAHs tend to oxidize completely to form carbon dioxide and water, whereas the heavier PAHs degrade partially to yield various oxygenated metabolites (e.g., various phenolic and acid metabolites, cis-dihydrodiol, etc.). Metals do not degrade at all, and PCBs degrade very slowly, either aerobically or anaerobically; therefore, it is probable that the total mass of metals and PCBs at SWMU 23 will remain relatively stable over time except for surface transport via erosion. VOCs biodegrade with half-lives in groundwater ranging from about 0.02 to 7 years. Vinyl chloride, the most volatile of the chlorinated VOCs that were analyzed for SWMU 23, is not readily adsorbed to solid substrates and tends to volatilize more rapidly than it biodegrades. Based on this information, it is probable that the total mass of PAHs and VOCs at SWMU 23 will decrease over time as a result of degradation (chemical and biological).

Assimilation and transformation by plants is another biodegradation pathway. The pathways for metabolic degradation are numerous and depend on the contaminant and the plant species (Erdei et al., 2002). In general, however, a chemical must be solubilized before it can be assimilated. After it is assimilated, the chemical may be transformed into metabolites that are more or less toxic than the original chemical. Volatile metabolites and volatile contaminants may be transpired through the leaves of plants. Phytoremediation is thus a natural degradation mechanism for contaminants that can be assimilated. Some metals such as cobalt, iron, nickel, and zinc are essential nutrients for some plants that are required to be present at low levels for normal physiological activity (Singh et al., 2011). Other metals such as cadmium and lead may inhibit physiologic metabolism of plants. Given the relatively low concentrations of contamination at SWMU 23, plant uptake and transformation of the assimilated chemicals is not likely to be a major degradation pathway.

3.2.3 Abiotic Degradation

Organic chemicals can degrade abiotically. One means of abiotic degradation is hydrolysis, whereby the compound reacts with water to form two or more new compounds.

Photolysis can be a primary abiotic degradation mechanism for PAHs in surface water (CLU-IN, 2013). Photolysis is the decomposition of a compound into simpler units when the parent compound absorbs radiation from sunlight. Photolytic degradation rates are typically slowed by high turbidity and increasing depth of water because the sunlight intensity is attenuated; however, sorbed species such as PAHs may be subject to more rapid photolysis when exposed to sunlight. PCB molecules may degrade photolytically through loss of chlorine atoms to form less chlorinated molecules. Photolysis is not

believed to be a potentially significant degradation mechanism for the other site-related organic contaminants or metals.

In general, the more hydrophobic (greater K_{ow} values), less polar, and larger an organic contaminant molecule is, the less likely it is to biodegrade and the more likely it is to adhere to sediment particles and sediment organic carbon matter. As a result, these persistent organic contaminants are likely to bioaccumulate (CLU-IN, 2013). Metals can become part of the sediment mass through precipitation (e.g., carbonates, sulfides, phosphates, hydroxl complexes) or adsorption (e.g., clay, sediment organic matter). In most cases, a radical change in sediment geochemistry (decreasing pH, change in redox) may result in their resuspension as ions. Some metals (e.g., arsenic, cadmium, lead, selenium, zinc) bioaccumulate, but others do not (e.g., copper, nickel). Contaminated sediments have the ability to affect the quality of groundwater and surface water. Water from a water body in a losing system passes through the sediments, picks up contaminants dissolved in the sediment pore water, and potentially carries them downward to groundwater. Groundwater passing through sediments in a gaining water body can carry contaminants dissolved in the sediment pore water upward into the water body.

3.3 CONCEPTUAL SITE MODEL

Figure 3-1 presents a three-dimensional representation of the CSM for SWMU 23. This figure identifies (with arrows) the potential transport pathways for contaminants that may move from one medium to another and from one location to another. Also identified are the representative human health and ecological receptors that may be exposed to the environmental media at SWMU 23.

Contaminant sources at SMWU 23 included a former debris disposal area, battery acid disposal areas, a former fuel UST, battery storage area, and O/WS. Battery acid and debris are no longer discarded along the slopes behind Building 36, and the UST has been removed from the site. In addition, the majority of PAH- and lead-contaminated soil was removed from the site during 2014 IM activities. Consequently, sources of contamination under current site conditions are primarily limited to the O/WS and lead- and PAH-contaminated soil remaining at the site.

Residual sediment contamination in the O/WS is contained within the concrete structure and is not expected to migrate to other site environmental media unless the integrity of the structure is compromised. Concentrations of PAHs and metals were elevated in the sediment sample collected from the O/WS; however, nearby subsurface soil samples did not provide evidence of O/WS leaks. Therefore, impacts to groundwater are not expected.

As discussed in Section 2.0, PAHs and lead in soil are the primary contaminants remaining at SWMU 23. Figure 2-3 for PAHs and Figure 2-4 for lead depict the residual contamination at SWMU 23 for these contaminants. A review of the data for drainageway sediments and surface water shows that overland transport of contamination has been very limited. In addition, migration to deeper soils from the surface has also been limited, as evidenced by the minimal number of contaminants detected in subsurface soil. The presence of shallow bedrock in the area also limits the depth of soil contamination. Migration from shallow soil to bedrock will be slow for PAHs and lead because of their tendency to adsorb to the soil. In general, impacts to groundwater are not expected to be significant because of the limited potential for contaminant desorption from soil. At some locations where bedrock is shallow, the potential for migration of contaminants from soil to bedrock is increased. This increases the potential impact to groundwater, but the residual contamination at the site is limited in total mass, and the rate of contaminant migration to bedrock and groundwater is slow. Consequently, site-related contaminants are not expected to be present in groundwater in appreciable quantities.

TABLE 3-1

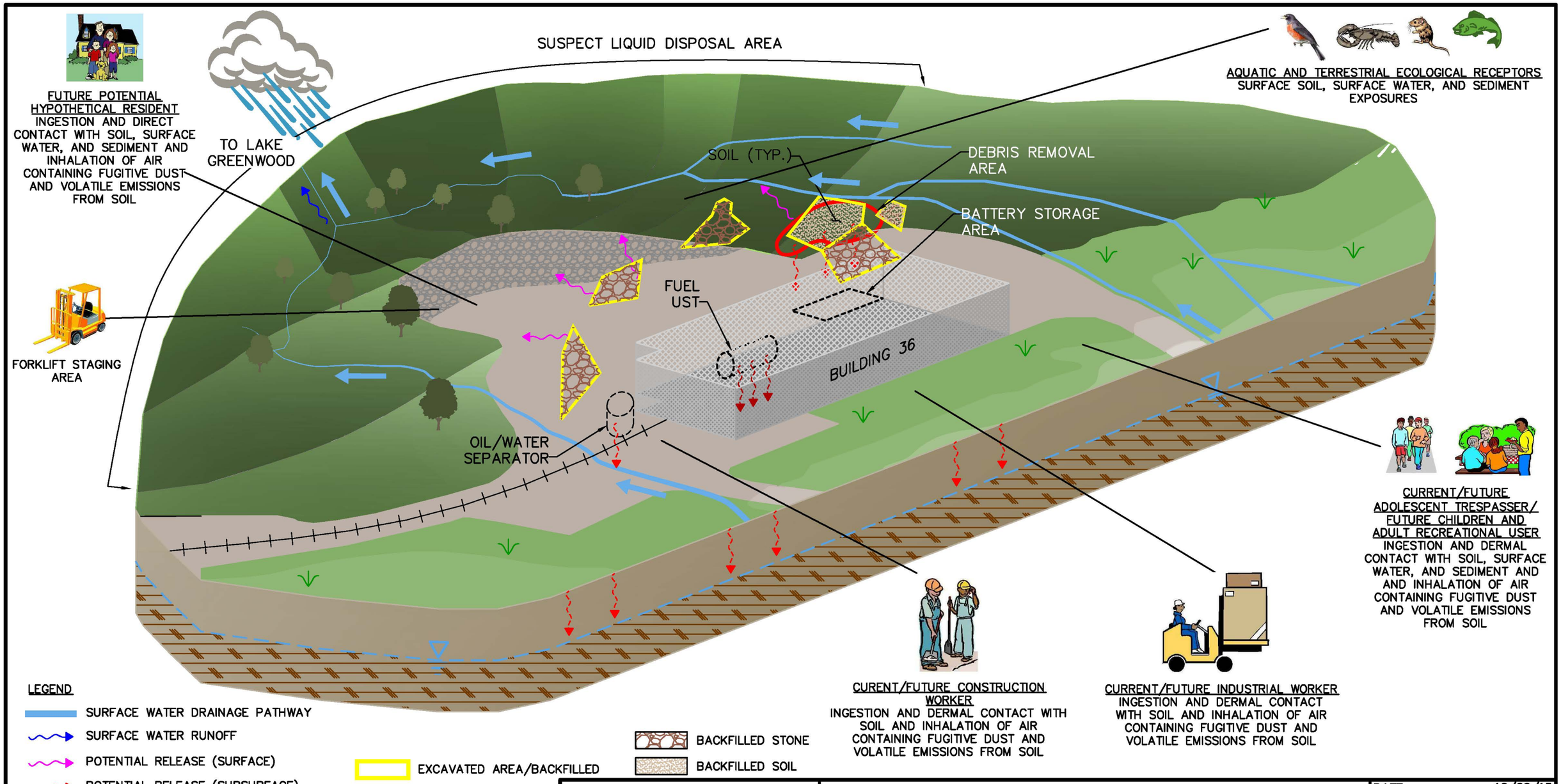
PHYSICOCHEMICAL CHARACTERISTICS OF CHEMICALS RETAINED AS COPCs
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Surface Soil	Subsurface Soil	Surface Water	Sediment	Water Solubility (mg/L)	Octanol-Water Partition Coefficient, K_{ow} (L/kg)	Organic Carbon-Water Partition Coefficient, K_{oc} (L/kg)	Henry's Law Constant (atm-m^3/mole)	Soil-Water Distribution Coefficient, K_d (L/kg)	Bioconcentration Factor, BCF[1] (L/kg)
Volatile Organic Compounds										
1,2-Dichloroethane	E				8.60E+03	3.02E+01	3.96E+01	1.18E-03	NA	4.40E+00
2-Butanone	E				2.23E+05	1.95E+00	4.51E+00	5.69E-05	NA	3.16E+00
Acetone	E				1.00E+06	5.75E-01	2.36E+00	3.50E-05	NA	3.16E+00
Carbon Disulfide	E				2.16E+03	8.71E+01	2.17E+01	1.44E-02	NA	1.95E+01
Chloroform	E				7.95E+03	9.33E+01	3.18E+01	3.67E-03	NA	1.30E+01
trans-1,4-Dichloro-2-Butene	E				8.50E+02	3.98E+02	1.32E+02	6.64E-04	NA	2.41E+01
Polycyclic Aromatic Hydrocarbons										
1-Methylnaphthalene	E				2.58E+01	7.41E+03	2.53E+03	5.14E-04	NA	5.33E+01
2-Methylnaphthalene	E				2.46E+01	7.24E+03	2.48E+03	5.18E-04	NA	7.47E+01
Acenaphthylene[1]				E	1.61E+01	2.13E+02	5.03E+03	1.14E-04	NA	2.71E+02
Benzo(a)anthracene	E, H	H			9.40E-03	5.75E+05	1.77E+05	1.20E-05	NA	2.60E+02
Benzo(a)pyrene	E, H	H		E, H	1.62E-03	1.35E+06	5.87E+05	4.57E-07	NA	5.15E+03
Benzo(b)fluoranthene	E, H	H		H	1.50E-03	6.03E+05	5.99E+05	6.57E-07	NA	3.02E+03
Benzo(g,h,i)perylene[1]	E			E	2.60E-04	1.04E+05	1.95E+06	3.30E-07	NA	1.10E+04
Benzo(k)fluoranthene	E	H			8.00E-04	1.29E+06	5.87E+05	5.84E-07	NA	4.99E+03
Chrysene	E				2.00E-03	6.46E+05	1.81E+05	5.23E-06	NA	3.17E+03
Dibenzo(a,h)anthracene	E, H	H		E, H	2.49E-03	5.62E+06	1.91E+06	1.41E-07	NA	9.60E+03
Fluorene	E				1.69E+00	1.51E+04	9.16E+03	9.62E-05	NA	5.25E+02
Indeno(1,2,3-cd)pyrene	E, H	H		H	1.90E-04	5.01E+06	1.95E+06	3.48E-07	NA	1.22E+04
Phenanthrene[1]	E				1.15E+00	7.05E+02	1.67E+04	4.23E-05	NA	2.51E+03
Pyrene	E				1.35E-01	7.59E+04	5.43E+04	1.19E-05	NA	1.51E+03
Polychlorinated Biphenyls										
Aroclor-1254	E, H				4.30E-02	3.16E+06	1.31E+05	2.83E-04	NA	NA
Aroclor-1260	E				1.44E-02	3.55E+07	3.50E+05	3.36E-04	NA	NA
Metals										
Arsenic	E, H	H	H	E, H	NA	NA	NA	NA	2.90E+01	3.00E+02
Barium				E	NA	NA	NA	NA	4.10E+01	4.00E+00
Beryllium				E	NA	NA	NA	NA	7.90E+02	1.00E+02
Chromium	E, H		H	H	NA	NA	NA	NA	1.80E+06	2.00E+02
Cobalt	E		H	E, H	NA	NA	NA	NA	4.50E+01	3.00E+02
Copper	E		E	E	NA	NA	NA	NA	3.50E+01	2.00E+02
Lead	E		E, H	E	NA	NA	NA	NA	9.00E+02	3.00E+02
Mercury	E				6.00E-02	4.17E+00	NA	1.14E-02	5.20E+01	NA
Nickel				E	NA	NA	NA	NA	6.50E+01	1.00E+02
Silver				E	NA	NA	NA	NA	8.30E+00	5.00E+00
Vanadium	E			E	NA	NA	NA	NA	1.00E+03	NA
Zinc	E			E	NA	NA	NA	NA	6.20E+01	1.00E+03

Notes:
Unless otherwise noted, values are from USEPA RSLs for Chemical Contaminants at Superfund Sites (USEPA, 2015), Chemical-Specific Parameters Supporting Table.

Footnotes:
1 - Values from the Risk Assessment Information System (ORNL, 2015).

Abbreviations:
E - Chemical was retained as an ecological risk COPC
H - Chemical was retained as a human health risk COPC
NA - Not applicable
ORNL - Oak Ridge National Laboratory
RSL - Regional Screening Level
USEPA - United States Environmental Protection Agency



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NSA CRANE
CRANE, INDIANA

CONCEPTUAL SITE MODEL
SWMU 23 – BATTERY SHOP

SCALE: NOT TO SCALE

DATE:	10/29/15
PROJECT NO.:	112G02122
DESIGNED BY:	
DRAWN BY:	CK
CHECKED BY:	
SHEET: 1 OF 1	

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FIGURE 3-1

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4.0 HUMAN HEALTH RISK ASSESSMENT

This section presents the HHRA for SWMU 23 at NSA Crane. The objective of the HHRA is to determine whether detected concentrations of chemicals at the site pose a significant threat to potential human receptors under current and/or future land use. The potential risks to human receptors were estimated based on the assumption that no actions are taken to address residual contamination present at the site following 2014 IM activities. The HHRA is structured according to the guidelines of the Risk Assessment Guidance for Superfund (RAGS) (USEPA, 2001).

An HHRA consists of five components: data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Sections 4.1 through 4.5 contain detailed discussions of the five components of the HHRA.

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 pathway is incomplete, and no potential risks are considered to exist for human receptors.

4.1 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.

4.1.1 Data Usability

Samples collected during the 2012 RFI and the 2013 and 2014 post-RFI supplemental investigations were used to assess risks to potential human receptors. A listing of the samples is presented in Table 2-1; soil samples labeled as remaining on site represent current soil conditions and were used to estimate potential risks. Samples used in this HHRA are listed in the COPC selection tables and in Appendix C.1. All analytical data used in the quantitative estimation of potential risks were subject to data validation; the quality of the data was addressed in the Draft RFI Report (Tetra Tech, 2013) and IM Work Plan (Tetra Tech, 2014), which documented the results of the post-RFI supplemental sampling efforts. Surface soil samples

were collected from 0 to 2 feet bgs. Depths for subsurface soil samples ranged from 2 to 12 feet bgs. Surface water and sediment samples were collected from drainageways located downgradient of SWMU 23. Sediment samples were collected from 0 to 0.5 foot below the below the sediment surface.

4.1.2 Derivation of Screening Criteria

The primary criteria used to identify COPCs are based on USEPA Regional Screening Levels (RSLs) (2015) and IDEM screening levels (2015). The RSLs are based on exposure pathways for which generally accepted methods, models, and assumptions have been developed (i.e., ingestion, dermal contact, and inhalation) for specific land-use conditions and do not consider ecological receptors. The screening concentrations used in the HHRA based on RSLs correspond to a systemic hazard quotient (HQ) of 0.1 for noncarcinogens or an ILCR of 1×10^{-6} (i.e., a one-in-one million chance of developing cancer) for carcinogens. The RSLs for noncarcinogens were based on an HQ of 0.1 to account for the potential cumulative effects of several chemicals affecting the same target organ or producing the same adverse noncarcinogenic effect. Adverse noncarcinogenic health effects are not anticipated when the HQ does not exceed 1.

The IDEM screening levels for soil are based on USEPA RSLs; however, IDEM screening levels are not necessarily the same as RSLs. IDEM screening levels for direct contact correspond to a systemic HQ of 1 (for noncarcinogens) or an ILCR of 1×10^{-5} (i.e., a one-in-one hundred thousand chance of developing cancer) for carcinogens. USEPA RSLs for carcinogens correspond to an ILCR of 1×10^{-6}. Some IDEM screening levels for soil are also be based on the soil saturation limit or are capped at 100,000 mg/kg.

Screening Levels for Soil

Screening concentrations based on the following criteria were used to select COPCs for surface and subsurface soil at SWMU 23:

- USEPA RSLs for residential soil (2015)
- IDEM residential direct contact criteria (2015)

Because of the different exposure scenarios for potential human receptors, COPCs were identified for surface and subsurface soil separately. Surface soil was defined as soil collected from 0 to 2 feet bgs, and subsurface soil was defined as soil collected from depths greater than 2 feet bgs.

Maximum chemical concentrations in soil were also compared to USEPA risk-based Soil Screening Levels (SSLs) for groundwater protection and to IDEM screening levels for migration from soil to groundwater. The SSLs and IDEM screening levels for migration from soil to groundwater were not used for the selection of COPCs for direct contact exposure (e.g., incidental ingestion, dermal contact, and inhalation); however, these levels were used to conduct a qualitative evaluation of the potential for chemical migration from soil to groundwater. Chemicals with concentrations exceeding the SSLs and IDEM screening levels for migration from soil to groundwater may potentially migrate from soil to groundwater in sufficient quantities to pose groundwater quality problems, especially if groundwater is used as a drinking water source. The results of the comparison of site soil concentrations to USEPA SSLs and IDEM screening levels for migration from soil to groundwater are discussed in Section 4.4.4.

The risk-based screening levels used in COPC selection for soil are presented in Table 4-1.

Screening Levels for Surface Water

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

- USEPA RSLs for tap water (2015)
- USEPA Maximum Contaminant Levels (MCLs) (2012a)
- IDEM tap water screening levels for groundwater (2015)

In general, the use of tap water screening levels is regarded as a highly conservative approach to COPC selection at SWMU 23 because surface water is not used as a potable water source.

Table 4-2 presents the screening criteria used for surface water.

Screening Levels for Sediment

Screening levels used to select COPCs for sediment were the same as those identified for soil. The use of residential soil screening levels to select COPCs for sediment is highly conservative because residential screening criteria assume that the receptor is exposed to soil 350 days of the year, whereas exposures to sediment would likely occur on a much less frequent basis.

Table 4-3 presents the screening criteria used for sediment.

Screening Levels for Chromium

Chromium speciation was not performed on the soil samples collected at SWMU 23. Therefore, for conservative purposes, chromium at the site was assumed to be in the hexavalent form, and the screening levels for hexavalent chromium were used for the selection of COPCs. It should be noted that there is no history of hexavalent chromium used at Building 36. Screening levels for trivalent chromium, the form of chromium likely to be present at the site, are presented in the COPC selection tables for comparison purposes.

Screening Levels for Petroleum Hydrocarbons

Samples were analyzed for DRO and gasoline range organics (GRO)., but there are no USEPA RSLs or IDEM screening levels for DRO or GRO. The absence of screening levels for DRO and GRO is not expected to introduce any significant uncertainty into this HHRA because the primary constituents that comprise DRO and GRO are included in the VOC and PAH analyses.

Background Evaluation

COPCs were also selected based on comparisons of concentrations detected in site samples to concentrations detected in facility background samples. If the maximum concentration of a chemical was less than the representative facility background concentration for soil and sediment, that chemical was not selected as a COPC. The background UTLs (representing 95-percent of the soil population with 95-percent confidence) for soil were used to aid in the determination as to whether metals are naturally occurring or are site-related contaminants. Background data for NSA Crane are described in the Final Base-Wide Background Soil Investigation Report (Tetra Tech, 2001) and are discussed in Section 2.1.

The elimination of chemicals as site-related COPCs on the basis of background comparisons in accordance with Navy Policy on the Use of Background Chemical Levels (2004). This document also presents the Navy's interpretation of USEPA guidance on the Role of Background in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Cleanup Program (USEPA, 2002c).

Chemicals present at concentrations exceeding risk-based screening criteria but not selected as COPCs on the basis of background are quantitatively evaluated in Section 4.4.3.4, which presents risks associated with site-related chemicals, risks for chemicals present at background concentrations, and a total site risk (site-related chemicals plus background chemicals).

4.1.3 Decision Rules for Establishing COPCs

The following decision rules were used to select initial lists of COPCs for SWMU 23:

- A chemical detected in soil was selected as a COPC for soil if the maximum detected concentration exceeded the screening level for soil and, for inorganics, if the background comparison indicated that the maximum site concentration is greater than the corresponding background concentration.

- A chemical detected in surface water was selected as a COPC for surface water if the maximum detected concentration in surface water exceeded the screening level for domestic use of a water supply.

- A chemical detected in sediment was selected as a COPC for sediment if the maximum detected concentration exceeded the screening level for residential exposures to soil and, for inorganics, if the background comparison indicated that the maximum site concentration is greater than the corresponding background concentration.

4.1.4 COPCs Selected for HHRA

COPCs were selected for surface soil, subsurface soil, surface water, and sediment using the risk-based COPC screening levels described in Section 4.1.2. A discussion of the chemicals identified as COPCs and rationales for COPC selection is provided in the following subsections. A discussion of the nature and extent of the chemicals detected in site media is presented in Section 2.0 and is not repeated in this section. COPC selection information for each medium is presented in Tables 4-4 through 4-7. RAGS Part D tables for COPC selection are included in Appendix C.2. A summary of the chemicals retained as COPCs is presented in Table 4-8.

4.1.4.1 Surface Soil

A comparison of maximum detected surface soil concentrations to screening levels based on RSLs and IDEM screening levels for residential exposures to soil is presented in Table 4-4. The following chemicals were detected at maximum concentrations exceeding direct contact COPC screening levels and were retained as COPCs for surface soil:

- PAHs – Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene

- PCBs – Aroclor-1254
- Metals – Arsenic and chromium

The maximum detected concentration of Aroclor-1254 exceeded the RSL based on a HQ of 0.1; however, it did not exceed the RSL based on an HQ of 1. Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and Aroclor-1254 exceeded screening criteria based on the RSLs, but were less than IDEM screening levels. Concentrations of cobalt also exceeded screening levels based on RSLs but were less than the NSA Crane background UTL and are not considered to be related to site activities; therefore, cobalt was not retained as a COPC for direct contact with surface soil.

4.1.4.2 Subsurface Soil

A comparison of maximum detected subsurface soil concentrations to screening levels based on RSLs and IDEM screening levels for residential exposures to soil is presented in Table 4-5. The following chemicals were detected at maximum concentrations exceeding direct contact COPC screening levels and were retained as COPCs for subsurface soil:

- PAHs – Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene
- Metals – Arsenic

Concentrations of chromium, cobalt, and vanadium also exceeded screening levels but were less than NSA Crane background UTLs and are not considered to be related to site activities; therefore, these chemicals were not retained as COPCs for direct contact with subsurface soil.

4.1.4.3 Surface Water

A comparison of maximum detected surface water concentrations to screening criteria based on the tap water RSL, IDEM screening levels for tap water, and USEPA MCLs is presented in Table 4-6. Arsenic, chromium, cobalt, and lead were detected at maximum concentrations in the unfiltered samples exceeding the COPC screening levels and were retained as COPCs for surface water. The maximum detected concentration of cobalt exceeded the RSL based on a HQ of 0.1; however, it did not exceed the RSL based on a HQ of 1. Concentrations of unfiltered arsenic and cobalt exceeded screening criteria based on the RSLs but were less than USEPA MCLs and IDEM screening levels, respectively. Concentrations of all metals in the filtered samples were less than screening levels.

4.1.4.4 Sediment

A comparison of maximum detected sediment concentrations to screening levels based on RSLs and IDEM screening levels for residential exposures to soil is presented in Table 4-7. The following chemicals were detected at maximum concentrations exceeding direct contact COPC screening levels and were retained as COPCs for sediment:

- PAHs – Benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene
- Metals – Arsenic, chromium, and cobalt

Concentrations of benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded the screening criteria based on the RSLs but were less than IDEM screening levels.

4.2 EXPOSURE ASSESSMENT

The exposure assessment 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 the site. The exposure assessment is designed to depict the physical setting of the site, to identify potentially exposed populations and applicable exposure pathways, to calculate concentrations of COPCs to which receptors might be exposed, and to estimate chemical intakes under the identified exposure scenarios.

Actual or potential exposures at SWMU 23 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.

4.2.1 Conceptual Site Model

A CSM facilitates consistent and comprehensive evaluation of 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 CSM depicts the relationships among the following elements:

- Site sources of contamination
- Contaminant release mechanisms and transport/migration pathways

- Exposure routes
- Potential receptors

The elements of the CSM 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.

Section 1.2 presents a discussion of the site location and history, Section 2.0 discusses site conditions with respect to residual contamination, Section 3.0 presents a discussion of contaminant fate and transport and the CSM for SWMU 23. Table 4-9 provides a site-specific summary of the potential receptors evaluated for SWMU 23, and a summary of the exposure routes addressed quantitatively for each human receptor is provided in Table 4-10.

Figure 4-1 illustrates the CSM for potential human receptors at SWMU 23. NSA Crane is an active Naval base with the Army as a major tenant and will remain active for the foreseeable future. Current site receptors include industrial and construction workers and adolescent trespassers. However, for purposes of completeness, the baseline risk assessment also considered 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 at the site:

- **Construction Workers** – A plausible receptor under current and future land use. No construction activities are currently planned for the study area; however, this receptor could be exposed to surface and subsurface soils (incidental ingestion, dermal contact), and air (inhalation) if construction activities were to occur in the future.

- **Industrial Worker** – A plausible receptor under current and future land use. This includes adult military or civilian personnel assigned to routine daily work tasks in the SWMU 23 area. This receptor could be exposed to surface soil (incidental ingestion, dermal contact) and air (inhalation). Industrial worker exposure to subsurface soil is unlikely; however, because future construction could potentially bring subsurface soil to the surface, exposure to subsurface soil via incidental ingestion, dermal contact, and inhalation was evaluated for this receptor to aid in risk management decisions.

- **Adolescent Trespassers** – A plausible receptor under current and future land use. Although access to the base is controlled, once inside the base, access to the site is not limited by any physical constraints. This receptor may be exposed to potentially contaminated surface soil (0 to 2 feet bgs)

(incidental ingestion, dermal contact), air (inhalation), surface water (incidental ingestion, dermal contact), and sediment (incidental ingestion, dermal contact) in the drainage ditches and intermittent streams. However, exposure to surface water is likely to be limited in some areas because of the intermittent nature of the surface water in the streams at the site, and potential exposures to surface water would be limited to wading because the streams at the sites are not deep enough for swimming. Trespasser exposure to subsurface soil is unlikely; however, because future construction could potentially bring subsurface soil to the surface, exposure to subsurface soil via incidental ingestion, dermal contact, and inhalation was evaluated for this receptor to aid in risk management decisions.

- **Recreational Users** – A plausible receptor under future land use. NSA 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. However, if NSA Crane were to close, the property could be converted to a park. A recreational user may be exposed to potentially contaminated surface soil (0 to 2 feet bgs) (incidental ingestion, dermal contact), air (inhalation), surface water (incidental ingestion, dermal contact), and sediment (incidental ingestion, dermal contact). Exposures to surface water would be limited to wading because the streams at the sites are not deep enough for swimming. Recreational exposure to subsurface soil is unlikely; however, because future construction could potentially bring subsurface soil to the surface, exposure to subsurface soil via incidental ingestion, dermal contact, and inhalation was evaluated for this receptor to aid in risk management decisions.

- **Residents (Child and Adult)** – Given the anticipated future land use for much of SWMU 23 (commercial/industrial), residents are very unlikely future receptors. However, the hypothetical 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, dermal contact), surface water (ingestion, dermal contact), air (inhalation), and sediment (incidental ingestion, dermal contact). Potential exposures to surface water would be limited to wading because the streams at the sites are not deep enough for swimming. Receptor exposure to subsurface soil would only occur if subsurface soil was excavated and deposited on existing surface soil. Although this is an unlikely scenario, it is included in this HHRA for purposes of completeness and to assist risk managers in assessing the need for deed restrictions.

4.2.2 Central Tendency Exposure versus Reasonable Maximum Exposure

Traditionally, exposures evaluated in the HHRA were based on the concept of RME only, which is defined as "the maximum exposure that is reasonably expected to occur at a site" (USEPA, 1989). However,

subsequent risk assessment guidance (USEPA, 1992) indicates the need to address an average case or CTE. To provide a full characterization of potential exposure, both RME and CTE scenarios were evaluated in the HHRA for SWMU 23. The available guidance (USEPA, 1993a) concerning the evaluation of CTE is limited. Therefore, professional judgment was exercised when defining CTE conditions for a particular receptor.

4.2.3 Exposure Point Concentrations

The EPC, which is calculated for COPCs only, is an estimate of the chemical concentration within an exposure unit (EU). The EPC is assumed to be the concentration to which the receptor is exposed and is used to estimate exposure intakes. An EU is the area over which receptor activity is expected to occur.

The following guidelines were used to calculate EPCs:

- For surface soil, subsurface soil, surface water, and sediment, the 95-percent upper confidence limit (UCL) on the arithmetic mean, which is based on the distribution of the data set, was selected as the EPC. EPCs were calculated following USEPA's guidance for calculating confidence limits for EPCs (USEPA, 2002b) and using USEPA's ProUCL software Version 5.0.00. If ProUCL was unable to calculate an UCL or if the recommended UCL exceeded the maximum detected concentration, the maximum detected concentration was used as the EPC. The uncertainty associated with using the maximum detected concentration as the EPC is discussed in the uncertainty analysis in Section 4.5.2.

- Non-detected values were evaluated in accordance with the ProUCL guidance.

- The same EPCs were used for both the RME and CTE scenarios.

Table 4-11 summarizes the EPCs for soil. ProUCL Outputs are included in Appendix C.3. RAGS Part D Tables for the EPCs are presented in Appendix C.2.

4.2.4 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 USEPA risk assessment guidance and are presented in the risk assessment spreadsheets. Risk assessment results are presented using USEPA RAGS Part D table format. Noncarcinogenic intakes were estimated using the concept of an

average annual exposure. Carcinogenic intakes were calculated as incremental lifetime exposures, which assume a life expectancy of 70 years.

The exposure assumptions presented in Tables 4-12 and 4-13 for the RME and CTE scenarios, respectively, reflect current USEPA and IDEM risk assessment guidance. The majority of the exposure assumptions used to estimate chemical intakes were based on default assumptions described in several USEPA guidance documents (e.g., USEPA, 1989, 2004, 2011a, and 2014). The following paragraphs discuss the non-default receptor-specific exposure assumptions used in the risk assessment.

4.2.4.1 Incidental Ingestion of Soil and Sediment

Direct physical contact with soil and sediment may result in the incidental ingestion of chemicals. Chemical intake for the incidental ingestion of soil/sediment is estimated in the following manner (USEPA, 1989):

$$\text{Intake} = \frac{(C_s)(RBA)(IR)(FI)(EF)(ED)(CF)}{(BW)(AT)}$$

where:

Intake	=	intake of chemical from soil or sediment (mg/kg/day)
C_s	=	concentration of chemical in soil or sediment (mg/kg)
RBA	=	relative bioavailability (unitless)
IR	=	ingestion rate (mg/day)
FI	=	fraction ingested from contaminated source (dimensionless)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
CF	=	conversion factor (1×10^{-6} kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days);
		for noncarcinogens, AT = ED x 365 days/year
		for carcinogens, AT = 70 years x 365 days/year

Most of the exposure assumptions used to estimate chemical intakes from incidental ingestion of soil/sediment were based on default assumptions described in standard USEPA guidance and are summarized in Tables 4-12 and 4-13. The following paragraphs briefly discuss the non-default receptor-specific exposure assumptions for incidental ingestion of soil/sediment that were used in the HHRA.

The selected exposure frequency assumptions consider anticipated receptor activities at SWMU 23. It was assumed that construction workers assigned to future construction projects at SWMU 23 would be exposed to soil for 5 days per week over 30 weeks (150 days per year) for 1 year under the RME scenario. The exposure frequency for the CTE scenario was assumed to be 50 percent of the RME or 75 days per year. Child and adult recreational users were assumed to be exposed to soil and sediment 2 days per week during the summer months (52 days per year) under the RME scenario and one day per week (26 days per year) under the CTE scenario. The adolescent trespasser was assumed to be exposed to soil and sediment on a somewhat less frequent basis (26 and 13 days per year for the RME and CTE cases, respectively). Hypothetical child and adult residents were assumed to be exposed to soil and sediment 2 days per week during the summer months (52 days per year) under the RME scenario and one day per week (26 days per year) under the CTE scenario. A value of 0.6 was used for the relative bioavailability (RBA) for arsenic (USEPA, 2012b), and a value of 1 was used for the RBA for all other chemicals.

4.2.4.2 Dermal Contact with Soil or Sediment

Direct physical contact with soil or sediment may result in the dermal absorption of chemicals. Exposure associated with dermal contact with soil/sediment is estimated in the following manner (USEPA, 1989):

$$DAD = \frac{(C_s)(SA)(AF)(ABS)(CF)(EF)(ED)}{(BW)(AT)}$$

where:

DAD	=	dermally absorbed dose, amount of chemical absorbed during contact with soil or sediment (mg/kg/day)
C_s	=	concentration of chemical in soil or sediment (mg/kg)
SA	=	skin surface area available for contact (cm^2/day)
AF	=	skin adherence factor (mg/cm^2)
ABS	=	absorption factor (dimensionless)
CF	=	conversion factor (1×10^{-6} kg/mg)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
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

Most of the exposure assumptions used to estimate chemical intakes from dermal contact with soil/sediment were based on the default assumptions described in standard USEPA guidance and are summarized in Tables 4-12 and 4-13. The following paragraphs briefly discuss non-default receptor-specific exposure assumptions for dermal contact with soil/sediment that were used in the HHRA.

The exposed skin surface areas of the body available for dermal contact with soil/sediment were determined on a receptor-specific basis because they correspond with assumed human activities and clothing worn during exposure events. With the exception of the skin surface area recommended for adolescent trespassers, all of the skin surface areas presented in Tables 4-12 and 4-13 are based on USEPA default values. For adolescent trespassers, the skin surface area is assumed to be 3,750 square centimeters (cm^2) for the RME and CTE scenarios (USEPA, 2011b). This value assumes the head, forearms, hands, and lower legs are exposed. The calculations used to derive this value are provided in Appendix C.4.

The exposure frequencies and durations recommended for the evaluation of incidental ingestion of soil/sediment were also used to estimate chemical intakes for dermal contact with soil/sediment. The soil/sediment adherence factors presented are those in Exhibits 3.3 and 3.5 of RAGS Part E. To the extent possible, chemical-specific dermal absorption factors provided in RAGS Part E were used to evaluate the COPCs for soil/sediment. However, dermal absorption factors are only available for the short list of chemicals in Exhibit 3-4 of RAGS Part E. In addition, as indicated in RAGS Part E, absorption factors for metals other than arsenic and cadmium have not been developed because of insufficient data to support default values. Therefore, ABSs were set equal to zero for these chemicals, and 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. The dermal absorption factors used in this HHRA are presented in Table 4-14.

4.2.4.3 Inhalation of Air Containing Fugitive Dust/Volatiles Emitted from Soil

Intakes of both particulates and vapors/gases are calculated using the same equation, as follows (USEPA, 2009):

$$EC = \frac{(C_{air})(ET)(EF)(ED)}{AT \times 24 \text{ hours / day}}$$

where:

EC	=	exposure concentration (mg/m^3)
C_{air}	=	concentration of chemical in air (mg/m^3)

ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
AT	=	averaging time (hours);
	=	for noncarcinogens, AT = ED x 365 days/year
	=	for carcinogens, AT = 70 years x 365 days/year

Some of the exposure assumptions used to estimate chemical intakes from inhalation of fugitive dusts/volatile emissions from surface and subsurface soil were based on default assumptions described in standard USEPA guidance and are summarized in Tables 4-12 and 4-13. The exposure frequencies and durations used to estimate incidental ingestion of soil intakes were also used to estimate exposure via inhalation of fugitive dust/volatile emissions for surface and subsurface soil.

The concentrations of chemicals in air resulting from emissions from soil are developed following procedures presented in USEPA Soil Screening Guidance (USEPA, 2002a). Chemical concentrations in air were calculated as follows:

$$C_{air} = C_{soil} \times \left[\frac{1}{PEF} + \frac{1}{VF} \right]$$

where:

C_{air}	=	chemical concentration in air (mg/m^3)
C_{soil}	=	chemical concentration in soil (mg/kg)
PEF	=	Particulate emission factor (m^3/kg)
VF	=	volatilization factor (m^3/kg)

The particulate emissions factor (PEF) relates the concentration of the chemical in soil to the concentration of dust particles in air. A PEF value of 1.316 x 10^{+9} was used for the SWMU 23 HHRA (USEPA, 2002a). Because air emissions resulting from fugitive dust emissions will be different than dust emissions generated during construction activities, a separate PEF was used for construction activities. The PEF for construction workers (1.34 x 10^{+6} m^3/kg) was calculated using the equations presented in the supplemental SSL guidance document (USEPA, 2002a). Sample calculations showing how the PEFs were calculated are presented in Appendix C.5.

Ambient air concentrations resulting from the volatilization of COPCs from soil are chemical dependent and were calculated using the following equation from USEPA's Soil Screening Guidance:

$$VF = \frac{Q/C \times (3.14 \times D_a \times T)^{0.5} \times 10^{-4}\ (m^2/cm^2)}{(2 \times \rho_b \times D_a)}$$

and

$$D_a = \frac{[(\theta_a^{10/3} \times D_i \times H' + \theta_w^{10/3} \times D_w)/n^2]}{\rho_b \times K_d + \theta_w + \theta_a \times H'}$$

where:

VF	=	volatilization factor (m^3-air/kg-soil)
Q/C	=	inverse of the mean concentration at the center of source (gm/m^2-sec per kg/m^3)
D_a	=	apparent diffusivity, chemical specific, (cm^2/sec)
T	=	exposure interval, exposure specific, (sec)
ρ_b	=	dry bulk soil particle density (g/cm^3)
θ_a	=	air-filled soil porosity (L_{air}/L_{soil})
D_i	=	diffusivity in air, chemical specific, (cm^2/sec)
H'	=	dimensionless Henry's law constant, chemical specific
n	=	total soil porosity (L_{pore}/L_{soil})
θ_w	=	water-filled soil porosity (L_{air}/L_{soil})
D_w	=	diffusivity in water, chemical specific, (cm^2/sec)
K_d	=	soil-water partition coefficient, chemical specific

A chemical is considered to be volatile if its vapor pressure is greater than 1 millimeter (mm) mercury or if its Henry's Law Constant is greater than 1 x 10^{-5} atm-m^3/mole (USEPA, 2015). Chemical properties were obtained from the current USEPA RSL table (2015) and are presented in Table 4-15.

4.2.4.4 Incidental Ingestion of Surface Water

Hypothetical residents, recreational users, and trespassers may incidentally ingest surface water while at SWMU 23. Intakes associated with ingestion of surface water were evaluated using the following equation (USEPA, 1989):

$$\text{Intake} = \frac{(C_W)(CF)(IR_W)(EF)(ED)}{(BW)(AT)}$$

where:

Intake	=	intake of chemical from surface water (mg/kg/day)
C_w	=	concentration of chemical in surface water (µg/L)
CF	=	conversion factor (0.001 mg/µg)
IR_w	=	surface water ingestion rate (L/day) = (CR)(ET)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
CR	=	contact rate (L/hour)
ET	=	exposure time (hours/day)
BW	=	body weight (kg)
AT	=	averaging time (days);
		for noncarcinogens, AT = ED x 365 days/year
		for carcinogens, AT = 70 years x 365 days/year

The following paragraphs briefly discuss non-default receptor-specific exposure assumptions for ingestion of surface water that were used in the HHRA.

Trespassers, recreational users, and residents were assumed to be exposed to surface water 4 hours per day under the RME scenario and 2 hours per day under the CTE scenario. It was assumed that trespassers, recreational users, and hypothetical residents would incidentally ingest 0.01 liters per hour (USEPA, 2011a) of surface water under the RME and CTE scenarios. The exposure frequencies and durations recommended for the evaluation of incidental ingestion of sediment were also used to estimate chemical intakes for incidental ingestion of surface water.

A summary of the receptor-specific input values used to estimate chemical intakes from ingestion of surface water are presented in Tables 4-12 and 4-13.

4.2.4.5 Dermal Contact with Surface Water

Trespassers, recreational users, and hypothetical residents may have dermal contact with surface water while wading in the stream at SWMU 23. The following equation was used to assess exposures resulting from dermal contact with surface water (USEPA, 2004):

$$DAD = \frac{(DA_{event})(EV)(ED)(EF)(SA)}{(BW)(AT)}$$

where:

DAD	=	dermally absorbed dose of chemical from water (mg/kg/day)
DA_{event}	=	dermally absorbed dose per event (mg/cm^2-event)
EV	=	event frequency (events/day)
ED	=	exposure duration (years)
EF	=	exposure frequency (days/year)
SA	=	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

For trespassers, recreational users, and residents exposed to surface water, 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.

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:

$$\text{If } t_{event} < t^*, \text{ then}: DA_{event} = (2)(K_p)(FA)(C_W)(CF)\left(\sqrt{\frac{6\tau t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then}: DA_{event} = (K_p)(FA)(C_W)(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

where:

t_{event}	=	duration of event (hours/event)
t*	=	time to reach steady-state conditions (hours)
K_p	=	permeability coefficient from water through skin (cm/hour)
FA	=	chemical-specific fraction absorbed (dimensionless)
C_w	=	concentration of chemical in water (mg/L)
CF	=	conversion factor (0.001 L/cm^3)
τ	=	lag time (hours)
π	=	Pi (dimensionless; equal to 3.1416)
B	=	Dimensionless ratio of the permeability of the stratum corneum relative to the permeability across the viable epidermis (dimensionless)

Values for the chemical-specific parameters (t*, K_p, FA, τ, and B) were obtained from the current dermal guidance (USEPA, 2004, Exhibit B-3) and are presented in Table 4-14. If published values were not available for a particular compound, they were calculated using equations provided in the USEPA dermal guidance.

The following steady-state equation was used to estimate DA_{event} for inorganics:

$$DA_{event} = (K_p)(C_W)(t_{event})$$

The dermal permeability coefficient (K_p) values recommended in the USEPA dermal guidance (2004) were used to calculate DA_{event} for inorganic COPCs.

4.2.4.6 Assessing Cancer Risks from Early Life Exposures

USEPA's guidance for assessing early-life exposure to carcinogens (USEPA, 2005g) recommends making adjustments to reflect the toxicity of carcinogenic chemicals that act via the mutagenic mode of action when evaluating early-life exposures. The guidance recommends using age-dependent adjustment factors (ADAFs) combined with age-specific exposure estimates when assessing cancer risks. In the absence of chemical-specific data, the supplemental guidance recommends the following, which reflect the fact that cancer risks are generally greater from early-life exposures than from similar exposures later in life:

- For exposures before 2 years of age (i.e., spanning a 2-year interval from the first day of birth until a child's second birthday), a 10-fold adjustment.
- For exposures between 2 and 16 years of age (i.e., spanning a 14-year time interval from a child's second birthday until their sixteenth birthday), a three-fold adjustment.
- For exposures after turning 16 years of age, no adjustment.

The adjustments were applied using the same method as that used by Oak Ridge National Laboratory (ORNL) in the development of RSLs. Children were evaluated as two age groups, ages 0 to 2 years and ages 2 to 6 years, and adults were evaluated as two age groups, ages 6 to 16, and ages greater than 16 years old. Using this approach, the intakes for child and adult recreational users and hypothetical residents were calculated as follows:

$$\text{Intake}_{\text{Child}} = \text{Intake}_{(\text{ages } 0 - 2 \text{ years})} \times 10 + \text{Intake}_{(\text{ages } 2 - 6 \text{ years})} \times 3$$

$$\text{Intake}_{\text{Adult}} = \text{Intake}_{(\text{ages } 6 - 16 \text{ years})} \times 3 + \text{Intake}_{(\text{ages} > 16 \text{ years})}$$

And the intakes for adolescent trespassers were calculated as follows:

$$\text{Intake}_{\text{Adolescent}} = \text{Intake}_{(\text{age } 6 - 16 \text{ years})} \times 3$$

The above approach was used only for those chemicals that are identified as mutagenic in the ORNL screening table (e.g., carcinogenic PAHs and hexavalent chromium). Sample calculations showing how this approach was applied are included in Appendix C.5.

4.3 TOXICITY ASSESSMENT

The toxicity assessment weighs the evidence regarding the potential for exposure to chemicals to produce adverse effects in exposed receptors, and when possible, the assessment estimates the relationship between the exposure to a chemical and the increased likelihood and/or severity of adverse effects. 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 constituents of concern. Quantitative toxicity values determined during this component of the risk assessment are integrated with exposure assessment outputs to characterize the potential occurrence of adverse health effects for each receptor group.

The reference dose (RfD) is the toxicity value used to evaluate noncarcinogenic health effects for ingestion and dermal exposures. The reference concentration (RfC) is used to evaluate noncarcinogenic health effects for inhalation exposures. The RfD and RfC estimate a daily exposure level for a human population that is unlikely to pose an appreciable risk during a portion or for all of a human lifetime. They are based on a review of animal and/or human toxicity data, with adjustments for various data uncertainties. Carcinogenic effects are quantified using the cancer slope factor (CSF) for ingestion and dermal exposures and using inhalation unit risks (IURs) for inhalation exposures that are plausible upper-bound estimates of the probability of the development of cancer per unit intake of the chemical over a lifetime. These are typically based on dose-response data from human and/or animal studies.

4.3.1 <u>Toxicity Criteria for Oral and Inhalation Exposures</u>

Oral RfDs and CSFs and inhalation RfCs and IURs used in this HHRA were obtained from the following primary USEPA literature sources (2003b):

- Tier 1: Integrated Risk Information System (IRIS) – This is USEPA's online data base that is continuously updated. Toxicity values that are presented have been verified by USEPA.

- Tier 2: USEPA 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 USEPA's Superfund program.

- Tier 3: Other Toxicity Values – These sources include but are not limited to California Environmental Protection Agency (Cal EPA) toxicity values, Agency for Toxic Substances and Disease Registry (ATSDR) values, and the Annual Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997b).

Although toxicity criteria can be found in several toxicological sources, USEPA's IRIS online database, Tier 1, is the preferred source of toxicity values. If no toxicity criteria were available in IRIS, PPRTVs, Tier 2 values, were used. Tier 3 resources were used if no toxicity criteria were available for Tier 1 and 2 resources. The toxicity criteria for the constituents selected as COPCs are presented in Tables 4-16 through 4-19.

4.3.2 Toxicity Criteria for Dermal Exposure

RfDs and CSFs in the scientific literature are typically expressed as "administered" (i.e., not absorbed) doses. Therefore, these values are considered inappropriate for estimating risks associated with dermal exposures. Oral dose-response parameters based on administered doses must be adjusted to absorbed doses before they can be compared to estimated dermal exposure intakes.

When oral absorption is essentially complete (i.e., 100 percent), an absorbed dose is equivalent to the administered dose and therefore no toxicity adjustment is necessary. Conversely, when the gastrointestinal absorption of a chemical is poor (e.g., 1 percent), the absorbed dose is smaller than the administered dose; thus, toxicity factors based on absorbed dose should be adjusted to account for the difference in the absorbed dose relative to the administered dose. USEPA (2004) recommends a 50-percent absorption cut-off to reflect the intrinsic variability in analyzing absorption studies. Therefore, the adjustment from administered to absorbed dose was only performed when the chemical-specific gastrointestinal absorption efficiency was less than 50 percent. The adjustment from administered to absorbed dose was made using

chemical-specific gastrointestinal absorption efficiencies published in numerous sources of guidance [e.g., (USEPA, 2004), IRIS, ATSDR toxicological profiles, etc.), using the following equations:

$$RfD_{dermal} = (RfD_{oral})(ABS_{GI})$$

$$CSF_{dermal} = (CSF_{oral})/(ABS_{GI})$$

where:	RfD_{dermal}	=	RfD for the dermal route of exposure
	RfD_{oral}	=	RfD for the oral route of exposure
	ABS_{GI}	=	absorption efficiency in the gastrointestinal tract
	CSF_{dermal}	=	CSF for the dermal route of exposure
	CSF_{oral}	=	CSF of the oral route of exposure

As noted above, the preceding adjustment of the oral toxicity criteria (e.g., RfDs, CSFs) was necessary to allow quantitative evaluation of the dermal route of exposure in the baseline risk assessment. An explanation of this procedure and the need for this procedure are presented in Appendix A of USEPA RAGS Part A (1989).

4.3.3 Toxicity of Chromium

Toxicity criteria are available for different forms of chromium (trivalent and hexavalent), and the hexavalent form is considered to be more toxic. In the absence of speciating chromium into its different valence states, it was conservatively assumed that the all of the chromium detected in SWMU 23 samples was in the hexavalent form. Hexavalent chromium has carcinogenic and noncarcinogenic toxicity factors. Additionally, hexavalent chromium is a carcinogen that potentially acts via a mutagenic mode of action. USEPA Guidelines for Carcinogen Risk Assessment (2005f) and Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005g) specify the use of ADAFs for carcinogens that act via a mutagenic mode of action. No chemical-specific ADAF is available for hexavalent chromium; therefore, USEPA's default ADAFs were applied to the carcinogenic intakes for hexavalent chromium. The following default ADAFs should be applied: 10 for ages 0 to 2, 3 for ages 2 to 16, and 1 (no adjustment) for ages 16 to 70. Noncarcinogenic effects were evaluated in the same way as for other noncarcinogens in accordance with USEPA's risk assessment guidance (1989).

4.3.4 Toxicity Criteria for the Carcinogenic Effects of PAHs

Limited toxicity values are available to evaluate the carcinogenic effects of exposure to PAHs. The most extensively studied PAH is benzo(a)pyrene, which is classified by USEPA as a probable human carcinogen.

Although CSFs are available for benzo(a)pyrene, insufficient data are available to calculate CSFs for other carcinogenic PAHs. Toxic effects for these chemicals were evaluated using toxic equivalency factors (TEFs) based on the potency of each compound relative to that of benzo(a)pyrene, as presented in current USEPA guidance (USEPA, 1993c). The equivalent oral CSF for a carcinogenic PAH other than benzo(a)pyrene is derived by multiplying the CSF for benzo(a)pyrene by the TEF recommended for that PAH. TEFs for the individual carcinogenic PAHs are as follows:

Compound	TEF
Benzo(a)anthracene	0.1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenzo(a,h)anthracene	1
Indeno(1,2,3-cd)pyrene	0.1

Carcinogenic PAHs potentially act via a mutagenic mode of action. USEPA Guidelines for Carcinogen Risk Assessment (2005f) and Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005g) specify the use of ADAFs for carcinogens that act via a mutagenic mode of action. No chemical-specific ADAFs are available for carcinogenic PAHs; therefore, USEPA's default ADAFs are applied to the carcinogenic intakes for the carcinogenic PAHs. The following default ADAFs were applied: 10 for ages 0 to 2, 3 for ages 2 to 16, and 1 (no adjustment) for ages 16 to 70.

4.4 RISK CHARACTERIZATION

This section provides a characterization of human health risks associated with potential exposures to residual concentrations of COPCs at SWMU 23. Potential risks (noncarcinogenic and carcinogenic) for human receptors resulting from exposures outlined in the exposure assessment were quantitatively determined and are discussed in this section. Section 4.4.1 outlines the methods used to quantitatively estimate the type and magnitude of potential risks for human receptors. Section 4.4.2 identifies the risk benchmarks used to evaluate quantitative estimates of risk for noncarcinogens and carcinogens. Summaries of the risk characterization for SWMU 23 are provided in Section 4.4.3. A qualitative evaluation of the migration of soil chemicals to groundwater is presented in Section 4.4.4.

4.4.1 Quantitative Analysis

Quantitative estimates of risk for COPCs were calculated according to risk assessment methods outlined in USEPA guidance (1989). Lifetime cancer risks are expressed in the form of dimensionless probabilities, referred to as ILCRs, based on CSFs and IURs. Noncarcinogenic risk estimates are presented in the form of HQs that are determined through a comparison of intakes with published RfDs and RfCs.

ILCR estimates for ingestion and dermal exposures were generated for each COPC using estimated exposure intakes and published CSFs, as follows:

$$\text{ILCR} = (\text{Estimated Exposure Intake})(\text{CSF})$$

ILCR estimates for inhalation exposures were generated for each COPC using estimated exposure concentrations and published IURs, as follows:

$$\text{ILCR} = (\text{IUR})(\text{Exposure Concentration})(1{,}000\ \mu\text{g/mg})$$

An ILCR of 1×10^{-6} indicates that the exposed receptor has a one-in-one-million chance of developing cancer under the defined exposure scenario. Alternatively, such a risk may be interpreted as representing one additional case of cancer in an exposed population of one million people.

Noncarcinogenic risks were assessed using the concept of HQs and HIs. The HQ for a COPC is the ratio of the estimated intake to the RfD and is calculated for ingestion and dermal exposures as follows:

$$\text{HQ} = (\text{Estimated Exposure Intake})/(\text{RfD})$$

For inhalation exposures, HQs are calculated as follows:

$$\text{HQ} = (\text{Exposure Concentration})/(\text{RfC})$$

An HI was generated by summing the individual HQs for all COPCs. The HI is not a mathematical prediction of the severity of toxic effects and therefore is not a true "risk"; it is simply a numerical indicator of the possibility of the occurrence of noncarcinogenic (threshold) effects.

4.4.2 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 risk benchmarks for carcinogens and noncarcinogens.

For carcinogens, calculated ILCRs were interpreted using USEPA's target cancer risk range (1×10^{-6} to 1×10^{-4}). USEPA has defined the range of 1×10^{-6} to 1×10^{-4} as the target cancer risk range for most hazardous waste facilities addressed under CERCLA and RCRA. IDEM has defined this same risk range for the non-default evaluation under their Risk Integrated System of Closure (RISC) program. Individual or cumulative ILCRs greater than 1×10^{-4} are typically not considered as protective of human health, and ILCRs less than 1×10^{-6} are typically regarded as protective. Risk management decisions are necessary when the ILCR is within the 1×10^{-4} to 1×10^{-6} cancer risk range.

An HI exceeding unity (1) indicates that there may be potential noncarcinogenic health risks associated with exposure. If an HI exceeds unity, a segregation of target organ effects associated with exposure to COPCs is typically performed. Only those chemicals that affect the same target organ(s) or exhibit similar critical effect(s) are regarded as truly additive. Consequently, it may be possible for a cumulative HI to exceed 1, but no adverse health effects are anticipated if the COPCs do not affect the same target organ or exhibit the same critical effect.

A chemical was retained as a COC if the total ILCR for a medium exceeded 1×10^{-4} and the chemical-specific ILCR exceeded 1×10^{-6} or if the total HI on a target organ basis exceeded 1 and the chemical-specific HI exceeded 0.1.

4.4.3 Results of the Risk Characterization

This section contains a summary of the results of the risk characterization for SWMU 23. Quantitative risk estimates for potential human receptors were developed for COPC detected in soil, surface water, and sediment under current site conditions (i.e., following IM activities). Uncertainties associated with the risk estimates are discussed in Section 4.5. The methodology used to calculate the risks presented in this section is provided in Sections 4.2 and 4.3. Potential carcinogenic and noncarcinogenic risks were calculated for current/future construction workers, industrial workers, adolescent trespassers, future child and adult recreational users, and hypothetical future residents under the RME and CTE scenarios. These risks are summarized in Tables 4-20 and 4-21 and illustrated on Figures 4-2 through 4-9. Sample calculations are presented in Appendix C.5, and the results of the risk assessment in RAGS Part D format are included in Appendix C.2.

4.4.3.1 Noncarcinogenic Risks

Tables 4-20 and 4-21 and Figures 4-2 through 4-5 present the HIs for the RME and CTE scenarios at SWMU 23. Cumulative HIs for all receptors under the RME and CTE scenarios were less than unity (1), indicating that adverse noncarcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

4.4.3.2 Carcinogenic Risks

Tables 4-20 and 4-21 and Figures 4-6 through 4-9 present the ILCRs for the RME and CTE scenarios at SWMU 23. With the exception of child and lifelong residents under the RME, cumulative risks for all receptors were either within USEPA's and IDEM's target cancer risk range of 1×10^{-6} to 1×10^{-4} or less than 1×10^{-6}. The RME ILCRs for hypothetical child and lifelong residents exposed to subsurface soil (via incidental ingestion) were equal to the upper bound of USEPA's and IDEM's target cancer risk range, 1×10^{-4}.

The most significant contributors to the 1×10^{-4} ILCR for hypothetical child and lifelong residents under the RME include PAHs [benzo(a)anthracene, benzo(a)pyrene, dibenzo(a.h)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene] in subsurface soil. As discussed in Section 2.2.4, the maximum concentrations of PAHs were observed in soil from 2 to 4 feet bgs and 4 to 6 feet bgs at location 23SB068 (see Figure 2-3). The concentrations of PAHs at this location are not indicative of contamination across the entire site; elevated PAH concentrations [greater than 1.5 mg/kg benzo(a)pyrene equivalents] are, in fact, isolated to a small area, which is depicted on Figures 2-4 and 2-5 according to soil intervals.

The risks for PAHs are overstated under the RME scenario because of bias introduced by location 23SB068. The uncertainty associated with the overestimation of risks for PAHs under this scenario is further evaluated in the uncertainty section of this report. Section 4.5.2 contains a discussion of the area-weighted average concentration for benzo(a)pyrene equivalents and the level of risk posed by this concentration.

4.4.3.4 Lead Risks

Lead was identified as a COPC in surface water only at SWMU 23. The maximum detected concentration in surface water (16.3 µg/L) slightly exceeded the IDEM tap water screening level and federal Action Level of 15 µg/L promulgated under the Safe Drinking Water Act.

There is no methodology available for estimating risks from exposures to lead in surface water that is not used for domestic purposes and is intermittent in nature. Lead was detected in three of six surface water samples. Concentrations of total lead only exceeded the federal Action Level and IDEM screening level of 15 µg/L in the sample collected from location 23SW001 (16.3 µg/L), which is the most upgradient surface water sampling location. This location is believed not to have been affected by site operations, indicating that lead in this sample is attributable to upgradient off-site sources rather than site activities. Lead was not detected in the associated filtered sample. The average lead concentration of 3.2 µg/L was less than the federal Action Level and IDEM screening level. Although the concentration of lead in one surface water sample exceeded the federal Action Level and IDEM screening level, exposure to lead in surface water is not considered to be a significant exposure pathway. Surface water is only present in the streams at SWMU 23 after precipitation events. Consequently, the surface water cannot be used as a domestic water source, and incidental ingestion of such water is unlikely. Any contact with surface water in the drainageways is expected to be very infrequent. Also, dermal exposure to lead in water is considered to be insignificant (ATSDR, 1999). Therefore, lead in not selected as a COC for surface water because exposure is not expected to be significant for the identified receptor groups and exposure scenarios.

4.4.3.4 Risk Estimates Due to Chemicals Attributable to Background

As discussed in Section 4.1.2, chemicals detected at maximum concentrations exceeding COPC screening levels but less than naturally occurring concentrations were not retained as COPCs and were not evaluated in the risk assessment presented in Sections 4.4.3.1 and 4.4.3.2. Cobalt was detected at concentrations less than background levels in surface soil, and chromium, cobalt, and vanadium were detected at concentrations less than background levels in subsurface soil. Table 4-22 presents the ILCRs and HIs associated with these metals. RAGS Part D tables for these chemicals are presented in Appendix C.6.

HIs for all receptors exposed to chemicals present at naturally occurring levels in surface soil and subsurface soil under RME and CTE scenarios were less than the acceptable level of 1. ILCRs for all receptors exposed to chemicals present at naturally occurring levels in surface soil and subsurface soil were within USEPA's and IDEM's target cancer risk range for the RME and CTE scenarios.

4.4.4 Qualitative Evaluation of Migration from Soil to Groundwater

The potential for chemicals to migrate from soil to groundwater was evaluated by comparing maximum detected chemical concentrations in soil to USEPA risk-based SSLs and IDEM screening levels for groundwater protection that were designed to be protective of groundwater at most sites. The USEPA

SSLs are based on a dilution attenuation factor (DAF) of 1 and an ILCR of 1 x 10^{-6} or an HI of 1. For comparison with site soil concentrations, the USEPA SSLs were multiplied by a factor of 20 to represent a DAF of 20. A DAF of 20 was selected because USEPA's Soil Screening Guidance (1996a) states, "the USEPA has selected a default DAF of 20 to account for contaminant dilution and attenuation during transport through the saturated zone to a compliance point (i.e., receptor well). At most sites, this adjustment will more accurately reflect a contaminant's threat to groundwater resources than assuming a DAF of 1 (i.e., no dilution or attenuation)." The guidance further states, "a DAF of 20 is protective for sources up to 0.5 acres in size," and "can be protective of larger sources as well." The IDEM criterion is based on a DAF of 20 and the MCL, if one is available. If an MCL is not available, the IDEM criterion is based on an ILCR of 1 x 10^{-5} or an HI of 1.

Tables 4-23 and 4-24 present comparisons of surface soil and subsurface soil concentrations, respectively, to USEPA SSLs and IDEM screening levels for chemical migration from soil to groundwater. The following chemicals were detected in surface soil at maximum concentrations exceeding screening levels for migration from soil to groundwater:

- VOCs – 1,2-Dichloroethane, chloroform, trans-1,4-dichloro-2-butene.
- PAHs – 1-Methylnaphthalene, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and naphthalene.
- PCBs – Aroclor-1254 and Aroclor-1260.
- Metals – Arsenic, chromium, cobalt, lead, mercury.

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

- VOC – Vinyl chloride.
- PAHs – 1-Methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene.
- Metals – Arsenic, chromium, and cobalt.

For VOCs, concentrations of 1,2-dichloroethane and chloroform in surface soil and vinyl chloride in subsurface soil exceeded USEPA risk-based SSLs but were less than IDEM MCL-based screening levels. 1,2-Dichloroethane was detected in only four surface soil samples, chloroform and trans-1,4-dichloro-2-butene were detected in only one surface soil sample, and vinyl chloride was only detected in one subsurface soil sample. The low frequencies of detection indicate there is not a large source area of VOC

contamination in surface and subsurface soil at SWMU 23. Consequently, no VOCs were retained as COCs for migration from surface soil and subsurface soil to groundwater at SWMU 23.

Concentrations of PAHs in surface soil and subsurface soil exceeded USEPA SSLs infrequently, with the exception of benzo(a)anthracene and benzo(a)pyrene. As discussed in Section 3.0, the heavier molecular weight PAHs [e.g., benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene] are relatively immobile in soil and are preferentially bound to soil. 1-Methylnaphthalene, 2-methylnaphthalene, and naphthalene only exceeded IDEM screening levels in one surface soil sample. PAHs in subsurface soil only exceeded IDEM screening levels in the two samples collected from location 23SB068. As discussed in Section 2.2.4, the PAH contamination at location 23SB068 comprises only a small area, indicating there is not a large source of PAH contamination in subsurface soil. Consequently, no PAHs were retained as COCs for migration from surface soil and subsurface soil to groundwater at SWMU 23.

Concentrations of Aroclor-1254 in one surface soil sample and Aroclor-1260 in two surface soil samples exceeded USEPA SSLs but were less than IDEM screening levels. The available data indicate there is not a large source of Aroclor contamination in surface and subsurface soil. In addition, Aroclors are relatively immobile in soil, which is demonstrated by the fact that no Aroclors were detected in subsurface soil at SWMU 23. Consequently, Aroclor-1254 and Aroclor-1260 were not retained as COCs for migration from surface soil and subsurface soil to groundwater at SWMU 23.

Concentrations of cobalt in surface soil and chromium and cobalt in subsurface soil were less than background levels. Concentrations of arsenic and chromium in surface soil only exceeded the background UTL in one sample, and concentrations of arsenic in subsurface soil only exceeded the background UTL in two samples. This indicates that concentrations of arsenic and chromium in surface and subsurface soil are generally less than background levels. In addition, chromium was evaluated as hexavalent chromium in this HHRA. If chromium had been evaluated as trivalent chromium, concentrations of chromium in surface and subsurface soil would be less than USEPA and IDEM screening levels in all samples. Lead concentrations only exceeded USEPA and IDEM screening levels in one surface soil sample, as shown in Tables 4-23 and 4-24. Mercury concentrations exceeded the USEPA risk-based MCL in one surface soil sample but was less than the IDEM MCL-based screening level in all surface soil samples. The available data indicate there is not a large source area of metals contamination in surface soil and subsurface soil at SWMU 23. Consequently, no metals were retained as COCs for migration from surface soil and subsurface soil to groundwater.

4.5 UNCERTAINTY ANALYSIS

There is uncertainty associated with all aspects of the HHRA. A summary of the uncertainties, including a discussion of how they may affect the final risk estimates, is provided in this section.

Uncertainty in the selection of COPCs is related to the current status of the predictive databases; the grouping of samples; the numbers, types, and distributions of samples; and the procedures used to include or exclude constituents as COPCs. Uncertainty associated with the exposure assessment includes the values used as input variables for a given intake route or scenario, the assumptions made to determine EPCs, and the predictions regarding future land use and population characteristics. Uncertainty in the toxicity assessment includes the quality of the existing toxicity data needed to support dose-response relationships, and the weight of evidence used to determine the carcinogenicity of COPCs. Uncertainty in risk characterization includes that associated with exposure to multiple chemicals and the cumulative uncertainty from combining conservative assumptions made in earlier steps of the risk assessment process.

Whereas there are various sources of uncertainty, the direction of uncertainty can be influenced by the assumptions made throughout the risk assessment, including selection of COPCs and selection of values for dose-response relationships. Throughout the entire risk assessment, assumptions are biased toward a margin of safety so that the final calculated risks are overestimated.

Generally, risk assessments carry two types of uncertainties, measurement and informational uncertainties. Measurement uncertainty refers to the usual variance that accompanies scientific measurements. For example, this type of uncertainty is associated with analytical data collected for the site. The risk assessment reflects the accumulated variances of the individual values used. Informational uncertainty stems from inadequate availability of information needed to complete the toxicity and exposure assessments. Often, this gap is significant, such as the absence of information on the effects of human exposure to low doses of a chemical, on the biological mechanism of action of a chemical, or the behavior of a chemical in soil.

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 must be made to ensure that the particular assumptions made are protective of sensitive subpopulations or the maximum exposed individuals. If a number of conservative assumptions are combined in an exposure model, the resulting calculations can propagate the uncertainties associated with those assumptions,

thereby producing a much larger uncertainty for the final results. This uncertainty is biased toward over-predicting both carcinogenic and noncarcinogenic risks. Thus, both the results of the risk assessment and the uncertainties associated with those results must be considered when making risk management decisions.

This interpretation is especially relevant when the risks exceed the point of departure for defining "acceptable" risk. For example, when risks calculated using a high degree of uncertainty are less than an acceptable risk level (i.e., 1×10^{-6} to 1×10^{-4}), 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., 1×10^{-4}), a conclusion can be difficult unless uncertainty is considered.

4.5.1 Uncertainty in Data Evaluation

The most significant issue related to uncertainty in the data evaluation is the usability of the existing database. A brief discussion of the uncertainty in the data evaluation is provided in the remainder of this section.

Usability of Existing Database

All the chemical data used in the HHRA were validated. The qualification of data during the formal data validation process is not expected to compromise the results of the HHRA. Analytical data qualified as estimated were utilized, even though detected concentrations or sample-specific quantitation limits may be somewhat imprecise. The use of estimated data adds to the uncertainty associated with the risk assessment; however, the associated uncertainty is expected to be negligible compared to the other uncertainties inherent in the risk evaluation process (i.e., uncertainties with land uses, exposure scenarios, toxicological criteria, etc.). Because all data have been validated, the uncertainty in the calculated risks associated with the chemical data is minimal.

4.5.2 Uncertainty in the Exposure Assessment

Uncertainty in the exposure assessment arises because of the determination of land use, the methods used to calculate or estimate EPCs, the selection of potential receptors and scenarios, and the selection of exposure parameters. Each of these is discussed below.

Land Use

The current land use patterns at NSA Crane are well established, thereby limiting the uncertainty associated with land use assumptions. Land use at SWMU 23 is currently limited and is expected to be limited in the future, as long as NSA remains open (industrial workers, construction workers, and adolescent trespassers are the only current and likely future receptors). A large portion of the site is located on the side of a hill. Even if the site were to be redeveloped in the future, only a small portion could be used for industrial or residential use. To be conservative, risks to potential future recreational users and hypothetical future residents were estimated for the site.

Exposure Point Concentrations

There were an insufficient number of samples to calculate UCLc for surface water; therefore, maximum detected concentrations were used as EPCs. Use of maximum concentrations tends to overestimate potential risks because receptors are assumed to be exposed continuously to maximum concentrations for the entire exposure period. In addition, there is uncertainty associated with the use of 95-percent UCLs on the mean concentrations as EPCs. As a result of using 95-percent UCLs, the estimations of potential risk for the RME scenario are most likely overstated because these values are representations of the upper limits that potential receptors would be exposed to over the entire exposure period.

As discussed in Section 4.2.3, the EPCs for soil and sediment were calculated using USEPA's ProUCL software. All the statistical methods used in ProUCL are based on the assumption of random sampling. As seen in Figure 1-4, the sample locations at SWMU 23 are not random but biased toward areas of suspected contamination, which would tend to overestimate the EPCs. Also, the UCLs calculated with ProUCL assume that receptors will be exposed to each sampling location equally and do not account for the spatial distribution of the sampling points. Some sampling locations represent larger areas than other sampling points. However, the bias that this approach creates is unknown.

The uncertainty associated with deriving EPCs is significant with respect to the evaluation of the risks associated with PAHs in subsurface soil at SWMU 23. ILCRs for child and lifelong residents exposed to subsurface soil were 1×10^{-4}, which is equal to the upper bound of USEPA's and IDEM's target cancer risk range. Carcinogenic PAHs at location 23SB068 were the main contributor to the ILCRs. As discussed in Section 2.2.4, location 23SB068 represents a small area of the site, and the elevated PAHs concentrations at this location cause the UCL to be biased high. A site-weighted average benzo(a)pyrene equivalent concentration was calculated using Thiessen polygons and is considered to be a better representation of the EPC for the site than the UCL. Appendix C.7 presents the site-weighted average concentration based

on the Thiessen polygon evaluation. The site-weighted average concentration for benzo(a)pyrene equivalents in subsurface soil is 0.196 mg/kg, which corresponds to an ILCR of 1×10^{-5}, which is an order of magnitude less than the ILCR of 1×10^{-4} that was calculated based on the (unweighted) UCL. Consequently, the use of an unweighted UCL as the EPC results in an overestimation of the ILCR, and the actual risks for exposures to subsurface soil are likely to be lower than those presented in Tables 4-20 and 4-21.

Exposure Routes and Receptor Identification

The determination of various receptor groups and exposure routes of potential concern was based on current land use at the site and anticipated future land use. Therefore, the uncertainty associated with the selection of exposure routes and potential receptors is minimal because the current and future uses are considered to be well defined.

Exposure Parameters

Each exposure factor (for RME and CTE scenarios) selected for use in the risk assessment has some associated uncertainty. Generally, exposure factors are based on surveys of physiological parameters and lifestyle profiles across the United States. The attributes and activities studied in these surveys generally have a broad distribution. To avoid underestimation of exposure, in most cases, USEPA guidelines (1993a and 2014) on the RME receptor were used, which generally specify the use of the 95th percentile for most parameters. Therefore, the selected values for the RME receptor represent the upper bound of the observed or expected habits of the majority of the population.

Although the default exposure assumptions for residents and industrial workers are upper bound values, they are also very conservative. For example, the default exposure assumptions for a resident assume that the resident is exposed to soil for 350 days per year. There is no seasonal adjustment accounting for a resident being indoors part of the year due to weather. Although it is possible for a resident to be exposed to indoor dust that consists of outdoor soil that was brought into a house, it is realistic to assume that most residents clean their houses occasionally. Therefore, it is highly conservative to assume that a resident is exposed to soil for 350 days per year. Likewise, the exposure assumptions for an industrial worker assume that the worker is exposed to soil for 250 days per year. This would only be likely for a worker who works outdoors all year round. Most workers work in factories or commercial buildings and would not be exposed to outdoor soil on a regular basis. And, as with the resident, although it is possible for a worker to be exposed to outdoor soil that is brought indoors, it is unrealistic to assume that factories and commercial

buildings are not cleaned at least occasionally. Therefore, the default exposure assumptions for residents and industrial workers are highly conservative and more likely overestimate risk than underestimate risk.

Many of the exposure parameters used to calculate exposures and risks in this report are selected from a distribution of possible values, including USEPA guidance (1993a, 2004, 2011b, and 2014). For the RME scenario, the value representing the 95th percentile was generally selected for each parameter to ensure that the assessment bounds the actual risks from a postulated exposure. This risk number is used in risk management decisions but does not indicate what a more average or typical exposure might be or what risk range might be expected for individuals in the exposed population. To address these issues, USEPA (1992) suggested the use of the CTE receptor, whose intake variables are often set at approximately the 50th percentile of the distribution. The risks for this receptor seek to incorporate the range of uncertainty associated with various intake assumptions. Some of the parameters presented in this risk assessment were estimated using professional judgment, although USEPA does provide limited guidance for the CTE evaluation (USEPA, 1993a).

4.5.3 Uncertainty in the Toxicological Evaluation

Uncertainties associated with the toxicity assessment, including determination of RfDs and CSFs and use of available criteria, are discussed in this section.

Derivation of Toxicity Criteria

Uncertainty associated with the toxicity assessment is associated with hazard assessment and dose-response evaluations for the COPCs. The hazard assessment deals with characterizing the nature and strength of the evidence of causation, or the likelihood that a chemical that induces adverse effects in animals will also induce adverse effects in humans. Hazard assessment of carcinogenicity is evaluated as a weight-of-evidence determination using USEPA 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.

Uncertainty in hazard assessment arises from the nature and quality of the animal and human data. Uncertainty is reduced when similar effects are observed across species, strain, sex, and exposure route; when the magnitude of the response is clearly dose related; when pharmacokinetic data indicate a similar fate in humans and animals; when postulated mechanisms of toxicity are similar for humans and animals; and when the COPC is structurally similar to other chemicals for which the toxicity is more completely characterized.

Uncertainty in the dose-response evaluation includes the determination of a CSF for the carcinogenic assessment. Uncertainty is introduced from interspecies (animal-to-human) extrapolation, which in the absence of quantitative pharmacokinetic or mechanistic data, is usually based on consideration of interspecies differences in basal metabolic rate. Uncertainty also results from intraspecies variation. Most toxicity experiments are performed with animals that are very similar in age and genotype, so intragroup biological variation is minimal, but the human population of concern may reflect a great deal of heterogeneity, including unusual sensitivity or tolerance to the COPC. Even toxicity data from human occupational exposure reflect a bias because only those individuals sufficiently healthy to attend work regularly (the "healthy worker effect") and those not unusually sensitive to the chemical are likely to be occupationally exposed. Finally, uncertainty arises from the quality of the key study from which the quantitative estimate is derived and the toxicity database. For cancer effects, the uncertainty associated with dose-response factors is mitigated by assuming the 95-percent upper bound for the slope factor. Another source of uncertainty in carcinogenic assessment is the method by which data from high doses in animal studies are extrapolated to the dose range expected for environmentally exposed humans. The linearized multistage model, which is used in nearly all quantitative estimations of human risk from animal data, is based on a non-threshold assumption of carcinogenesis. Evidence suggests, however, that epigenetic carcinogens, as well as many genotoxic carcinogens, have a threshold below which they are noncarcinogenic. Therefore, the use of the linearized multistage model is conservative for chemicals that exhibit a threshold for carcinogenicity.

Uncertainty with the Use of ADAF

ADAFs are applied as default safety factors to risk calculations when evaluating cancer risk associated with exposure by children between the ages of birth to 16 years to chemicals that are carcinogenic via a mutagenic mode of action. USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposures to Carcinogens (2005g) states that the ADAFs should be used when chemical-specific data to evaluate differences between adults and children are unavailable.

Inherent within the use of ADAFs is uncertainty in the evaluation of risk. Specifically, the default ADAFs were derived from studies where exposures were much greater than those typically observed in the environment. Hence, the mutagenic potential of a chemical at typical environmental concentrations may be much less and may be offset by deoxyribonucleic acid (DNA) repair mechanisms. Moreover, the default ADAFs were based on results of repeated exposure studies because the lifetime study design had less ability to distinguish potential increased susceptibility from early-life exposures. Finally, cell replication can vary for different tissues, thus making the window of susceptibility different for individual chemicals,

depending on target tissues. Hence, using the same ADAF for all chemicals may clearly misrepresent the level of risk associated with exposure.

Use of Chronic Toxicity Values for Construction Workers

Under the guidelines established by the Superfund program, the 1-year exposure duration assumed for the construction worker should be evaluated as a subchronic exposure. Risks for noncarcinogenic effects associated with subchronic exposures should be developed using subchronic toxicity criteria, not chronic toxicity values. Subchronic toxicity values used in this HHRA were obtained from USEPA's PPRTV internet site if available. Subchronic ATSDR Minimal Risk Levels (MRLs) were used as subchronic toxicity values when subchronic PPRTV values were not available. However, subchronic toxicity values are not as widely available as chronic toxicity values (e.g., subchronic toxicity criteria are not currently available for aluminum and manganese). Therefore, chronic toxicity values were used when subchronic toxicity values were not available. This likely resulted in an overestimation of potential noncarcinogenic risks for the construction worker receptor because subchronic toxicity values may be up to an order of magnitude greater than chronic toxicity values.

4.5.4 Uncertainty in the Risk Characterization

Uncertainty in risk characterization results from assumptions made regarding additivity of effects from exposure to multiple COPCs from various exposure routes. High uncertainty exists when summing noncancer risks for several substances across different exposure pathways. This assumes that each substance has a similar effect and/or mode of action. Even when chemicals affect the same target organs, they may have different mechanisms of action or differ in their fate in the body, so additivity may not be an appropriate assumption. The assumption of additivity in this risk characterization was considered acceptable because, in most cases, it represented a conservative estimate of risk.

Risks to any individual may also have been overestimated by summing multiple assumed exposure pathway risks for any single receptor. Although every effort was made to develop reasonable scenarios, not all individual receptors may be exposed via all pathways considered.

Also, the risk characterization did not consider antagonistic or synergistic effects. Little or no information was available to determine the potential for antagonism or synergism for the COPCs. Because chemical-specific interactions could not be predicted, the likelihood for risks to be over-predicted or under-predicted could not be defined, but the methodology used was based on current USEPA guidance.

4.6 HUMAN HEALTH RISK ASSESSMENT SUMMARY

This section summarizes the results of the baseline HHRA for SWMU 23, which was performed to characterize the potential risks to current and future potential human receptors under current site conditions (i.e., following IM activities).

Potential receptors under current and future land use are industrial workers, construction workers, and trespassers. Potential receptors under future land use are child and adult recreational users and hypothetical child and adult residents. Although future land use is likely to be the same as current land use, the potential future receptors were evaluated in the baseline HHRA primarily for decision-making purposes.

Chemicals retained as COPCs are summarized in Table 4-8. PAHs, Aroclor-1254, and metals were retained as COPCs in soil. PAHs and metals were retained as COPCs in sediment from the drainageways. Metals were retained as COPCs in surface water from the drainageways.

Quantitative estimates of noncarcinogenic and carcinogenic risks (HIs and ILCRs, respectively) for COPCs were developed for potential human receptors directly contacting site media; these risks are presented in Tables 4-20 and 4-21. Cumulative HIs for all receptors under the RME and CTE scenarios were less than unity (1), indicating that adverse noncarcinogenic effects are not anticipated for these receptors under the defined exposure conditions. Cumulative ILCRs for all receptors, with the exception of hypothetical child and lifelong residents under the RME, were either within USEPA's and IDEM's target cancer risk range of 1×10^{-4} to 1×10^{-6} or less than 1×10^{-6}. ILCRs for hypothetical child and lifelong residents exposed to subsurface soil were equal to the upper bound of USEPA's and IDEM's target cancer risk range, 1×10^{-4}; the most significant contributors to these ILCRs are PAHs in subsurface soil. However, risk estimates for PAHs are likely overstated by an order or magnitude because of the bias introduced by elevated PAH concentrations at one location, 23SB068.

Additionally, lead was identified as a COPC for surface water at SWMU 23. A quantitative evaluation of the risks associated with this chemical could not be completed because there is no methodology available for estimating exposure to water than is not used for domestic purposes. Although the maximum detected concentration in surface water (16.3 µg/L at location 23SW001) slightly exceeded the IDEM tap water screening level and federal Action Level of 15 µg/L promulgated under the Safe Drinking Water Act (for water used for domestic purposes), exposure to lead in surface water is not a significant exposure pathway because flow within the drainageways is intermittent, and anticipated exposure is expected to be infrequent.

An evaluation of the migration of soil chemicals to groundwater was also conducted. Although some chemical concentrations in surface soil and subsurface soil exceeded USEPA and IDEM criteria, no chemicals were retained as COCs because there is not a significant source of contamination at the site (i.e., exceedances were observed in only a few samples, metals concentrations were generally similar to NSA Crane background conditions, and elevated PAH concentrations are limited to a small area).

TABLE 4-1

SCREENING CRITERIA USED IN SELECTION OF COPCs - SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS No.	Chemical	USEPA RSL[1] (mg/kg)		IDEM Screening Level[2] (mg/kg)	
		Direct Contact Residential	Protection of Groundwater	Direct Contact Residential	Migration to Groundwater
Volatile Organic Compounds					
107-06-2	1,2-Dichloroethane	0.46 C	0.00096 C	6.4 C	0.028 M
78-93-3	2-Butanone	2,700 N	24 N	28,000 S	23 N
67-64-1	Acetone	6,100 N	58 N	85,000 N	57 N
71-43-2	Benzene	1.2 C	0.0046 C	17 C	0.051 M
75-15-0	Carbon Disulfide	77 N	4.8 N	740 S	4.8 N
67-66-3	Chloroform	0.32 C	0.0012 C	4.5 C	0.44 M
156-59-2	cis-1,2-Dichloroethene	16 N	0.22 N	220 N	0.41 M
75-09-2	Methylene Chloride	35 N	0.058 C	490 N	0.025 M
127-18-4	Tetrachloroethene	8.1 N	0.10 C	110 N	0.045 M
108-88-3	Toluene	490 N	15 N	820 S	14 M
110-57-6	trans-1,4-Dichloro-2-Butene	0.0074 C	0.000012 C	0.1 C	0.00012 C
75-01-4	Vinyl Chloride	0.059 C	0.00013 C	0.83 C	0.014 M
Polycyclic Aromatic Hydrocarbons					
90-12-0	1-Methylnaphthalene	0.16 C	2.6 C	240 C	1.2 C
91-57-6	2-Methylnaphthalene	24 N	3.8 N	320 N	3.7 N
83-32-9	Acenaphthene	360 N	110 N	4,900 N	110 N
208-96-8	Acenaphthylene	360 N[3]	110 N[3]	NA	NA
120-12-7	Anthracene	1,800 N	1,200 N	24,000 N	1,200 N
56-55-3	Benzo(a)anthracene	0.16 C	0.085 C	2.1 C	2.4 C
50-32-8	Benzo(a)pyrene	0.016 C	0.08 C	0.21 C	4.7 M
205-99-2	Benzo(b)fluoranthene	0.16 C	0.82 C	2.1 C	8.2 C
191-24-2	Benzo(g,h,i)perylene	180 N[4]	260 N[4]	NA	NA
207-08-9	Benzo(k)fluoranthene	1.6 C	8 C	21 C	80 C
218-01-9	Chrysene	16 C	24 C	210 C	250 C
53-70-3	Dibenzo(a,h)anthracene	0.016 C	0.26 C	0.21 C	2.6 C
206-44-0	Fluoranthene	240 N	1,800 N	3,200 N	1,800 N
86-73-7	Fluorene	240 N	110 N	3,200 N	110 N
193-39-5	Indeno(1,2,3-cd)pyrene	0.16 C	2.6 C	2.1 C	47 C
91-20-3	Naphthalene	3.8 C	0.011 C	53 C	0.11 C
85-01-8	Phenanthrene	180 N[4]	260 N[4]	NA	NA
129-00-0	Pyrene	180 N	260 N	2,400 N	260 N
Polychlorinated Biphenyls					
11097-69-1	Aroclor-1254	0.12 N	0.04 C	1.5 N	2 C
11096-82-5	Aroclor-1260	0.24 C	0.11 C	3.4 C	5.5 C
Metals					
7440-36-0	Antimony	3.1 N	7 N	43 N	5.4 M
7440-38-2	Arsenic	0.68 C	0.03 C	9.4 C	5.9 M
7440-39-3	Barium	1,500 N	3,200 N	21,000 N	1,700 M
7440-41-7	Beryllium	16 N	380 N	220 N	63 M
7440-43-9	Cadmium	7.1 N	14 N	98 N	7.5 M
7440-47-3	Chromium	0.3 C[5][6]	0.013 C[5][7]	4.2 C[5][8]	0.14 C[5][9]
7440-48-4	Cobalt	2.3 N	5.4 N	32 N	5.4 N
7440-50-8	Copper	310 N	560 N	4,300 N	920 M
7439-92-1	Lead	400	280 [10]	400	270 N
7439-97-6	Mercury	2.3 N[11]	0.66 N[12]	32 N	2.1 M
7440-02-0	Nickel	150 N	520 N	2,100 N	510 N
7782-49-2	Selenium	39 N	10 N	550 N	5.3 M
7440-22-4	Silver	39 N	16 N	550 N	16 N
7440-62-2	Vanadium	39 N	1,700 N	550 N	1,700 N
7440-66-6	Zinc	2,300 N	7,400 N	32,000 N	7,500 N

TABLE 4-2

SCREENING CRITERIA USED IN SELECTION OF COPCs - SURFACE WATER
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS No.	Chemical	USEPA Tap Water RSL[1] (µg/L)	USEPA MCL[2] (µg/L)	IDEM Groundwater Residential Screening Level[3] (µg/L)
Metals				
7440-38-2	Arsenic	0.052 C	10	10 M
7440-39-3	Barium	380 N	2,000	2,000 M
7440-47-3	Chromium	0.035 C[4][5]	100	0.35 C[4][6]
7440-48-4	Cobalt	0.6 N	NA	6 N
7440-50-8	Copper	80 N	1,300 [7]	1,300 M
7439-92-1	Lead	15	15 [7]	15 M
7440-02-0	Nickel	39 N	NA	390 N
7440-62-2	Vanadium	8.6 N	NA	86 N
7440-66-6	Zinc	600 N	NA	6,000 N

Footnotes:

1 - USEPA RSLs for Chemical Contaminants at Superfund Sites (2015). Values are based on a cancer risk of $1x10^{-6}$ or a hazard quotient of 0.1.
2 - 2012 Edition of the Drinking Water Standards and Health Advisories (USEPA, 2012a).
3 - IDEM Closure Guide (2015). Values are based on a cancer risk of $1x10^{-5}$ or a hazard quotient of 1.
4 - Value is for hexavalent chromium.
5 - Value for trivalent chromium, which is provided for comparison purposes, is 2,200 µg/L.
6 - Value for trivalent chromium, which is provided for comparison purposes, is 22,000 µg/L.
7 - The MCL for this chemical is actually a treatment technique. The SDWA Action Level (at the tap) has been presented.

Abbreviations:

C - Based on carcinogenic endpoint
CAS - Chemical Abstracts Service
IDEM - Indiana Department of Environmental Management
M - Based on maximum contaminant limit for groundwater
MCL - Maximum Contaminant Level
N - Based on noncarcinogenic endpoint
RSL - Regional Screening Level
SDWA - Safe Water Drinking Act
USEPA - United States Environmental Protection Agency

TABLE 4-1

SCREENING CRITERIA USED IN SELECTION OF COPCs - SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS No.	Chemical	USEPA RSL[1] (mg/kg)		IDEM Screening Level[2] (mg/kg)	
		Direct Contact Residential	Protection of Groundwater	Direct Contact Residential	Migration to Groundwater
Miscellaneous Parameters					
-	Sulfate	NA	NA	NA	NA
Petroleum Hydrocarbons					
-	DRO, C08-C28	NA [13]	NA [13]	NA [13]	NA [13]
-	DRO, C08-C34	NA [13]	NA [13]	NA [13]	NA [13]
-	Gasoline Range Organics	NA [13]	NA [13]	NA [13]	NA [13]

Footnotes:
1 - USEPA RSLs for Chemical Contaminants at Superfund Site (2015). Direct contact values are based on a cancer risk of $1x10^{-6}$ or a hazard quotient of 0.1. Protection-of-groundwater values are risk-based SSLs and have been multiplied by 20 to represent a DAF of 20. Protection of groundwater values are based on a cancer risk of $1x10^{-6}$ or a hazard quotient of 1.
2 - IDEM Closure Guide (2015). Direct contact residential values are based on a cancer risk of $1x10^{-5}$ or a hazard quotient of 1. Migration-to-groundwater values are based on a DAF of 20.
3 - Value is for acenaphthene.
4 - Value is for pyrene.
5 - Value is for hexavalent chromium.
6 - Value for trivalent chromium, which is included for comparison purposes, is 12,000 mg/kg.
7 - Value for trivalent chromium, which is included for comparison purposes, is 80,000,000 mg/kg.
8 - Value for trivalent chromium, which is included for comparison purposes, is 100,000 mg/kg.
9 - Value for trivalent chromium, which is included for comparison purposes, is 1,000,000 mg/kg.
10 - Value is based on the federal MCL.
11 - Value is for mercuric chloride (and other mercury salts).
12 - There is no SSL for mercuric chloride. Value is for elemental mercury.
13 - This general parameter, which is comprised of a range of organic chemicals, is evaluated by the chemical-specific results.

Abbreviations:
C - Based on carcinogenic endpoint
CAS - Chemical Abstracts Service
COPCs - Chemicals of potential concern
DAF - Dilution attenuation factor
DRO - Diesel range organics
IDEM - Indiana Department of Environmental Management
M - Based on MCL
MCL - Maximum Contaminant Level
N - Based on noncarcinogenic endpoint
PCBs - Polychlorinated biphenyls
RSL - Regional Screening Level
S - Capped at soil saturation limit
SSL - Soil Screening Level
USEPA - United States Environmental Protection Agency

TABLE 4-3

SCREENING CRITERIA USED IN SELECTION OF COPCs - SEDIMENT
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS No.	Chemical	USEPA Direct Contact Residential RSL[1] (mg/kg)	IDEM Soil Direct Contact Screening Level[2] (mg/kg)
Volatile Organic Compounds			
79-01-6	Trichloroethene	0.41 N	5.7 N
Polycyclic Aromatic Hydrocarbons			
91-57-6	2-Methylnaphthalene	24 N	320 N
208-96-8	Acenaphthylene	360 N[3]	NA
50-32-8	Benzo(a)pyrene	0.016 C	0.21 C
205-99-2	Benzo(b)fluoranthene	0.16 C	2.1 C
191-24-2	Benzo(g,h,i)perylene	180 N[4]	NA
207-08-9	Benzo(k)fluoranthene	1.6 C	21 C
218-01-9	Chrysene	16 C	210 C
53-70-3	Dibenzo(a,h)anthracene	0.016 C	0.21 C
206-44-0	Fluoranthene	240 N	3,200 N
193-39-5	Indeno(1,2,3-cd)pyrene	0.16 C	2.1 C
85-01-8	Phenanthrene	180 N[4]	NA
129-00-0	Pyrene	180 N	2,400 N
Polychlorinated Biphenyls			
11097-69-1	Aroclor-1254	0.12 N	1.5 N
11096-82-5	Aroclor-1260	0.24 C	3.4 C
Metals			
7440-38-2	Arsenic	0.68 C	9.4 C
7440-39-3	Barium	1,500 N	21,000 N
7440-41-7	Beryllium	16 N	220 N
7440-43-9	Cadmium	7.1 N	98 N
7440-47-3	Chromium	0.3 C[5][6]	4.2 C[5][7]
7440-48-4	Cobalt	2.3 N	32 N
7440-50-8	Copper	310 N	4,300 N
7439-92-1	Lead	400	400
7439-97-6	Mercury	2.3 N[8]	32 N[8]
7440-02-0	Nickel	150 N	2,100 N
7440-22-4	Silver	39 N	550 N
7440-62-2	Vanadium	39 N	550 N
7440-66-6	Zinc	2,300 N	32,000 N

Notes:

1 - USEPA RSLs for Chemical Contaminants at Superfund Sites (2015). Values are based on a cancer risk of $1x10^{-6}$ or a hazard quotient of 0.1.
2 - IDEM Closure Guide (2015). Values are based on a cancer risk of $1x10^{-5}$ or a hazard quotient of 1.
3 - Value is for acenaphthene.
4 - Value is for pyrene.
5 - Value is for hexavalent chromium.
6 - Value for trivalent chromium, which is provided for comparison purposes, is 12,000 mg/kg.
7 - Value for trivalent chromium, which is provided for comparison purposes, is 100,000 mg/kg.
8 - Value is for mercuric chloride (and other mercury salts).

Abbreviations:

C - Based on a carcinogenic endpoint
CAS - Chemical Abstracts Service
COPCs - Chemicals of potential concern
IDEM - Indiana Department of Environmental Management
N - Based on a noncarcinogenic endpoint
RSL - Regional Screening Level
USEPA - United States Environmental Protection Agency

TABLE 4-4

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Non-Detects[1]	Concentration Used for Screening[2]	Background Upper Tolerance Limit[3]	USEPA Residential Soil RSL[4]	IDEM Screening Level Residential Soil[5]	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
Volatile Organic Compounds													
107-06-2	1,2-Dichloroethane	0.00124 J	0.00153 J	mg/kg	23SS023-0002	4/16	0.00244 - 0.108	0.00153	NA	0.46 C	6.4 C	No	BSL
78-93-3	2-Butanone	0.00592 J	0.0405 J	mg/kg	23SS001-0002	3/16	0.00483 - 0.216	0.0405	NA	2,700 N	28,000 S	No	BSL
67-64-1	Acetone	0.00733 J	0.234 J	mg/kg	23SS001-0002	9/16	0.00967 - 0.433	0.234	NA	6,100 N	85,000 N	No	BSL
71-43-2	Benzene	0.0018 J	0.0018 J	mg/kg	23SS001-0002	1/21	0.00242 - 0.108	0.0018	NA	1.2 C	17 C	No	BSL
75-15-0	Carbon Disulfide	0.00888 J	0.00888 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00888	NA	77 N	740 S	No	BSL
67-66-3	Chloroform	0.00514 J	0.00514 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00514	NA	0.32 C	4.5 C	No	BSL
127-18-4	Tetrachloroethene	0.00539 J	0.00539 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00539	NA	8.1 N	110 N	No	BSL
108-88-3	Toluene	0.0094 J	0.0094 J	mg/kg	23SS001-0002	1/21	0.00242 - 0.108	0.0094	NA	490 N	820 S	No	BSL
110-57-6	trans-1,4-Dichloro-2-Butene	0.004 J	0.004 J	mg/kg	23SS023-0002	1/16	0.00242 - 0.108	0.004	NA	0.0074 C	0.1 C	No	BSL
Polycyclic Aromatic Hydrocarbons													
90-12-0	1-Methylnaphthalene	2.5	2.5	mg/kg	23SS070-0002	1/22	0.0038 - 0.043	2.5	NA	18 C	240 C	No	BSL
91-57-6	2-Methylnaphthalene	6.8	6.8	mg/kg	23SS070-0002	1/49	0.00366 - 0.162	6.8	NA	24 N	320 N	No	BSL
83-32-9	Acenaphthene	0.082 J	0.15	mg/kg	23SS091-0002	2/49	0.00366 - 0.162	0.15	NA	360 N	4,900 N	No	BSL
208-96-8	Acenaphthylene	0.0041 J	0.0077	mg/kg	23SS074-0002	3/49	0.00366 - 0.162	0.0077	NA	360 N[7]	NA	No	BSL
120-12-7	Anthracene	0.041 J	0.37	mg/kg	23SS091-0002	6/49	0.00367 - 0.162	0.37	NA	1,800 N	24,000 N	No	BSL
56-55-3	**Benzo(a)anthracene**	0.0041 J	0.99	mg/kg	23SS091-0002	27/49	0.0038 - 0.162	0.99	NA	**0.16 C**	2.1 C	**Yes**	ASL
50-32-8	**Benzo(a)pyrene**	0.0023 J	0.97	mg/kg	23SS091-0002	30/49	0.00373 - 0.162	0.97	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
205-99-2	**Benzo(b)fluoranthene**	0.0043 J	1.3	mg/kg	23SS091-0002	35/49	0.0038 - 0.162	1.3	NA	**0.16 C**	2.1 C	**Yes**	ASL
191-24-2	Benzo(g,h,i)perylene	0.00568 J	0.71	mg/kg	23SS091-0002	27/49	0.00373 - 0.162	0.71	NA	180 N[8]	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	0.0024 J	0.63	mg/kg	23SS091-0002	31/49	0.00373 - 0.162	0.63	NA	1.6 C	21 C	No	BSL
218-01-9	Chrysene	0.0041 J	1	mg/kg	23SS091-0002	30/49	0.0038 - 0.162	1	NA	16 C	210 C	No	BSL
53-70-3	**Dibenzo(a,h)anthracene**	0.00671 J	0.23	mg/kg	23SS091-0002	13/49	0.00373 - 0.162	0.23	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
206-44-0	Fluoranthene	0.0047 J	1.9	mg/kg	23SS091-0002	33/49	0.0038 - 0.162	1.9	NA	240 N	3,200 N	No	BSL
86-73-7	Fluorene	0.099	0.17	mg/kg	23SS091-0002	2/49	0.00366 - 0.162	0.17	NA	240 N	3,200 N	No	BSL
193-39-5	**Indeno(1,2,3-cd)pyrene**	0.00493 J	0.5	mg/kg	23SS091-0002	26/49	0.00373 - 0.162	0.5	NA	**0.16 C**	2.1 C	**Yes**	ASL
91-20-3	Naphthalene	0.95	0.95	mg/kg	23SS070-0002	1/49	0.00366 - 0.162	0.95	NA	3.8 C	53 C	No	BSL
85-01-8	Phenanthrene	0.0044 J	1.4	mg/kg	23SS091-0002	18/49	0.0038 - 0.162	1.4	NA	180 N[8]	NA	No	BSL
129-00-0	Pyrene	0.0081	2 J	mg/kg	23SS091-0002	30/49	0.0038 - 0.162	2	NA	180 N	2,400 N	No	BSL
Pesticides/Polychlorinated Biphenyls													
11097-69-1	**Aroclor-1254**	0.00127 J	0.191 J	mg/kg	23SS001-0002	6/16	0.00184 - 0.0384	0.191	NA	**0.12 N**	1.5 N	**Yes**	ASL
11096-82-5	Aroclor-1260	0.00208 J	0.186 J	mg/kg	23SS001-0002	10/16	0.00184 - 0.00204	0.186	NA	0.24 C	3.4 C	No	BSL
Metals													
7440-38-2	**Arsenic**	2.3	17.8	mg/kg	23SS035-0002	26/26	--	17.8	**11.83**	**0.68 C**	**9.4 C**	**Yes**	ASL
7440-39-3	Barium	12.4	115	mg/kg	23SS007-0002	26/26	--	115	211	1,500 N	21,000 N	No	BSL, BKG
7440-41-7	Beryllium	0.327 J	0.963 J	mg/kg	23SS020-0002	20/26	0.362 - 0.572	0.963	**0.93**	16 N	220 N	No	BSL
7440-43-9	Cadmium	0.0645 J	0.345 J	mg/kg	23SS013-0002	2/26	0.118 - 0.704	0.345	6.05	7.1 N	98 N	No	BSL, BKG
7440-47-3	**Chromium**	4.92	29.5 J	mg/kg	23SS001-0002	26/26	--	29.5	**28.7**	**0.3 C[9][10]**	**4.2 C[9][11]**	**Yes[12]**	ASL
7440-48-4	Cobalt	2.5	15.4 J	mg/kg	23SS037-0002	26/26	--	15.4	32.4	**2.3 N**	32 N	No	BKG
7440-50-8	Copper	3.35	39.8	mg/kg	23SS001-0002	26/26	--	39.8	**17.6**	310 N	4,300 N	No	BSL
7439-92-1	Lead	2.33	345	mg/kg	23SS013-0002	48/48	--	345	**27**	400	400	No	BSL
7439-97-6	Mercury	0.0209 J	0.692 J	mg/kg	23SS001-0002	20/26	0.0332 - 0.249	0.692	**0.077**	2.3 N[13]	3.1 S	No	BSL
7440-02-0	Nickel	5.33	19.4	mg/kg	23SS020-0002	26/26	--	19.4	22.1	150 N	2,100 N	No	BSL, BKG

TABLE 4-4

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Non-Detects(1)	Concentration Used for Screening(2)	Background Upper Tolerance Limit(3)	USEPA Residential Soil RSL(4)	IDEM Screening Level Residential Soil(5)	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Metals (Continued)													
7782-49-2	Selenium	0.169 J	0.425 J	mg/kg	23SS033-0002	6/26	0.294 - 1.76	0.425	0.81	39 N	550 N	No	BSL, BKG
7440-62-2	Vanadium	5.8	38.3	mg/kg	23SS009-0002	26/26	--	38.3	51.2	39 N	550 N	No	BSL, BKG
7440-66-6	Zinc	11.1	127 J	mg/kg	23SS001-0002	26/26	--	127	**65.6**	2,300 N	32,000 N	No	BSL
Petroleum Hydrocarbons													
-	DRO, C08-C28	9.69 J	69	mg/kg	23SS012-0002	15/16	7.49 - 7.49	69	NA	NA	NA	No(14)	NTX
-	DRO, C08-C34	12 J	88.5	mg/kg	23SS012-0002	16/16	-	88.5	NA	NA	NA	No(14)	NTX
-	Gasoline Range Organics	55.3	55.3	mg/kg	23SS013-0002	1/16	4.33 - 6.38	55.3	NA	NA	NA	No(14)	NTX

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - Upper tolerance limits (representing 95-percent of the soil population with 95-percent confidence), Final Base-Wide Background Soil Investigation Report (Tetra Tech, 2001).
4 - USEPA RSLs for Chemical Contaminants at Superfund Sites, June 2015. The noncarcinogenic values (denoted with a "N" flag) correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of $1x10^{-6}$ (carcinogens denoted with a "C" flag).
5 - IDEM Closure Guide (2015). Values based on a cancer risk of $1x10^{-5}$ or a hazard quotient of 1.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based screening level and is determined to be greater than background.
7 - Value is for acenaphthene.
8 - Value is for pyrene.
9 - Value is for hexavalent chromium.
10 - Value for trivalent chromium, which is presented for comparison purposes, is 12,000 mg/kg.
11 - Value for trivalent chromium, which is presented for comparison purposes, is 100,000 mg/kg.
12 - This chemical would not be selected as a COPC if trivalent chromium screening levels were used in COPC selection. Chromium at the site is likely present as trivalent chromium; however, because speciation analyses were not conducted, this chemical was assumed to be present as hexavalent chromium.
13 - Value is for mercuric chloride (and other mercury salts).
14 - This general parameter, which is comprised of a range of organic chemicals, is evaluated by the chemical-specific results.

Abbreviations:
C - Carcinogenic endpoint
CAS - Chemical Abstracts Service
COPC - Chemical of potential concern
DRO - Diesel range organics
IDEM - Indiana Department of Environmental Management
J - Estimated value
N - Noncarcinogen endpoint
NA - Not applicable/not available
RSL - Regional Screening Level
S - Soil saturation limit
USEPA - United States Environmental Protection Agency

Rationale Codes:
For selection as a COPC:
ASL = Above screening level and site background
For elimination as a COPC:
BKG = Less than background concentration
BSL = Below screening level
NTX = No toxicity criterion

Notes:
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Associated Samples:

23SS001-0002	23SS016-0002	23SS029-0002	23SS039-0002	23SS050-0002	23SS066-0002	23SS078-0001	23SS091-0002
23SS005-0002	23SS017-0002	23SS030-0002	23SS040-0002	23SS053-0002	23SS067-0002	23SS079-0002	23SS092-0002
23SS007-0002	23SS018-0002	23SS031-0002	23SS042-0002	23SS054-0002	23SS069-0002	23SS080-0002	
23SS008-0002	23SS019-0002	23SS032-0002	23SS043-0002	23SS055-0002	23SS070-0002	23SS081-0002	
23SS009-0002	23SS020-0002	23SS033-0002	23SS044-0002	23SS056-0002	23SS072-0002	23SS082-0002	
23SS011-0002	23SS021-0002	23SS034-0002	23SS045-0002	23SS058-0002	23SS073-0002	23SS083-0002	
23SS012-0002	23SS022-0002	23SS035-0002	23SS046-0002	23SS059-0002	23SS074-0002	23SS085-0002	
23SS013-0002	23SS023-0002	23SS036-0002	23SS047-0002	23SS062-0002	23SS075-0002	23SS086-0002	
23SS014-0002	23SS027-0002	23SS037-0002	23SS048-0002	23SS063-0002	23SS076-0002	23SS088-0002	
23SS015-0002	23SS028-0002	23SS038-0002	23SS049-0002	23SS064-0002	23SS077-0002	23SS089-0002	

TABLE 4-5

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Non-Detects[2]	Concentration Used for Screening[3]	Background Upper Tolerance Limit[3]	USEPA Residential Soil RSL[4]	IDEM Residential Soil Screening Level[5]	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
Volatile Organic Compounds													
78-93-3	2-Butanone	0.0043 J	0.00553 J	mg/kg	23SB003-0810	2/12	0.00444 - 0.273	0.00553	NA	2,700 N	28,000 S	No	BSL
67-64-1	Acetone	0.00666 J	0.101	mg/kg	23SB003-0810	4/12	0.00889 - 0.546	0.101	NA	6,100 N	85,000 N	No	BSL
75-15-0	Carbon Disulfide	0.00113 J	0.00113 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.00113	NA	77 N	740 S	No	BSL
156-59-2	cis-1,2-Dichloroethene	0.0012 J	0.0012 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.0012	NA	16 N	220 N	No	BSL
75-09-2	Methylene Chloride	0.00486 J	0.00486 J	mg/kg	23SB006-0608	1/12	0.00425 - 0.273	0.00486	NA	35 N	490 N	No	BSL
108-88-3	Toluene	0.00178 J	0.00378 J	mg/kg	23SB001-1012	2/14	0.00222 - 0.136	0.00378	NA	490 N	820 S	No	BSL
75-01-4	Vinyl Chloride	0.00144 J	0.00144 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.00144	NA	0.059 C	0.83 C	No	BSL
Polycyclic Aromatic Hydrocarbons													
90-12-0	1-Methylnaphthalene	0.048 J	0.37 J	mg/kg	23SB068-0406	2/39	0.0038 - 0.07	0.37	NA	18 C	240 C	No	BSL
91-57-6	2-Methylnaphthalene	0.0041 J	0.5 J	mg/kg	23SB068-0406	7/58	0.00358 - 0.162	0.5	NA	24 N	320 N	No	BSL
83-32-9	Acenaphthene	0.0046 J	3.6 J	mg/kg	23SB068-0406	3/58	0.00358 - 0.162	3.6	NA	360 N	4,900 N	No	BSL
208-96-8	Acenaphthylene	0.00554 J	1 J	mg/kg	23SB068-0204	7/58	0.00358 - 0.162	1	NA	360 N[7]	NA	No	BSL
120-12-7	Anthracene	0.00427 J	7.6 J	mg/kg	23SB068-0406	6/58	0.00358 - 0.162	7.6	NA	1,800 N	24,000 N	No	BSL
56-55-3	**Benzo(a)anthracene**	0.0046 J	17 J	mg/kg	23SB068-0406	18/58	0.00358 - 0.162	17	NA	**0.16 C**	**2.1 C**	**Yes**	ASL
50-32-8	**Benzo(a)pyrene**	0.0045 J	12 J	mg/kg	23SB068-0406	27/58	0.00358 - 0.162	12	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
205-99-2	**Benzo(b)fluoranthene**	0.004 J	18 J	mg/kg	23SB068-0406	27/58	0.00358 - 0.162	18	NA	**0.16 C**	**2.1 C**	**Yes**	ASL
191-24-2	Benzo(g,h,i)perylene	0.0093	7.6 J	mg/kg	23SB068-0406	23/58	0.00358 - 0.162	7.6	NA	180 N[8]	NA	No	BSL
207-08-9	**Benzo(k)fluoranthene**	0.0025 J	7.2 J	mg/kg	23SB068-0406	21/58	0.00358 - 0.162	7.2	NA	**1.6 C**	21 C	**Yes**	ASL
218-01-9	Chrysene	0.0043 J	16 J	mg/kg	23SB068-0406	26/58	0.00358 - 0.162	16	NA	16 C	210 C	No	BSL
53-70-3	**Dibenzo(a,h)anthracene**	0.0077 J	2.6 J	mg/kg	23SB068-0406	7/58	0.00358 - 0.162	2.6	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
206-44-0	Fluoranthene	0.0053 J	33 J	mg/kg	23SB068-0406	24/58	0.00358 - 0.162	33	NA	240 N	3,200 N	No	BSL
86-73-7	Fluorene	0.0046 J	5 J	mg/kg	23SB068-0406	3/58	0.00358 - 0.162	5	NA	240 N	3,200 N	No	BSL
193-39-5	**Indeno(1,2,3-cd)pyrene**	0.0068 J	8.9 J	mg/kg	23SB068-0406	15/58	0.00358 - 0.162	8.9	NA	**0.16 C**	**2.1 C**	**Yes**	ASL
91-20-3	Naphthalene	0.0045 J	0.54 J	mg/kg	23SB068-0406	3/58	0.00358 - 0.162	0.54	NA	3.8 C	53 C	No	BSL
85-01-8	Phenanthrene	0.0032 J	31 J	mg/kg	23SB068-0406	24/58	0.00358 - 0.162	31	NA	180 N[8]	NA	No	BSL
129-00-0	Pyrene	0.0056 J	25 J	mg/kg	23SB068-0406	28/58	0.00358 - 0.162	25	NA	180 N	2,400 N	No	BSL
Metals													
7440-38-2	**Arsenic**	1.28 J	19.7	mg/kg	23SB024-0406	17/17	--	19.7	**12.5**	**0.68 C**	**9.4 C**	**Yes**	ASL
7440-39-3	Barium	8.52 J	88.4	mg/kg	23SB001-1012	17/17	--	88.4	115	1,500 N	21,000 N	No	BSL, BKG
7440-41-7	Beryllium	0.287	0.795 J	mg/kg	23SB025-0608	12/17	0.362 - 0.582	0.795	NA	16 N	220 N	No	BSL
7440-43-9	Cadmium	0.618 J	0.618 J	mg/kg	23SB025-0608	1/17	0.113 - 0.643	0.618	0.8	7.1 N	98 N	No	BSL, BKG
7440-47-3	Chromium	4.92	29.8	mg/kg	23SB003-0810	17/17	--	29.8	33	**0.3 C[9][10]**	**4.2 C[9][11]**	No	BKG
7440-48-4	Cobalt	2.16 J	11.4	mg/kg	23SB025-0608	15/17	2.57 - 2.78	11.4	21.2	**2.3 N**	32 N	No	BKG
7440-50-8	Copper	3.35	41.3	mg/kg	23SB024-0406	17/17	--	41.3	**33.3**	310 N	4,300 N	No	BSL
7439-92-1	Lead	2.33	29 J	mg/kg	23SB088-0204	32/32	--	29	**19.6**	400	400	No	BSL
7439-97-6	Mercury	0.022 J	0.0882	mg/kg	23SB024-0406	15/17	0.249	0.0882	0.18	2.3 N[12]	3.1 S	No	BSL, BKG
7440-02-0	Nickel	2.14 J	18	mg/kg	23SB025-0608	17/17	--	18	29.6	150 N	2,100 N	No	BSL, BKG
7782-49-2	Selenium	0.169 J	0.169 J	mg/kg	23SB085-0204, 23SB085-0406	2/17	0.282 - 1.61	0.169	1.07	39 N	550 N	No	BSL, BKG
7440-22-4	Silver	0.122 J	0.122 J	mg/kg	23SB037-0204	1/17	0.113 - 1.45	0.122	0.13	39 N	550 N	No	BSL, BKG
7440-62-2	Vanadium	5.8	51.2	mg/kg	23SB003-0810	17/17	--	51.2	69.1	**39 N**	550 N	No	BKG
7440-66-6	Zinc	11.1	74.3	mg/kg	23SB025-0608	15/17	3.85 - 7.59	74.3	83.3	2,300 N	32,000 N	No	BSL, BKG

TABLE 4-5

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Non-Detects(2)	Concentration Used for Screening(3)	Background Upper Tolerance Limit(3)	USEPA Residential Soil RSL(4)	IDEM Residential Soil Screening Level(5)	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Petroleum Hydrocarbons													
-	DRO (C08-C28)	11.5 J	2,220	mg/kg	23SB001-1012	4/12	7.15 - 8.06	2,220	NA	NA	NA	No(13)	NTX
-	DRO (C08-C34)	8.53 J	3,490	mg/kg	23SB001-1012	12/12	-	3,490	NA	NA	NA	No(13)	NTX
-	Gasoline Range Organics	4.75 J	5.03 J	mg/kg	23SB026-0608	2/12	4.28 - 5.46	5.03	NA	NA	NA	No(13)	NTX

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - Upper tolerance limits (representing 95-percent of the soil population with 95-percent confidence), Final Base-Wide Background Soil Investigation Report (Tetra Tech, 2001).
4 - USEPA RSLs for Chemical Contaminants at Superfund Sites, June 2015. The noncarcinogenic values (denoted with a "N" flag) correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of $1x10^{-6}$ (carcinogens denoted with a "C" flag).
5 - IDEM Closure Guide (2015). Values based on a cancer risk of $1x10^{-5}$ or a hazard quotient of 1.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is determined to be greater than background.
7 - Value is for acenaphthene.
8 - Value is for pyrene.
9 - Value is for hexavalent chromium.
10 - Value for trivalent chromium, which is presented for comparison purposes, is 12,000 mg/kg.
11 - Value for trivalent chromium, which is presented for comparison purposes, is 100,000 mg/kg.
12 - Value is for mercuric chloride (and other mercury salts).
13 - This general parameter, which is comprised of a range of organic chemicals, is evaluated by the chemical-specific results.

Notes:
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Associated Samples:

23SB001-0204	23SB025-0608	23SB063-0406	23SB073-0204	23SB087-0406
23SB001-0406	23SB026-0406	23SB064-0406	23SB073-0406	23SB088-0204
23SB001-1012	23SB026-0608	23SB066-0204	23SB074-0406	23SB088-0406
23SB002-0204	23SB027-0204	23SB066-0406	23SB075-0204	23SB089-0406
23SB002-0406	23SB028-0204	23SB067-0204	23SB075-0406	23SB090-0204
23SB002-1012	23SB029-0204	23SB068-0204	23SB076-0203	23SB090-0406
23SB003-0204	23SB030-0204	23SB068-0406	23SB083-0204	23SB091-0204
23SB003-0406	23SB032-0204	23SB069-0204	23SB083-0406	23SB091-0406
23SB003-0810	23SB034-0204	23SB069-0406	23SB084-0204	23SB092-0204
23SB004-0406	23SB036-0204	23SB070-0204	23SB084-0406	23SB092-0406
23SB004-0810	23SB037-0204	23SB070-0406	23SB085-0204	
23SB005-0810	23SB048-0204	23SB071-0204	23SB085-0406	
23SB006-0608	23SB048-0406	23SB071-0406	23SB086-0204	
23SB024-0406	23SB059-0204	23SB072-0204	23SB086-0406	
23SB024-0608	23SB063-0204	23SB072-0406	23SB087-0204	

Abbreviations:

C - Carcinogenic endpoint
CAS - Chemical Abstracts Service
COPC - Chemical of potential concern
DRO - Diesel range organics
IDEM - Indiana Department of Environmental Management
J - Estimated value
N - Noncarcinogen endpoint
NA - Not applicable/not available
RSL - Regional Screening Level
S - Soil saturation limit
USEPA - United States Environmental Protection Agency

Rationale Codes:
For selection as a COPC:
ASL = Above screening level and site background
For elimination as a COPC:
BKG = Less than background concentration
BSL = Below screening level
NTX = No toxicity criterion

TABLE 4-6

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE WATER
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Non-Detects(1)	Concentration Used for Screening(2)	Background Upper Tolerance Limit(3)	USEPA Tap Water RSL(4)	USEPA MCL(5)	IDEM Groundwater Residential Screening Level(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Total Metals (Unfiltered)														
7440-38-2	**Arsenic**	2.16 J	2.16 J	ug/L	23SW001	1/6	1.5	2.16	NA	**0.052 C**	10	10 M	**Yes**	ASL
7440-39-3	Barium	39	144	ug/L	23SW001	6/6	-	144	NA	380 N	2,000	2,000 M	No	BSL
7440-47-3	**Chromium**	0.56 J	3.21 J	ug/L	23SW001	3/6	1	3.21	NA	**0.035 C(8)(9)**	100	**0.35 C(8)(10)**	**Yes(11)**	ASL
7440-48-4	**Cobalt**	3.44	3.44	ug/L	23SW001	1/6	2.5	3.44	NA	**0.6 N**	NA	6 N	**Yes**	ASL
7440-50-8	Copper	1.26 J	10.7	ug/L	23SW001	4/6	2	10.7	NA	80 N	1,300 (12)	1,300 M	No	BSL
7439-89-6	**Lead**	0.685 J	16.3	ug/L	23SW001	3/6	0.75	16.3	NA	**15**	**15 (12)**	**15 M**	**Yes**	ASL
7439-92-1	Nickel	1.08 J	12.8	ug/L	23SW006	6/6	-	12.8	NA	39 N	NA	390 N	No	BSL
7440-62-2	Vanadium	7.29 J	7.29 J	ug/L	23SW001	1/6	2.5	7.29	NA	8.6 N	NA	86 N	No	BSL
7440-66-6	Zinc	1.31 J	62.6 J	ug/L	23SW001	6/6	-	62.6	NA	600 N	NA	6,000 N	No	BSL
Dissolved Metals (Filtered)														
7440-39-3	Barium	38.9	73	ug/L	23SW001	6/6	-	73	NA	380 N	2,000	2,000 M	No	BSL
7440-50-8	Copper	1.42 J	2.46 J	ug/L	23SW004	3/6	2	2.46	NA	80 N	1,300 (12)	1,300 M	No	BSL
7439-92-1	Nickel	0.907 J	12.2	ug/L	23SW006	6/6	-	12.2	NA	39 N	NA	390 N	No	BSL
7440-66-6	Zinc	1.82 J	14	ug/L	23SW006	5/6	2.5	14	NA	600 N	NA	6,000 N	No	BSL

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - No background data are available for surface water.
4 - USEPA RSLs for Chemical Contaminants at Superfund Sites (2015). The noncarcinogenic values (denoted with a "N" flag) are the screening level divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of $1x10^{-6}$ (carcinogens denoted with a "C" flag).
5 - 2012 Edition of the Drinking Water Standards and Health Advisories (USEPA, 2012a).
6 - IDEM Closure Guide (2015). Values based on a cancer risk of $1x10^{-5}$ or a hazard quotient of 1.
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the screening level.
8 - Value is for hexavalent chromium.
9 - Value for trivalent chromium, which is presented for comparison purposes, is 2,200 µg/L.
10 - Value for trivalent chromium, which is presented for comparison purposes, is 22,000 µg/L.
11 - This chemical would not be selected as a COPC if trivalent chromium screening levels were used in COPC selection. Chromium at the site is likely present as trivalent chromium; however, because speciation analyses were not conducted, this chemical was assumed to be present as hexavalent chromium.
12 - The MCL for this parameter is actually a treatment technique. The SDWA Action Level (at the tap) has been presented.

Notes:
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Associated Samples:
23SW001
23SW002
23SW003
23SW004
23SW005
23SW006

Abbreviations:
C - Carcinogenic endpoint
CAS - Chemical Abstracts Service
COPC - Chemical of potential concern
DRO - Diesel range organics
IDEM - Indiana Department of Environmental Management
J - Estimated value
MCL - Maximum Contaminant Level
N - Noncarcinogen endpoint
NA - Not applicable/not available
RSL - Regional Screening Level
SWDA - Safe Water Drinking Act
USEPA - United States Environmental Protection Agency

Rationale Codes:
For selection as a COPC:
ASL = Above screening level and site background
For elimination as a COPC:
BSL = Below screening level

TABLE 4-7

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Non-Detects[1]	Concentration Used for Screening[2]	Background Upper Tolerance Limit[3]	USEPA Residential Soil RSL[4]	IDEM Residential Soil Screening Level[5]	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
Volatile Organic Compounds													
79-01-6	Trichloroethene	0.00124 J	0.00124 J	mg/kg	23SD009-0006	1/7	0.130 - 0.276	0.00124	NA	0.41 N	5.7 N	No	BSL
Polycyclic Aromatic Hydrocarbons													
91-57-6	2-Methylnaphthalene	0.00834	0.00834	mg/kg	23SD004-0006	1/7	0.00418 - 0.0347	0.00834	NA	24 N	320 N	No	BSL
208-96-8	Acenaphthylene	0.00685 J	0.00685 J	mg/kg	23SD006-0006	1/7	0.00392 - 0.0347	0.00685	NA	360 N[7]	NA	No	BSL
50-32-8	**Benzo(a)pyrene**	0.00604 J	0.255	mg/kg	23SD006-0006	5/7	0.0187 - 0.0216	0.255	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
205-99-2	**Benzo(b)fluoranthene**	0.00583 J	0.254	mg/kg	23SD006-0006	6/7	0.0187	0.254	NA	**0.16 C**	2.1 C	**Yes**	ASL
191-24-2	Benzo(g,h,i)perylene	0.00998	0.185	mg/kg	23SD006-0006	4/7	0.00424 - 0.0216	0.185	NA	180 N[8]	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	0.00476 J	0.141	mg/kg	23SD006-0006	4/7	0.0187 - 0.0217	0.141	NA	1.6 C	21 C	No	BSL
218-01-9	Chrysene	0.00854	0.0989	mg/kg	23SD001-0006	3/7	0.00418 - 0.0216	0.0989	NA	16 C	210 C	No	BSL
53-70-3	**Dibenzo(a,h)anthracene**	0.0884	0.0884	mg/kg	23SD006-0006	1/7	0.00392 - 0.0347	0.0884	NA	**0.015 C**	0.21 C	**Yes**	ASL
206-44-0	Fluoranthene	0.0084	0.101	mg/kg	23SD001-0006	6/7	0.0187	0.101	NA	240 N	3,200 N	No	BSL
193-39-5	**Indeno(1,2,3-cd)pyrene**	0.00492 J	0.164	mg/kg	23SD006-0006	5/7	0.0187 - 0.0216	0.164	NA	**0.16 C**	2.1 C	**Yes**	ASL
85-01-8	Phenanthrene	0.012	0.012	mg/kg	23SD004-0006	1/7	0.00418 - 0.0347	0.012	NA	180 N[8]	NA	No	BSL
129-00-0	Pyrene	0.00948	0.0929	mg/kg	23SD001-0006	6/7	0.0187	0.0929	NA	180 N	2,400 N	No	BSL
Polychlorinated Biphenyls													
11097-69-1	Aroclor-1254	0.00298 J	0.00298 J	mg/kg	23SD005-0006	1/6	0.00203 - 0.00341	0.00298	NA	0.12 N	1.5 N	No	BSL
11096-82-5	Aroclor-1260	0.00224 J	0.0108 J	mg/kg	23SD002-0006	5/6	0.00217	0.0108	NA	0.24 C	3.4 C	No	BSL
Metals													
7440-38-2	**Arsenic**	4.59	12.3	mg/kg	23SD003-0006	7/7	-	12.3	**11.83**	**0.68 C**	**9.4 C**	**Yes**	ASL
7440-39-3	Barium	20.9	219	mg/kg	23SD001-0006	7/7	-	219	**211**	1,500 N	21,000 N	No	BSL
7440-41-7	Beryllium	0.46	1.48 J	mg/kg	23SD004-0006	7/7	-	1.48	**0.93**	16 N	220 N	No	BSL
7440-43-9	Cadmium	0.478 J	0.76 J	mg/kg	23SD001-0006	2/7	0.586 - 0.684	0.76	6.05	7.1 N	98 N	No	BSL, BKG
7440-47-3	**Chromium**	9.63	35.2	mg/kg	23SD004-0006	7/7	-	35.2	**28.7**	**0.3 C[9][10]**	**4.2 C[9][11]**	**Yes[12]**	ASL
7440-48-4	**Cobalt**	4.65	62	mg/kg	23SD003-0006	7/7	-	62	**32.4**	**2.3 N**	**32 N**	**Yes**	ASL
7440-50-8	Copper	6.1	34.4	mg/kg	23SD001-0006	7/7	-	34.4	**17.6**	310 N	4,300 N	No	BSL
7439-92-1	Lead	9.19	52.3	mg/kg	23SD001-0006	7/7	-	52.3	**27**	400	400	No	BSL
7439-97-6	Mercury	0.0171 J	0.14	mg/kg	23SD001-0006	7/7	-	0.14	**0.077**	2.3 N[13]	32 N[13]	No	BSL
7440-02-0	Nickel	17.4	48.1	mg/kg	23SD004-0006	7/7	-	48.1	**22.1**	150 N	2,100 N	No	BSL
7440-22-4	Silver	0.959 J	0.959 J	mg/kg	23SD002-0006	1/7	0.586 - 1.1	0.959	**0.13**	39 N	550 N	No	BSL
7440-62-2	Vanadium	9.1	35.2	mg/kg	23SD001-0006	7/7	-	35.2	51.2	39 N	550 N	No	BSL, BKG
7440-66-6	Zinc	42.1	207	mg/kg	23SD001-0006	7/7	-	207	**65.6**	2,300 N	32,000 N	No	BSL

TABLE 4-7

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - Upper tolerance limits (representing 95-percent of the soil population with 95-percent confidence), Final Base-Wide Background Soil Investigation Report (Tetra Tech, 2001).
4 - USEPA RSLs for Chemical Contaminants at Superfund Sites (2015). Noncarcinogenic values (denoted with a "N" flag) are the screening level divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of $1x10^{-6}$ (carcinogens denoted with a "C" flag).
5 - IDEM Closure Guide (2015). Values based on a cancer risk of $1x10^{-5}$ or a hazard quotient of 1.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the screening level and is determined to be greater than background.
7 - Value is for acenaphthene.
8 - Value is for pyrene.
9 - Value is for hexavalent chromium.
10 - Value for trivalent chromium, which is presented for comparison purposes, is 12,000 mg/kg.
11 - Value for trivalent chromium, which is presented for comparison purposes, is 100,000 mg/kg.
12 - This chemical would not be selected as a COPC if trivalent chromium screening levels were used in COPC selection. Chromium at the site is likely present as trivalent chromium; however, because speciation analyses were not conducted, this chemical was assumed to be present as hexavalent chromium.
13 - Value is for mercuric chloride (and other mercury salts).

Notes:
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemicals was retained as a COPC.

Associated Samples:
23SD001-0006
23SD002-0006
23SD003-0006
23SD004-0006
23SD005-0006
23SD006-0006
23SD009-0006

Abbreviations:
BAP - Benzo(a)pyrene
C - Carcinogenic endpoint
CAS - Chemical Abstracts Service
COPC - Chemical of potential concern
IDEM - Indiana Department of Environmental Management
J - Estimated value
N - Noncarcinogen endpoint
NA - Not applicable/not available
RSL - Regional Screening Level
USEPA - United States Environmental Protection Agency

Rationale Codes:
For selection as a COPC:
ASL = Above screening level and site background
For elimination as a COPC:
BKG = Less than background concentration
BSL = Below screening level

TABLE 4-8

CHEMICALS RETAINED AS COPCs
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Surface Soil	Subsurface Soil	Surface Water	Sediment
Polycyclic Aromatic Hydrocarbons				
Benzo(a)anthracene	E	E,I		
Benzo(a)pyrene	E,I	E,I		E,I
Benzo(b)fluoranthene	E	E,I		E
Benzo(k)fluoranthene		E		
Dibenzo(a,h)anthracene	E,I	E,I		E
Indeno(1,2,3-cd)pyrene	E	E,I		E
Polychlorinated Biphenyls				
Aroclor-1254	E			
Metals				
Arsenic	E,I	E,I	E	E,I
Chromium	E,I[(1)]		E,I[(1)]	E,I[(1)]
Cobalt			E	E,I
Lead			E, I	

Abbreviations:
COPC - Chemical of potential concern
E - Concentrations exceeded USEPA screening criteria and chemical was retained as a COPC
I - Concentrations exceeded IDEM screening criteria and chemical was retained as a COPC
IDEM - Indiana Department of Environmental Management
USEPA - United States Environmental Protection Agency

Footnotes:
1 - Chromium would not be selected as a COPC if trivalent chromium screening levels were used in COPC selection. This chemical is likely present at the site as trivalent chromium; however, because speciation analyses were not conducted, this chemical was assumed to be present as hexavalent chromium.

TABLE 4-9

SELECTION OF EXPOSURE PATHWAYS
SWMU 23 - BATTERY SHOP
NSWC CRANE, CRANE INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	SWMU 23	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may contact surface soil during excavation activities.
				Industrial Workers	Adult	Ingestion Dermal	Quant Quant	Industrial workers may contact surface soil during normal work activities.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Trespassers may contact surface soil while at the site.
		Air	SWMU 23	Construction Workers	Adult	Inhalation	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Industrial Workers	Adult	Inhalation	Quant	Industrial workers may be exposed to fugitive dust and volatile emissions during work activities.
				Trespassers	Adolescent	Inhalation	Quant	Trespassers may be exposed to fugitive dust and volatile emissions while at the site.
	Subsurface Soil	Subsurface Soil	SWMU 23	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Industrial Workers	Adult	Ingestion Dermal	Quant Quant	Although exposures to subsurface soil by industrial workers are considered unlikely at the site, this scenario is included to aid in future risk management decisions.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Although exposures to subsurface soil by trespassers are considered unlikely at the site, this scenario is included to aid in future risk management decisions.
		Air	SWMU 23	Construction Workers	Adult	Inhalation	Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Industrial Workers	Adult	Inhalation	Quant	Although exposures to subsurface soil by industrial workers are considered unlikely at the site, this scenario is included to aid in future risk management decisions.
				Trespassers	Adolescent	Inhalation	Quant	Although exposures to subsurface soil by trespassers are considered unlikely at the site, this scenario is included to aid in future risk management decisions.
	Surface Water	Surface Water	SWMU 23	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not exposed to surface water.
				Industrial Workers	Adult	Ingestion Dermal	None None	Industrial workers are not exposed to surface water.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Trespassers may be exposed to surface water while at the site.

TABLE 4-9

SELECTION OF EXPOSURE PATHWAYS
SWMU 23 - BATTERY SHOP
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	Sediment	Sediment	SWMU 23	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not exposed to sediment.
				Industrial Workers	Adult	Ingestion Dermal	None None	Industrial workers are not exposed to sediment.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Trespassers may be exposed to sediment while at the site.
Future	Surface Soil	Surface Soil	SWMU 23	Recreational Users	Child	Ingestion Dermal	Quant Quant	Recreational users may contact surface soil while at the site.
					Adult	Ingestion Dermal	Quant Quant	
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	
		Air	SWMU 23	Recreational Users	Child	Inhalation	Quant	Recreational users may be exposed to fugitive dust and volatile emissions while at the site.
					Adult	Inhalation	Quant	
				Residents	Child	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	
	Subsurface Soil	Subsurface Soil	SWMU 23	Recreational Users	Child	Ingestion Dermal	Quant Quant	Although exposures to subsurface soil by recreational users are considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	

TABLE 4-9

SELECTION OF EXPOSURE PATHWAYS
SWMU 23 - BATTERY SHOP
NSWC CRANE, CRANE INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Subsurface Soil	Air	SWMU 23	Recreational Users	Child	Inhalation	Quant	Although exposures to subsurface soil by recreational users are considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	
				Residents	Child	Inhalation	Quant	Although a future residential scenario isconsidered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	
	Surface Water	Surface Water	SWMU 23	Recreational Users	Child	Ingestion Dermal	Quant Quant	Recreational users may be exposed to surface water while at the site.
					Adult	Ingestion Dermal	Quant Quant	
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	
	Sediment	Sediment	SWMU 23	Recreational Users	Child	Ingestion Dermal	Quant Quant	Recreational users may be exposed to sediment while at the site.
					Adult	Ingestion Dermal	Quant Quant	
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	

Abbreviations:
Quant - Quantitative

TABLE 4-10

RECEPTORS AND EXPOSURE ROUTES FOR QUANTITATIVE EVALUATION
SWMU 23 – BATTERY SHOP
NSWC CRANE, CRANE INDIANA

Receptors	Exposure Routes
Construction Workers (current/future land use)	• Soil incidental ingestion • Soil dermal contact • Inhalation of air containing fugitive dust/volatile emissions from soil
Industrial Workers (current/future land use)	• Soil incidental ingestion • Soil dermal contact • Inhalation of air containing fugitive dust/volatile emissions from soil
Adolescent Trespassers (6 to 17 years) (current/future land use)	• Soil incidental ingestion • Soil dermal contact • Inhalation of air containing fugitive dust/volatile emissions from soil • Surface water/sediment dermal contact • Surface water/sediment incidental ingestion
Small Child (0 to 6 years) and Adult Recreational Users (future land use)	• Soil incidental ingestion • Soil dermal contact • Inhalation of air containing fugitive dust/volatile emissions from soil • Surface water/sediment dermal contact • Surface water/sediment incidental ingestion
Residents (Adult/Children) (hypothetical future land use)	• Soil incidental ingestion • Soil dermal contact • Inhalation of air containing fugitive dust/volatile emissions from soil • Surface water/sediment dermal contact • Surface water/sediment incidental ingestion

TABLE 4-11

EXPOSURE POINT CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE INDIANA

Chemical	Surface Soil (mg/kg)	Subsurface Soil (mg/kg)	Surface Water (µg/L)	Sediment (mg/kg)
Polycyclic Aromatic Hydrocarbons				
Benzo(a)anthracene	0.137	3.54	NA	NA
Benzo(a)pyrene	0.155	1.36	NA	0.125
Benzo(b)fluoranthene	0.235	2.03	NA	0.133
Benzo(k)fluoranthene	NA	1.63	NA	NA
Dibenzo(a,h)anthracene	0.031	0.356	NA	0.088
Indeno(1,2,3-cd)pyrene	0.080	2.02	NA	0.084
Polychlorinated Biphenyls				
Aroclor-1254	0.092	NA	NA	NA
Metals				
Arsenic	6.6	9.03	2.16	10.8
Chromium	14.8	NA	3.21	26.2
Cobalt	NA	NA	3.44	26.2
Lead	NA	NA	3.15	NA

Notes:
EPCs for surface soil, subsurface soil, surface water, and sediment were calculated according to USEPA's ProUCL guidance. See the RAGS PART D Table 3s in Appendix C for details concerning the EPCs.

Abbreviations:
COPC - Chemical of potential concern
EPCs - Exposure point concentrations
NA - Not applicable; not a COPC for this medium
RAGS - Risk Assessment Guidance for Superfund
USEPA - United States Environmental Protection Agency

TABLE 4-12

SUMMARY OF EXPOSURE INPUT PARAMETERS - REASONABLE MAXIMUM EXPOSURES
SWMU 23 – BATTERY SHOP
NSWC CRANE, CRANE INDIANA

Parameter Code	Exposure Parameter	Construction Worker	Industrial Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
All Exposures								
C_{soil}	Exposure Concentration for Soil (mg/kg)	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]
ED	Exposure Duration (years)	1[2]	25[3]	10[4]	6[3]	20[3]	6[3]	20[3]
BW	Body Weight (kg)	80[3]	80[3]	45[5]	15[3]	80[3]	15[3]	80[3]
AT-N	Averaging Time (Non-Cancer) (days)	365[3]	9,125[3]	3,650[3]	2,190[3]	7,300[3]	2,190[3]	7,300[3]
AT-C	Averaging Time (Cancer) (days)	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]	25,550[3]
Incidental Ingestion/Dermal Contact with Soil								
IR	Ingestion Rate (mg/day)	330[6]	100[3]	100[3]	200[3]	100[3]	200[3]	100[3]
RBA	Relative Bioavailability (unitless)	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]
EF	Exposure Frequency (days/year)	150[8]	250[3]	26[9]	52[10]	52[10]	350[3]	350[3]
FI	Fraction Ingested (unitless)	1[6]	1[3]	1[3]	0.5[2]	0.5[2]	1[3]	1[3]
SA	Skin Surface Available for Contact (cm^2)	3,527[3]	3,527[3]	3,750[11]	2,373[3]	6,032[3]	2,373[3]	6,032[3]
AF	Soil to Skin Adherence Factor (mg/cm^2/event)	0.3[6]	0.12[3]	0.2[12]	0.2[12]	0.07[12]	0.2[12]	0.07[12]
ABS	Absorption Factor (unitless)	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF	Conversion Factor (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Inhalation of Fugitive Dust/Volatile Emissions from Soil								
C_{air}	Exposure Concentration for Air (mg/m^3)	calculated[6]	calculated[6]	calculated[6]	calculated[6]	calculated[6]	calculated[6]	calculated[6]
ET	Exposure Time (hours/day)	8[6]	8[6]	4[2]	4[2]	4[2]	24[6]	24[6]
EF	Exposure Frequency (days/year)	150[8]	250[3]	26[9]	52[10]	52[10]	350[3]	350[3]
PEF	Particulate Emission Factor (m^3/kg)	1.34E+06[6]	1.316E+09[6]	1.316E+09[6]	1.316E+09[6]	1.316E+09[6]	1.316E+09[6]	1.316E+09[6]
Ingestion/Dermal Contact with Surface Water								
C_{sw}	Exposure Concentration for Surface Water (µg/L)	NA	NA	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]
CR	Contact Rate (L/hr)	NA	NA	0.01[5]	0.01[5]	0.01[5]	0.01[5]	0.01[5]
EF	Exposure Frequency (days/year)	NA	NA	26[9]	52[10]	52[10]	52[10]	52[10]
ET/t_{event}	Exposure Time (hours/day)/ Event Duration (hours/event)	NA	NA	4[2]	4[2]	4[2]	4[2]	4[2]
EV	Event Frequency (events/day)	NA	NA	1[2]	1[2]	1[2]	1[2]	1[2]
SA	Skin Surface Available for Contact (cm^2)	NA	NA	3,750[11]	2,373[3]	6,032[3]	2,373[3]	6,032[3]
CF	Conversion Factor (L/m^3)	NA	NA	1E-03	1E-03	1E-03	1E-03	1E-03
	Kp (cm/hour), t* (hour/event), t (hour), and B (unitless)	NA	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
Incidental Ingestion/Dermal Contact with Sediment								
C_{sed}	Exposure Concentration for Sediment (mg/kg)	NA	NA	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]
IR	Ingestion Rate (mg/day)	NA	NA	100[3]	200[3]	100[3]	200[3]	100[3]
RBA	Relative Bioavailability (unitless)	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]
EF	Exposure Frequency (days/year)	NA	NA	26[9]	52[10]	52[10]	52[10]	52[10]
FI	Fraction Ingested (unitless)	NA	NA	1[7]	0.5[2]	0.5[2]	0.5[2]	0.5[2]

TABLE 4-12

SUMMARY OF EXPOSURE INPUT PARAMETERS - REASONABLE MAXIMUM EXPOSURES
SWMU 23 – BATTERY SHOP
NSWC CRANE, CRANE INDIANA

Parameter Code	Exposure Parameter	Construction Worker	Industrial Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
Incidental Ingestion/Dermal Contact with Sediment (Continued)								
SA	Skin Surface Available for Contact (cm^2)	NA	NA	3,750[11]	2,373[3]	6,032[3]	2,373[3]	6,032[3]
AF	Soil to Skin Adherence Factor (mg/cm^2/event)	NA	NA	0.2[12]	0.2[12]	0.07[12]	0.2[12]	0.07[12]
ABS	Absorption Factor (unitless)	NA	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF	Conversion Factor (kg/mg)	NA	NA	1E-06	1E-06	1E-06	1E-06	1E-06

Footnotes:
1 - USEPA, 2002b. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
2 - Professional judgment.
3 - USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.
4 - Adolescents ages 7 to 16 years old.
5 - USEPA, 2011a: Exposure Factors Handbook: 2011 Edition.
6 - USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9365.4-24.
7 - USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.
8 - Assumes a 30-week construction project over one year.
9 - Assume one day every other week for reasonable maximum exposure and approximately once a month for central tendency exposure.
10 - Assume one day a week for reasonable maximum exposure and every other week for central tendency exposure.
11 - Assumes face, forearms, hands, and lower legs are exposed (USEPA, 2011a).
12 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. PA/540/R/99/005.

Abbreviations:
NA - Not applicable
OSWER - Office of Solid Waste and Emergency Response
UCL - Upper confidence limit
USEPA - United States Environmental Protection Agency

TABLE 4-13

SUMMARY OF EXPOSURE INPUT PARAMETERS - CENTRAL TENDENCY EXPOSURES
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE INDIANA

Parameter Code	Exposure Parameter	Construction Worker	Industrial Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
All Exposures								
C_{soil}	Exposure Concentration for Soil (mg/kg)	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]
ED	Exposure Duration (years)	1[2]	9[3]	10[4]	2[3]	7[3]	2[3]	7[3]
BW	Body Weight (kg)	80[5]	80[5]	45[6]	15[5]	80[5]	15[5]	80[5]
AT-N	Averaging Time (Non-Cancer) (days)	365[7]	3,285[7]	3,650[7]	730[7]	2,555[7]	730[7]	2,555[7]
AT-C	Averaging Time (Cancer) (days)	25,550[7]	25,550[7]	25,550[7]	25,550[7]	25,550[7]	25,550[7]	25,550[7]
Incidental Ingestion/Dermal Contact with Soil								
IR	Ingestion Rate (mg/day)	165[8]	50[3]	50[3]	100[3]	50[3]	100[3]	50[3]
RBA	Relative Bioavailability (unitless)	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]
EF	Exposure Frequency (days/year)	75[8]	219[3]	13[9]	26[10]	26[10]	234[3]	234[3]
FI	Fraction Ingested (unitless)	1[11]	1[3]	1[3]	0.5[2]	0.5[2]	1[3]	1[3]
SA	Skin Surface Available for Contact (cm^2)	3,527[5]	3,527[5]	3,750[6]	2,373[5]	6,032[5]	2,373[5]	6,032[5]
AF	Soil to Skin Adherence Factor (mg/cm^2/event)	0.1[12]	0.02[12]	0.04[12]	0.04[12]	0.01[12]	0.04[12]	0.01[12]
ABS	Absorption Factor (unitless)	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF	Conversion Factor (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Inhalation of Fugitive Dust/Volatile Emissions from Soil								
C_{air}	Exposure Concentration for Air (mg/m^3)	calculated[11]	calculated[11]	calculated[11]	calculated[11]	calculated[11]	calculated[11]	calculated[11]
ET	Exposure Time (hours/day)	8[13]	8[13]	2[8]	2[8]	2[8]	24[11]	24[11]
EF	Exposure Frequency (days/year)	75[8]	219[3]	13[9]	26[10]	26[10]	234[3]	234[3]
PEF	Particulate Emission Factor (m^3/kg)	1.34E+06[11]	1.316E+09[11]	1.316E+09[11]	1.316E+09[11]	1.316E+09[11]	1.316E+09[11]	1.316E+09[11]
Ingestion/Dermal Contact with Surface Water								
C_{sw}	Exposure Concentration for Surface Water (µg/L)	NA	NA	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]
CR	Contact Rate (L/hr)	NA	NA	0.01[14]	0.01[14]	0.01[14]	0.01[14]	0.01[14]
EF	Exposure Frequency (days/year)	NA	NA	13[9]	26[10]	26[10]	26[10]	26[10]
ET/t_{event}	Exposure Time (hours/day)/ Event Duration (hours/event)	NA	NA	2[8]	2[8]	2[8]	2[8]	2[8]
EV	Event Frequency (events/day)	NA	NA	1[2]	1[2]	1[2]	1[2]	1[2]
SA	Skin Surface Available for Contact (cm^2)	NA	NA	3,750[6]	2,373[5]	6,032[5]	2,373[5]	6,032[5]
CF	Conversion Factor (L/m^3)	NA	NA	1E-03	1E-03	1E-03	1E-03	1E-03
	Kp (cm/hour), t* (hour/event), t (hour), and B (unitless)	NA	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
Incidental Ingestion/Dermal Contact with Sediment								
C_{sed}	Exposure Concentration for Sediment (mg/kg)	NA	NA	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]	95% UCL[1]
IR	Ingestion Rate (mg/day)	NA	NA	50[3]	100[3]	50[3]	100[3]	50[3]
RBA	Relative Bioavailability (unitless)	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]	chemical-specific[7]
EF	Exposure Frequency (days/year)	NA	NA	13[9]	26[10]	26[10]	26[10]	26[10]
FI	Fraction Ingested (unitless)	NA	NA	1[7]	0.5[2]	0.5[2]	0.5[2]	0.5[2]

TABLE 4-13

SUMMARY OF EXPOSURE INPUT PARAMETERS - CENTRAL TENDENCY EXPOSURES
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE INDIANA

Parameter Code	Exposure Parameter	Construction Worker	Industrial Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
Incidental Ingestion/Dermal Contact with Sediment (Continued)								
SA	Skin Surface Available for Contact (cm^2)	NA	NA	3,750[6]	2,373[5]	6,032[5]	2,373[5]	6,032[5]
AF	Soil to Skin Adherence Factor (mg/cm^2/event)	NA	NA	0.04[12]	0.04[12]	0.01[12]	0.04[12]	0.01[12]
ABS	Absorption Factor (unitless)	NA	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF	Conversion Factor (kg/mg)	NA	NA	1E-06	1E-06	1E-06	1E-06	1E-06

Notes:
1 - USEPA, 2002b. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
2 - Professional judgment.
3 - USEPA, 1993a: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
4 - Adolescents ages 7 to 16 years old.
5 - USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120
6 - USEPA, 2011a: Exposure Factors Handbook: 2011 Edition.
7 - USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.
8 - Central tendency exposure is assumed to be one-half the reasonable maximum exposure value.
9 - Assume one day every other week for reasonable maximum exposure and approximately once a month for central tendency exposure.
10 - Assume one day per week for reasonable maximum exposure and every other week for central tendency exposure.
11 - USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9365.4-24.
12 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. PA/540/R/99/005.
13 - Assume an 8-hour work shift.
14 - Assume 50 percent of total body surface area is exposed (USEPA, 2004).

Abbreviations:
NA - Not applicable
OSWER - Office of Solid Waste and Emergency Response
UCL - Upper confidence limit
USEPA - United States Environmental Protection Agency

TABLE 4-14

INTERMEDIATE VARIABLES FOR CALCULATING DA_{EVENT}
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical of Potential Concern	Medium	Dermal Absorption Fraction (soil)	FA	K_p		T_{event}		Tau		T*		B
			Value	Value	Units	Value	Units	Value	Units	Value	Units	Value
Semivolatile Organic Compounds												
Benzo(a)anthracene	Soil	0.13	NA(1)	NA(1)	cm/hr	NA(1)	hr	NA(1)	hr	NA(1)	hr	NA(2)
Benzo(a)pyrene	Soil, Sediment	0.13	NA(1)	NA(1)	cm/hr	NA(1)	hr	NA(1)	hr	NA(1)	hr	NA(2)
Benzo(b)fluoranthene	Soil, Sediment	0.13	NA(1)	NA(1)	cm/hr	NA(1)	hr	NA(1)	hr	NA(1)	hr	NA(2)
Benzo(k)fluoranthene	Soil	0.13	NA(1)	NA(1)	cm/hr	NA(1)	hr	NA(1)	hr	NA(1)	hr	NA(2)
Dibenzo(a,h)anthracene	Soil, Sediment	0.13	NA(1)	NA(1)	cm/hr	NA(1)	hr	NA(1)	hr	NA(1)	hr	NA(2)
Indeno(1,2,3-cd)pyrene	Soil, Sediment	0.13	NA(1)	NA(1)	cm/hr	NA(1)	hr	NA(1)	hr	NA(1)	hr	NA(2)
Polychlorinated Biphenyls												
Aroclor-1254	Soil	0.14	NA(1)	NA(1)	cm/hr	NA(1)	NA(1)	NA(1)	NA(1)	NA(1)	NA(1)	NA(1)
Inorganics												
Arsenic	Soil, Surface Water, Sediment	0.03	1	1.0E-03	cm/hr	(2)	hr	NA	NA	NA	NA	NA
Chromium VI	Soil, Surface Water, Sediment	0	1	2.0E-03	cm/hr	(2)	hr	NA	NA	NA	NA	NA
Cobalt	Surface Water, Sediment	0	1	4.0E-04	cm/hr	(2)	hr	NA	NA	NA	NA	NA
Lead	Surface Water	0	1	1.0E-04	cm/hr	(2)	hr	NA	NA	NA	NA	NA

Notes:
All values are from USEPA's Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final (2004).

Footnotes:
1 - RAGS Part E recommends not attempting to quantify risk because contaminants are outside the effective predictive domain of the model.
2 - See Tables 4-12 and 4-13 for values for T_{event}.

Abbreviations:
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis
FA - Fraction absorbed water
K_p - Dermal permeability coefficient of compound in water
NA - Not applicable
T_{event} - Event duration
Tau - Lag time
T* - Time to reach steady-state

TABLE 4-15

CHEMICAL PROPERTIES FOR VOLATILIZATION FROM SOIL TO OUTDOOR AIR MODEL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Molecular Weight (g/mole)	Organic Carbon Partition Coefficient (cm^3/g)	Air Diffusivity (cm^2/sec)	Water Diffusivity (cm^2/sec)	Solubility Limit (mg/L)	Henry's Law Constant	
						(Dimensionless)	($atm\text{-}m^3/mol$)
Benzo(a)anthracene	2.28E+02	1.77E+05	2.61E-02	6.75E-06	9.40E-03	4.91E-04	1.20E-05
Aroclor-1254	3.26E+02	1.31E+05	2.37E-02	6.10E-06	4.30E-02	1.16E-02	2.83E-04

Source:
USEPA, 2015. USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites.

TABLE 4-16

NON-CANCER TOXICITY DATA - ORAL/DERMAL
SWMU 23 - BATTERY SHOP
NSA 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 Organs	
		Value	Units		Value	Units			Source	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
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
Polychlorinated Biphenyls										
Aroclor-1254	Subchronic	3.0E-05	mg/kg/day	1	3.0E-05	mg/kg/day	Central Nervous System	300/1	ATSDR	11/2000
	Chronic	2.0E-05	mg/kg/day	1	2.0E-05	mg/kg/day	Whole Body	300/1	IRIS	9/16/2015
Inorganics										
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, Cardiovascular System	3/1	IRIS	9/16/2015
Chromium[3]	Subchronic	5.0E-03	mg/kg/day	0.025	1.3E-04	mg/kg/day	Kidney	100/1	ATSDR	9/2012
	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	None Reported	300/3	IRIS	9/16/2015
Cobalt	Subchronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Thyroid	300/1	PPRTV	8/25/2008
	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Thyroid	3000/1	PPRTV	8/25/2008
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Footnotes:
1 - USEPA, 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 - Values are for hexavalent chromium.

Abbreviations:
ATSDR - Agency for Toxic Substances and Disease Registry
IRIS - Integrated Risk Information System
NA - Not available
PPRTV - Provisional Peer Reviewed Toxicity Value
RfD - Reference dose
USEPA - United States Environmental Protection Agency

TABLE 4-17

NON-CANCER TOXICITY DATA - INHALATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source	Date(s) (MM/DD/YYYY)
Semivolatile Organic Compounds									
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls									
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics									
Arsenic	Chronic	1.5E-05	mg/m^3	4.3E-06	(mg/kg/day)	Skin, Cardiovascular System	NA	Cal EPA	9/2009
Chromium[2]	Subchronic	3.0E-04	mg/m^3	8.6E-05	(mg/kg/day)	Respiratory	30/1	ATSDR	9/2012
	Chronic	1.0E-04	mg/m^3	2.9E-05	(mg/kg/day)	Respiratory	300/1	IRIS	9/16/2015
Cobalt	Subchronic	2.0E-05	mg/m^3	5.7E-06	(mg/kg/day)	Respiratory	100/1	PPRTV	8/25/2008
	Chronic	6.0E-06	mg/m^3	1.7E-06	(mg/kg/day)	Respiratory	300/1	PPRTV	8/25/2008
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA

Footnotes:
1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg.
2 - Values are for hexavalent chromium.

Abbreviations:
ATSDR - Agency for Toxic Substances and Disease Registry
Cal EPA - California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009
IRIS - Integrated Risk Information System
NA - Not applicable
PPRTV - Provisional Peer Reviewed Toxicity Value
RfC - Reference concentration
RfD - Reference dose

TABLE 4-18

CANCER TOXICITY DATA - ORAL/DERMAL
SWMU 23 - BATTERY SHOP
NSA 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	Date(s) (MM/DD/YYYY)
Semivolatile Organic Compounds								
Benzo(a)anthracene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Benzo(a)pyrene[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	9/16/2015
Benzo(b)fluoranthene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Benzo(k)fluoranthene[3]	7.3E-02	$(mg/kg/day)^{-1}$	1	7.3E-02	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Dibenzo(a,h)anthracene[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Indeno(1,2,3-cd)pyrene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Polychlorinated Biphenyls								
Aroclor-1254	2.0E+00	$(mg/kg/day)^{-1}$	1	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(2)	9/1996
Inorganics								
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A / human carcinogen	IRIS	9/16/2015
Chromium[3,4]	5.0E-01	$(mg/kg/day)^{-1}$	0.025	2.0E+01	$(mg/kg/day)^{-1}$	Carcinogenic potential cannot be determined (Oral route)	NJDEP	4/8/2009
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	B2 / Probable human carcinogen	IRIS	9/16/2015

Footnotes:

1 - USEPA, 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 / Oral absorption efficiency for dermal.

3 - Carcinogenic PAHs and hexavalent chromium are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005a).

4 - Values are for hexavalent chromium.

Abbreviations:

IRIS - Integrated Risk Information System
NA - Not available
NJDEP - New Jersey Department of Environmental Protection
PAHs - Polycyclic aromatic hydrocarbons
USEPA(1) - USEPA, 1993c. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July, EPA/600/R-93/089
USEPA(2) - USEPA, 1996b. PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September, EPA/600/P-96/001F

TABLE 4-19

CANCER TOXICITY DATA - INHALATION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical of Potential Concern	Unit Risk		Inhalation CSF[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation CSF	
	Value	Units	Value	Units		Source	Date(s) (MM/DD/YYYY)
Semivolatile Organic Compounds							
Benzo(a)anthracene[2]	1.1E-04	$(\mu g/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Benzo(a)pyrene[2]	1.1E-03	$(\mu g/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Benzo(b)fluoranthene[2]	1.1E-04	$(\mu g/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Benzo(k)fluoranthene[2]	1.1E-04	$(\mu g/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Dibenzo(a,h)anthracene[2]	1.2E-03	$(\mu g/m^3)^{-1}$	4.2E+00	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Indeno(1,2,3-cd)pyrene[2]	1.1E-04	$(\mu g/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Polychlorinated Biphenyls							
Aroclor-1254	5.7E-04	$(\mu g/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	9/1996
Inorganics							
Arsenic	4.3E-03	$(\mu g/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	9/16/2015
Chromium[2,3]	8.4E-02	$(\mu g/m^3)^{-1}$	2.9E+02	$(mg/kg/day)^{-1}$	Known/likely human carcinogen (Inhalation route)	IRIS	9/16/2015
Cobalt	9.0E-03	$(\mu g/m^3)^{-1}$	3.2E+01	$(mg/kg/day)^{-1}$	NA	PPRTV	8/25/2008
Lead	NA	NA	NA	NA	B2 / Probable human carcinogen	IRIS	9/16/2015

Foonotes:

1 - Inhalation CSF = Unit Risk * 70 kg / $20m^3$/day.

2 - Carcinogenic PAHs and hexavalent chromium are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005a).

3 - Values are for hexavalent chromium.

Abbreviations:

Cal EPA(1) - California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009
CSF - Cancer slope factor
IRIS - Integrated Risk Information System
NA - Not available
PAHs - Polycyclic aromatic hydrocarbons
PPRTV - Provisional Peer Reviewed Toxicity Value

TABLE 4-20

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to a Target Organ Hazard Index > 1
Construction Workers	Surface Soil	Incidental Ingestion	3E-07	--	--	--	0.03	--
		Dermal Contact	4E-08	--	--	--	0.006	--
		Inhalation	2E-06	--	--	Chromium	0.05	--
		Total	2E-06	--	--	Chromium	0.09	--
	Subsurface Soil	Incidental Ingestion	6E-07	--	--	--	0.03	--
		Dermal Contact	2E-07	--	--	--	0.005	--
		Inhalation	6E-08	--	--	--	0.06	--
		Total	9E-07	--	--	--	0.1	--
Industrial Workers	Surface Soil	Incidental Ingestion	5E-06	--	--	Arsenic, Chromium	0.02	--
		Dermal Contact	7E-07	--	--	--	0.004	--
		Inhalation	9E-08	--	--	--	0.0001	--
		Total	6E-06	--	--	Arsenic, Chromium	0.02	--
	Subsurface Soil	Incidental Ingestion	9E-06	--	--	Benzo(a)pyrene, Arsenic	0.02	--
		Dermal Contact	4E-06	--	--	Benzo(a)pyrene	0.003	--
		Inhalation	9E-09	--	--	--	0.0001	--
		Total	1E-05	--	--	Benzo(a)pyrene, Arsenic	0.02	--
Adolescent Trespassers	Surface Soil	Incidental Ingestion	7E-07	--	--	--	0.004	--
		Dermal Contact	2E-07	--	--	--	0.002	--
		Inhalation	5E-09	--	--	--	0.000005	--
		Total	9E-07	--	--	--	0.006	--
	Subsurface Soil	Incidental Ingestion	2E-06	--	--	--	0.003	--
		Dermal Contact	1E-06	--	--	--	0.001	--
		Inhalation	6E-10	--	--	--	0.000005	--
		Total	3E-06	--	--	--	0.004	--
	Surface Water	Incidental Ingestion	2E-07	--	--	--	0.002	--
		Dermal Contact	3E-06	--	--	Chromium	0.005	--
		Total	3E-06	--	--	Chromium	0.007	--
	Sediment	Incidental Ingestion	6E-07	--	--	--	0.02	--
		Dermal Contact	2E-07	--	--	--	0.001	--
		Total	8E-07	--	--	--	0.02	--
	Total Surface Soil, Surface Water, and Sediment		5E-06				0.03	
	Total Subsurface Soil, Surface Water, and Sediment		7E-06				0.03	
Child Recreational Users	Surface Soil	Incidental Ingestion	4E-06	--	--	Chromium	0.02	--
		Dermal Contact	6E-07	--	--	--	0.006	--
		Inhalation	1E-08	--	--	--	0.00001	--
		Total	5E-06	--	--	Chromium	0.03	--
	Subsurface Soil	Incidental Ingestion	8E-06	--	--	Benzo(a)pyrene	0.02	--
		Dermal Contact	5E-06	--	--	Benzo(a)pyrene	0.004	--
		Inhalation	1E-09	--	--	--	0.00001	--
		Total	1E-05	--	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	0.02	--
	Surface Water	Incidental Ingestion	4E-07	--	--	--	0.007	--
		Dermal Contact	5E-06	--	--	Chromium	0.009	--
		Total	5E-06	--	--	Chromium	0.02	--
	Sediment	Incidental Ingestion	8E-06	--	--	Chromium	0.2	--
		Dermal Contact	7E-07	--	--	--	0.005	--
		Total	9E-06	--	--	Chromium	0.2	--
	Total Surface Soil, Surface Water, and Sediment		2E-05				0.3	
	Total Subsurface Soil, Surface Water, and Sediment		2E-05				0.2	

TABLE 4-20

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to a Target Organ Hazard Index > 1
Adult Recreational Users	Surface Soil	Incidental Ingestion	7E-07	--	--	--	0.002	--
		Dermal Contact	2E-07	--	--	--	0.001	--
		Inhalation	1E-08	--	--	--	0.00001	--
		Total	9E-07	--	--	--	0.003	--
	Subsurface Soil	Incidental Ingestion	1E-06	--	--	--	0.002	--
		Dermal Contact	1E-06	--	--	--	0.0007	--
		Inhalation	1E-09	--	--	--	0.00001	--
		Total	2E-06	--	--	--	0.003	--
	Surface Water	Incidental Ingestion	1E-07	--	--	--	0.001	--
		Dermal Contact	3E-06	--	--	Chromium	0.005	--
		Total	3E-06	--	--	Chromium	0.006	--
	Sediment	Incidental Ingestion	1E-06	--	--	--	0.02	--
		Dermal Contact	2E-07	--	--	--	0.0008	--
		Total	1E-06	--	--	--	0.02	--
	Total Surface Soil, Surface Water, and Sediment		5E-06				0.03	
	Total Subsurface Soil, Surface Water, and Sediment		6E-06				0.03	
Lifelong Recreational Users (Child and Adult)	Surface Soil	Incidental Ingestion	5E-06	--	--	Chromium	NA	--
		Dermal Contact	8E-07	--	--	--	NA	--
		Inhalation	2E-08	--	--	--	NA	--
		Total	6E-06	--	--	Chromium	NA	--
	Subsurface Soil	Incidental Ingestion	9E-06	--	--	Benzo(a)pyrene	NA	--
		Dermal Contact	7E-06	--	--	Benzo(a)pyrene	NA	--
		Inhalation	2E-09	--	--	--	NA	--
		Total	2E-05	--	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	NA	--
	Surface Water	Incidental Ingestion	6E-07	--	--	--	NA	--
		Dermal Contact	8E-06	--	--	Chromium	NA	--
		Total	9E-06	--	--	Chromium	NA	--
	Sediment	Incidental Ingestion	9E-06	--	--	Chromium	NA	--
		Dermal Contact	9E-07	--	--	--	NA	--
		Total	1E-05	--	--	Chromium	NA	--
	Total Surface Soil, Surface Water, and Sediment		3E-05				NA	
	Total Subsurface Soil, Surface Water, and Sediment		4E-05				NA	

TABLE 4-20

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to a Target Organ Hazard Index > 1
Child Residents	Surface Soil	Incidental Ingestion	6E-05	--	Chromium	Benzo(a)pyrene, Arsenic	0.3	--
		Dermal Contact	4E-06	--	--	Benzo(a)pyrene	0.04	--
		Inhalation	4E-07	--	--	--	0.0004	--
		Total	6E-05	--	Chromium	Benzo(a)pyrene, Arsenic	0.3	--
	Subsurface Soil	Incidental Ingestion	1E-04	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	Benzo(b)fluoranthene, Indeno(1,2,3-cd)pyrene, Arsenic	0.2	--
		Dermal Contact	4E-05	--	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene	0.03	--
		Inhalation	4E-08	--	--	--	0.0004	--
		Total	1E-04	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	Benzo(b)fluoranthene, Indeno(1,2,3-cd)pyrene, Arsenic	0.2	--
	Surface Water	Incidental Ingestion	4E-07	--	--	--	0.007	--
		Dermal Contact	5E-06	--	--	Chromium	0.009	--
		Total	5E-06	--	--	Chromium	0.02	--
	Sediment	Incidental Ingestion	8E-06	--	--	Chromium	0.2	--
		Dermal Contact	7E-07	--	--	--	0.005	--
		Total	9E-06	--	--	Chromium	0.2	--
	Total Surface Soil, Surface Water, and Sediment		7E-05				0.5	
	Total Subsurface Soil, Surface Water, and Sediment		1E-04				0.4	
Adult Residents	Surface Soil	Incidental Ingestion	8E-06	--	--	Arsenic, Chromium	0.03	--
		Dermal Contact	1E-06	--	--	--	0.006	--
		Inhalation	5E-07	--	--	--	0.0004	--
		Total	1E-05	--	--	Arsenic, Chromium	0.04	--
	Subsurface Soil	Incidental Ingestion	2E-05	--	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Arsenic	0.02	--
		Dermal Contact	8E-06	--	--	Benzo(a)pyrene	0.005	--
		Inhalation	6E-08	--	--	--	0.0004	--
		Total	3E-05	--	--	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Arsenic	0.03	--
	Surface Water	Incidental Ingestion	1E-07	--	--	--	0.001	--
		Dermal Contact	3E-06	--	--	Chromium	0.005	--
		Total	3E-06	--	--	Chromium	0.006	--
	Sediment	Incidental Ingestion	1E-06	--	--	--	0.02	--
		Dermal Contact	2E-07	--	--	--	0.0008	--
		Total	1E-06	--	--	--	0.02	--
	Total Surface Soil, Surface Water, and Sediment		1E-05				0.07	
	Total Subsurface Soil, Surface Water, and Sediment		3E-05				0.06	

TABLE 4-20

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to a Target Organ Hazard Index > 1
Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	7E-05	--	Chromium	Benzo(a)pyrene, Arsenic	NA	--
		Dermal Contact	4E-06	--	--	Benzo(a)pyrene	NA	--
		Inhalation	9E-07	--	--	--	NA	--
		Total	7E-05	--	Chromium	Benzo(a)pyrene, Dibenzo(a,h)anthracene, Arsenic	NA	--
	Subsurface Soil	Incidental Ingestion	1E-04	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	Benzo(b)fluoranthene, Indeno(1,2,3-cd)pyrene, Arsenic	NA	--
		Dermal Contact	4E-05	--	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Arsenic	NA	--
		Inhalation	1E-07	--	--	--	NA	--
		Total	1E-04	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	Benzo(b)fluoranthene, Indeno(1,2,3-cd)pyrene, Arsenic	NA	--
	Surface Water	Incidental Ingestion	6E-07	--	--	--	NA	--
		Dermal Contact	8E-06	--	--	Chromium	NA	--
		Total	9E-06	--	--	Chromium	NA	--
	Sediment	Incidental Ingestion	9E-06	--	--	Chromium	NA	--
		Dermal Contact	9E-07	--	--	--	NA	--
		Total	1E-05	--	--	Chromium	NA	--
	Total Surface Soil, Surface Water, and Sediment		9E-05				NA	
	Total Subsurface Soil, Surface Water, and Sediment		1E-04				NA	

Abbreviations:
NA - Not applicable

TABLE 4-21

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENDENCY EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to a Target Organ Hazard Index > 1
Construction Workers	Surface Soil	Incidental Ingestion	1E-07	--	--	--	0.008	--
		Dermal Contact	7E-09	--	--	--	0.001	--
		Inhalation	9E-07	--	--	--	0.02	--
		Total	1E-06	--	--	--	0.03	--
	Subsurface Soil	Incidental Ingestion	2E-07	--	--	--	0.008	--
		Dermal Contact	4E-08	--	--	--	0.0008	--
		Inhalation	3E-08	--	--	--	0.03	--
		Total	3E-07	--	--	--	0.04	--
Industrial Workers	Surface Soil	Incidental Ingestion	8E-07	--	--	--	0.009	--
		Dermal Contact	4E-08	--	--	--	0.0006	--
		Inhalation	2E-08	--	--	--	0.00009	--
		Total	9E-07	--	--	--	0.01	--
	Subsurface Soil	Incidental Ingestion	1E-06	--	--	--	0.007	--
		Dermal Contact	2E-07	--	--	--	0.0004	--
		Inhalation	3E-09	--	--	--	0.00009	--
		Total	1E-06	--	--	--	0.007	--
Adolescent Trespassers	Surface Soil	Incidental Ingestion	2E-07	--	--	--	0.0009	--
		Dermal Contact	2E-08	--	--	--	0.0002	--
		Inhalation	3E-09	--	--	--	0.000001	--
		Total	2E-07	--	--	--	0.001	--
	Subsurface Soil	Incidental Ingestion	4E-07	--	--	--	0.0007	--
		Dermal Contact	1E-07	--	--	--	0.0001	--
		Inhalation	8E-09	--	--	--	0.000001	--
		Total	5E-07	--	--	--	0.0008	--
	Surface Water	Incidental Ingestion	3E-08	--	--	--	0.0006	--
		Dermal Contact	7E-07	--	--	--	0.001	--
		Total	7E-07	--	--	--	0.002	--
	Sediment	Incidental Ingestion	1E-07	--	--	--	0.005	--
		Dermal Contact	2E-08	--	--	--	0.0001	--
		Total	1E-07	--	--	--	0.005	--
	Total Surface Soil, Surface Water, and Sediment		1E-06				0.008	
	Total Subsurface Soil, Surface Water, and Sediment		1E-06				0.008	
Child Recreational Users	Surface Soil	Incidental Ingestion	4E-07	--	--	--	0.005	--
		Dermal Contact	2E-08	--	--	--	0.0006	--
		Inhalation	1E-09	--	--	--	0.000003	--
		Total	4E-07	--	--	--	0.006	--
	Subsurface Soil	Incidental Ingestion	8E-07	--	--	--	0.004	--
		Dermal Contact	2E-07	--	--	--	0.0004	--
		Inhalation	1E-10	--	--	--	0.000003	--
		Total	1E-06	--	--	--	0.004	--
	Surface Water	Incidental Ingestion	4E-08	--	--	--	0.002	--
		Dermal Contact	5E-07	--	--	--	0.002	--
		Total	5E-07	--	--	--	0.004	--
	Sediment	Incidental Ingestion	7E-07	--	--	--	0.06	--
		Dermal Contact	2E-08	--	--	--	0.0005	--
		Total	7E-07	--	--	--	0.06	--
	Total Surface Soil, Surface Water, and Sediment		2E-06				0.07	
	Total Subsurface Soil, Surface Water, and Sediment		2E-06				0.07	

TABLE 4-21

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENDENCY EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to a Target Organ Hazard Index > 1
Adult Recreational Users	Surface Soil	Incidental Ingestion	5E-08	--	--	--	0.0005	--
		Dermal Contact	4E-09	--	--	--	0.00007	--
		Inhalation	9E-10	--	--	--	0.000003	--
		Total	5E-08	--	--	--	0.0006	--
	Subsurface Soil	Incidental Ingestion	9E-08	--	--	--	0.0004	--
		Dermal Contact	2E-08	--	--	--	0.00005	--
		Inhalation	1E-10	--	--	--	0.000003	--
		Total	1E-07	--	--	--	0.0005	--
	Surface Water	Incidental Ingestion	1E-08	--	--	--	0.0003	--
		Dermal Contact	2E-07	--	--	--	0.001	--
		Total	2E-07	--	--	--	0.001	--
	Sediment	Incidental Ingestion	9E-08	--	--	--	0.006	--
		Dermal Contact	5E-09	--	--	--	0.00007	--
		Total	1E-07	--	--	--	0.006	--
	Total Surface Soil, Surface Water, and Sediment		4E-07				0.008	
	Total Subsurface Soil, Surface Water, and Sediment		4E-07				0.008	
Lifelong Recreational Users (Child and Adult)	Surface Soil	Incidental Ingestion	4E-07	--	--	--	NA	--
		Dermal Contact	2E-08	--	--	--	NA	--
		Inhalation	2E-09	--	--	--	NA	--
		Total	4E-07	--	--	--	NA	--
	Subsurface Soil	Incidental Ingestion	8E-07	--	--	--	NA	--
		Dermal Contact	2E-07	--	--	--	NA	--
		Inhalation	2E-10	--	--	--	NA	--
		Total	1E-06	--	--	--	NA	--
	Surface Water	Incidental Ingestion	6E-08	--	--	--	NA	--
		Dermal Contact	7E-07	--	--	--	NA	--
		Total	8E-07	--	--	--	NA	--
	Sediment	Incidental Ingestion	9E-07	--	--	--	NA	--
		Dermal Contact	3E-08	--	--	--	NA	--
		Total	9E-07	--	--	--	NA	--
	Total Surface Soil, Surface Water, and Sediment		2E-06				NA	
	Total Subsurface Soil, Surface Water, and Sediment		3E-06				NA	
Child Residents	Surface Soil	Incidental Ingestion	8E-06	--	--	Chromium	0.1	--
		Dermal Contact	2E-07	--	--	--	0.006	--
		Inhalation	1E-07	--	--	--	0.0003	--
		Total	8E-06	--	--	Chromium	0.1	--
	Subsurface Soil	Incidental Ingestion	2E-05	--	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	0.08	--
		Dermal Contact	2E-06	--	--	--	0.004	--
		Inhalation	1E-08	--	--	--	0.0003	--
		Total	2E-05	--	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	0.08	--
	Surface Water	Incidental Ingestion	4E-08	--	--	--	0.002	--
		Dermal Contact	5E-07	--	--	--	0.002	--
		Total	5E-07	--	--	--	0.004	--
	Sediment	Incidental Ingestion	7E-07	--	--	--	0.06	--
		Dermal Contact	2E-08	--	--	--	0.0005	--
		Total	7E-07	--	--	--	0.06	--
	Total Surface Soil, Surface Water, and Sediment		9E-06				0.2	
	Total Subsurface Soil, Surface Water, and Sediment		2E-05				0.1	

TABLE 4-21

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENDENCY EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to a Target Organ Hazard Index > 1
Adult Residents	Surface Soil	Incidental Ingestion	8E-07	--	--	--	0.009	--
		Dermal Contact	3E-08	--	--	--	0.0006	--
		Inhalation	1E-07	--	--	--	0.0003	--
		Total	9E-07	--	--	--	0.01	--
	Subsurface Soil	Incidental Ingestion	1E-06	--	--	--	0.007	--
		Dermal Contact	2E-07	--	--	--	0.0004	--
		Inhalation	1E-08	--	--	--	0.0003	--
		Total	1E-06	--	--	--	0.008	--
	Surface Water	Incidental Ingestion	1E-08	--	--	--	0.0003	--
		Dermal Contact	2E-07	--	--	--	0.001	--
		Total	2E-07	--	--	--	0.001	--
	Sediment	Incidental Ingestion	8E-08	--	--	--	0.006	--
		Dermal Contact	5E-09	--	--	--	0.00006	--
		Total	9E-08	--	--	--	0.006	--
	Total Surface Soil, Surface Water, and Sediment		1E-06				0.02	
	Total Subsurface Soil, Surface Water, and Sediment		1E-06				0.02	
Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	9E-06	--	--	Chromium	NA	--
		Dermal Contact	2E-07	--	--	--	NA	--
		Inhalation	2E-07	--	--	--	NA	--
		Total	9E-06	--	--	Chromium	NA	--
	Subsurface Soil	Incidental Ingestion	2E-05	--	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	NA	--
		Dermal Contact	2E-06	--	--	--	NA	--
		Inhalation	2E-08	--	--	--	NA	--
		Total	2E-05	--	--	Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene	NA	--
	Surface Water	Incidental Ingestion	6E-08	--	--	--	NA	--
		Dermal Contact	7E-07	--	--	--	NA	--
		Total	8E-07	--	--	--	NA	--
	Sediment	Incidental Ingestion	9E-07	--	--	--	NA	--
		Dermal Contact	3E-08	--	--	--	NA	--
		Total	9E-07	--	--	--	NA	--
	Total Surface Soil, Surface Water, and Sediment		1E-05				NA	
	Total Subsurface Soil, Surface Water, and Sediment		2E-05				NA	

Abbreviations:
NA - Not applicable

TABLE 4-22

RISKS ASSOCIATED WITH NATURALLY OCCURRING CHEMICALS
SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA

Receptor	Reasonable Maximum Exposures		Central Tendency Exposures	
	ILCR	HI	ILCR	HI
Current/Future Construction Workers				
Surface Soil				
Site Risk	2E-06	0.09	1E-06	0.03
Background Risk	1E-07	0.06	6E-08	0.02
Site + Background Risk	2E-06	0.2	1E-06	0.05
Subsurface Soil				
Site Risk	9E-07	0.1	3E-07	0.04
Background Risk	2E-06	0.05	1E-06	0.01
Site + Background Risk	3E-06	0.2	1E-06	0.05
Current/Future Industrial Workers				
Surface Soil				
Site Risk	6E-06	0.02	9E-07	0.01
Background Risk	5E-09	0.03	2E-09	0.01
Site + Background Risk	6E-06	0.05	9E-07	0.02
Subsurface Soil				
Site Risk	1E-05	0.02	1E-06	0.007
Background Risk	3E-06	0.03	5E-07	0.01
Site + Background Risk	1E-05	0.05	2E-06	0.02
Current/Future Adolescent Trespassers				
Surface Soil				
Site Risk	9E-07	0.006	2E-07	0.001
Background Risk	1E-10	0.005	3E-11	0.001
Site + Background Risk	9E-07	0.01	2E-07	0.002
Subsurface Soil				
Site Risk	3E-06	0.004	5E-07	0.0008
Background Risk	7E-07	0.005	2E-07	0.001
Site + Background Risk	4E-06	0.009	7E-07	0.002
Surface Water	3E-06	0.007	7E-07	0.002
Sediment	8E-07	0.02	1E-07	0.005
Site Totals				
Total Surface Soil, Surface Water, and Sediment	5E-06	0.03	1E-06	0.008
Total Subsurface Soil, Surface Water, and Sediment	7E-06	0.03	1E-06	0.008
Site and Background Totals				
Total Surface Soil, Surface Water, and Sediment	5E-06	0.04	1E-06	0.009
Total Subsurface Soil, Surface Water, and Sediment	8E-06	0.04	2E-06	0.009

TABLE 4-22

RISKS ASSOCIATED WITH NATURALLY OCCURRING CHEMICALS
SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA

Receptor	Reasonable Maximum Exposures		Central Tendency Exposures	
	ILCR	HI	ILCR	HI
Future Child Recreational Users				
Surface Soil				
Site Risk	5E-06	0.03	4E-07	0.006
Background Risk	1E-10	0.03	1E-11	0.007
Site + Background Risk	5E-06	0.06	4E-07	0.01
Subsurface Soil				
Site Risk	1E-05	0.02	1E-06	0.004
Background Risk	4E-06	0.03	4E-07	0.006
Site + Background Risk	1E-05	0.05	1E-06	0.01
Surface Water	5E-06	0.02	5E-07	0.004
Sediment	9E-06	0.2	7E-07	0.06
Site Totals				
Total Surface Soil, Surface Water, and Sediment	2E-05	0.3	2E-06	0.07
Total Subsurface Soil, Surface Water, and Sediment	2E-05	0.2	2E-06	0.07
Site and Background Totals				
Total Surface Soil, Surface Water, and Sediment	2E-05	0.3	2E-06	0.08
Total Subsurface Soil, Surface Water, and Sediment	3E-05	0.3	3E-06	0.07
Future Adult Recreational Users				
Surface Soil				
Site Risk	9E-07	0.003	5E-08	0.0006
Background Risk	4E-10	0.003	4E-11	0.0007
Site + Background Risk	9E-07	0.006	5E-08	0.001
Subsurface Soil				
Site Risk	2E-06	0.003	1E-07	0.0005
Background Risk	5E-07	0.003	3E-08	0.0006
Site + Background Risk	3E-06	0.006	1E-07	0.001
Surface Water	3E-06	0.006	2E-07	0.001
Sediment	1E-06	0.02	1E-07	0.006
Site Totals				
Total Surface Soil, Surface Water, and Sediment	5E-06	0.03	4E-07	0.008
Total Subsurface Soil, Surface Water, and Sediment	6E-06	0.03	4E-07	0.008
Site and Background Totals				
Total Surface Soil, Surface Water, and Sediment	5E-06	0.03	4E-07	0.01
Total Subsurface Soil, Surface Water, and Sediment	7E-06	0.03	4E-07	0.01

TABLE 4-22

RISKS ASSOCIATED WITH NATURALLY OCCURRING CHEMICALS
SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA

Receptor	Reasonable Maximum Exposures		Central Tendency Exposures	
	ILCR	HI	ILCR	HI
Future Lifelong Recreational Users				
Surface Soil				
Site Risk	6E-06	NA	4E-07	NA
Background Risk	5E-10	NA	5E-11	NA
Site + Background Risk	6E-06	NA	4E-07	NA
Subsurface Soil				
Site Risk	2E-05	NA	1E-06	NA
Background Risk	5E-06	NA	4E-07	NA
Site + Background Risk	3E-05	NA	1E-06	NA
Surface Water	9E-06	NA	8E-07	NA
Sediment	1E-05	NA	9E-07	NA
Site Totals				
Total Surface Soil, Surface Water, and Sediment	3E-05	NA	2E-06	NA
Total Subsurface Soil, Surface Water, and Sediment	4E-05	NA	3E-06	NA
Site and Background Totals				
Total Surface Soil, Surface Water, and Sediment	3E-05	NA	2E-06	NA
Total Subsurface Soil, Surface Water, and Sediment	4E-05	NA	3E-06	NA
Hypothetical Future Child Residents				
Surface Soil				
Site Risk	6E-05	0.3	8E-06	0.1
Background Risk	5E-09	0.4	1E-09	0.1
Site + Background Risk	6E-05	0.7	8E-06	0.2
Subsurface Soil				
Site Risk	1E-04	0.2	2E-05	0.08
Background Risk	6E-05	0.4	8E-06	0.1
Site + Background Risk	2E-04	0.6	3E-05	0.2
Surface Water	5E-06	0.02	5E-07	0.004
Sediment	9E-06	0.2	7E-07	0.06
Site Totals				
Total Surface Soil, Surface Water, and Sediment	7E-05	0.5	9E-06	0.2
Total Subsurface Soil, Surface Water, and Sediment	1E-04	0.4	2E-05	0.1
Site and Background Totals				
Total Surface Soil, Surface Water, and Sediment	7E-05	0.9	9E-06	0.3
Total Subsurface Soil, Surface Water, and Sediment	2E-04	0.8	3E-05	0.2

TABLE 4-22

RISKS ASSOCIATED WITH NATURALLY OCCURRING CHEMICALS
SWMU 23 - BATTERY SHOP NSA CRANE, CRANE, INDIANA

Receptor	Reasonable Maximum Exposures		Central Tendency Exposures	
	ILCR	HI	ILCR	HI
Hypothetical Future Adult Residents				
Surface Soil				
Site Risk	1E-05	0.04	9E-07	0.01
Background Risk	2E-08	0.04	4E-09	0.01
Site + Background Risk	1E-05	0.08	9E-07	0.02
Subsurface Soil				
Site Risk	3E-05	0.03	1E-06	0.008
Background Risk	8E-06	0.03	7E-07	0.01
Site + Background Risk	4E-05	0.06	2E-06	0.02
Surface Water	3E-06	0.006	2E-07	0.001
Sediment	1E-06	0.02	9E-08	0.006
Site Totals				
Total Surface Soil, Surface Water, and Sediment	1E-05	0.07	1E-06	0.02
Total Subsurface Soil, Surface Water, and Sediment	3E-05	0.06	1E-06	0.02
Site and Background Totals				
Total Surface Soil, Surface Water, and Sediment	1E-05	0.1	1E-06	0.03
Total Subsurface Soil, Surface Water, and Sediment	4E-05	0.1	2E-06	0.03
Hypothetical Future Lifelong Residents				
Surface Soil				
Site Risk	7E-05	NA	9E-06	NA
Background Risk	3E-08	NA	5E-09	NA
Site + Background Risk	7E-05	NA	9E-06	NA
Subsurface Soil				
Site Risk	1E-04	NA	2E-05	NA
Background Risk	7E-05	NA	9E-06	NA
Site + Background Risk	2E-04	NA	3E-05	NA
Surface Water	9E-06	NA	8E-07	NA
Sediment	1E-05	NA	9E-07	NA
Site Totals				
Total Surface Soil, Surface Water, and Sediment	9E-05	NA	1E-05	NA
Total Subsurface Soil, Surface Water, and Sediment	1E-04	NA	2E-05	NA
Site and Background Totals				
Total Surface Soil, Surface Water, and Sediment	9E-05	NA	1E-05	NA
Total Subsurface Soil, Surface Water, and Sediment	2E-04	NA	3E-05	NA

Notes:
"Site Risk" is the ILCR or HI for only site-related chemicals detected at concentrations exceeding screening levels.
"Background Risk" is the ILCR or HI for only chemicals present at naturally occurring levels detected at concentrations exceeding screening levels. Cobalt concentration were less than background levels in surface soil. Chromium, cobalt, and vanadium concentrations were less than background levels in subsurface soil.
"Site + Background Risk" is the ILCR or HI for all chemicals detected at concentrations exceeding screening levels.

Abbreviations:
ILCR - Incremental lifetime cancer risk
HI - Hazard index

TABLE 4-23

COMPARISON OF CHEMICAL CONCENTRATIONS TO SCREENING CRITERIA FOR MIGRATION FROM SURFACE SOIL TO GROUNDWATER
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample with Maximum Concentration	Frequency of Detection	Range of Non-Detects[1]	Concentration Used for Screening[2]	Background Upper Tolerance Limit[3]	Number of Samples Greater than Background	USEPA SSL Protection of Groundwater[4]	Number of Detections Greater than SSL	IDEM Migration to Groundwater[5]	Number of Detections Greater than IDEM Migration to Groundwater
Volatile Organic Compounds														
107-06-2	1,2-Dichloroethane	0.00124 J	0.00153 J	mg/kg	23SS023-0002	4/16	0.00244 - 0.108	0.00153	NA	NA	**0.00096 C**	4	0.028 M	0
78-93-3	2-Butanone	0.00592 J	0.0405 J	mg/kg	23SS001-0002	3/16	0.00483 - 0.216	0.0405	NA	NA	24 N	0	23 N	0
67-64-1	Acetone	0.00733 J	0.234 J	mg/kg	23SS001-0002	9/16	0.00967 - 0.433	0.234	NA	NA	58 N	0	57 N	0
71-43-2	Benzene	0.0018 J	0.0018 J	mg/kg	23SS001-0002	1/21	0.00242 - 0.108	0.0018	NA	NA	0.0046 C	0	0.051 M	0
75-15-0	Carbon Disulfide	0.00888 J	0.00888 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00888	NA	NA	4.8 N	0	4.8 N	0
67-66-3	Chloroform	0.00514 J	0.00514 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00514	NA	NA	**0.0012 C**	1	0.44 M	0
127-18-4	Tetrachloroethene	0.00539 J	0.00539 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00539	NA	NA	0.10 C	0	0.045 M	0
108-88-3	Toluene	0.0094 J	0.0094 J	mg/kg	23SS001-0002	1/21	0.00242 - 0.108	0.0094	NA	NA	15 N	0	14 M	0
110-57-6	trans-1,4-Dichloro-2-Butene	0.004 J	0.004 J	mg/kg	23SS023-0002	1/16	0.00242 - 0.108	0.004	NA	NA	**0.000012 C**	1	**0.00012 C**	1
Polycyclic Aromatic Hydrocarbons														
90-12-0	1-Methylnaphthalene	2.5	2.5	mg/kg	23SS070-0002	1/22	0.0038 - 0.043	2.5	NA	NA	**0.12 C**	1	**1.2 C**	1
91-57-6	2-Methylnaphthalene	6.8	6.8	mg/kg	23SS070-0002	1/49	0.00366 - 0.162	6.8	NA	NA	**3.8 N**	1	**3.7 N**	1
83-32-9	Acenaphthene	0.082 J	0.15	mg/kg	23SS091-0002	2/49	0.00366 - 0.162	0.15	NA	NA	110 N	0	110 N	0
208-96-8	Acenaphthylene	0.0041 J	0.0077	mg/kg	23SS074-0002	3/49	0.00366 - 0.162	0.0077	NA	NA	110 N[6]	0	NA	NA
120-12-7	Anthracene	0.041 J	0.37	mg/kg	23SS091-0002	6/49	0.00367 - 0.162	0.37	NA	NA	1,200 N	0	1,200 N	0
56-55-3	Benzo(a)anthracene	0.0041 J	0.99	mg/kg	23SS091-0002	27/49	0.0038 - 0.162	0.99	NA	NA	**0.085 C**	9	2.4 C	0
50-32-8	Benzo(a)pyrene	0.0023 J	0.97	mg/kg	23SS091-0002	30/49	0.00373 - 0.162	0.97	NA	NA	**0.08 C**	15	4.7 M	0
205-99-2	Benzo(b)fluoranthene	0.0043 J	1.3	mg/kg	23SS091-0002	35/49	0.0038 - 0.162	1.3	NA	NA	**0.82 C**	2	8.2 C	0
191-24-2	Benzo(g,h,i)perylene	0.00568 J	0.71	mg/kg	23SS091-0002	27/49	0.00373 - 0.162	0.71	NA	NA	260 N[7]	0	NA	NA
207-08-9	Benzo(k)fluoranthene	0.0024 J	0.63	mg/kg	23SS091-0002	31/49	0.00373 - 0.162	0.63	NA	NA	8 C	0	80 C	0
218-01-9	Chrysene	0.0041 J	1	mg/kg	23SS091-0002	30/49	0.0038 - 0.162	1	NA	NA	24 C	0	250 C	0
53-70-3	Dibenzo(a,h)anthracene	0.00671 J	0.23	mg/kg	23SS091-0002	13/49	0.00373 - 0.162	0.23	NA	NA	0.26 C	0	2.6 C	0
206-44-0	Fluoranthene	0.0047 J	1.9	mg/kg	23SS091-0002	33/49	0.0038 - 0.162	1.9	NA	NA	1,800 N	0	1,800 N	0
86-73-7	Fluorene	0.099	0.17	mg/kg	23SS091-0002	2/49	0.00366 - 0.162	0.17	NA	NA	110 N	0	110 N	0
193-39-5	Indeno(1,2,3-cd)pyrene	0.00493 J	0.5	mg/kg	23SS091-0002	26/49	0.00373 - 0.162	0.5	NA	NA	2.6 C	0	47 C	0
91-20-3	Naphthalene	0.95	0.95	mg/kg	23SS070-0002	1/49	0.00366 - 0.162	0.95	NA	NA	**0.011 C**	1	**0.11 C**	1
85-01-8	Phenanthrene	0.0044 J	1.4	mg/kg	23SS091-0002	18/49	0.0038 - 0.162	1.4	NA	NA	260 N[7]	0	NA	NA
129-00-0	Pyrene	0.0081	2 J	mg/kg	23SS091-0002	30/49	0.0038 - 0.162	2	NA	NA	260 N	0	260 N	0
Pesticides/Polychlorinated Biphenyls														
11097-69-1	Aroclor-1254	0.00127 J	0.191 J	mg/kg	23SS001-0002	6/16	0.00184 - 0.0384	0.191	NA	NA	**0.04 C**	1	2 C	0
11096-82-5	Aroclor-1260	0.00208 J	0.186 J	mg/kg	23SS001-0002	10/16	0.00184 - 0.00204	0.186	NA	NA	**0.11 C**	2	5.5 C	0
Metals														
7440-38-2	Arsenic	2.3	17.8	mg/kg	23SS035-0002	26/26	--	17.8	**11.83**	1	**0.03 C**	26	**5.9 M**	8
7440-39-3	Barium	12.4	115	mg/kg	23SS007-0002	26/26	--	115	211	0	3,200 N	0	1700 M	0
7440-41-7	Beryllium	0.327 J	0.963 J	mg/kg	23SS020-0002	20/26	0.362 - 0.572	0.963	**0.93**	1	380 N	0	63 M	0
7440-43-9	Cadmium	0.0645 J	0.345 J	mg/kg	23SS013-0002	2/26	0.118 - 0.704	0.345	6.05	0	14 N	0	7.5 M	0
7440-47-3	Chromium	4.92	29.5 J	mg/kg	23SS001-0002	26/26	--	29.5	**28.7**	1	**0.013 C[8][9]**	26	**0.14 C[8][10]**	26
7440-48-4	Cobalt	2.5	15.4 J	mg/kg	23SS037-0002	26/26	--	15.4	32.4	0	**5.4 N**	20	**5.4 N**	20
7440-50-8	Copper	3.35	39.8	mg/kg	23SS001-0002	26/26	--	39.8	**17.6**	4	560 N	0	920 M	0
7439-92-1	Lead	2.33	345	mg/kg	23SS013-0002	48/48	--	345	**27**	18	**280 [11]**	1	**270 N**	1
7439-97-6	Mercury	0.0209 J	0.692 J	mg/kg	23SS001-0002	20/26	0.0332 - 0.249	0.692	**0.077**	3	**0.66 N**	1	2.1 M	0
7440-02-0	Nickel	5.33	19.4	mg/kg	23SS020-0002	26/26	--	19.4	22.1	0	520 N	0	510 N	0
7782-49-2	Selenium	0.169 J	0.425 J	mg/kg	23SS033-0002	6/26	0.294 - 1.76	0.425	0.81	0	10 N	0	5.3 M	0
7440-62-2	Vanadium	5.8	38.3	mg/kg	23SS009-0002	26/26	--	38.3	51.2	0	1,700 N	0	1,700 N	0
7440-66-6	Zinc	11.1	127 J	mg/kg	23SS001-0002	26/26	--	127	**65.6**	1	7,400 N	0	7,500 N	0

TABLE 4-23

COMPARISON OF CHEMICAL CONCENTRATIONS TO SCREENING CRITERIA FOR MIGRATION FROM SURFACE SOIL TO GROUNDWATER
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample with Maximum Concentration	Frequency of Detection	Range of Non-Detects(1)	Concentration Used for Screening(2)	Background Upper Tolerance Limit(3)	Number of Samples Greater than Background	USEPA SSL Protection of Groundwater(4)	Number of Detections Greater than SSL	IDEM Migration to Groundwater(5)	Number of Detections Greater than IDEM Migration to Groundwater
Petroleum Hydrocarbons														
-	DRO, C08-C28	9.69 J	69	mg/kg	23SS012-0002	15/16	7.49 - 7.49	69	NA(10)	NA(10)	NA (12)	NA(12)	NA (12)	NA(12)
-	DRO, C08-C34	12 J	88.5	mg/kg	23SS012-0002	16/16	-	88.5	NA(10)	NA(10)	NA (12)	NA(12)	NA (12)	NA(12)
-	Gasoline Range Organics	55.3	55.3	mg/kg	23SS013-0002	1/16	4.33 - 6.38	55.3	NA(10)	NA(10)	NA (12)	NA(12)	NA (12)	NA(12)

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - Upper tolerance limits (representing 95-percent of the soil population with 95-percent confidence), Final Base-Wide Background Soil Investigation Report, Tetra Tech, 2001.
4 - USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, June 2015. Values are based on a dilution attenuation factor of 20.
5 - IDEM Closure Guide, March 2, 2015.
6 - Value is for acenaphthene.
7 - Value is for pyrene.
8 - Value is for hexavalent chromium.
9 - Value for trivalent chromium, which is presented for comparison purposes, is 80,000 mg/kg,
10 - Value for trivalent chromium, which is presented for comparison purposes, is 1,000,000 mg/kg,
11 - Value is an MCL-based SSL.
12 - This general parameter, which is comprised of a range of organic chemicals, is evaluated by the chemical-specific results.

Abbreviations:
C - Carcinogenic endpoint
CAS - Chemical Abstracts Service
DRO - Diesel range organics
IDEM - Indiana Department of Environmental Management
J - Estimated value
M - Based on MCL
MCL - Maximum Contaminant Level
N - Noncarcinogen endpoint
NA - Not applicable/not available
SSL - Soil Screening Level
USEPA - United States Environmental Protection Agency

Notes:
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria.

Associated Samples:

23SS001-0002	23SS028-0002	23SS048-0002	23SS077-0002	23SS088-0002
23SS005-0002	23SS029-0002	23SS049-0002	23SS078-0001	23SS089-0002
23SS007-0002	23SS030-0002	23SS054-0002	23SS079-0002	23SS091-0002
23SS008-0002	23SS031-0002	23SS055-0002	23SS080-0002	23SS092-0002
23SS009-0002	23SS032-0002	23SS056-0002	23SS081-0002	
23SS011-0002	23SS033-0002	23SS058-0002	23SS082-0002	
23SS012-0002	23SS034-0002	23SS059-0002	23SS083-0002	
23SS013-0002	23SS037-0002	23SS062-0002	23SS085-0002	
23SS014-0002	23SS038-0002	23SS063-0002	23SS086-0002	
23SS015-0002	23SS039-0002	23SS064-0002	23SS018-0002	
23SS016-0002	23SS040-0002	23SS066-0002	23SS019-0002	
23SS017-0002	23SS042-0002	23SS067-0002	23SS035-0002	
23SS020-0002	23SS043-0002	23SS069-0002	23SS036-0002	
23SS021-0002	23SS044-0002	23SS070-0002	23SS050-0002	
23SS022-0002	23SS045-0002	23SS074-0002	23SS053-0002	
23SS023-0002	23SS046-0002	23SS075-0002	23SS072-0002	
23SS027-0002	23SS047-0002	23SS076-0002	23SS073-0002	

TABLE 4-24

COMPARISON OF CHEMICAL CONCENTRATIONS TO SCREENING CRITERIA FOR MIGRATION FROM SUBSURFACE SOIL TO GROUNDWATER
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample with Maximum Concentration	Frequency of Detection	Range of Non-Detects[2]	Concentration Used for Screening[3]	Background Upper Tolerance Limit[3]	Number of Samples Greater than Background	USEPA SSL Protection of Groundwater[4]	Number of Detections Greater than SSL	IDEM Migration to Groundwater[5]	Number of Detections Greater than IDEM Migration to Groundwater
Volatile Organic Compounds														
78-93-3	2-Butanone	0.0043 J	0.00553 J	mg/kg	23SB003-0810	2/12	0.00444 - 0.273	0.00553	NA	NA	24 N	0	23 N	0
67-64-1	Acetone	0.00666 J	0.101	mg/kg	23SB003-0810	4/12	0.00889 - 0.546	0.101	NA	NA	58 N	0	57 N	0
75-15-0	Carbon Disulfide	0.00113 J	0.00113 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.00113	NA	NA	4.8 N	0	4.8 N	0
156-59-2	cis-1,2-Dichloroethene	0.0012 J	0.0012 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.0012	NA	NA	0.22 N	0	0.41 M	0
75-09-2	Methylene Chloride	0.00486 J	0.00486 J	mg/kg	23SB006-0608	1/12	0.00425 - 0.273	0.00486	NA	NA	0.058 C	0	0.025 M	0
108-88-3	Toluene	0.00178 J	0.00378 J	mg/kg	23SB001-1012	2/12	0.00222 - 0.136	0.00378	NA	NA	15 N	0	14 M	0
75-01-4	Vinyl Chloride	0.00144 J	0.00144 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.00144	NA	NA	**0.00013 C**	1	0.014 M	0
Polycyclic Aromatic Hydrocarbons														
90-12-0	1-Methylnaphthalene	0.048 J	0.37 J	mg/kg	23SB068-0406	2/39	0.0038 - 0.07	0.37	NA	NA	**0.12 C**	1	1.2 C	0
91-57-6	2-Methylnaphthalene	0.0041 J	0.5 J	mg/kg	23SB068-0406	7/56	0.00358 - 0.046	0.5	NA	NA	3.8 N	0	3.7 N	0
83-32-9	Acenaphthene	0.0046 J	3.6 J	mg/kg	23SB068-0406	3/56	0.00358 - 0.046	3.6	NA	NA	110 N	0	110 N	0
208-96-8	Acenaphthylene	0.00554 J	1 J	mg/kg	23SB068-0204	7/56	0.00358 - 0.046	1	NA	NA	110 N[6]	0	NA	NA
120-12-7	Anthracene	0.00427 J	7.6 J	mg/kg	23SB068-0406	6/56	0.00358 - 0.046	7.6	NA	NA	1,200 N	0	1,200 N	0
56-55-3	Benzo(a)anthracene	0.0046 J	17 J	mg/kg	23SB068-0406	18/56	0.00358 - 0.046	17	NA	NA	**0.085 C**	9	**2.4 C**	2
50-32-8	Benzo(a)pyrene	0.0045 J	12 J	mg/kg	23SB068-0406	27/56	0.00358 - 0.039	12	NA	NA	**0.08 C**	10	**4.7 M**	2
205-99-2	Benzo(b)fluoranthene	0.004 J	18 J	mg/kg	23SB068-0406	27/56	0.00358 - 0.039	18	NA	NA	**0.82 C**	1	**8.2 C**	2
191-24-2	Benzo(g,h,i)perylene	0.0093	7.6 J	mg/kg	23SB068-0406	23/56	0.00358 - 0.042	7.6	NA	NA	260 N[7]	0	NA	NA
207-08-9	Benzo(k)fluoranthene	0.0025 J	7.2 J	mg/kg	23SB068-0406	21/56	0.00358 - 0.042	7.2	NA	NA	8 C	0	80 C	0
218-01-9	Chrysene	0.0043 J	16 J	mg/kg	23SB068-0406	26/56	0.00358 - 0.042	16	NA	NA	24 C	0	250 C	0
53-70-3	Dibenzo(a,h)anthracene	0.0077 J	2.6 J	mg/kg	23SB068-0406	7/56	0.00358 - 0.046	2.6	NA	NA	**0.26 C**	2	2.6 C	0
206-44-0	Fluoranthene	0.0053 J	33 J	mg/kg	23SB068-0406	24/56	0.00358 - 0.046	33	NA	NA	1,800 N	0	1,800 N	0
86-73-7	Fluorene	0.0046 J	5 J	mg/kg	23SB068-0406	3/56	0.00358 - 0.046	5	NA	NA	110 N	0	110 N	0
193-39-5	Indeno(1,2,3-cd)pyrene	0.0068 J	8.9 J	mg/kg	23SB068-0406	15/56	0.00358 - 0.046	8.9	NA	NA	**2.6 C**	2	47 C	0
91-20-3	Naphthalene	0.0045 J	0.54 J	mg/kg	23SB068-0406	3/56	0.00358 - 0.046	0.54	NA	NA	**0.011 C**	2	**0.11 C**	2
85-01-8	Phenanthrene	0.0032 J	31 J	mg/kg	23SB068-0406	24/56	0.00358 - 0.046	31	NA	NA	260 N[7]	0	NA	NA
129-00-0	Pyrene	0.0056 J	25 J	mg/kg	23SB068-0406	28/56	0.00358 - 0.042	25	NA	NA	260 N	0	260 N	0
Metals														
7440-38-2	Arsenic	1.28 J	19.7	mg/kg	23SB024-0406	17/17	--	19.7	**12.5**	2	**0.03 C**	0	**5.9 M**	0
7440-39-3	Barium	8.52 J	88.4	mg/kg	23SB001-1012	17/17	--	88.4	115	0	3,200 N	0	1,700 M	0
7440-41-7	Beryllium	0.287	0.795 J	mg/kg	23SB025-0608	12/17	0.362 - 0.582	0.795	NA	0	380 N	0	63 M	0
7440-43-9	Cadmium	0.618 J	0.618 J	mg/kg	23SB025-0608	1/17	0.113 - 0.643	0.618	0.8	0	14 N	0	7.5 M	0
7440-47-3	Chromium	4.92	29.8	mg/kg	23SB003-0810	17/17	--	29.8	33	0	**0.00067 C[8][9]**	0	**0.14 C[8][10]**	0
7440-48-4	Cobalt	2.16 J	11.4	mg/kg	23SB025-0608	15/17	2.57 - 2.78	11.4	21.2	0	**5.4 N**	0	**5.4 N**	0
7440-50-8	Copper	3.35	41.3	mg/kg	23SB024-0406	17/17	--	41.3	**33.3**	1	560 N	0	920 M	0
7439-92-1	Lead	2.33	29 J	mg/kg	23SB088-0204	32/32	--	29	**19.6**	4	280 [11]	0	270 N	0
7439-97-6	Mercury	0.022 J	0.0882	mg/kg	23SB024-0406	15/17	0.249 - 0.249	0.0882	0.18	0	0.66 N	0	2.1 M	0
7440-02-0	Nickel	2.14 J	18	mg/kg	23SB025-0608	17/17	--	18	29.6	0	520 N	0	510 N	0
7782-49-2	Selenium	0.169 J	0.169 J	mg/kg	23SB085-0204, 23SB085-0406	2/17	0.282 - 1.61	0.169	1.07	0	10 N	0	5.3 M	0
7440-22-4	Silver	0.122 J	0.122 J	mg/kg	23SB037-0204	1/17	0.113 - 1.45	0.122	0.13	0	16 N	0	16 N	0
7440-62-2	Vanadium	6.23	51.2	mg/kg	23SB003-0810	17/17	--	51.2	69.1	0	1,700 N	0	1,700 N	0
7440-66-6	Zinc	12.1	74.3	mg/kg	23SB025-0608	15/17	3.85 - 7.59	74.3	83.3	0	7,400 N	0	7,500 N	0
Petroleum Hydrocarbons														
-	DRO, C08-C28	11.5 J	2220	mg/kg	23SB001-1012	4/12	7.15 - 8.06	2220	NA[10]	NA[10]	NA [12]	NA[12]	NA [12]	NA[12]
-	DRO, C08-C34	8.53 J	3490	mg/kg	23SB001-1012	12/12	-	3490	NA[10]	NA[10]	NA [12]	NA[12]	NA [12]	NA[12]
-	Gasoline Range Organics	4.75 J	5.03 J	mg/kg	23SB026-0608	2/12	4.28 - 5.46	5.03	NA[10]	NA[10]	NA [12]	NA[12]	NA [12]	NA[12]

TABLE 4-24

COMPARISON OF CHEMICAL CONCENTRATIONS TO SCREENING CRITERIA FOR MIGRATION FROM SUBSURFACE SOIL TO GROUNDWATER
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

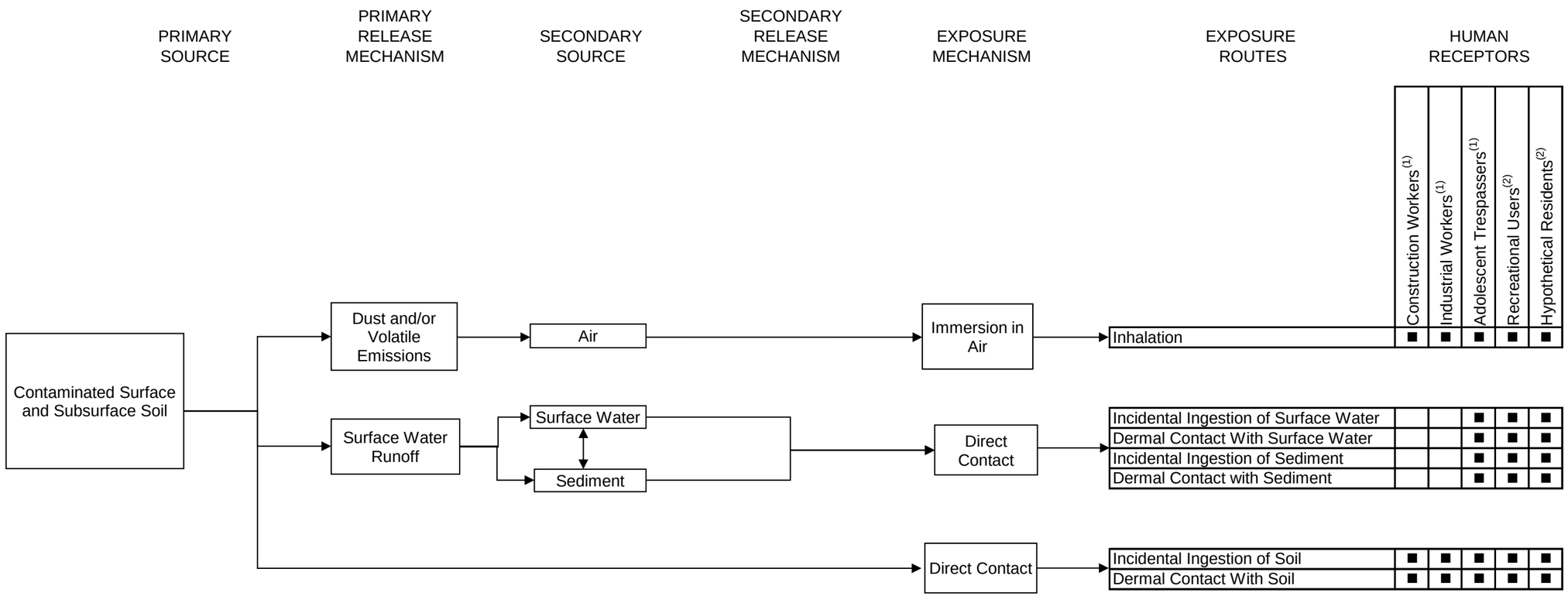
Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - Upper tolerance limits (representing 95-percent of the soil population with 95-percent confidence), Final Base-Wide Background Soil Investigation Report, Tetra Tech, 2001.
4 - USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, June 2015. Values are based on a dilution attenuation factor of 20.
5 - IDEM Closure Guide, March 2, 2015.
6 - Value is for acenaphthene.
7 - Value is for pyrene.
8 - Value is for hexavalent chromium.
9 - Value for trivalent chromium, which is presented for comparison purposes, is 80,000 mg/kg,
10 - Value for trivalent chromium, which is presented for comparison purposes, is 1,000,000 mg/kg,
11 - Value is MCL-based SSL.
12 - This general parameter, which is comprised of a range of organic chemicals, is evaluated by the chemical-specific results.

Abbreviations:
C - Carcinogenic endpoint
CAS - Chemical Abstracts Service
DRO - Diesel range organics
IDEM - Indiana Department of Environmental Management
J - Estimated value
M - Based on MCL
MCL - Maximum Contaminant Level
N - Noncarcinogen endpoint
NA - Not applicable/not available
SSL - Soil Screening Level
USEPA - United States Environmental Protection Agency

Notes:
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria.

Associated Samples:

23SB001-0204	23SB024-0608	23SB048-0406	23SB070-0406	23SB084-0204	23SB024-0406
23SB001-0406	23SB025-0406	23SB059-0204	23SB071-0204	23SB084-0406	23SB048-0204
23SB001-1012	23SB025-0608	23SB063-0204	23SB071-0406	23SB085-0204	23SB070-0204
23SB002-0204	23SB026-0406	23SB063-0406	23SB072-0204	23SB085-0406	23SB083-0406
23SB002-0406	23SB026-0608	23SB064-0204	23SB072-0406	23SB086-0204	23SB090-0406
23SB002-1012	23SB027-0204	23SB064-0406	23SB073-0204	23SB086-0406	23SB091-0204
23SB003-0204	23SB028-0204	23SB066-0204	23SB073-0406	23SB087-0204	23SB091-0406
23SB003-0406	23SB029-0204	23SB066-0406	23SB074-0204	23SB087-0406	23SB092-0204
23SB003-0810	23SB030-0204	23SB067-0204	23SB074-0406	23SB088-0204	23SB092-0406
23SB004-0406	23SB032-0204	23SB068-0204	23SB075-0204	23SB088-0406	
23SB004-0810	23SB034-0204	23SB068-0406	23SB075-0406	23SB089-0204	
23SB005-0810	23SB036-0204	23SB069-0204	23SB076-0203	23SB089-0406	
23SB006-0608	23SB037-0204	23SB069-0406	23SB083-0204	23SB090-0204	



Legend:

■ Exposure pathway to be quantitatively evaluated in the risk assessment

Footnotes:

1 Potential receptor under current or future land use.

2 Potential (but unlikely) receptor under future land use; evaluated for decision-making purposes.

FIGURE 4-1

HUMAN HEALTH CONCEPTUAL SITE MODEL
SWMU 23 - BATTERY PLANT
NSA CRANE, CRANE, INDIANA

FIGURE 4-2

SUMMARY OF CUMULATIVE HAZARD INDICES - REASONABLE MAXIMUM EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE
CRANE, INDIANA

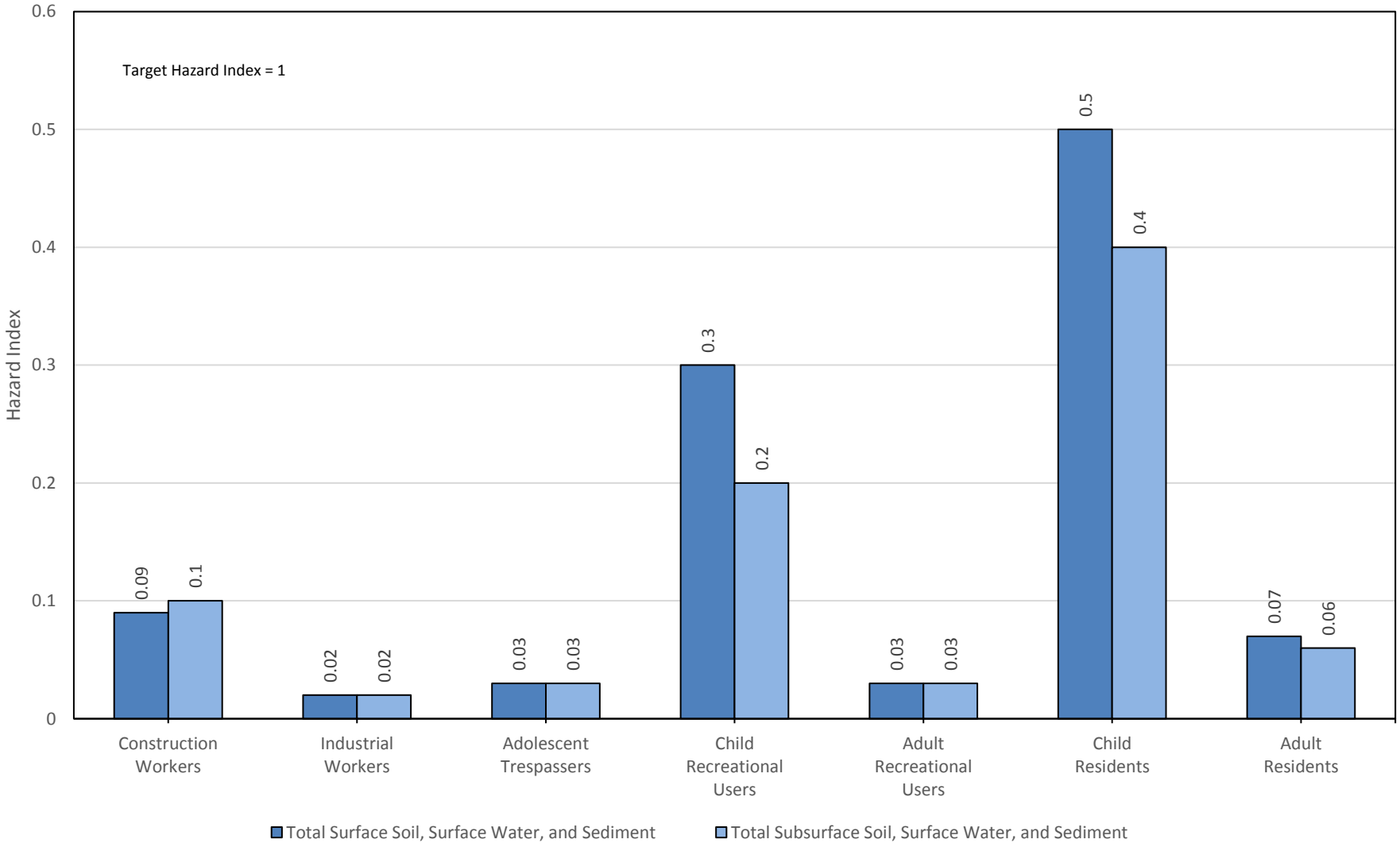


FIGURE 4-3

SUMMARY OF MEDIUM-SPECIFIC HAZARD INDICES - REASONABLE MAXIMUM EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE
CRANE, INDIANA

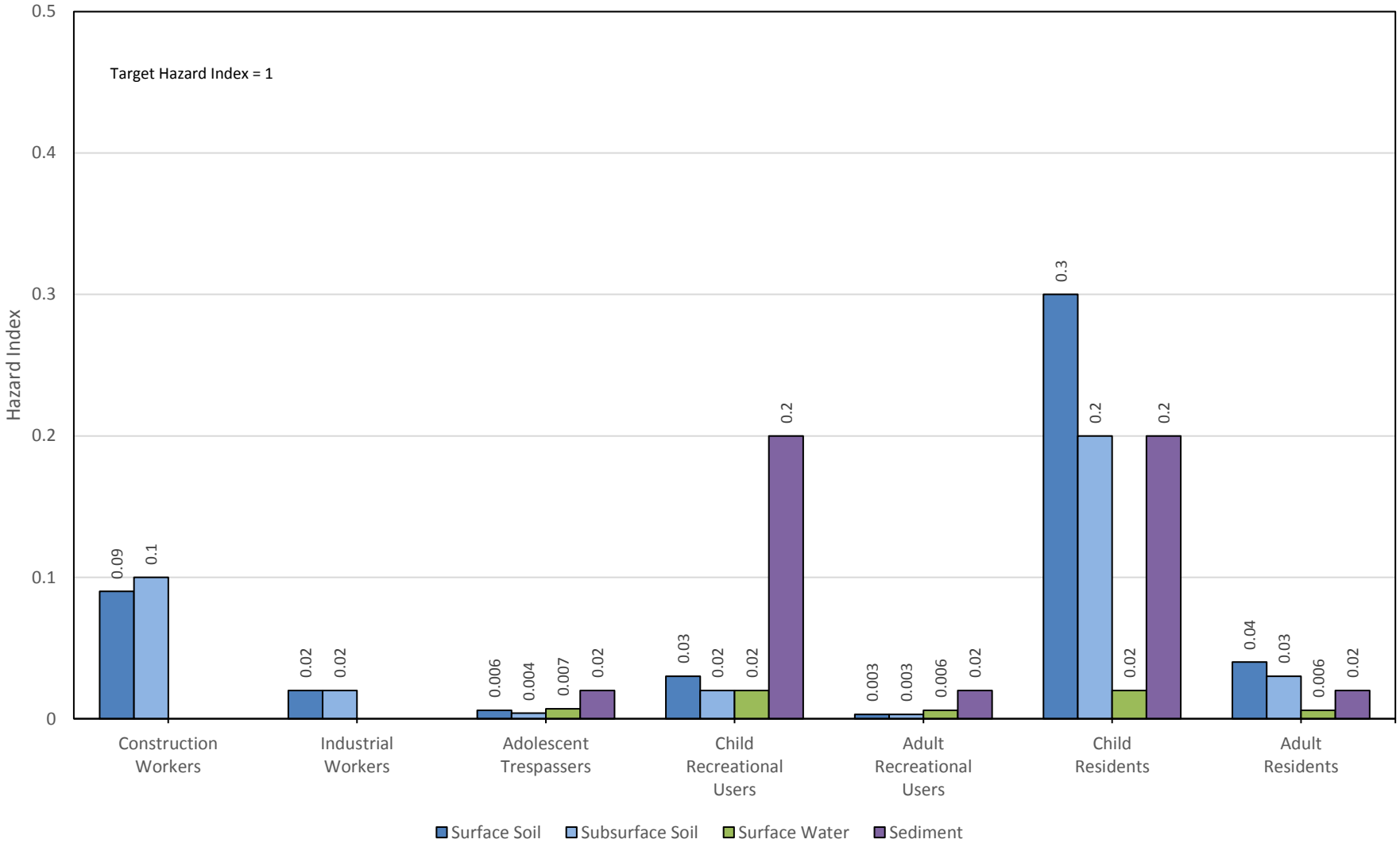


FIGURE 4-4

SUMMARY OF CUMULATIVE HAZARD INDICES - CENTRAL TENDENCY EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE
CRANE, INDIANA

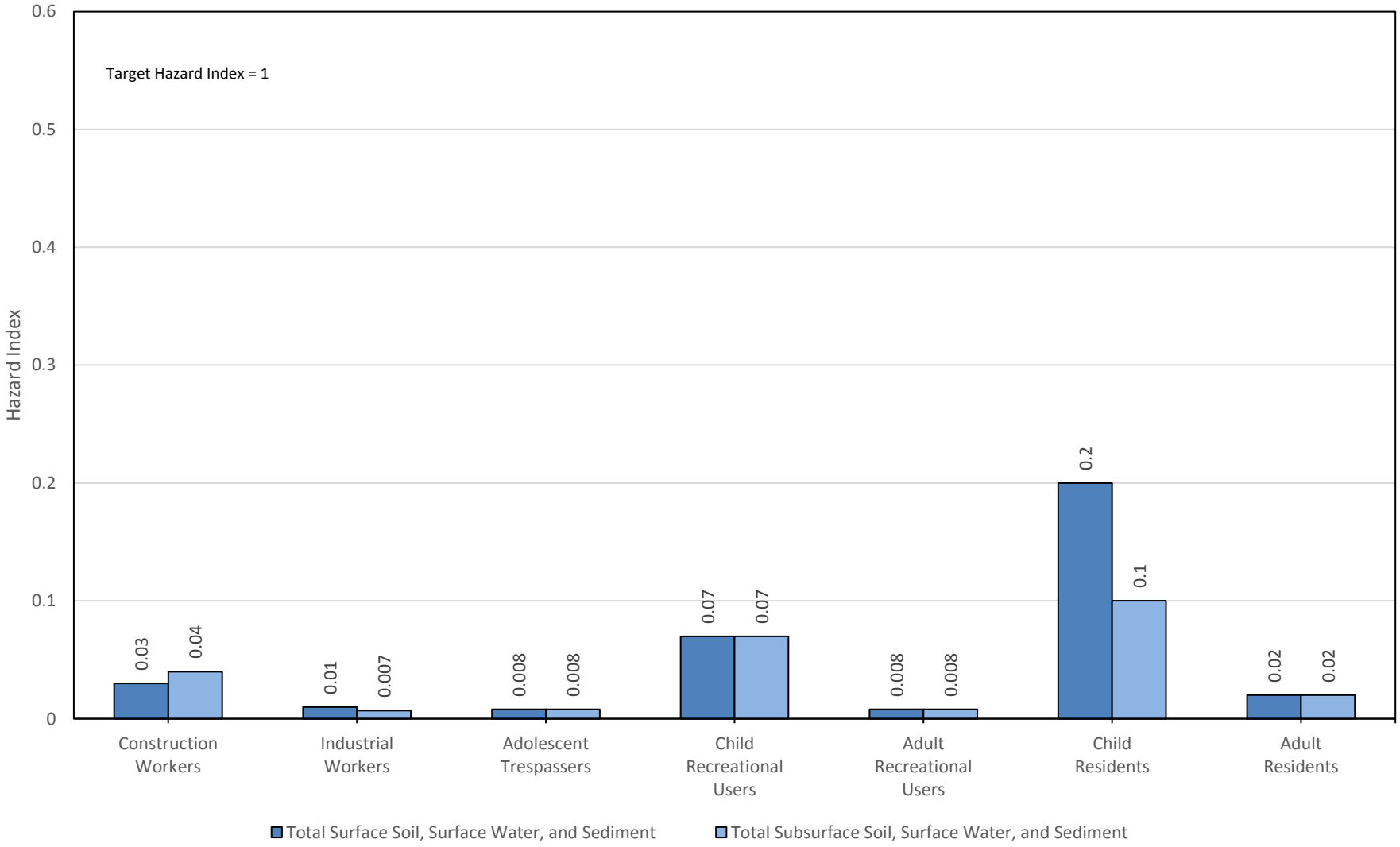


FIGURE 4-5

SUMMARY OF MEDIUM-SPECIFIC HAZARD INDICES - CENTRAL TENDENCY EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE
CRANE, INDIANA

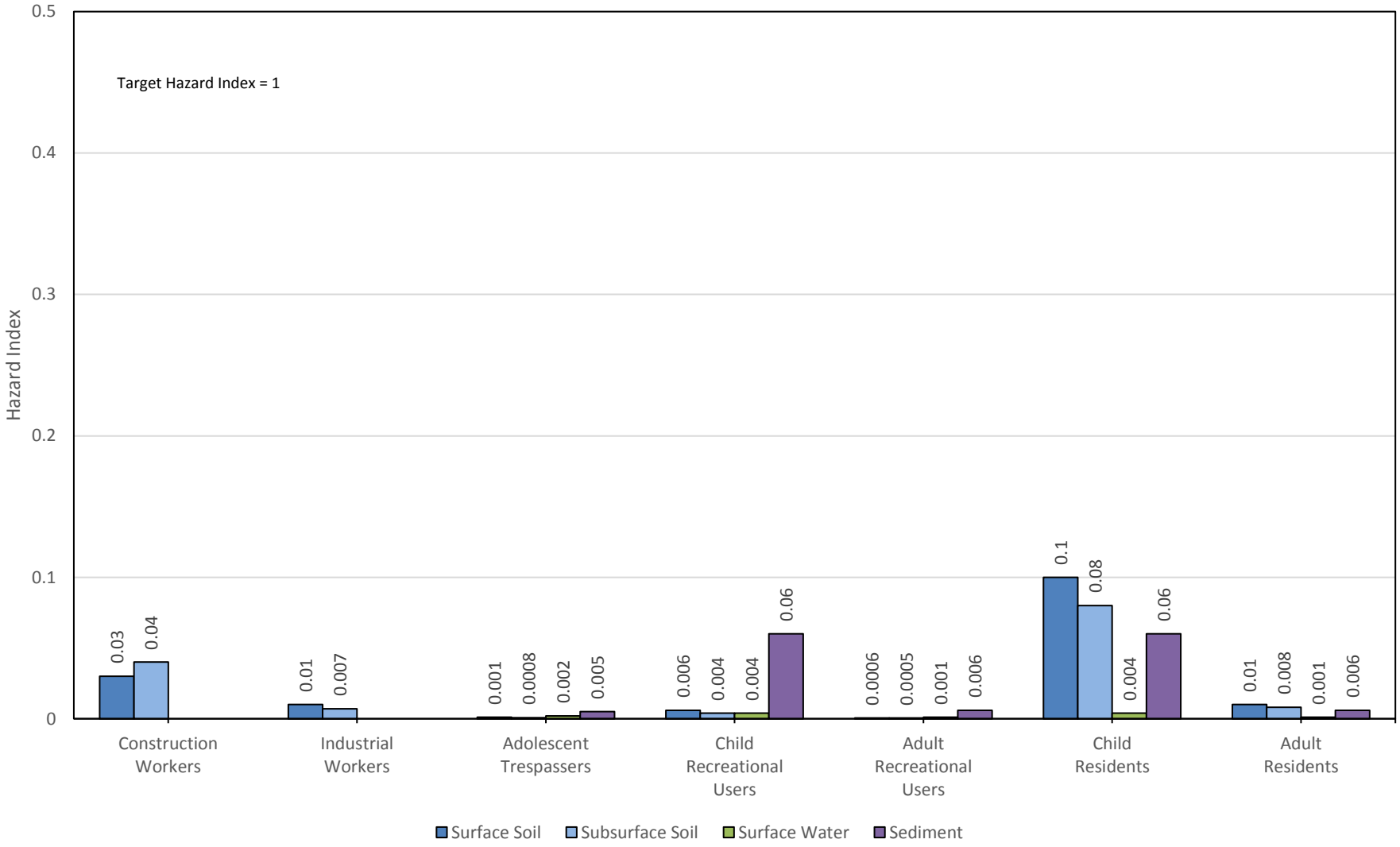


FIGURE 4-6

SUMMARY OF CUMULATIVE CANCER RISKS - REASONABLE MAXIMUM EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE
CRANE, INDIANA

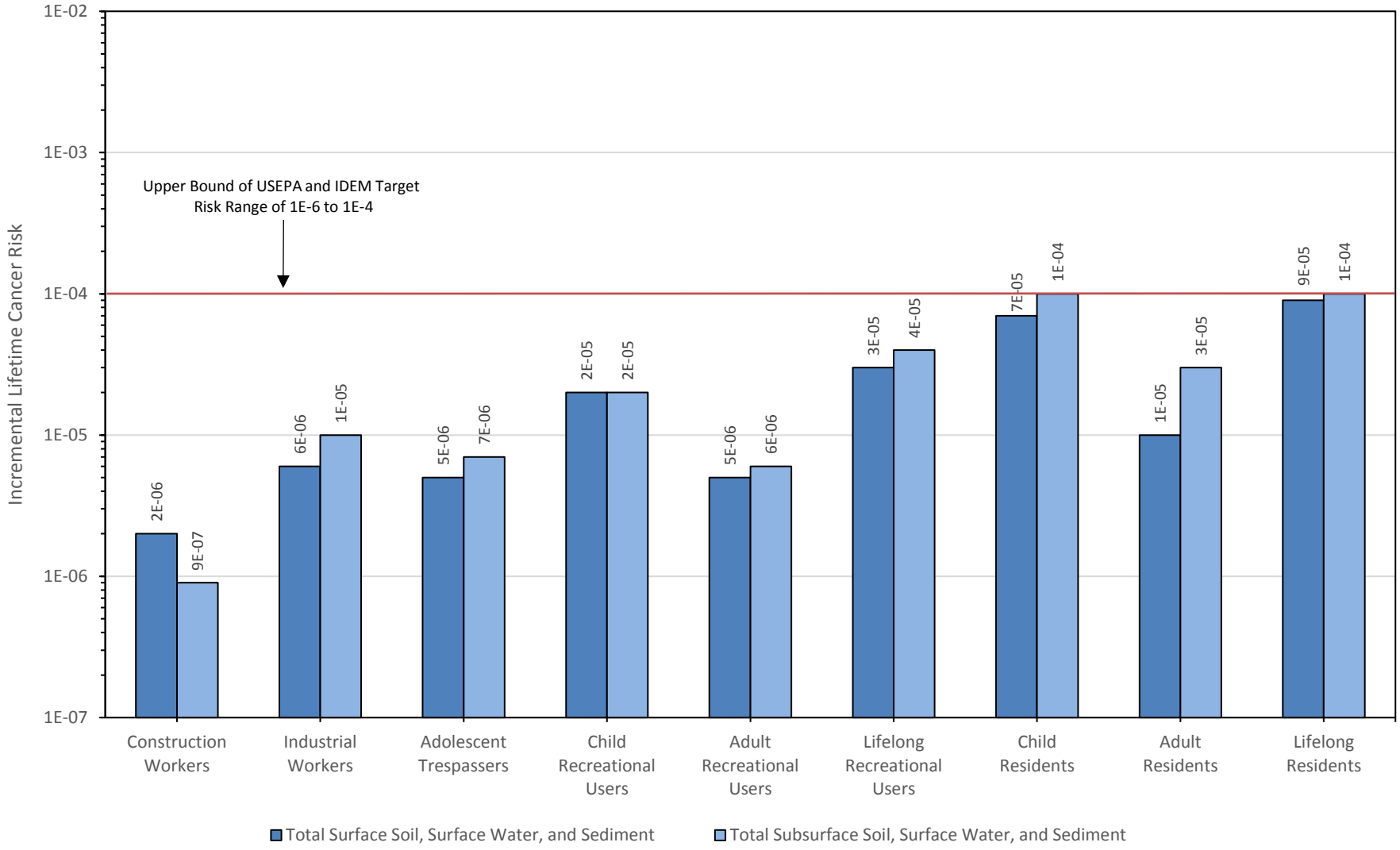


FIGURE 4-7

SUMMARY OF MEDIUM-SPECIFIC CANCER RISKS - REASONABLE MAXIMUM EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE
CRANE, INDIANA

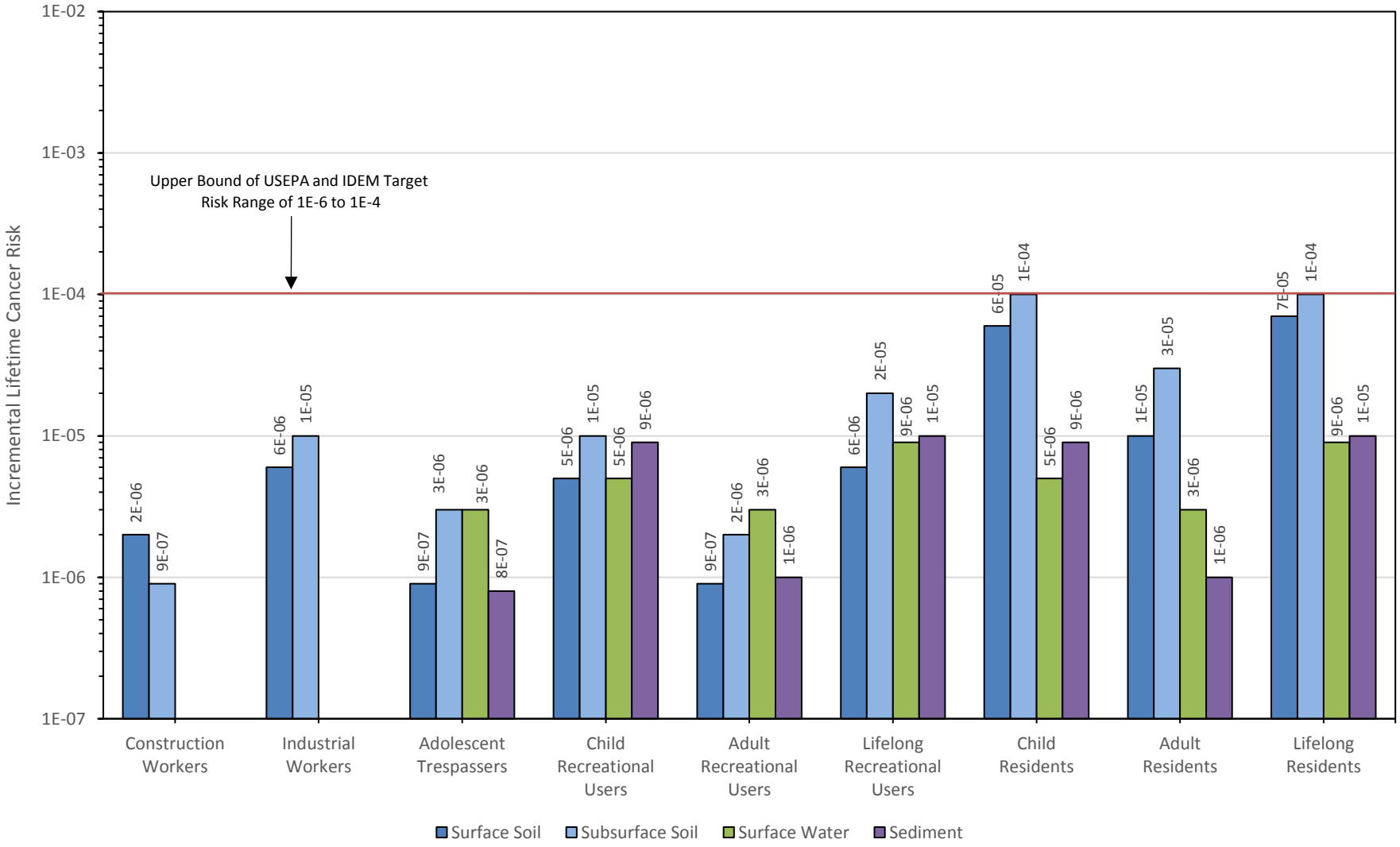


FIGURE 4-8

SUMMARY OF CUMULATIVE CANCER RISKS - CENTRAL TENDENCY EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE
CRANE, INDIANA

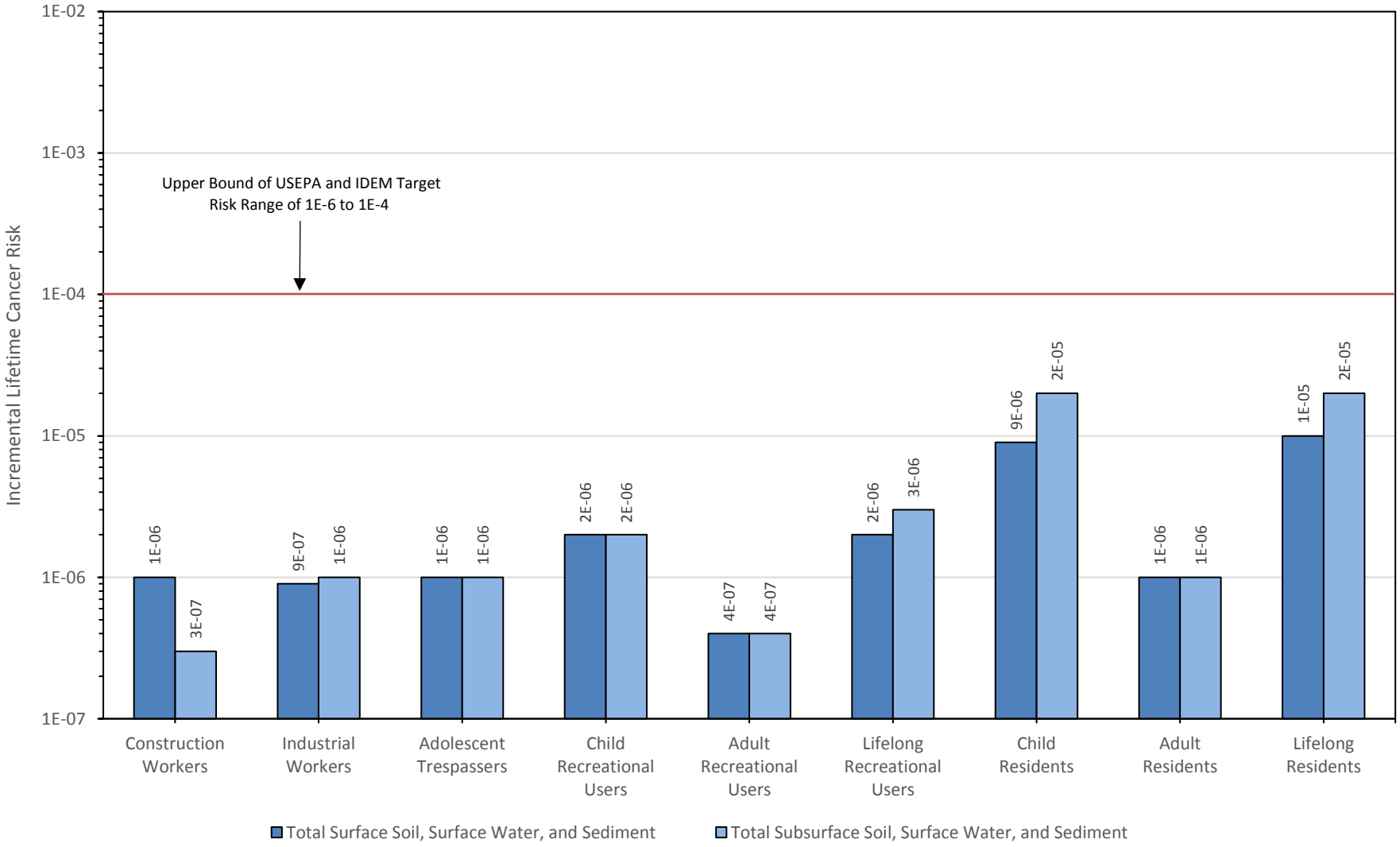
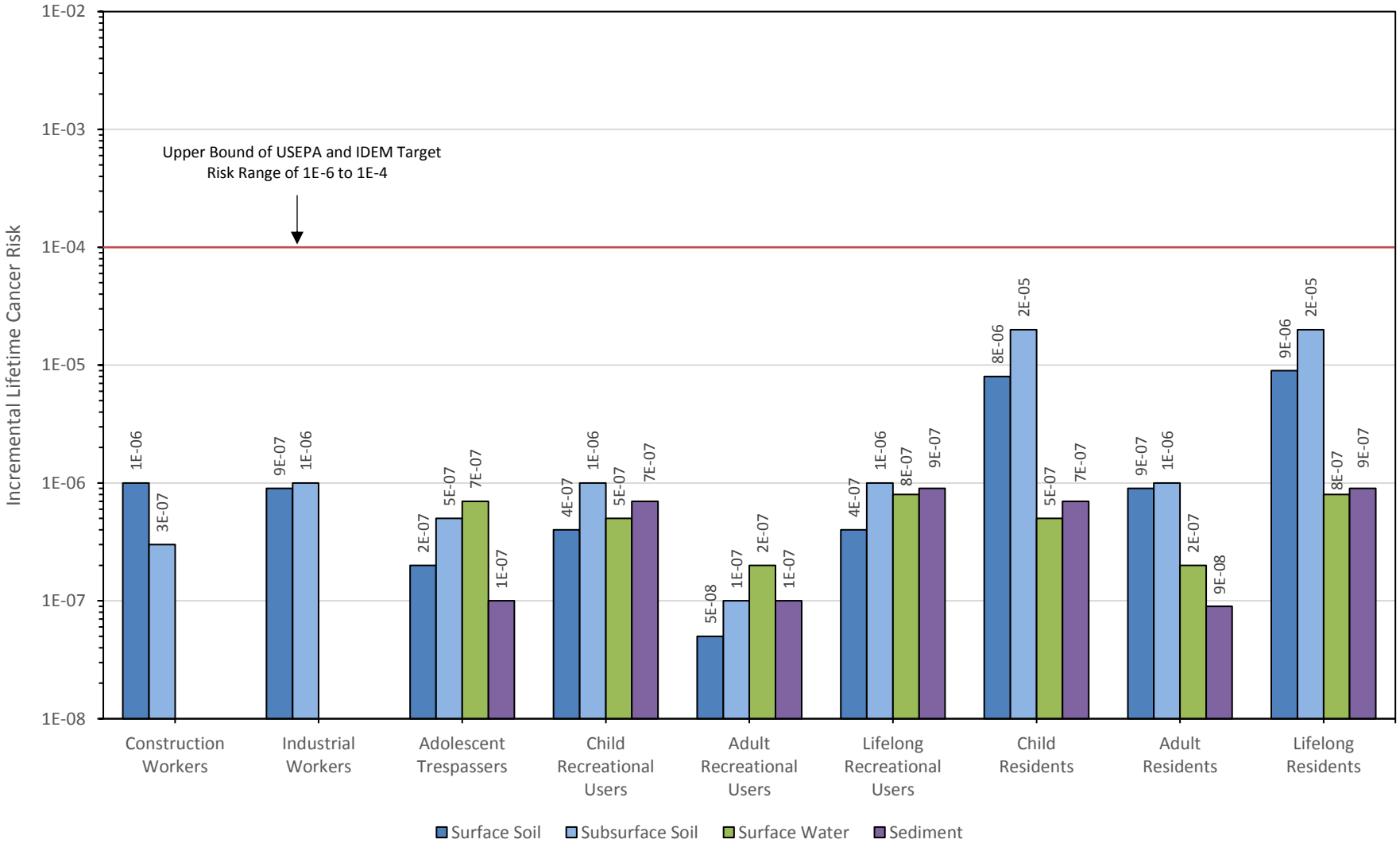


FIGURE 4-9

SUMMARY OF MEDIUM-SPECIFIC CANCER RISKS - CENTRAL TENDENCY EXPOSURES
SWMU 23 - BATTERY SHOP
NSA CRANE
CRANE, INDIANA



5.0 ECOLOGICAL RISK ASSESSMENT

The goal of this ecological risk assessment (ERA) for SWMU 23 was to evaluate the potential for adverse ecological impacts resulting from exposure to site-related contamination under current site conditions (i.e., following IM activities). This goal was accomplished by conducting a SERA, which consisted of identifying COPCs detected at concentrations that exceed screening levels, identifying the locations of these exceedances, and concluding whether or not further investigation and/or additional remedial action at SWMU 23 is warranted from an ecological perspective.

5.1 INTRODUCTION

The SERA methodology used at NSA Crane is in accordance with the following Navy and USEPA guidance documents: Navy, 1997 and 1999; USEPA, 1997c and 1998.

This ERA consists of Steps 1, 2, and 3a of the eight-step ecological risk evaluation process discussed in USEPA guidance (1997c and 1998) and the Navy Policy for Conducting ERAs (1999). The first two screening steps comprise the SERA and correspond to Tier 1 of the Navy policy (1999), during which conservative exposure estimates are compared to screening-level and threshold toxicity values. Step 3a is the first step of a baseline ecological risk assessment (BERA) and consists of refining the Tier 1 assumptions following Steps 1 and 2 to further focus the ERA process on the chemicals of greatest concern at a site. Step 3a corresponds to the first part of Tier 2 of the Navy policy (1999). 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 USEPA Region 5 regulators.

A schematic diagram of the general ERA process is provided on Figure 5-1.

5.2 TIER 1, STEP 1: SCREENING-LEVEL PROBLEM FORMULATION

The screening-level problem formulation is the first step of the ERA and includes identification of potential receptor groups, COPCs, and the mechanisms for contaminant fate, transport, and toxicity. The complete exposure pathways that exist at a site are determined 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 measurement endpoints); and the chemicals, geographic areas, and environmental media relevant to the risk assessment.

As part of receptor identification, site habitats and potential ecological receptors, as they apply to ecological risk, are described in the following subsections.

5.2.1 Environmental Setting

5.2.1.1 Base-Wide Environmental Setting

A biological characterization of NSA Crane (including a list of plants and animals found at the facility) is presented in the Installation Assessment (IA) (Army, 1978) and 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 NSA Crane and that are protected under the United States Endangered Species Act or by Indiana Department of Natural Resources and United States Fish and Wildlife Service (USFWS) is provided below. The following paragraphs briefly summarize the environmental setting at the base.

Eighty percent of NSA Crane's approximately 63,000 acres is classified as Central Hardwoods Forest of the United States. In addition, some former 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 NSA Crane (i.e., many stages of forest succession, streams, ponds, Lake Greenwood, grassy open spaces) lead to great diversity of animal species (NEESA, 1983). These species include but are not limited to mammals such as white-tailed deer, beaver, coyote, 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.

Seven main creeks receive drainage in five separate drainage basins at NSA Crane: Furst Creek, Indiana Creek, Sulphur Creek, Little Sulphur Creek, Boggs Creek, Turkey Creek, and Seed Tick Creek. There are also many smaller streams, creeks, and drainage ditches located at the facility, along with several small man-made ponds and one large lake, Lake Greenwood. Lake Greenwood is the source of potable water for NSA Crane. Surface water from the facility eventually discharges to the East Fork of the White River, which is located south of the facility.

Threatened and Endangered Species

The Endangered Species Management Plan for NSA Crane (Comarco Systems, Inc., 2000) identified the federal and state threatened and endangered species and species of special concern potentially present at the facility. 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 NSA Crane are described in more detail in the Endangered Species Management Plan and summarized below.

The Indiana bat is the only federally threatened or endangered species documented to be present at NSA Crane. No mist nets were located at SWMU 23 during the mist net and radiotelemetry surveys for the Indiana Bat; however, mist net sites were located approximately 1 mile northeast, 1.5 miles east, and 2 miles southeast of SWMU 23. Three Indiana bats were captured at the location east of SWMU 23, and one Indiana bat was captured at the location southeast of SWMU 23 in June 2005.

USFWS issued a notice in the Federal Register (FR) (72 FR 37346 et seq.) on July 9, 2007, that effective August 8, 2007, the American bald eagle would be removed from the federal List of Endangered and Threatened Wildlife and Plants. The American bald eagle is still protected by the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act. The bald eagle is known to be present in the Lake Greenwood area approximately 3,200 feet north of SWMU 23.

In addition, a number of state endangered and federal and state species of concern have been identified for NSA 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).

Boggs Creek and Turkey Creek discharge from NSA Crane 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 of an ongoing study of lake sturgeon populations, another state endangered species (IDNR, 2004). Finally, the spotted darter, a state species of special concern, has been found in the East Fork of the White River (IDNR, 2000).

5.2.1.2 Site-Specific Environmental Setting

SWMU 23, the Battery Shop, is located the north-central portion of NSA Crane (see Figure 1-1). In addition to a paved lot on the western side of Building 36, the area around Building 36 is covered with gravel to a depth of approximately 2 to 4 feet. The area to the north and west of Building 36 are heavily wooded areas along steep hillsides (see Figure 1-2). The entire site covers approximately 6.5 acres with the vegetated portion covering approximately 4.3 acres.

Surface elevations range from approximately 755 feet above msl in the area of Building 36 to approximately 675 feet above msl in the northwestern area of the site. Drainage channels are present downgradient of Building 36 to the north and west. Surface water flow in the vicinity of SWMU 23 is southeast to northwest, and surface water ultimately discharges to Lake Greenwood, which is located approximately 3,200 feet north of SWMU 23. Small tributaries to the north and south of Building 36 are intermittent, and only the main stream channel northwest of SWMU 23 has continuous flow throughout the year. Some small pools of surface water (approximately 3 feet by 4 feet) within the drainage channels had depths of approximately 0.5 to 1 foot during the RFI sampling conducted in October 2012.

5.2.2 Physical and Chemical Characteristics of Contaminants

Historical disposal activities at SWMU 23 included discharging battery acid (containing lead and sulfates), waste oils, oily water, and miscellaneous debris onto the sloped area behind Building 36. Miscellaneous debris was disposed of north of Building 36 over an area approximately 160 feet wide and 100 feet long that extended to the bottom of the ravine. Based on the disposal activities and previous investigations, VOCs, PAHs, PCBs, and metals are among the site-related chemical contaminants known to be present in environmental media at SWMU 23. Physical and chemical characteristics of contaminants may affect their mobility, transport, and bioavailability in the environment. These characteristics include bioaccumulation factors (BAFs), K_{OC}s, and K_{OW}s. Appendix D.1 includes a general discussion of the chemical classes detected at the site. Section 2 includes a discussion of the nature and extent of the chemicals detected at the site. Section 3 provides information on the chemical and physical properties that affect the mobility, migration, biodegradation, and persistence of the principal COPCs at SWMU 23.

5.2.3 Potential Sources of Contamination

Section 1.2.2 of this RFI Report describes the operational history of SWMU 23, and Section 1.2.4 presents detailed descriptions of previous site investigations and IMs. Battery Shop personnel performed maintenance operations on electric vehicles, primarily forklifts. In the past, spent battery acid and waste oil from forklift servicing were discharged onto a hillside behind the Battery Shop (Building 36).

Approximately 150 gallons per month (approximately 2,000 gallons per year) of spent battery acid were disposed of in this manner from 1940 to 1975. The IAS Report (NEESA, 1983) indicated that one small solvent tank of unknown size and type of solvent stored was located in Building 36, and prior to 1980, 10 to 20 gallons of solvent were drained out of the tank twice per year and dumped down the hillside behind the building.

Two removal actions (IMs) have been conducted at the site. Surface debris from the debris disposal area was removed in 1996 during an IM; debris included construction and domestic waste such as concrete, reinforcement bar (rebar), metal cans, drums, chairs, tires, and battery components (Morrison Knudsen, 2000). IM activities conducted in 2014 included the excavation of seven areas with PAH- and/or lead-contaminated soil (Tetra Tech, 2015).

5.2.4 Potential Exposure Pathways

Chemicals may have entered surface soil, sediment, and surface water from historical disposal site activities. Battery acid, waste oils, and miscellaneous debris were discharged directly to surface soil by dumping onto a steep hillside behind Building 36. Chemicals from these wastes may have reached surface water and sediment because intermittent streams are present in drainage pathways at the bottom of the ravine. The hillside is highly vegetated with undergrowth and sizable trees; however, the area close to Building 36 is mostly covered by gravel or pavement. The following sections describe the potential exposure pathways for ecological receptors at the site.

5.2.4.1 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 and are then translocated to different parts of the plants (e.g., leaves, seeds). These pathways were evaluated in this 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 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 this SERA. Small mammals also may be

exposed to contaminants in 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 this 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. For reasons discussed in Section 5.2.5.1, these pathways were not evaluated in the SERA.

5.2.4.2 Surface Water/Sediment

Contaminants may enter streams at SWMU 23 via overland flow. Benthic invertebrates and other aquatic organisms can be exposed to chemicals in surface water and sediment. Although piscivorous receptors may be exposed to contaminants in sediment via incidental ingestion of sediment and ingestion of invertebrates that have accumulated contaminants from the sediment, this is not expected to be a significant exposure pathway because of the limited habitat in the drainageways. Therefore, piscivorous receptors are not evaluated in this SERA.

Terrestrial receptors may be exposed to contaminants in surface water via ingestion of surface water. This pathway is evaluated in this SERA.

One sediment sample (from location 23SD008) was collected from the bottom of the O/WS. Ecological receptors will not be exposed to this sediment; therefore, the data from this sample were not evaluated in this SERA.

5.2.4.3 Air

Inhalation of particulates by mammals and birds is not considered a complete pathway at SWMU 23 because there are no activities causing air contamination. Also, inhalation pathways are not typically evaluated in an ERA because of the uncertainty inherent in estimating exposure levels and toxicological effects. Therefore, the air inhalation pathway is not evaluated in this SERA.

5.2.5 Assessment Endpoints and Measurement Endpoints

Assessment endpoints are explicit expressions of the environmental value that is to be protected (USEPA, 1997c). The selection of these endpoints is based on the habitats present, migration pathways of probable contaminants, and relevant exposure routes for the receptors. Measurement endpoints are estimates of measurable biological impacts (e.g., mortality, growth, and reproduction) that are used to evaluate the

assessment endpoints. The assessment endpoints and measurement endpoints for SWMU 23 are presented in Table 5-1.

5.2.5.1 Assessment Endpoints

Based on the habitat at SWMU 23 (which consists of hillsides vegetated with undergrowth and sizable trees), the surface water drainage pathways at the bottom of the ravine, and the chemicals present at the site, the assessment endpoints include protection of the following groups of receptors from adverse effects of contaminants on their growth, survival, and reproduction:

- Terrestrial vegetation
- Soil invertebrates
- Aquatic organisms
- Sediment invertebrates
- Herbivorous birds and mammals
- Invertivorous birds and mammals

The following paragraphs discuss these assessment endpoints.

Terrestrial Vegetation: Terrestrial vegetation at SWMU 23 consists of grasses, shrubs, and trees. They serve as food sources 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.

Soil Invertebrates: Soil invertebrates are present in soil at SWMU 23. They aid in the formation of soil and the redistribution and decomposition of organic matter in the soil, and they serve as food sources 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.

Aquatic Organisms: Aquatic organisms such as insects and other invertebrates serve as food sources for higher trophic-level organisms (i.e., birds, mammals). They can also accumulate contaminants that can be transferred to higher trophic-level organisms that consume them.

Sediment Invertebrates: Sediment invertebrates serve as food sources for higher trophic-level organisms (i.e., fish, amphibians, birds, mammals). They can also accumulate contaminants that can be transferred to higher trophic-level organisms that consume invertebrates.

Herbivorous Birds and Mammals: Herbivorous birds and mammals (i.e., birds and mammals that consume only plant tissue) forage in some portions of SWMU 23. 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.

Invertivorous Birds and Mammals: Invertivorous birds and mammals are present throughout the base in different terrestrial habitats (e.g., forested, open field) and are present at SWMU 23. These are considered first-level carnivores, and they serve as food sources for higher trophic-level carnivores. They may be exposed to and accumulate contaminants present in the food items they consume.

Not all of the potential ecological receptors were evaluated in this SERA. As indicated in USEPA 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, this SERA focused on the endpoints that would tend to yield the highest risks, which was expected to account for endpoints associated with lower risks.

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 invertivores. Therefore, omnivores are protected by protecting herbivores and invertivores. Large carnivorous birds and mammals were not selected as assessment endpoints because their home ranges (hundreds of acres) are much larger than the vegetated portion of SWMU 23 (approximately 4.3 acres), so they would only consume a small portion of food from the site. Therefore, risks would be greater to small mammals and birds that may obtain all of their food from the site. Although amphibians and reptiles may be present near the drainageways, they were not selected as assessment endpoints because of the general lack of toxicity information and lack of methods to evaluate their exposure to chemicals.

5.2.5.2 Measurement Endpoints

The specific measurement endpoints used to evaluate the assessment endpoints are presented in Table 5-1. In general, the measurement endpoints used in the SERA are as follows:

- Soil screening values – Mortality, growth, and reproduction of plants and soil invertebrates were evaluated by comparing measured concentrations of chemicals in surface soil to screening values designed to be protective of ecological receptors.

- Surface water screening values – Mortality, growth, and reproduction of aquatic organisms were evaluated by comparing measured concentrations of chemicals in surface water to screening values designed to be protective of ecological receptors.

- Sediment screening values – Mortality, growth, and reproduction of sediment invertebrates were evaluated by comparing measured concentrations of chemicals in sediment to screening values designed to be protective of ecological receptors.

- Wildlife toxicity reference values (TRVs) – Mortality, reproductive, and/or developmental effects of birds and mammals were evaluated by comparing estimated doses incurred (based on conservative and average assumptions) from ingestion of contaminants in surface soil, plants, and invertebrates to wildlife TRVs.

5.2.5.3 Selection of Receptor Species

Many receptors in the terrestrial/aquatic environment at SWMU 23 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, the selection of representative species is required so that risks to these upper-level species incurred by intake through eating and drinking can be estimated. Food-chain models are used to estimate these intakes.

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 5.2.5.1 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 was also a factor in selecting surrogate species. The following surrogate species were used in the food-chain modeling conducted as part of this SERA:

- Herbivorous mammal – Meadow vole
- Herbivorous bird – Bobwhite quail
- Invertivorous mammal – Short-tailed shrew
- Invertivorous bird – American woodcock

Receptor profiles for each of the species above are presented in Appendix D.2.

5.2.5.4 Conceptual Site Model

A CSM 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 stressors, exposure, and assessment endpoint response; and a diagram that illustrates the relationships (USEPA, 1998). The CSM for ecological receptors is discussed below.

The primary sources of known or potential contamination at SWMU 23 were identified based on past operations and disposal practices and the physical characteristics of the site. The primary sources of contamination are disposal of battery acid, oily water, waste oils, and miscellaneous debris to surface soil. These wastes may have reached surface water drainageways via overland runoff/erosion. The primary stressors to ecological receptors are contaminants in surface soil, sediment, and surface water. The primary receptors in the potentially impacted media (surface soil, sediment, and surface water) are plants, soil invertebrates, aquatic organisms, and sediment invertebrates, and secondary receptors are birds and mammals. Figure 5-2 represents the ecological CSM for SWMU 23.

5.3 TIER 1, STEP 2: SCREENING-LEVEL EXPOSURE ESTIMATE AND RISK QUOTIENTS

5.3.1 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). Toxicity thresholds are usually expressed in units of concentration when the medium of concern is in intimate contact with the receptor, such as soil for soil invertebrates. For vertebrates such as mammals and birds, 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, surface soil, sediment, and surface water ecological screening levels are compiled. For surface soil, chemical concentrations were compared to USEPA Ecological Soil Screening Levels (Eco SSLs) (USEPA, 2007a and supporting documents) because they are the most current screening levels. If USEPA Eco SSLs were not available, USEPA Region 5 soil ecological screening levels (ESLs) (USEPA, 2003a) were used next in order of preference, followed by Canadian Soil Quality Guidelines (SQGs) [Canadian Council of Ministers of the Environment (CCME), 1999a-e, 2001, 2004a through b, 2010]; ORNL Toxicological Benchmarks for invertebrates (Efroymson et

al., 1997a) and plants (Efroymson et al., 1997b), and Los Alamos National Laboratory (LANL) ECORISK database (version 3.2; LANL, 2014). Because most of the USEPAS Region 5 ESLs are based on risks to mammals, screening levels specific to birds, plants, or invertebrates from other sources were used preferentially for those endpoints, when available. Table 5-2 presents the soil screening levels for plants, invertebrates, mammals, and birds for each chemical and the sources of each value. For sediment, Region 5 sediment ESLs (USEPA, 2003a), followed by USEPA Region 3 freshwater sediment screening benchmarks (USEPA, 2006) and sediment screening levels from National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQUIRT) (Buchman, 2008) were used in COPC selection. These sediment screening values are protective of sediment invertebrates. Although the Region 3 sediment benchmarks were the second choice after the USEPA Region 5 ESLs, no USEPA Region 3 benchmarks were available for any of the chemicals that did not have a USEPA Region 5 ESL. For surface water, USEPA National Recommended Water Quality Criteria for chronic freshwater (2012c) followed by USEPA Region 5 water ESLs (2003a) were used in COPC selection. These surface water screening values are protective of aquatic organisms.

Potential risks to mammals and birds resulting from exposure to chemicals in surface soil were evaluated by first comparing chemical concentrations to ecological screening levels. Only bioaccumulative chemicals or chemicals that exceeded wildlife criteria were evaluated in a food-chain model.

Risks to mammals and birds from exposures to chemicals in surface soil were determined by estimating chronic daily intakes (CDIs) and comparing them to TRVs representing acceptable daily doses in mg/kg-day. The TRVs were developed from no observed adverse effect levels (NOAELs) and lowest observed adverse effect levels (LOAELs) obtained from wildlife studies. The majority of the TRVs, obtained from ORNL toxicological benchmarks for wildlife (Sample et al., 1996) and USEPA Eco SSL documents, were supplemented with other toxicity information, when necessary.

Appendix D.4 presents the TRVs and sources (i.e., NOAELs and LOAELs) of the TRVs used in this SERA. 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. Also, the LOAEL was multiplied by a factor of 0.1 to estimate a NOAEL TRV if only a LOAEL study was available. The chemical-specific Eco SSL documents provide both NOAELs and LOAELs for various studies, but overall TRVs are calculated only for NOAELs. The geometric mean of the chemical-specific growth and reproduction LOAELs from the chemical-specific Eco SSL documents were used as the LOAEL TRVs. This approach was used because the survival LOAELs tend to be greater than growth or reproductive LOAELs, and the selected LOAELs were generally much lower than many NOAELs for growth, reproduction, and survival.

5.3.2 Exposure Characterization

To determine whether a chemical has the potential to impact an ecological receptor, a chemical concentration or dose must first be determined. That concentration/dose is then compared to the ecological effects data presented above. The following paragraphs describe the concentrations and doses used for each set of ecological receptors.

Soil invertebrates and plants, aquatic organisms, and sediment invertebrates are exposed to chemicals in surface soil, surface water, or sediment through direct contact and/or ingestion. Because the screening values developed for these receptors are in units of chemical concentration in each medium, maximum chemical concentrations were used in the screening step to select COPCs.

However, for terrestrial wildlife (mammals and birds), food-chain models were used to estimate doses in mg/kg-day using exposure dose equations. The food-chain models were conducted on a dry-weight basis to be consistent with soil concentrations, which are reported on a dry-weight basis. Therefore, the concentrations in the food items were estimated on a dry-weight basis. The following generic equation was used to calculate EPCs for terrestrial wildlife from exposure to chemicals in soil, surface water, and associated food items such as plants and soil invertebrates:

$$CDI = \frac{[(Cf * If) + (Cs * Is) + (Cw * Iw)] * H}{BW}$$

Where:	CDI	=	Chronic daily intake (mg/kg)-day
	Cf	=	Chemical concentration in food – (see discussion below)
	If	=	Food ingestion rate (kg/day)
	Cs	=	Chemical concentration in surface soil (mg/kg)
	Is	=	Incidental surface soil ingestion rate (kg/day)
	Cw	=	Chemical concentration in surface water (mg/L)
	Iw	=	Water ingestion rate (L/day)
	H	=	Portion of food intake from the contaminated area (unitless)
	BW	=	Body weight (kg)

The exposure factors used for the food-chain model, their derivations, and receptor profiles for the surrogate species are presented in Appendix D.2. The exposure assumptions (e.g., ingestion rate, body weight) were obtained primarily from the Wildlife Exposure Factors Handbook (USEPA, 1993b) and USEPA Eco SSL Guidance Attachment 4-1 (2007a), with other sources used as necessary.

Chemical concentrations in food items for soil invertivorous and herbivorous receptors were calculated using soil-to-invertebrate or soil-to-plant BAFs and regression equations from the USEPA Eco SSL Guidance Document Attachment 4-1 (2007a) or BAFs from published sources. The following equation was used to calculate chemical concentrations in plants or invertebrates when BAFs were used:

$$Cf = Cs * BAF$$

Where: Cf = Contaminant concentration in food (mg/kg)
Cs = Contaminant concentration in surface soil (mg/kg)
BAF = Biota-soil bioaccumulation factor (unitless)

Sources of BAFs are documented in Appendix D.3.

The food-chain model scenarios were calculated using various exposure assumptions to present a range of potential risks. For selecting chemicals as COPCs, the following Tier 1 exposure assumptions were used:

- Maximum soil/surface water concentrations.
- 90th percentile BAFs (or maximum value if a 90th percentile value is not available) or regression equations.
- Conservative receptor body weight and ingestion rates.
- Receptors spend 100 percent of their time at the site.

5.3.3 Risk Characterization

An EEQ approach was used to characterize the risk to ecological receptors. This approach characterizes potential effects by comparing exposure concentrations to effects data. The EEQs for soil invertebrates and plants were calculated as follows:

$$EEQ = \frac{Css}{SSSL}$$

where: EEQ = Ecological effects quotient (unitless)
Css = Contaminant concentration in surface soil (µg/kg or mg/kg)
SSSL = Surface soil screening level (µg/kg or mg/kg)

The EEQs for sediment invertebrates were calculated as follows:

$$EEQ = \frac{Csd}{SdSL}$$

where: EEQ = Ecological effects quotient (unitless)
Csd = Chemical concentration in sediment (µg/kg or mg/kg)
SdSL = Sediment screening level (µg/kg or mg/kg)

The EEQs for aquatic organisms were calculated as follows:

$$EEQ = \frac{Csw}{SwSL}$$

where: EEQ = Ecological effects quotient (unitless)
Csw = Chemical concentration in surface water (µg/L)
SwSL = Surface water screening level (µg/L)

The EEQs for terrestrial wildlife were calculated as follows:

$$EEQ = \frac{CDI}{TRV}$$

where: EEQ = Ecological effects quotient (unitless)
CDI = Chronic daily intake dose (mg/kg-day)
TRV = Toxicity reference value (NOAEL or LOAEL) (mg/kg-day)

An EEQ of greater than 1.0 was considered to indicate potential risk. EEQs greater than 1.0 do not necessarily indicate that an effect will occur but only that a low (i.e., conservative) threshold has been exceeded.

5.3.4 Tier 1, Step 2: Selection of Contaminants of Potential Concern

This section presents the results of COPC selection, which was conducted using the following rules:

- A contaminant was retained as a COPC for risks to terrestrial plants, soil invertebrates, aquatic organisms, or sediment invertebrates if the maximum detected concentration in surface soil, surface water, or sediment exceeded the associated screening level or if a screening level was not available.

- If a contaminant had a maximum detected concentration that exceeded the associated soil screening level for birds or mammals or if a screening level was not available for a bioaccumulative chemical, the chemical was retained for food-chain modeling for wildlife. If the EEQ was greater than 1.0 based on the conservative food-chain model using the NOAEL as the TRV, the chemical was selected as a COPC.

- Calcium, magnesium, potassium, and sodium were not selected as COPCs because they are naturally occurring. Essential nutrients that can be tolerated by living systems at high concentrations. No evidence indicates that these chemicals are related to site operations, and they are not considered hazardous chemicals.

- Petroleum hydrocarbons (i.e., DRO and GRO) lack ecological screening levels. However, because the soil samples were analyzed for PAHs and VOCs, risks from these compounds are evaluated indirectly by evaluating risks from the individual chemicals. Therefore, DRO and GRO were not selected as COPCs, and risks from these parameters are not discussed below.

Contaminants retained as COPCs were further evaluated as part of Step 3a of the eight-step ERA process.

Tables 5-3 through 5-5 provide the results of COPC selection for surface soil, sediment, and surface water, respectively. Table 5-6 presents the results of the Tier 1 food-chain model for surface soil.

5.3.4.1 Terrestrial Plants

Table 5-3 presents the results of COPC selection for terrestrial plants in SWMU 23 surface soil. Two metals were selected as COPCs because they were detected at maximum concentrations that resulted in EEQs greater than 1.0. Six VOCs and 10 PAHs were selected as COPCs because screening levels are not available.

5.3.4.2 Soil Invertebrates

Table 5-3 presents the COPC selection for soil invertebrates in SWMU 23 surface soil. Four metals were selected as COPCs because they were detected at maximum concentrations that resulted in EEQs greater than 1.0. Five VOCs were selected as COPCs because screening levels are not available.

5.3.4.3 Sediment Invertebrates

Table 5-4 presents the COPC selection for sediment invertebrates in the drainageways. Four PAHs and eight metals were selected as COPCs because they were detected at maximum concentrations that resulted in EEQs greater than 1.0. Two metals were selected as COPCs because screening levels are not available.

5.3.4.4 Aquatic Organisms

Table 5-5 presents the COPC selection for aquatic organisms in the drainageways. Two total metals (in unfiltered surface water samples) were selected as COPCs because they were detected at maximum concentrations that resulted in EEQs greater than 1.0.

5.3.4.5 Wildlife

Table 5-6 summarizes the results of Tier 1 food-chain modeling for terrestrial (invertivorous and herbivorous) receptors. Appendix D.5 presents the calculation worksheets. The following summarizes the results of the food-chain modeling for terrestrial receptors using maximum concentrations and Tier 1 input parameters:

- Herbivorous bird: Three metals had EEQs greater than 1.0 in the food-chain model.
- Herbivorous mammal: One metal had an EEQ greater than 1.0 in the food-chain model.
- Invertivorous bird: Five metals and two PCBs had EEQs greater than 1.0 in the food-chain model.
- Invertivorous mammal: Two metals and two PCBs had EEQs greater than 1.0 in the food-chain model.

5.4 TIER 2, STEP 3A – COPC REFINEMENT

Step 3a consists of refining the conservative exposure assumptions and site concentrations used to evaluate potential risks to ecological 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 might not be retained as a COPC in soil based on low risks to plants but might be retained for evaluating risks to wildlife. This is important because if the site proceeds to a BERA, the studies in the BERA should only focus on the receptors that are at potential risk.

For chemicals evaluated further in Step 3a, the following factors were evaluated, as appropriate, to determine whether 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)] (all factors may not be discussed for all chemical and/or receptor groups):

- Magnitude of criterion exceedance: Although the magnitude of risk 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, 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 result represents.

- Contaminant bioavailability: Many contaminants (especially inorganics) are present in the environment in forms that are typically not bioavailable, and limited bioavailability was considered when evaluating exposures of receptors to site contaminants. Contaminants with generally less bioavailability are considered to be less toxic than 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).

- Food-chain modeling: Exposure via the food chain is a major pathway of concern for chemicals known to significantly bioaccumulate and/or biomagnify. Thus, potential risk to upper-level receptors was evaluated using food-chain models. The Tier 1 exposure doses calculated for terrestrial wildlife were recalculated using the following Tier 2, Step 3a exposure assumptions and chemical concentrations:

  - Average soil/surface water concentrations
  - Median or mean BAFs (if available)
  - Average receptor body weights and ingestion rates

- Background: Chemicals with concentrations that were determined to be less than background concentrations based on the 95-percent UTLs from the Crane Base-Wide Background Report (Tetra Tech, 2001) were eliminated as COPCs because they are not considered related to site operations. Of the chemicals initially selected as COPCs, concentrations of cobalt and vanadium in site surface soil were less than background concentrations; therefore, these chemicals are eliminated as COPCs and not further evaluated.

Summaries of the Step 3a evaluation for terrestrial plants and soil invertebrates, sediment invertebrates, and aquatic organisms are presented in Tables 5-7 to 5-9, respectively. As part of the Step 3a evaluation for terrestrial wildlife, Table 5-10 presents the results of the food-chain models for surface soil using Step 3a exposure assumptions and chemical concentrations. A detailed discussion of the Step 3a evaluation is provided in the following sections.

5.4.1 Tier 2, Step 3a: Terrestrial Plants

Several volatiles (1,2-dichloroethane, 2-butanone, acetone, carbon disulfide, chloroform, and trans-1,4-dichloro-2-butene) in surface soil were selected as COPCs for terrestrial plants because screening levels are not available. Concentrations of these VOCs were less than the screening levels for other VOCs (e.g., tetrachloroethene, benzene) detected at the site. Also, carbon disulfide, chloroform, and trans-1,4-dichloro-2-butene were infrequently detected in 1 of 16 samples, as was 2-butanone (3 of 16 samples) and 1,2-dichloroethane (4 of 16 samples). Acetone, which was detected in 9 of 16 samples is a common laboratory contaminant. Although there is some uncertainty in whether the VOCs without screening levels are impacting plants, based on their low detection frequencies and low concentrations relative to screening levels for other VOCs, it is not likely that plants are being significantly impacted by VOCs in the soil. For these reasons, VOCs in surface soil are eliminated as COPCs for terrestrial plants.

Several PAHs in surface soil were selected as COPCs for terrestrial plants because screening levels are not available. An Eco SSL is not available for plants for PAHs; however, data presented on Table 3.1 in the Eco SSL document for PAHs show that PAHs are typically not toxic to plants except at high soil concentrations. The lowest listed median effective concentration (EC_{50}) was 30 mg/kg from Mitchell et al. (1988), and all concentrations of PAHs at SWMU 23 are significantly less than this value. Also, PAHs concentrations were generally less than Canadian SQGs for other PAHs, which range from 2.5 to 50 mg/kg (CCME, 2010). With the exception of a single detection of 2-methylnapthalane (6.8 mg/kg), concentrations of low molecular weight PAHs were less than or equal to the Canadian SQG for anthracene (2.5 mg/kg; CCME, 2010), a low molecular weight PAH with the lowest SQG. 2-Methylnapthalene was only detected in 1 of 49 samples, and the only detection was from a sample located along a paved road; therefore, little ecological habitat is present at this location. Concentrations of high molecular weight PAHs were much lower than the Canadian SQG for benzo(a)pyrene (20 mg/kg; CCME, 2010) (a high molecular weight PAH with the lowest SQG). Therefore, PAHs in surface soil are not expected to impact plants at the site and are eliminated as COPCs for terrestrial plants.

Only one metal in surface soil, lead, exceeded its respective plant benchmarks and was greater than the available background value. Lead concentrations from three locations exceeded the screening level (120 mg/kg). Only the maximum concentration was greater than twice the screening level. Two locations with elevated lead concentrations (23SB013 at 345 mg/kg and 23SB046 at 140 mg/kg) are along the hillside west of the debris removal area. The area around location 23SB013 is vegetated, it does not appear that plants are being significantly impacted. Location 23SB013 is bounded within approximately 70 feet by samples with lower concentrations in all directions. Location 23SB046 is on the western boundary of an area excavated during 2014 IM activities and backfilled with stone and is bounded by samples with lower lead concentrations to the north, south, and west within approximately 20 feet. The other location with an elevated lead concentration (23SB001 at 125 mg/kg) is along the edge of the gravel lot southwest of Building 36. This location is bounded to the east by the gravel lot but is not well bounded in other directions. However, ecological habitat is limited in the immediate vicinity of the sample location because the ground surface is covered by gravel. Consequently, any potential impacts to plants from lead do not appear to be widespread. Also, because the areas around several of the sampling locations with criteria exceedances are vegetated, it does not appear that plants are being significantly impacted. For these reasons, it is not likely that plants are being significantly impacted by lead concentrations in surface soil. Therefore, lead in surface soil is eliminated as a COPC for terrestrial plants.

5.4.2 Tier 2, Step 3a: Soil Invertebrates

VOCs were eliminated as COPCs for soil invertebrates for reasons similar to those presented above for plants.

Concentrations of four metals (arsenic, chromium, mercury, and zinc) exceeded their respective soil invertebrate benchmarks and were greater than available background values. Only the maximum arsenic concentration (17.8 mg/kg) slightly exceeded its screening level (17 mg/kg) in one sample (from location 23SB035). Similarly, only the maximum zinc concentration (127 mg/kg) exceeded its screening level (120 mg/kg) in one sample (from location 23SB001). Because arsenic and zinc concentrations only slightly exceeded their screening levels in one sample each, potential impacts to soil invertebrates from these metals are not widespread. Therefore, any impacts to soil invertebrates are expected to be minimal, and these metals are eliminated as COPCs for this receptor.

Chromium was selected as a COPC because all detected concentrations exceeded its screening value. The USEPA Region 5 ESL for chromium is 0.4 mg/kg, which is a screening benchmark for hexavalent chromium. This value is overly conservative because it is significantly less than the background level (28.7 mg/kg) and is based on a chromium salt in solution being added to soil. This makes the chromium much more bioavailable then it would be in the environment. In addition, there is no history of hexavalent chromium use at Building 36. A more appropriate benchmark for the site is the Canadian SQG for plants/invertebrates of 78 mg/kg because it is based on a more robust data set (CCME, 1999a). All chromium concentrations were significantly less than this benchmark. Therefore, chromium is eliminated as a COPC for soil invertebrates.

Mercury concentrations in two samples exceeded the screening level (0.1 mg/kg). The USEPA Region 5 soil ESL for mercury is based on the ORNL benchmark for invertebrates (Efroymson et al., 1997b). The ORNL document states that there is significant uncertainty in the value because of the limited data set used to establish the value. However, a Canadian SQG of 12 mg/kg for the protection of plants and invertebrates was developed for mercury using a much more robust data set (CCME, 1999b). All mercury concentrations were less than the Canadian SQG, so risks to soil invertebrates are expected to be minimal. Therefore, mercury is eliminated as a COPC for soil invertebrates.

5.4.3 Tier 2, Step 3a: Sediment Invertebrates

Several PAHs and metals detected in sediment at SWMU 23 exceeded risk screening values, which are based primarily on threshold effects level (TEL) or threshold effects concentration (TEC) values. The

sediment risk screening levels (e.g., TELs and TECs) used to select COPCs are conservative because chemicals detected at concentrations less than these levels are not expected to cause any adverse impacts to the benthic community. Because the objective of the risk screening is to determine whether the chemicals at the site are causing a risk to ecological receptors, alternate benchmarks were used to further evaluate the risk associated with chemicals that exceeded the conservative screening levels. Corresponding higher effect level benchmarks such as probable effects levels (PELs) and probable effects concentrations (PECs) are discussed below. These higher effect level benchmarks correspond to concentrations at which adverse impacts are likely to occur. Although corresponding higher effects level benchmarks were not available for some screening values, available higher effects level benchmarks were presented, if available.

Four PAHs [acenaphthylene, benzo(a)pyrene, benzo(g,h,i)perylene, and dibenzo(a,h)anthracene] were selected as COPCs for sediment invertebrates because concentrations exceeded screening levels in one sample (from location 23SD006). As presented in Table 5-8, the concentrations of all four PAHs were much less than their respective higher effects benchmarks [PEC, PEL, or severe effects level (SEL)]. Also, the concentration of total PAHs in the sample from 23SD006 (1,180 µg/kg) (including one-half the detection limit for non-detects) was less than the TEC (1,610 µg/kg) from MacDonald et al. (2000). Therefore, risks to sediment invertebrates from PAHs are not likely, and PAHs are eliminated as COPCs for this receptor.

Ten metals were identified as COPCs for sediment invertebrates. Arsenic, barium, cobalt, copper, lead, nickel, silver, and zinc were initially selected as COPCs for this receptor because maximum concentrations exceeded screening values, and beryllium and vanadium were selected as COPCs because screening levels are not available. As summarized in Table 5-8, all of these metals were eliminated as COPCs for sediment invertebrates based on the following rationales:

- Concentrations of arsenic, copper, lead, nickel, and zinc are less than their respective higher effects benchmarks. Therefore, any impacts from these metals are expected to be minimal.

- Barium concentrations in four of seven samples exceed the screening level of 48 mg/kg. The barium exceedances were located in the drainageway along the western edge of the site, with the maximum concentration south of Building 36. Barium is not generally considered toxic, and although there are limited toxicity data for sediment invertebrates, the NOAA SQUIRT lists a TEL for barium of 130.1 mg/kg (Buchman, 2008). TELs are similar to TECs except they are saltwater values. Only the maximum detected barium concentration (219 mg/kg) exceeds the TEL. The average barium concentration (84.6 mg/kg) is less than the TEL. Also, concentrations of barium in surface soil at the site are less than the NSA Crane background UTL for surface soil; therefore, barium is not considered to be a site-

related contaminant because the source of metals to the sediment would have been runoff from surface soil.

- Cobalt concentrations (52.4 mg/kg and 62 mg/kg) in two of seven samples (23SD003 and 23SD004) slightly exceed the screening value of 50 mg/kg. Although a higher effects level benchmark is not available, the average cobalt concentration (22 mg/kg) is less than the screening value. Also, the concentration of cobalt in surface soil at the site was less than NSA Crane background UTL for surface soil; therefore, cobalt is not considered to be a site-related contaminant.

- Silver was only detected in one of seven samples (at 0.959 mg/kg), and its concentration only slightly exceed its screening value (0.5 mg/kg). The average silver concentration (0.445 mg/kg) (including one-half of the LOQ for non-detect results) is less than the screening value. A higher effects level benchmark for freshwater sediment is not available; however, the silver concentration is significantly less than the saltwater sediment PEL of 1.77 mg/kg.

- Alternate benchmarks are not available for beryllium and vanadium; therefore, impacts cannot be quantified. However, concentrations of these chemicals in sediment are similar to NSA Crane background concentrations for surface soil. Two beryllium concentrations (1.48 and 1.32 mg/kg) slightly exceed the background UTL (0.93 mg/kg). The maximum vanadium concentration (35.2 mg/kg) in sediment is less than the background UTL (51.2 mg/kg). Also, the maximum beryllium concentration in surface soil (0.963 mg/kg) is only slightly greater than the background UTL, and the maximum vanadium concentration in surface soil (38.3 mg/kg) is less than the UTL. Therefore, beryllium and vanadium are not considered to be site-related contaminants.

Additionally, the habitat at SWMU 23 is limited for sediment invertebrates because only a few inches of water were present during RFI sample collection, and water is not present at all times. Small tributaries to the north and south of Building 36 are intermittent, and only the main stream channel northwest of the site has continuous flow throughout the year. Therefore, impacts to sediment invertebrates from the chemicals discussed above are expected to be minimal.

5.4.4 Tier 2, Step 3a: Aquatic Organisms

Only maximum concentrations of total copper (10.7 µg/L) and total lead (16.3 µg/L) in surface water at location 23SW001 exceed the screening values of 9 µg/L for copper and 2.5 µg/L for lead. The dissolved copper concentration (in the filtered sample) was less than its screening value, and lead was not detected in the dissolved fraction. In accordance with USEPA (1993b), dissolved metals more closely approximate

the bioavailable fraction of metals in the water column than total metals. Therefore, impacts to aquatic organisms from copper and lead are expected to be minimal. For these reasons, copper and lead are eliminated as COPCs for aquatic organisms.

5.4.5 Tier 2, Step 3a: Terrestrial Wildlife

As presented in Section 5.3.2.5, EEQs from terrestrial food-chain modeling were greater than 1.0 for several chemicals using maximum chemical concentrations and Tier 1 exposure assumptions. Therefore, as part of the Step 3a refinement, risks were recalculated using average chemical concentrations and Tier 2, Step 3a exposure parameters as presented in Appendix D.2. The food-chain model calculation sheets are also provided in Appendix D.5.

Table 5-10 presents the result of the less conservative food-chain model for surface soil. Associated risks to mammals and birds are as follows:

- Herbivorous mammal and bird: No EEQs were greater than 1 for the vole or quail. Therefore, impacts to herbivorous mammals and birds are not expected from chemicals detected in surface soil at SWMU 23.

- Invertivorous mammal and bird: The EEQ for mercury (1.5) for the shrew was slightly greater than 1 using the NOAEL as the TRV. The LOAEL EEQ for mercury for the shrew was less than 1. The EEQs for lead (1.4) and mercury (10) for the woodcock were greater than 1.0 using the NOAEL as the TRV. The LOAEL EEQs for lead and mercury for the woodcock were equal to or less than 1. For these reasons, impacts to invertivorous receptors are expected to be minimal, and lead and mercury in surface soil are eliminated as COPCs for this receptor.

5.5 ECOLOGICAL RISK UNCERTAINTY ANALYSIS

This section discusses some of the uncertainties associated with the SWMU 23 SERA.

5.5.1 Uncertainty in Assessment Endpoints and Measurement Endpoints

Measurement endpoints were used to evaluate the assessment endpoints selected for the SERA. Measurement endpoints were used to predict effects to the assessment endpoints by selecting surrogate species to be evaluated. For example, a decrease in reproduction of a shrew was used to assess a decrease in reproduction of the small mammal population. However, predicting a decrease in reproduction

of a shrew may either underprotect or overprotect the small mammal population based on differences in ingestion rates, toxicities, food preferences, home ranges, etc. among different species.

Risks to reptiles were not quantitatively evaluated because exposure factors are not established for most species and because toxicity data are very limited (see below for a discussion of potential risks to the timber rattlesnake). As discussed in Section 5.2.1.1, several endangered and threatened species or species of special concern are present at NSA Crane and potentially may inhabit SWMU 23. Risks to these species were not specifically calculated, so the uncertainties of not calculating risks to these species are presented in this section. Unacceptable risks to the bobcat, bald eagle, Northern harrier, and osprey are not expected because habitat is not available. The bobcat has a significantly larger home range than the area encompassed by the site. The bald eagle and osprey require open water habitat, which is not available at SWMU 23, but is available in Lake Greenwood. The Northern harrier prefers wetlands habitat, which is not available at SWMU 23. However, there is uncertainty with these conclusions because risks were not quantitatively evaluated.

The loggerhead shrike and 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 soil, it is expected that they would have greater levels of SWMU 23 contaminants 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. By protecting the woodcock, these other invertivorous birds are also expected to be protected. The American bittern is a marshland bird that feeds on fish, frogs, eels, insects, and water snakes. The drainageways at SWMU 23 do not provide preferred habitat (marshes) for the bittern, so it is not likely that it will be present in this area. As mentioned in Section 5.2.1.1, the presence of the Indiana bat has not been documented at SWMU 23; however, three Indiana bats were captured approximately 1.5 miles east of the site, and one Indiana bat was captured 2 miles southeast of the site. Given the small size of the site and the fact that a portion of the site is a gravel lot, limited habitat exists for the Indiana bat at SWMU 23.

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 5.2.1.1, one threatened reptilian species, the timber rattlesnake, is listed as potentially present at NSA Crane. Based on the preferred habitat of the timber rattlesnake and the ecology of SWMU 23, this species likely does not inhabit areas of SWMU 23. Risks to carnivorous reptiles were not specifically calculated; however, risks are accounted for by using invertivorous birds and mammals as surrogates.

5.5.2 Uncertainty in Exposure Characterization

Contaminant doses to terrestrial wildlife were calculated using an equation that incorporates ingestion rates, body weights, BAFs, and other exposure factors. The 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 USEPA (1993a), 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, etc. Therefore, actual BAFs at the site may be different than those used in this SERA and obtained from the literature. Also, the bioavailabilities of contaminants reported in toxicity studies is typically greater than the bioavailabilities of these contaminants in environmental media. Typically, highly bioavailable forms of the chemicals are used when conducting toxicity tests and/or conducting dosing studies for wildlife.

There is uncertainty in the chemical data collected at the site. Measured levels of chemicals are only estimates of true site chemical concentrations. At SWMU 23, samples were deliberately biased toward known or suspected high concentrations, so predicted doses are probably greater than actual doses. Whereas this is a conservative approach in predicting exposure concentrations, actual exposure of ecological receptors to chemical concentrations at SWMU 23 is likely overestimated. In particular, wildlife that typically roam over multiple sample locations are unlikely to obtain all of their food from within the most contaminated areas at SWMU 23. Although samples collected from the edge of a gravel lot were conservatively included in the SERA, it is not likely that ecological receptors would be exposed to these locations.

5.5.3 Uncertainty in Ecological Effects Data

Uncertainty exists in the ecological effects data, including the screening levels and wildlife TRVs. Several of the screening levels are very conservative and typically are based on studies where the bioavailability of the chemical is much greater than it is in the environment. Also, toxicity data are not available or are limited for some chemicals.

The NOAELs and LOAELs used for the wildlife endpoint species are based on species other than the endpoint species (e.g., rats, mice). Uncertainty exists in the application of toxicity data across species

because the contaminant may be more or less toxic to the endpoint species than it was to the test study species.

5.5.4 Uncertainty in 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 TRV was exceeded.

Finally, there is uncertainty in how the predicted risks to a species at a site translate into risk to the population in the area as a whole.

5.6 ECOLOGICAL RISK SUMMARY

This SERA evaluated surface soil, sediment, and surface water. Based on the initial screening of the chemical data, several chemicals were initially selected as COPCs in surface soil, sediment, and surface water because they were detected at concentrations that exceeded conservative screening levels, because they had EEQs greater than 1.0 in the conservative food-chain model, or because they did not have screening levels. These chemicals were then further evaluated to refine the list of COPCs and to better characterize risks to terrestrial plants, soil and sediment invertebrates, aquatic organisms, mammals, and birds. Based on the Tier 2, Step 3a risk refinement, no COPCs were retained for any ecological receptor at SWMU 23.

TABLE 5-1

ASSESSMENT ENDPOINTS AND MEASUREMENT ENDPOINTS
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Assessment Endpoint	Measurement Endpoint
Adverse effects on the survival, reproduction, and/or growth of terrestrial plants	Survival, growth, and/or reproduction of terrestrial plants were evaluated by comparing measured concentrations of chemicals in surface soil to plant soil screening levels.
Adverse effects on the survival, reproduction, and/or growth of soil invertebrates	Survival, growth, and/or reproduction of soil invertebrates were evaluated by comparing measured concentrations of chemicals in surface soil to invertebrate soil screening levels.
Adverse effects on the survival, reproduction, and/or growth of sediment invertebrates	Survival, growth, and/or reproduction of sediment invertebrates were evaluated by comparing measured concentrations of chemicals in sediment to sediment screening levels.
Adverse effects on the survival, reproduction, and/or growth of aquatic organisms	Survival, growth, and/or reproduction of aquatic organisms were evaluated by comparing measured concentrations of chemicals in surface water to surface water screening levels.
Adverse effects on the survival, reproduction, and/or increase in development effects of invertivorous birds and mammals	Survival, reproduction, and/or increase in development effects of invertivorous birds and mammals were evaluated by comparing estimated ingested doses of contaminants in surface soil and earthworms to no observed adverse effects levels (NOAELs) and lowest observed adverse effects levels (LOAELs) for surrogate wildlife species.
Adverse effects on the survival, reproduction, and/or increase in development effects of herbivorous birds and mammals	Survival, reproduction, and/or increase in development effects of herbivorous birds and mammals were evaluated by comparing estimated ingested doses of contaminants in surface soil and plants to NOAELs and LOAELs for surrogate wildlife species.

TABLE 5-2

ECOLOGICAL SOIL SCREENING CRITERIA
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Ecological Soil Screening Level							
	Plant		Invertebrate		Avian		Mammal	
	Value	Source	Value	Source	Value	Source	Value	Source
Volatile Organic Compounds (mg/kg)								
1,2-DICHLOROETHANE	NA	NA	NA	NA	0.85	LANL	21.2	Region 5
2-BUTANONE	NA	NA	NA	NA	NA	NA	89.6	Region 5
ACETONE	NA	NA	NA	NA	7.5	LANL	2.5	Region 5
BENZENE	31	CCME	31	CCME	NA	NA	0.255	Region 5
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	0.0941	Region 5
CHLOROFORM	NA	NA	NA	NA	NA	NA	1.19	Region 5
TETRACHLOROETHENE	3.8	CCME	3.8	CCME	NA	NA	9.92	Region 5
TOLUENE	75	CCME	75	CCME	NA	NA	5.45	Region 5
TRANS-1,4-DICHLORO-2-BUTENE	NA	NA	1000	ORNL(1)	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg)								
1-METHYLNAPHTHALENE	NA	NA	29	EcoSSL	NA	NA	100	EcoSSL
2-METHYLNAPHTHALENE	NA	NA	29	EcoSSL	NA	NA	100	EcoSSL
ACENAPHTHENE	20	ORNL	29	EcoSSL	NA	NA(3)	100	EcoSSL
ACENAPHTHYLENE	20	ORNL(2)	29	EcoSSL	NA	NA	100	EcoSSL
ANTHRACENE	2.5	CCME	29	EcoSSL	NA	NA(3)	100	EcoSSL
BENZO(A)ANTHRACENE	18	LANL	18	EcoSSL	0.8	LANL(3)	1.1	EcoSSL
BENZO(A)PYRENE	20	CCME	18	EcoSSL	NA	NA(3)	1.1	EcoSSL
BENZO(B)FLUORANTHENE	18	LANL	18	EcoSSL	NA	NA(3)	1.1	EcoSSL
BENZO(G,H,I)PERYLENE	NA	NA	18	EcoSSL	NA	NA	1.1	EcoSSL
BENZO(K)FLUORANTHENE	NA	NA	18	EcoSSL	NA	NA(3)	1.1	EcoSSL
CHRYSENE	NA	NA	18	EcoSSL	NA	NA(3)	1.1	EcoSSL
DIBENZO(A,H)ANTHRACENE	NA	NA	18	EcoSSL	NA	NA	1.1	EcoSSL
FLUORANTHENE	50	CCME	29	EcoSSL	NA	NA(3)	100	EcoSSL
FLUORENE	NA	NA	29	EcoSSL	NA	NA(3)	100	EcoSSL
INDENO(1,2,3-CD)PYRENE	NA	NA	18	EcoSSL	NA	NA	1.1	EcoSSL
NAPHTHALENE	1	LANL	29	EcoSSL	3.4	LANL(3)	100	EcoSSL
PHENANTHRENE	NA	NA	29	EcoSSL	NA	NA(3)	100	EcoSSL
PYRENE	NA	NA	18	EcoSSL	34	LANL(3)	1.1	EcoSSL
Polycvhlorinated Biphenyls (mg/kg)								
AROCLOR-1254	33	CCME	33	CCME	1.3	CCME	0.000332	Region 5
AROCLOR-1260	33	CCME	33	CCME	1.3	CCME	0.000332	Region 5
Metals (mg/kg)								
ARSENIC	18	EcoSSL	17	CCME	43	EcoSSL	46	EcoSSL
BARIUM	500	ORNL	330	EcoSSL	820	LANL	2000	EcoSSL
BERYLLIUM	10	ORNL	40	EcoSSL	NA	NA	21	EcoSSL
CADMIUM	32	EcoSSL	140	EcoSSL	0.77	EcoSSL	0.36	EcoSSL
CHROMIUM	78	CCME	0.4	Region 5	26	EcoSSL	34	EcoSSL
COBALT	13	EcoSSL	1000	ORNL(1)	120	EcoSSL	230	EcoSSL
COPPER	70	EcoSSL	80	EcoSSL	28	EcoSSL	49	EcoSSL
LEAD	120	EcoSSL	1700	EcoSSL	11	EcoSSL	56	EcoSSL
MERCURY	12	CCME	0.1	Region 5	0.013	LANL(4)	1.7	LANL(4)
NICKEL	38	EcoSSL	280	EcoSSL	210	EcoSSL	130	EcoSSL
SELENIUM	0.52	Eco SSL	4.1	Eco SSL	1.2	Eco SSL	0.63	Eco SSL
SILVER	560	EcoSSL	50	ORNL(1)	4.2	EcoSSL	14	EcoSSL
VANADIUM	130	CCME	130	CCME	7.8	EcoSSL	280	EcoSSL
ZINC	160	EcoSSL	120	EcoSSL	46	EcoSSL	79	EcoSSL
Petroleum Hydrocarbons (mg/kg)								
DRO, C08-C28	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)
DRO, C08-C34	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)
GASOLINE RANGE ORGANICS	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)	NA(5)

Ecological Screening Level sources were used in the folloowing order of preference:
EcoSSL - USEPA Ecological Soil Screening Levels (2005d through d, 2005e, and 2005f, 2006, 2007b through f, and 2008)
Region 5 - USEPA Region 5 Ecological Screening Levels (2003a)
CCME - Canadian Soil Quality Guidelines (CCME, 1999a through e, 2001, 2004a through b, and 2010)

TABLE 5-2

ECOLOGICAL SOIL SCREENING CRITERIA
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Ecological Soil Screening Level							
	Plant		Invertebrate		Avian		Mammal	
	Value	Source	Value	Source	Value	Source	Value	Source

ORNL - Oak Ridge National Laboratory Toxicological Benchmarks for plants and invertebrates (Efroymson et al., 1997a and 1997b)
LANL - Los Alamos National Laboratory (3.2 database; 2014)

Footnotes:
1 - Value for microorganisms.
2 - Value for acenaphthene.
3 - Canadian SQG was not selected because it was calculated using a lowest observed adverse effects level (LOAEL) for mammals.
4 - Available Canadian SQG was not selected because it was based on organic mercury toxicity to a pig.
5 - This general parameter, which is comprised of a range of organic chemicals, is evaluated by the chemical-specific results.

Abbreviations:
NA - Not available
SQG - Soil Quality Guideline
USEPA - United States Environmental Protection Agency

TABLE 5-3

SURFACE SOIL ECOLOGICAL COPC SELECTION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Detection	Maximum Detection	Sample with Maximum Detection	Average of Detections[1]	Average of All Results[2]	Background Upper Tolerance Limit[3]	Screening Levels[4]				EEQs[5]				Deletion or Selection of COPCs for Invertebrates/Plants		Further Evaluated in Terrestrial Food-Chain Modeling[6]	
								Plants	Invertebrates	Birds	Mammals	Plants	Invertebrates	Birds	Mammals	COPC (yes/no)?	Rationale	Evaluated (yes/no)?	Rationale
Volatile Organic Compounds (mg/kg)																			
1,2-DICHLOROETHANE	4/16	0.00124 J	0.00153 J	23SS023-0002	0.00141	0.00471	NA	NA	NA	0.85	21.2	NA	NA	0.0018	0.000072	**YES**	NSL	NO	BSL
2-BUTANONE	3/16	0.00592 J	0.0405 J	23SS001-0002	0.0194	0.0125	NA	NA	NA	NA	89.6	NA	NA	NA	0.00045	**YES**	NSL	NO	BSL, NONBIO
ACETONE	9/16	0.00733 J	0.234 J	23SS001-0002	0.0539	0.0458	NA	NA	NA	7.5	2.5	NA	NA	0.031	0.094	**YES**	NSL	NO	BSL
BENZENE	1/21	0.0018 J	0.0018 J	23SS001-0002	0.0018	0.0042	NA	31	31	NA	0.255	0.000058	0.000058	NA	0.0071	NO	BSL	NO	BSL, NONBIO
CARBON DISULFIDE	1/16	0.00888 J	0.00888 J	23SS001-0002	0.00888	0.00515	NA	NA	NA	NA	0.0941	NA	NA	NA	0.094	**YES**	NSL	NO	BSL, NONBIO
CHLOROFORM	1/16	0.00514 J	0.00514 J	23SS001-0002	0.00514	0.00491	NA	NA	NA	NA	1.19	NA	NA	NA	0.0043	**YES**	NSL	NO	BSL, NONBIO
TETRACHLOROETHENE	1/16	0.00539 J	0.00539 J	23SS001-0002	0.00539	0.00493	NA	3.8	3.8	NA	9.92	0.0014	0.0014	NA	0.00054	NO	BSL	NO	BSL, NONBIO
TOLUENE	1/21	0.0094 J	0.0094 J	23SS001-0002	0.0094	0.0045	NA	75	75	NA	5.45	0.00013	0.00013	NA	0.0017	NO	BSL	NO	BSL, NONBIO
TRANS-1,4-DICHLORO-2-BUTENE	1/16	0.004 J	0.004 J	23SS023-0002	0.004	0.005	NA	NA	1000	NA	NA	NA	0.0000040	NA	NA	**YES**	NSL	NO	NONBIO
Polycyclic Aromatic Hydrocarbons (mg/kg)																			
1-METHYLNAPHTHALENE	1/22	2.5	2.5	23SS070-0002	2.5	0.13	NA	NA	29	NA	100	NA	0.086	NA	0.025	**YES**	NSL	NO	BSL, NONBIO
2-METHYLNAPHTHALENE	1/49	6.8	6.8	23SS070-0002	6.8	0.16	NA	NA	29	NA	100	NA	0.23	NA	0.068	**YES**	NSL	NO	BSL, NONBIO
ACENAPHTHENE	2/49	0.082 J	0.15	23SS091-0002	0.12	0.021	NA	20	29	NA	100	0.0075	0.0052	NA	0.0015	NO	BSL	**YES**	NSL, BIO
ACENAPHTHYLENE	3/49	0.0041 J	0.0077	23SS074-0002	0.0054	0.017	NA	20	29	NA	100	0.00039	0.00027	NA	0.000077	NO	BSL	**YES**	NSL, BIO
ANTHRACENE	6/49	0.041 J	0.37	23SS091-0002	0.13	0.030	NA	2.5	29	NA	100	0.15	0.013	NA	0.0037	NO	BSL	**YES**	NSL, BIO
BENZO(A)ANTHRACENE	27/49	0.0041 J	0.99	23SS091-0002	0.13	0.08	NA	18	18	0.8	1.1	0.055	0.055	**1.2**	0.90	NO	BSL	**YES**	ASL
BENZO(A)PYRENE	30/49	0.0023 J	0.97	23SS091-0002	0.15	0.10	NA	20	18	NA	1.1	0.049	0.054	NA	0.88	NO	BSL	**YES**	NSL, BIO
BENZO(B)FLUORANTHENE	35/49	0.0043 J	1.3	23SS091-0002	0.20	0.15	NA	18	18	NA	1.1	0.072	0.072	NA	**1.2**	NO	BSL	**YES**	ASL
BENZO(G,H,I)PERYLENE	27/49	0.00568 J	0.71	23SS091-0002	0.138	0.0864	NA	NA	18	NA	1.1	NA	0.039	NA	0.65	**YES**	NSL	**YES**	NSL, BIO
BENZO(K)FLUORANTHENE	31/49	0.0024 J	0.63	23SS091-0002	0.085	0.064	NA	NA	18	NA	1.1	NA	0.035	NA	0.57	**YES**	NSL	**YES**	NSL, BIO
CHRYSENE	30/49	0.0041 J	1	23SS091-0002	0.15	0.10	NA	NA	18	NA	1.1	NA	0.056	NA	0.91	**YES**	NSL	**YES**	NSL, BIO
DIBENZO(A,H)ANTHRACENE	13/49	0.00671 J	0.23	23SS091-0002	0.0605	0.0299	NA	NA	18	NA	1.1	NA	0.013	NA	0.21	**YES**	NSL	**YES**	NSL, BIO
FLUORANTHENE	33/49	0.0047 J	1.9	23SS091-0002	0.19	0.14	NA	50	29	NA	100	0.038	0.066	NA	0.019	NO	BSL	**YES**	NSL, BIO
FLUORENE	2/49	0.099	0.17	23SS091-0002	0.13	0.022	NA	NA	29	NA	100	NA	0.0059	NA	0.0017	**YES**	NSL	**YES**	NSL, BIO
INDENO(1,2,3-CD)PYRENE	26/49	0.00493 J	0.5	23SS091-0002	0.0834	0.0556	NA	NA	18	NA	1.1	NA	0.028	NA	0.45	**YES**	NSL	**YES**	NSL, BIO
NAPHTHALENE	1/49	0.95	0.95	23SS070-0002	0.95	0.036	NA	1	29	3.4	100	0.95	0.033	0.28	0.0095	NO	BSL	NO	BSL
PHENANTHRENE	18/49	0.0044 J	1.4	23SS091-0002	0.19	0.081	NA	NA	29	NA	100	NA	0.048	NA	0.014	**YES**	NSL	**YES**	NSL, BIO
PYRENE	30/49	0.0081	2 J	23SS091-0002	0.21	0.14	NA	NA	18	34	1.1	NA	0.11	0.059	**1.8**	**YES**	NSL	**YES**	ASL
Polychlorinated Biphenyls (mg/kg)																			
AROCLOR-1254	6/16	0.00127 J	0.191 J	23SS001-0002	0.0334	0.0143	NA	33	33	1.3	0.00033	0.0058	0.0058	0.15	**575**	NO	BSL	**YES**	ASL
AROCLOR-1260	10/16	0.00208 J	0.186 J	23SS001-0002	0.0426	0.0270	NA	33	33	1.3	0.00033	0.0056	0.0056	0.14	**560**	NO	BSL	**YES**	ASL
Metals (mg/kg)																			
ARSENIC	26/26	2.3	17.8	23SS035-0002	5.3	5.3	**11.83**	18	17	43	46	0.99	**1.05**	0.41	0.39	**YES**	ASL	NO	BSL
BARIUM	26/26	12.4	115	23SS007-0002	65.6	65.6	211	500	330	820	2000	0.23	0.35	0.14	0.058	NO	BSL	NO	BSL
BERYLLIUM	20/26	0.327 J	0.963 J	23SS020-0002	0.559	0.475	**0.93**	10	40	NA	21	0.096	0.024	NA	0.046	NO	BSL	NO	BSL, NONBIO
CADMIUM	2/26	0.0645 J	0.345 J	23SS013-0002	0.205	0.251	6.05	32	140	0.77	0.36	0.011	0.0025	0.45	0.96	NO	BSL	NO	BSL
CHROMIUM	26/26	4.92	29.5 J	23SS001-0002	12.5	12.5	**28.7**	78	0.4	26	34	0.38	**74**	**1.1**	0.87	**YES**	ASL	**YES**	ASL
COBALT	26/26	2.5	15.4 J	23SS037-0002	7.8	7.8	32.4	13	1000	120	230	**1.2**	0.015	0.13	0.067	**YES**	ASL	NO	BSL
COPPER	26/26	3.35	39.8	23SS001-0002	10.8	10.8	**17.6**	70	80	28	49	0.57	0.50	**1.4**	0.81	NO	BSL	**YES**	ASL
LEAD	48/48	2.33	345	23SS013-0002	37.5	37.5	**27**	120	1700	11	56	**2.9**	0.20	**31**	**6.2**	**YES**	ASL	**YES**	ASL
MERCURY	20/26	0.0209 J	0.692 J	23SS001-0002	0.0861	0.0908	**0.077**	12	0.1	0.013	1.7	0.058	**6.9**	**53**	0.41	**YES**	ASL	**YES**	ASL
NICKEL	26/26	5.33	19.4	23SS020-0002	11.1	11.1	22.1	38	280	210	130	0.51	0.069	0.092	0.15	NO	BSL	NO	BSL
SELENIUM	6/26	0.169 J	0.425 J	23SS033-0002	0.212	0.580	0.81	0.52	4.1	1.2	0.63	0.82	0.10	0.35	0.67	NO	BSL	NO	BSL
VANADIUM	26/26	5.8	38.3	23SS009-0002	16.1	16.1	51.2	130	130	7.8	280	0.29	0.29	**4.9**	0.14	NO	BSL	**YES**	ASL
ZINC	26/26	11.1	127 J	23SS001-0002	39.3	39.3	**65.6**	160	120	46	79	0.79	**1.1**	**2.8**	**1.6**	**YES**	ASL	**YES**	ASL
Petroleum Hydrocarbons (mg/kg)																			
DRO, C08-C28	15/16	9.69 J	69	23SS012-0002	23.7	22.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NO	(7)	NO	(7)
DRO, C08-C34	16/16	12 J	88.5	23SS012-0002	48.4	48.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NO	(7)	NO	(7)
GASOLINE RANGE ORGANICS	1/16	55.3	55.3	23SS013-0002	55.3	6.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NO	(7)	NO	(7)

Cells are shaded for the following reasons:
The chemical name (and "YES") if the chemical was selected as a COPC or retained for food-chain modeling.
The value in the background column if the maximum detected concentration exceeds the background upper tolerance level.
EEQs that are greater than 1.

Abbreviations:
COPC - Chemical of potential concern
EEQ - Ecological effects quotient
J - Estimated concentration
NA - Not applicable/not available
PAHs - Polycyclic aromatic hydrocarbons

Rationale Codes for COPC Selection:
ASL - Above COPC screening level
BIO - Bioaccumulative chemical
BSL - Below COPC screening level
NONBIO - Non-bioaccumulative chemical
NSL - No screening level

Footnotes:
1 - Average of detected concentrations only.
2 - Average of all analytical results including one-half of the detection limit for non-detects.
3 - Upper tolerance limits (representing 95-percent of the soil population with 95-percent confidence), Final Base-Wide Background Soil Investigation Report (Tetra Tech, 2001). Shaded cells indicate that the maximum concentration exceeds background.
4 - The sources of the screening levels are presented in Table 5-2.
5 - EEQ is calculated by dividing the maximum chemical concentration by its screening level. Value is unitless.
6 - Chemicals with EEQs for birds or mammals greater than 1.0 or bioaccumulative chemicals without bird or mammal screening values were retained for food-chain modeling.
7 - Risks from parameter considered by evaluating volatiles and PAHs.

TABLE 5-4

SEDIMENT ECOLOGICAL COPC SELECTION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Detection	Maximum Detection	Sample with Maximum Detection	Average of Detections(1)	Average of All Results(2)	Background Upper Tolerance Limit(3)	Screening Level(4)		EEQ(5)	COPC for Sediment Invertebrates (yes/no)?	Rationale for COPC selection
								Value	Source			
Volatile Organic Compounds (mg/kg)												
TRICHLOROETHENE	1/7	0.00124 J	0.00124 J	23SD009-0006	0.00124	0.0688	NA	0.112	Reg 5	0.011	NO	BSL
Polycyclic Aromatic Hydrocarbons (mg/kg)												
2-METHYLNAPHTHALENE	1/7	0.00834	0.00834	23SD004-0006	0.00834	0.00870	NA	0.0202	Reg 5	0.41	NO	BSL
ACENAPHTHYLENE	1/7	0.00685 J	0.00685 J	23SD006-0006	0.00685	0.00847	NA	0.00587	Reg 5	**1.2**	**YES**	ASL
BENZO(A)PYRENE	5/7	0.00604 J	0.255	23SD006-0006	0.0747	0.0563	NA	0.15	Reg 5	**1.7**	**YES**	ASL
BENZO(B)FLUORANTHENE	6/7	0.00583 J	0.254	23SD006-0006	0.0741	0.0649	NA	10.4	Reg 5	0.024	NO	BSL
BENZO(G,H,I)PERYLENE	4/7	0.00998	0.185	23SD006-0006	0.0792	0.0484	NA	0.17	Reg 5	**1.1**	**YES**	ASL
BENZO(K)FLUORANTHENE	4/7	0.00476 J	0.141	23SD006-0006	0.0582	0.0377	NA	0.24	Reg 5	0.59	NO	BSL
CHRYSENE	3/7	0.00854	0.0989	23SD001-0006	0.0457	0.0231	NA	0.166	Reg 5	0.60	NO	BSL
DIBENZO(A,H)ANTHRACENE	1/7	0.0884	0.0884	23SD006-0006	0.0884	0.0201	NA	0.033	Reg 5	**2.7**	**YES**	ASL
FLUORANTHENE	6/7	0.0084	0.101	23SD001-0006	0.0322	0.0290	NA	0.423	Reg 5	0.24	NO	BSL
INDENO(1,2,3-CD)PYRENE	5/7	0.00492 J	0.164	23SD006-0006	0.0527	0.0405	NA	0.2	Reg 5	0.82	NO	BSL
PHENANTHRENE	1/7	0.012	0.012	23SD004-0006	0.0120	0.00922	NA	0.204	Reg 5	0.059	NO	BSL
PYRENE	6/7	0.00948	0.0929	23SD001-0006	0.0407	0.0362	NA	0.195	Reg 5	0.48	NO	BSL
Polychlorinated Biphenyls (mg/kg)												
AROCLOR-1254	1/6	0.00298 J	0.00298 J	23SD005-0006	0.00298	0.00148	NA	0.0598	Reg 5	0.050	NO	BSL
AROCLOR-1260	5/6	0.00224 J	0.0108 J	23SD002-0006	0.00650	0.00559	NA	0.0598	Reg 5	0.18	NO	BSL
Metals (mg/kg)												
ARSENIC	7/7	4.59	12.3	23SD003-0006	8.60	8.60	**11.83**	9.79	Reg 5	**1.3**	**YES**	ASL
BARIUM	7/7	20.9	219	23SD001-0006	84.6	84.6	**211**	48	NOAA	**4.6**	**YES**	ASL
BERYLLIUM	7/7	0.46	1.48 J	23SD004-0006	0.85	0.85	**0.93**	NA	NA	NA	**YES**	NSL
CADMIUM	2/7	0.478 J	0.76 J	23SD001-0006	0.62	0.41	6.05	0.99	Reg 5	0.77	NO	BSL
CHROMIUM	7/7	9.63	35.2	23SD004-0006	20.0	20.0	**28.7**	43.4	Reg 5	0.81	NO	BSL
COBALT	7/7	4.65	62	23SD003-0006	22.1	22.1	**32.4**	50	Reg 5	**1.2**	**YES**	ASL
COPPER	7/7	6.1	34.4	23SD001-0006	14.3	14.3	**17.6**	31.6	Reg 5	**1.1**	**YES**	ASL
LEAD	7/7	9.19	52.3	23SD001-0006	29.8	29.8	**27**	35.8	Reg 5	**1.5**	**YES**	ASL
MERCURY	7/7	0.0171 J	0.14	23SD001-0006	0.052	0.052	**0.077**	0.174	Reg 5	0.80	NO	BSL
NICKEL	7/7	17.4	48.1	23SD004-0006	27.1	27.1	**22.1**	22.7	Reg 5	**2.1**	**YES**	ASL
SILVER	1/7	0.959 J	0.959 J	23SD002-0006	0.96	0.45	**0.13**	0.5	Reg 5	**1.9**	**YES**	ASL
VANADIUM	7/7	9.1	35.2	23SD001-0006	22.5	22.5	51.2	NA	NA	NA	**YES**	NSL
ZINC	7/7	42.1	207	23SD001-0006	85.8	85.8	**65.6**	121	Reg 5	**1.7**	**YES**	ASL

Notes:
Shaded chemical name indicates that the chemical was selected as a COPC. Shaded cells indicate that the EEQ exceeds 1.

Footnotes:
1 - Average of detected concentrations only.
2 - Average of all analytical results including one-half of the detection limit for non-detects.
3 - Upper tolerance limits (representing 95-percent of the soil population with 95-percent confidence), Final Base-Wide Background Soil Investigation Report (Tetra Tech, 2001). Shaded cells indicate that the maximum concentration exceeds background.
4 - Order of preference was USEPA Region 5 Ecological Screening Levels (2003a) followed by NOAA marine sediment screening values (Buchman, 2008).
5 - EEQ is calculated by dividing the maximum detected chemical concentration by its screening level. Value is unitless.

Abbreviations:
COPC - Chemical of potential concern
EEQ - Ecological effects quotient
J - Estimated concentration
NA - Not applicable/not available
NOAA - National Oceanic and Atmospheric Administration
USEPA - United States Environmental Protection Agency

Rationale Codes for COPC Selection:
ASL - Above COPC Screening Level
BSL - Below COPC Screening Level
NSL - No Screening Level

TABLE 5-5

SURFACE WATER ECOLOGICAL COPC SELECTION
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Detection	Maximum Detection	Sample of Maximum Detection	Average of Detections(1)	Average of All Results(2)	Screening Level(3)		EEQ(4)	COPC for Aquatic Organisms (yes/no)?	Rationale for COPC selection
							Value	Source			
Total Metals (µg/L)											
ARSENIC	1/6	2.16 J	2.16 J	23SW001	2.16	0.99	150	NRWQC	0.014	NO	BSL
BARIUM	6/6	39	144	23SW001	63.2	63.2	220	Reg 5	0.65	NO	BSL
CHROMIUM	3/6	0.56 J	3.21 J	23SW001	1.48	0.99	11	NRWQC	0.29	NO	BSL
COBALT	1/6	3.44	3.44	23SW001	3.44	1.62	24	Reg 5	0.14	NO	BSL
COPPER	4/6	1.26 J	10.7	23SW001	3.77	2.84	9	NRWQC	**1.2**	**YES**	ASL
LEAD	3/6	0.685 J	16.3	23SW001	5.93	3.15	2.5	NRWQC	**6.5**	**YES**	ASL
NICKEL	6/6	1.08 J	12.8	23SW006	4.48	4.48	52	NRWQC	0.25	NO	BSL
VANADIUM	1/6	7.29 J	7.29 J	23SW001	7.29	2.26	12	Reg 5	0.61	NO	BSL
ZINC	6/6	1.31 J	62.6 J	23SW001	14.7	14.7	120	NRWQC	0.52	NO	BSL
Dissolved Metals (µg/L)											
BARIUM	6/6	38.9	73	23SW001	50.6	50.6	220	Reg 5	0.33	NO	BSL
COPPER	3/6	1.42 J	2.46 J	23SW004	1.83	1.41	9	NRWQC	0.27	NO	BSL
NICKEL	6/6	0.907 J	12.2	23SW006	3.88	3.88	52	NRWQC	0.23	NO	BSL
ZINC	5/6	1.82 J	14	23SW006	5.54	4.82	120	NRWQC	0.12	NO	BSL

Notes:
Shaded chemical name indicates that the chemical was selected as a COPC. Shaded cells indicate that the EEQ exceeds 1.

Footnotes:
1 - Average of detected concentrations only.
2 - Average of all analytical results including one-half of the detection limit for non-detects.
3 - Order of preference was NRWQC (USEPA, 2012c) followed by Region 5 Ecological Screening Levels (USEPA, 2003a).
4 - EEQ is calculated by dividing the maximum detected chemical concentration by its screening level. Value is unitless.

Abbreviations:
COPC - Chemical of potential concern
EEQ - Ecological effects quotient
J - Estimated concentration
NA - Not applicable/not available
NRWQC - National Recommended Water Quality Criteria
USEPA - Unted States Environmental Protection Agency

Rationale Codes for COPC Selection:
ASL - Above COPC Screening Level
BSL - Below COPC Screening Level

TABLE 5-6

TERRESTRIAL FOOD-CHAIN MODEL - TIER 1 SCENARIO
INVERTIVOROUS AND HERBIVOROUS RECEPTORS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Herbivorous Receptors EEQs				Invertivorous Receptors EEQs			
	Bobwhite Quail		Meadow Vole		Woodcock		Short-Tailed Shrew	
	NOAEL-Based	LOAEL-Based	NOAEL-Based	LOAEL-Based	NOAEL-Based	LOAEL-Based	NOAEL-Based	LOAEL-Based
Polycyclic Aromatic Hydrocarbons								
ACENAPHTHENE	2.0E-03	2.0E-04	2.2E-05	4.0E-06	2.2E-02	2.2E-03	5.8E-04	1.1E-04
ACENAPHTHYLENE	4.0E-04	4.0E-05	6.3E-06	1.2E-06	1.6E-02	1.6E-03	4.6E-04	8.4E-05
ANTHRACENE	1.1E-02	1.1E-03	1.6E-04	3.0E-05	8.7E-02	8.7E-03	2.3E-03	4.3E-04
BENZO(A)ANTHRACENE	1.0E-02	1.0E-03	9.3E-03	1.5E-04	1.6E-01	1.6E-02	4.4E-01	7.1E-03
BENZO(A)PYRENE	1.3E-02	1.3E-03	1.5E-02	2.3E-04	1.3E-01	1.3E-02	3.6E-01	5.8E-03
BENZO(B)FLUORANTHENE	3.0E-02	3.0E-03	4.2E-02	6.8E-04	3.3E-01	3.3E-02	9.4E-01	1.5E-02
BENZO(G,H,I)PERYLENE	1.8E-02	1.8E-03	2.7E-02	4.3E-04	2.0E-01	2.0E-02	5.8E-01	9.3E-03
BENZO(K)FLUORANTHENE	8.4E-03	8.4E-04	9.3E-03	1.5E-04	1.6E-01	1.6E-02	4.6E-01	7.3E-03
CHRYSENE	1.0E-02	1.0E-03	9.4E-03	1.5E-04	2.2E-01	2.2E-02	6.4E-01	1.0E-02
DIBENZO(A,H)ANTHRACENE	3.1E-03	3.1E-04	3.5E-03	5.7E-05	5.2E-02	5.2E-03	1.5E-01	2.4E-03
FLUORANTHENE	6.1E-02	6.1E-03	9.0E-04	1.7E-04	5.6E-01	5.6E-02	1.5E-02	2.8E-03
FLUORENE	2.1E-03	2.1E-04	2.0E-05	3.8E-06	1.5E-01	1.5E-02	4.2E-03	7.8E-04
INDENO(1,2,3-CD)PYRENE	6.3E-03	6.3E-04	6.7E-03	1.1E-04	1.4E-01	1.4E-02	4.0E-01	6.4E-03
PHENANTHRENE	6.3E-02	6.3E-03	9.7E-04	1.8E-04	2.4E-01	2.4E-02	6.3E-03	1.2E-03
PYRENE	8.7E-02	8.7E-03	1.4E-01	2.3E-03	3.5E-01	3.5E-02	9.8E-01	1.6E-02
Polychlorinated Biphenyls								
AROCLOR-1254	1.5E-02	1.5E-03	6.0E-03	6.0E-04	**3.1E+00**	3.1E-01	**7.6E+00**	7.6E-01
AROCLOR-1260	1.5E-02	1.5E-03	5.2E-03	5.2E-04	**3.0E+00**	3.0E-01	**7.4E+00**	7.4E-01
Metals								
CHROMIUM	2.0E-01	3.7E-02	5.3E-02	5.3E-03	9.5E-01	1.7E-01	7.0E-01	7.0E-02
COPPER	3.5E-01	4.0E-02	1.0E-01	3.1E-03	**1.2E+00**	1.4E-01	6.6E-01	2.0E-02
LEAD	**3.4E+00**	5.7E-01	2.3E-01	3.5E-02	**1.6E+01**	**2.8E+00**	**3.6E+00**	5.6E-01
MERCURY	**5.6E+01**	**5.6E+00**	**6.4E+00**	**1.3E+00**	**3.0E+01**	**3.0E+00**	**5.2E+00**	1.0E+00
VANADIUM	**1.6E+00**	3.0E-01	2.0E-02	1.1E-02	**4.2E+00**	7.6E-01	1.1E-01	6.1E-02
ZINC	1.4E-01	7.0E-02	5.8E-02	4.9E-03	**1.2E+00**	6.3E-01	9.5E-01	8.0E-02

Notes:
Cells are shaded if the value is greater than 1.

Abbreviations:
EEQ - Ecological effects quotient
LOAEL - Lowest observed adverse effects level
NOAEL - No observed adverse effects level

TABLE 5-7

STEP 3A EVALUATION FOR RISKS TO PLANTS AND INVERTEBRATES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Maximum Detected Concentration (mg/kg)	Screening Level (mg/kg)[1]		Maximum EEQ[2]		Step 3a Evaluation[3]		Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?	
							Step 3a Factors Considered in Evaluation				
			Plants	Invertebrates	Plants	Invertebrates	Plants	Invertebrates		Plants	Invertebrates
Volatile Organic Compounds											
1,2-DICHLOROETHANE	4/16	0.00153	NA	NA	NA	NA	Concentrations less than benchmarks for other VOCs. Generally detected infrequently.		Acceptable	No	No
2-BUTANONE	3/16	0.0405	NA	NA	NA	NA					
ACETONE	9/16	0.234	NA	NA	NA	NA					
CARBON DISULFIDE	1/16	0.00888	NA	NA	NA	NA					
CHLOROFORM	1/16	0.00514	NA	NA	NA	NA					
TRANS-1,4-DICHLORO-2-BUTENE	1/16	0.004	NA	1000	NA	0.000004					
Polycyclic Aromatic Hydrocarbons											
1-METHYLNAPHTHALENE	1/22	2.5	NA	29	NA	0.086	Concentrations less than benchmarks for other PAHs. PAHs are typically not toxic to plants except at high soil concentrations.	Not COPCs for invertebrates.	Acceptable	No	No
2-METHYLNAPHTHALENE	1/49	6.8	NA	29	NA	0.23					
BENZO(G,H,I)PERYLENE	27/49	0.71	NA	18	NA	0.039					
BENZO(K)FLUORANTHENE	31/49	0.63	NA	18	NA	0.035					
CHRYSENE	30/49	1	NA	18	NA	0.056					
DIBENZO(A,H)ANTHRACENE	13/49	0.23	NA	18	NA	0.013					
FLUORENE	2/49	0.17	NA	29	NA	0.0059					
INDENO(1,2,3-CD)PYRENE	26/49	0.5	NA	18	NA	0.028					
PHENANTHRENE	18/49	1.4	NA	29	NA	0.048					
PYRENE	30/49	2	NA	18	NA	0.11					
Metals											
ARSENIC	26/26	17.8	18	17	0.99	1.05	Not a COPC	Only one concentration slightly exceeded the screening level.	Acceptable	No	No
CHROMIUM	26/26	29.5	78	0.4	0.38	73.8	Not a COPC	Screening benchmark is for hexavalent chromium, which is overly conservative. A more appropriate benchmark is the Canadian SQG (78 mg/kg); no samples exceed this benchmark.	Acceptable	No	No
COBALT	26/26	15.4	13	1000	1.2	0.015	Less than background.	Not a COPC	Acceptable	No	No
LEAD	48/48	345	120	1700	2.9	0.20	Concentrations in 3 of 48 samples exceeded its screening level; potential impacts are not widespread.	Not a COPC	Acceptable	No	No
MERCURY	20/26	0.692	12	0.1	0.058	6.9	Not a COPC	Uncertainty in screening value because of limited data set. A more appropriate benchmark is the Canadian SQG (12 mg/kg); no samples exceed this benchmark.	Acceptable	No	No
ZINC	26/26	127	160	120	0.79	1.1	Not a COPC	Only one concentration slightly exceeded the screening level.	Acceptable	No	No

Footnotes:
1 - Sources of ecological screening levels presented in Table 5-2.
2 - Maximum detection divided by screening level. Values are unitless.
3 - See Section 5.4 for a more detailed Step 3a evaluation.

Abbreviations:
COPC - Chemical of potential concern
EEQ - Ecological effects quotient
NA - Not available/not applicable
SQG - Soil Quality Guideline
VOCs - Volatile organic compounds

TABLE 5-8

STEP 3A EVALUATION FOR RISKS TO SEDIMENT INVERTEBRATES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Maximum Detected Concentration (mg/kg)	Screening Level[1] (mg/kg)	Maximum EEQ[2]	Step 3a Evaluation			Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
					Alternate Benchmark (mg/kg)		Step 3a Factors Considered in Evaluation[3]		
					Value	Source			
Polycyclic Aromatic Hydrocarbons									
ACENAPHTHYLENE	1/7	0.00685	0.00587	1.2	0.128	PEL	Concentrations in 1 of 7 samples exceeded the screening level. Concentrations less than higher effects level benchmarks. Concentrations of total PAHs (1,180 µg/kg) less than TEC (1,610 µg/kg).	Acceptable	No
BENZO(A)PYRENE	5/7	0.255	0.15	1.7	1.45	PEC		Acceptable	No
BENZO(G,H,I)PERYLENE	4/7	0.185	0.17	1.1	0.0884	PEL		Acceptable	No
DIBENZO(A,H)ANTHRACENE	1/7	0.0884	0.033	2.7	3.2	SEL		Acceptable	No
Metals									
ARSENIC	7/7	12.3	9.79	1.3	33	PEC	Concentrations in 3 of 7 samples exceeded the screening level. Concentrations less than higher effects level benchmark.	Acceptable	No
BARIUM	7/7	219	48	4.6	130	TEL	Concentrations in 4 of 7 samples exceeded the screening level. Limited toxicity data; however, generally not considered toxic. Average concentration less than higher effects level benchmark.	Acceptable	No
BERYLLIUM	7/7	1.48	NA	NA	NA	NA	A screening level was not available to quantify impacts. Concentrations in 2 of 7 sediment samples slightly exceeded surface soil background (0.93 mg/kg).	Not Quantified	No
COBALT	7/7	62	50	1.2	NA	NA	Concentrations in 2 of 7 samples exceeded screening level. Average concentration (22 mg/kg) less than screening level.	Acceptable	No
COPPER	7/7	34.4	31.6	1.1	149	PEC	Concentrations in 1 of 7 samples exceeded the screening level. Concentrations less than higher effects level benchmark.	Acceptable	No
LEAD	7/7	52.3	35.8	1.5	128	PEC	Concentrations in 1 of 7 samples exceeded the screening level. Concentrations less than higher effects level benchmark.	Acceptable	No
NICKEL	7/7	48.1	22.7	2.1	48.6	PEC	Concentrations in 4 of 7 samples exceeded the screening level. Concentrations less than higher effects level benchmark.	Acceptable	No
SILVER	1/7	0.959	0.5	1.9	1.77	PEL	Concentrations in 1 of 7 samples exceeded the screening level. Average concentration (0.045 mg/kg) less than screening level. Concentrations less than higher effects level benchmark.	Acceptable	No
VANADIUM	7/7	35.2	NA	NA	NA	NA	A screening level was not available to quantify impacts. Sediment samples less than surface soil background (51.2 mg/kg).	Not Quantified	No
ZINC	7/7	207	121	1.7	459	PEC	Concentrations in 1 of 7 samples exceeded the screening level. Concentrations less than higher effects level benchmark.	Acceptable	No

Footnotes:
1 - Sources of ecological screening level presented in Table 5-4.
2 - Maximum detection divided by the screening level. Value is unitless.
3 - See Section 5.4 for a more detailed Step 3a evaluation.

Abbreviations:
COPC - Chemical of potential concern
EEQ - Ecological effects quotient
NA - Not available/not applicable
PAHs - Polycyclic aromatic hydrocarbons
PEC - Probable Effects Concentration (MacDonald, et al., 2000)
PEL - Probable Efffects Level (Buchman, 2008)
SEL - Severe Effects Level (Buchman, 2008)
TEC - Threshold Effects concentration (MacDonald, et al., 2000)
TEL - Threshold Effects Level (Buchman, 2008)

TABLE 5-9

STEP 3A EVALUATION FOR RISKS TO AQUATIC ORGANISMS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Frequency of Detection	Maximum Detected Concentration	Screening Level(1)	Maximum EEQ(2)	Step 3a Factors Considered in Evaluation(3)	Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
Inorganics (µg/L)							
COPPER	4/6	10.7	9	1.2	Dissolved metals more closely approximate the bioavailable fraction of metals in the water column, and dissolved copper concentrations were less than the screening value.	Acceptable	No
LEAD	3/6	16.3	2.5	6.5	Dissolved metals more closely approximate the bioavailable fraction of metals in the water column, and lead was not detected in filtered samples.	Acceptable	No

Footnotes:
1 - Sources of ecological screening level presented in Table 5-5.
2 - Maximum detection divided by the screening level. Value is unitless.
3 - See Section 5.4 for a more detailed Step 3a evaluation.

Abbreviations:
COPC - Chemical of potential concern
EEQ - Ecological effects quotient

TABLE 5-10

TERRESTRIAL FOOD-CHAIN MODEL - TIER 2, STEP 3A SCENARIO
INVERTIVOROUS AND HERBIVOROUS RECEPTORS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

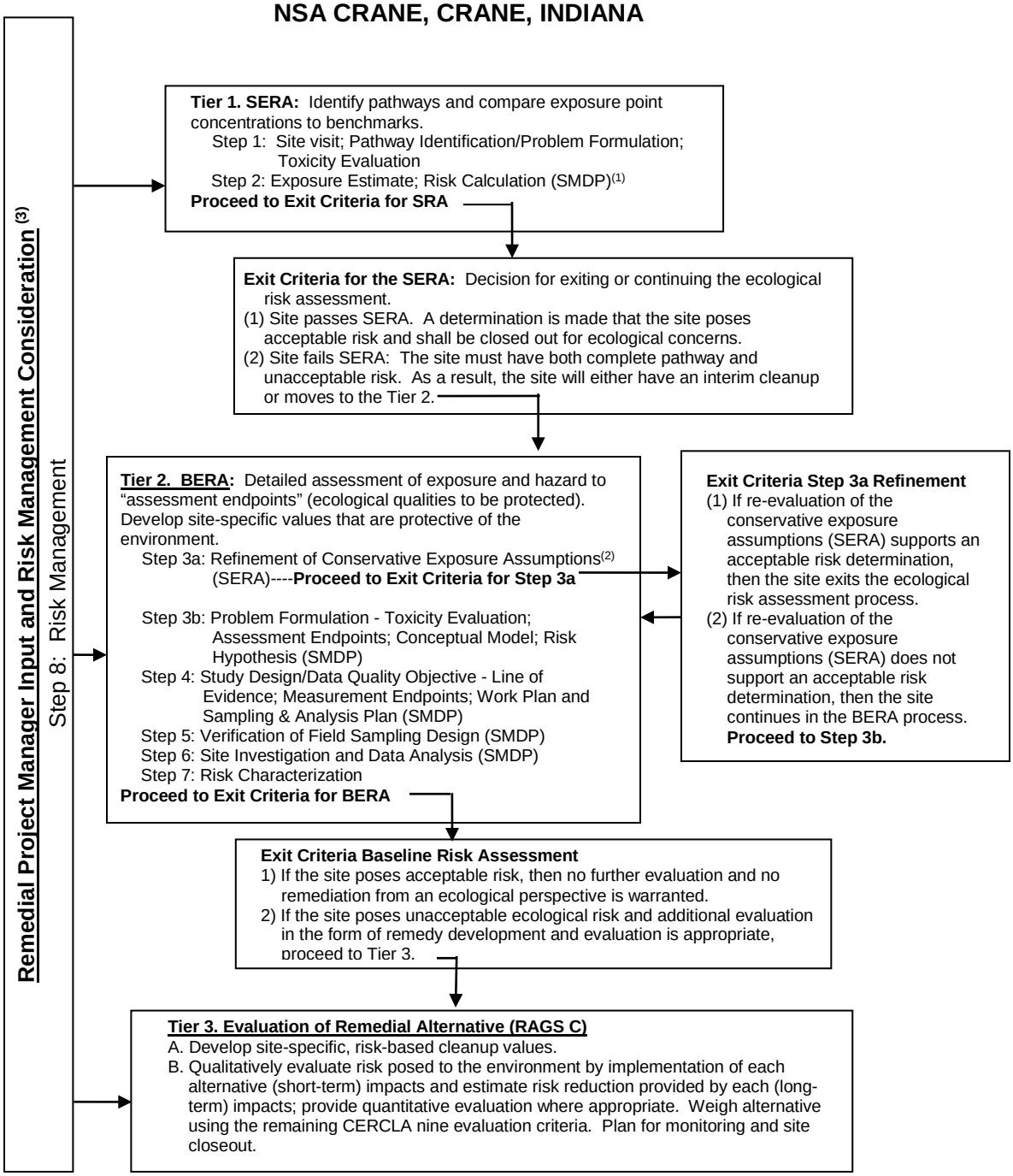
Chemical	Herbivorous Receptors EEQs				Invertivorous Receptors EEQs			
	Bobwhite Quail		Meadow Vole		Woodcock		Short-Tailed Shrew	
	NOAEL-Based	LOAEL-Based	NOAEL-Based	LOAEL-Based	NOAEL-Based	LOAEL-Based	NOAEL-Based	LOAEL-Based
Inorganics								
CHROMIUM	3.9E-02	7.2E-03	1.4E-02	1.4E-03	2.3E-01	4.3E-02	1.6E-01	1.6E-02
COPPER	1.1E-01	1.3E-02	4.5E-02	1.4E-03	2.1E-01	2.3E-02	9.9E-02	3.1E-03
LEAD	2.2E-01	3.6E-02	2.6E-02	4.0E-03	**1.4E+00**	2.4E-01	3.2E-01	5.0E-02
MERCURY	8.2E-01	8.2E-02	9.2E-02	1.8E-02	**1.0E+01**	1.0E+00	**1.5E+00**	2.9E-01
ZINC	4.8E-02	2.5E-02	2.4E-02	2.0E-03	5.8E-01	3.0E-01	3.7E-01	3.1E-02
Polychlorinated Biphenyls								
AROCLOR-1254	4.2E-04	4.2E-05	1.7E-04	1.7E-05	7.1E-02	7.1E-03	1.4E-01	1.4E-02
AROCLOR-1260	7.5E-04	7.5E-05	2.4E-04	2.4E-05	1.3E-01	1.3E-02	2.6E-01	2.6E-02

Notes:
Cells are shaded if the value is greater than 1.

Abbreviations:
EEQ - Ecological effects quotient
LOAEL - Lowest observed adverse effects level
NOAEL - No observed adverse effects level

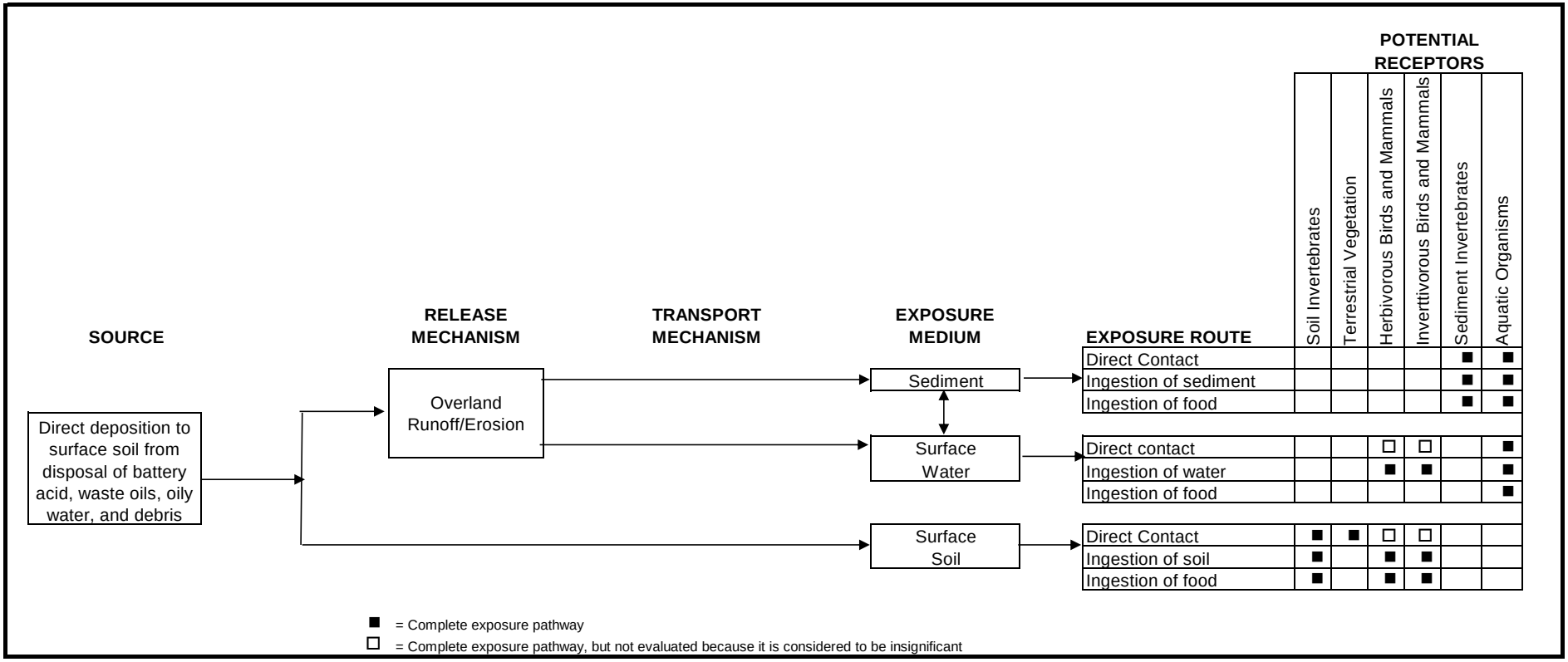
FIGURE 5-1

NAVY ECOLOGICAL RISK ASSESSMENT TIERED APPROACH
SWMU 23 – BATTERY SHOP
NSA CRANE, CRANE, INDIANA



Notes: 1 - See USEPA's Eight-Step Ecological Risk Assessment Process for requirements for each SMDP.
2 - Refinement includes but is not limited to background, bioavailability, detection frequency, etc.
3 - Risk management is incorporated throughout the tiered approach.

Abbreviations:
BERA – Baseline ecological risk assessment
CERCLA – Comprehensive Environmental Response, Compensation and Liability Act
RAGS – Risk Assessment Guidance for Superfund
SERA – Screening-Level Ecological Risk Assessment
Scientific Management Decision Point



Blank space indicates incomplete exposure pathway, or not applicable, potential exposure.

FIGURE 5-2

ECOLOGICAL CONCEPTUAL SITE MODEL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE INDIANA

6.0 CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions and recommendations for the Revised Draft RFI Report for SWMU 23.

6.1 CONCLUSIONS

The evaluations conducted in this RFI Report support the conclusion that the majority of contaminated soil was removed from SWMU 23 during 2014 IM activities. Although there is a hotspot of elevated PAH contamination [greater than 1.5 mg/kg benzo(a)pyrene equivalents] remaining in subsurface soil at location 23SB068 from approximately 2 to 6 feet bgs, this contamination is isolated to a relatively small area, ranging from approximately 2,050 to 2,405 square feet.

Based on the findings of the HHRA and SERA, no chemicals in soil, sediment, and surface water were identified as COCs for human health or COPCs for ecological receptors after the Step 3a refinement. Although the cumulative ILCRs for hypothetical future child and lifelong residents under the RME were equal to 1×10^{-4}, the upper limit of the USEPA's and IDEM's target cancer risk range, these risks are considered to be overstated by at least one order of magnitude because of the bias introduced by elevated PAH concentrations at location 23SB068. The risks for other human receptors under the CTE and RME scenarios were less than unity (1) for noncarcinogens and less than 1×10^{-6} or within the USEPA's and IDEM's target cancer risk range for carcinogens.

6.2 RECOMMENDATIONS

No further action is recommended for SWMU 23. The residual concentrations at the site do not warrant an additional remedial action because they are isolated to a relatively small area of the site that is not expected to adversely impact human and ecological receptors or result in significant migration to groundwater.

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APPENDIX A

SITE PHOTOGRAPHS

APPENDIX A – SITE PHOTOGRAPHS

Photographs 1 and 2 show Building 36 and surrounding pavement on the western side of the building. To the right of the forklifts shown in the photographs is a steep hillside that is highly vegetated with undergrowth and sizable trees (Photograph 3).

Photograph 1: View of rear of Building 36, facing southeast

Photograph 2: View of rear of Building 36, facing southwest

Photograph 3: View of steep hill slope west of Building 36.

Two concrete stormwater headwalls are present along the hill slope west of the building. No significant debris and no stressed vegetation were identified during the RFI visit. Photograph 4 shows one of the two headwalls.

Photograph 4: View of one of the headwalls located along the hill slope west of Building 36.

APPENDIX B

SWMU 23 ANALYTICAL DATA

B.1 SWMU 23 Analytical Data for Soil

B.2 SWMU 23 Analytical Data for Sediment

B.3 SWMU 23 Analytical Data for Surface Water

APPENDIX B.1

SWMU 23 ANALYTICAL DATA FOR SOIL

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB001						23SB002				23SB003				
SAMPLE ID	23SS001-0002	23SS001-0002-D	23SB001-0204	23SB001-0406	23SB001-1012	23SB001-1012-D	23SS002-0002	23SB002-0204	23SB002-0406	23SB002-1012	23SS003-0002	23SS003-0002-D	23SB003-0204	23SB003-0406	23SB003-0810
SAMPLE DATE	20121007	20121007	20140523	20140523	20121007	20121007	20121007	20140326	20140326	20121007	20121007	20121007	20140326	20140326	20121007
SAMPLE CODE	NORMAL	DUP	NORMAL	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	REMOVED	REMOVED	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SS	SB	SB	SB	SB	SS	SB	SB	SB	SS	SS	SB	SB	SB
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	2	4	10	10	0	2	4	10	0	0	2	4	8
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	2	4	6	12	12	2	4	6	12	2	2	4	6	10
VOLATILES (MG/KG)															
1,1,1,2-TETRACHLOROETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
1,1,1-TRICHLOROETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
1,1,2,2-TETRACHLOROETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
1,1,2-TRICHLOROETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
1,1-DICHLOROETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
1,1-DICHLOROETHENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
1,2,3-TRICHLOROPROPANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
1,2-DIBROMO-3-CHLOROPROPANE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 U	0.218 UJ	0.00481 U	NA	NA	0.227 UJ	0.00488 U	0.247 UJ	NA	NA	0.0048 U
1,2-DIBROMOETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
1,2-DICHLOROETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 UJ	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 UJ	0.124 UJ	NA	NA	0.0024 UJ
1,2-DICHLOROPROPANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
2-BUTANONE	0.0405 J	0.222 UJ	NA	NA	0.0043 J	0.218 UJ	0.00714 J	NA	NA	0.227 UJ	0.00532 J	0.247 UJ	NA	NA	0.00553 J
2-HEXANONE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 U	0.218 UJ	0.00481 U	NA	NA	0.227 UJ	0.00488 U	0.247 UJ	NA	NA	0.0048 U
3-CHLOROPROPENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
4-METHYL-2-PENTANONE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 U	0.218 UJ	0.00481 U	NA	NA	0.227 UJ	0.00488 U	0.247 UJ	NA	NA	0.0048 U
ACETONE	0.234 J	0.443 UJ	NA	NA	0.024	0.436 UJ	0.0601	NA	NA	0.455 UJ	0.0714	0.495 UJ	NA	NA	0.101
ACETONITRILE	0.0346 UR	1.11 UR	NA	NA	0.0212 UR	1.09 UR	0.0241 UR	NA	NA	1.14 UR	0.0244 UR	1.24 UR	NA	NA	0.024 UR
ACROLEIN	0.0138 UR	0.443 UR	NA	NA	0.0085 UR	0.436 UR	0.00963 UR	NA	NA	0.455 UR	0.00977 UR	0.495 UR	NA	NA	0.00961 UR
ACRYLONITRILE	0.0138 UJ	0.443 UJ	NA	NA	0.0085 U	0.436 UJ	0.00963 U	NA	NA	0.455 UJ	0.00977 U	0.495 UJ	NA	NA	0.00961 U
BENZENE	0.0018 J	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00167 J	0.124 UJ	NA	NA	0.0024 U
BROMODICHLOROMETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
BROMOFORM	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
BROMOMETHANE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 UJ	0.218 UJ	0.00481 UJ	NA	NA	0.227 UJ	0.00488 UJ	0.247 UJ	NA	NA	0.0048 UJ
CARBON DISULFIDE	0.00888 J	0.111 UJ	NA	NA	0.00113 J	0.109 UJ	0.00414 J	NA	NA	0.114 UJ	0.00586	0.124 UJ	NA	NA	0.0024 U
CARBON TETRACHLORIDE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
CHLOROBENZENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
CHLORODIBROMOMETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
CHLOROETHANE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 UJ	0.218 UJ	0.00481 UJ	NA	NA	0.227 UJ	0.00488 UJ	0.247 UJ	NA	NA	0.0048 UJ
CHLOROFORM	0.00514 J	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
CHLOROMETHANE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 UJ	0.218 UJ	0.00481 UJ	NA	NA	0.227 UJ	0.00488 UJ	0.247 UJ	NA	NA	0.0048 UJ
CHLOROPRENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
CIS-1,2-DICHLOROETHENE	0.00346 UJ	0.111 UJ	NA	NA	0.0012 J	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
CIS-1,3-DICHLOROPROPENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
DIBROMOMETHANE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 UJ	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 UJ	0.124 UJ	NA	NA	0.0024 UJ
DICHLORODIFLUOROMETHANE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 UJ	0.218 UJ	0.00481 UJ	NA	NA	0.227 UJ	0.00488 UJ	0.247 UJ	NA	NA	0.0048 UJ
ETHYL METHACRYLATE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
ETHYLBENZENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
ISOBUTANOL	0.0553 UJ	1.77 UJ	NA	NA	0.034 U	1.74 UJ	0.0385 U	NA	NA	1.82 UJ	0.0391 U	1.98 UJ	NA	NA	0.0384 U
METHACRYLONITRILE	0.0346 UJ	1.11 UJ	NA	NA	0.0212 U	1.09 UJ	0.0241 U	NA	NA	1.14 UJ	0.0244 U	1.24 UJ	NA	NA	0.024 U
METHYL IODIDE	0.0138 UJ	0.443 UJ	NA	NA	0.0085 U	0.436 UJ	0.00963 U	NA	NA	0.455 UJ	0.00977 U	0.495 UJ	NA	NA	0.00961 U
METHYL METHACRYLATE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 UJ	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 UJ	0.124 UJ	NA	NA	0.0024 UJ
METHYLENE CHLORIDE	0.00691 UJ	0.137 J	NA	NA	0.00425 U	0.218 UJ	0.00481 U	NA	NA	0.227 UJ	0.00279 J	1.45 J	NA	NA	0.0048 U
PROPIONITRILE	0.0346 UR	1.11 UR	NA	NA	0.0212 UR	1.09 UR	0.0241 UR	NA	NA	1.14 UR	0.0244 UR	1.24 UR	NA	NA	0.024 UR
STYRENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
TETRACHLOROETHENE	0.00539 J	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
TOLUENE	0.0094 J	0.111 UJ	NA	NA	0.00378 J	0.109 UJ	0.00131 J	NA	NA	0.114 UJ	0.00345 J	0.124 UJ	NA	NA	0.00178 J
TOTAL XYLENES	0.0104 UJ	0.333 UJ	NA	NA	0.00637 U	0.327 UJ	0.00722 UJ	NA	NA	0.341 UJ	0.00732 U	0.371 UJ	NA	NA	0.00721 U
TRANS-1,2-DICHLOROETHENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
TRANS-1,3-DICHLOROPROPENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
TRANS-1,4-DICHLORO-2-BUTENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 U	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
TRICHLOROETHENE	0.00346 UJ	0.111 UJ	NA	NA	0.00212 U	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 U	0.124 UJ	NA	NA	0.0024 U
TRICHLOROFLUOROMETHANE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 UJ	0.218 UJ	0.00481 UJ	NA	NA	0.227 UJ	0.00488 UJ	0.247 UJ	NA	NA	0.0048 UJ
VINYL ACETATE	0.00691 UJ	0.222 UJ	NA	NA	0.00425 U	0.218 UJ	0.00481 UJ	NA	NA	0.227 UJ	0.00488 U	0.247 UJ	NA	NA	0.0048 U
VINYL CHLORIDE	0.00346 UJ	0.111 UJ	NA	NA	0.00144 J	0.109 UJ	0.00241 UJ	NA	NA	0.114 UJ	0.00244 UJ	0.124 UJ	NA	NA	0.0024 UJ
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)															
1-METHYLNAPHTHALENE	NA	NA	0.037 U	0.048 J	NA	NA	NA	0.046 U	0.0041 U	NA	NA	NA	0.037 U	0.004 U	NA
2-METHYLNAPHTHALENE	0.0187 U	0.0195 J	0.037 U	0.058 J	0.0185 U	0.0184 U	0.0375 U	0.046 U	0.0041 U	0.00383 U	0.0217 J	0.0188 J	0.037 U	0.004 U	0.00391 U
ACENAPHTHENE	0.0187 U	0.0187 U	0.037 U	0.038 U	0.0185 U	0.0184 U	0.0375 U	0.046 U	0.0041 U	0.00383 U	0.0181 J	0.0179 U	0.037 U	0.004 U	0.00391 U
ACENAPHTHYLENE	0.0187 U	0.0187 U	0.037 U	0.038 U	0.0546	0.0184 U	0.442	0.046 U	0.0041 U	0.00383 U	0.384 J	0.079 J	0.037 U	0.004 U	0.0105
ANTHRACENE	0.0187 U	0.021 J	0.037 U	0.038 U	0.0185 U	0.0184 U	0.277 J	0.046 U	0.0041 U	0.00383 U	1.03 J	0.126 J	0.037 U	0.004 U	0.00427 J
BAP EQUIVALENT-HALFND	0.1067887	0.161465	0.0545035	0.038 U	0.0185 U	0.0184 U	3.81559	0.08876	0.0081566	0.00383 U	4.60075	1.354006	0.51836	0.004 U	0.0852781
BAP EQUIVALENT-POS	0.0974387	0.161465	0.0321	0.038 U	0.0185 U	0.0184 U	3.81559	0.06116	0.0059016	0.00383 U	4.60075	1.354006	0.51836	0.004 U	0.0852781
BENZO(A)ANTHRACENE	0.0463 J	0.0799 J	0.037 U	0.038 U	0.0185 U	0.0184 U	1.37	0.046 U	0.005 J	0.00383 U	3.22 J	0.706 J	0.24	0.004 U	0.0299
BENZO(A)PYRENE	0.0757	0.103	0.028 J	0.038 U	0.0185 U	0.0184 UJ	2.51	0.051 J	0.0045 J	0.00383 U	3.03 J	0.858 J	0.33	0.004 U	0.0565
BENZO(B)FLUORANTHENE	0.0963	0.129	0.041 J	0.038 U	0.0185 U	0.0184 UJ	2.9	0.098	0.0087	0.00383 U	3.62 J	1.04 J	0.66	0.004 U	0.0643
BENZO(G,H,I)PERYLENE	0.0844	0.104	0.037 U	0.091	0.043	0.0184 UJ	2.56	0.046 J	0.0041 U	0.00383 U	1.93 J	0.761 J	0.26	0.004 U	0.0578
BENZO(K)FLUORANTHENE	0.0574 J	0.101 J	0.037 U	0.038 U	0.0185 U	0.0184 UJ	1.99	0.031 J	0.0025 J	0.00383 U	3 J	0.813 J	0.2	0.004 U	0.0445
CHRYSENE	0.0647 J	0.115 J	0.037 U	0.038 U	0.0185 U	0.0184 U	1.69	0.05 J	0.0066 J	0.00383 U	3.75 J	0.876 J	0.36	0.004 U	0.0431
DIBENZO(A,H)ANTHRACENE	0.0187 U	0.028 J	0.037 UJ	0.038 UJ	0.0185 U	0.0184 UJ	0.657	0.046 U	0.0041 U	0.00383 U	0.675 J	0.246 J	0.08	0.004 U	0.0142
FLUORANTHENE	0.0577 J	0.12 J	0.064 J	0.038 U	0.0185 U	0.0184 U	1.22	0.046 U	0.0053 J	0.00383 U	3.85 J	1.04 J	0.28	0.004 U	0.041
FLUORENE	0.0187 U	0.0187 U	0.037 U	0.038 U	0.0185 U	0.0184 U	0.0375 U	0.046 U	0.0041 U	0.00383 U	0.084	0.0211 J	0.037 U	0.004 U	0.00391 U
INDENO(1,2,3-CD)PYRENE	0.0684	0.0845	0.037 UJ	0.038 UJ	0.0185 U	0.0184 UJ	2	0.046 UJ	0.0041 U	0.00383 U	1.78 J	0.664 J	0.16 J	0.004 U	0.0467
NAPHTHALENE	0.0187 U	0.0187 U	0.037 U	0.038 UJ	0.0185 U	0.0184 U	0.0382 J	0.046 U	0.0041 U	0.00383 U	0.0363	0.03 J	0.037 U	0.004 U	0.00391 U
PHENANTHRENE	0.0324 J	0.0573	0.034 J	0.047 J	0.0185 U	0.0184 U	0.203 J	0.046 U	0.0041 U	0.00383 U	0.356 J	0.174 J	0.055 J	0.004 U	0.00944
PYRENE	0.0656 J	0.119 J	0.073 J	0.087	0.0597	0.0184 U	1.33	0.075 J	0.0056 J	0.00383 U	4.3 J	1.05 J	0.49 J	0.004 U	0.0467
PESTICIDES/PCBS (MG/KG)															
AROCLOR-1016	0.0193 UJ	0.187 U	NA	NA	NA	NA	0.0371 UJ	NA	NA	NA	0.00182 UJ	0.00179 UJ	NA	NA	NA
AROCLOR-1221	0.0193 UJ	0.187 U	NA	NA	NA	NA	0.0371 UJ	NA	NA	NA	0.00182 UJ	0.00179 UJ	NA	NA	NA
AROCLOR-1232	0.0193 UJ	0.187 U	NA	NA	NA	NA	0.0371 UJ	NA	NA	NA	0.00182 UJ	0.00179 UJ	NA	NA	NA
AROCLOR-1242	0.0193 UJ	0.187 U	NA	NA	NA	NA	0.0371 UJ	NA	NA	NA	0.00182 UJ	0.00179 UJ	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB001						23SB002				23SB003				
SAMPLE ID	23SS001-0002	23SS001-0002-D	23SB001-0204	23SB001-0406	23SB001-1012	23SB001-1012-D	23SS002-0002	23SB002-0204	23SB002-0406	23SB002-1012	23SS003-0002	23SS003-0002-D	23SB003-0204	23SB003-0406	23SB003-0810
SAMPLE DATE	20121007	20121007	20140523	20140523	20121007	20121007	20121007	20140326	20140326	20121007	20121007	20121007	20140326	20140326	20121007
SAMPLE CODE	NORMAL	DUP	NORMAL	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	REMOVED	REMOVED	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SS	SB	SB	SB	SB	SS	SB	SB	SB	SS	SS	SB	SB	SB
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	2	4	10	10	0	2	4	10	0	0	2	4	8
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	2	4	6	12	12	2	4	6	12	2	2	4	6	10
AROCLOR-1248	0.0193 UJ	0.187 U	NA	NA	NA	NA	0.0371 UJ	NA	NA	NA	0.00182 UJ	0.00179 UJ	NA	NA	NA
AROCLOR-1254	0.191 J	3.29 J	NA	NA	NA	NA	0.0371 UJ	NA	NA	NA	0.00182 UJ	0.00179 UJ	NA	NA	NA
AROCLOR-1260	0.186 J	0.187 UJ	NA	NA	NA	NA	0.0371 UJ	NA	NA	NA	0.00746 J	0.00537 J	NA	NA	NA
METALS (MG/KG)															
ANTIMONY	2.44 U	2.42 U	NA	NA	2.38 U	2.39 U	2.35 U	NA	NA	2.24 UJ	0.875 U	2.11 U	NA	NA	2.47 U
ARSENIC	8.07	7.58	NA	NA	9.5	8.01	7.16	NA	NA	9.4 J	5.64	5.94	NA	NA	12.8
BARIUM	67.4	84.3	NA	NA	88.4	84.5	72	NA	NA	41.9	29.1	41.2	NA	NA	77.5
BERYLLIUM	0.46 J	0.485 J	NA	NA	0.593 J	0.58 J	0.455 J	NA	NA	0.494 J	0.21 J	0.321 J	NA	NA	0.605 J
CADMIUM	0.61 U	1.88	NA	NA	0.595 U	0.597 U	0.757 J	NA	NA	0.559 U	0.219 U	0.528 U	NA	NA	0.619 U
CHROMIUM	29.5 J	116 J	NA	NA	19	17.8	32.5	NA	NA	16.9 J	11.9 J	24 J	NA	NA	29.8
COBALT	7.38	9.03	NA	NA	7.63	9.84	7.49	NA	NA	2.46 J	3.48	4.14	NA	NA	5.69
COPPER	39.8	60.1	NA	NA	14.6	12.6	30.1	NA	NA	10.9	6.41 J	12.6 J	NA	NA	20.7
LEAD	125 J	73.2 J	NA	NA	18.3	13	61 J	NA	NA	11.8	8.54 J	14.4 J	NA	NA	14.7
MERCURY	0.692 J	2.37 J	NA	NA	0.0475	0.0456	1.6 J	NA	NA	0.0642	0.015 J	0.0625	NA	NA	0.0384 J
NICKEL	13.8 J	22.9 J	NA	NA	11.2	12.3	11	NA	NA	5.15	10.7	11.3	NA	NA	16.8
SELENIUM	1.53 U	1.51 U	NA	NA	1.49 U	1.49 U	1.47 U	NA	NA	1.4 U	0.656 U	1.32 U	NA	NA	1.55 U
SILVER	0.61 U	0.606 U	NA	NA	0.595 U	0.597 U	2.21 J	NA	NA	0.559 U	0.219 U	0.528 U	NA	NA	0.619 U
THALLIUM	1.22 U	1.21 U	NA	NA	1.19 U	1.19 U	1.18 U	NA	NA	1.12 U	0.438 U	1.06 U	NA	NA	1.24 U
VANADIUM	19.5	31.2	NA	NA	33.1	32.3	28.2	NA	NA	22.4	13.8	13.8	NA	NA	51.2
ZINC	127 J	485 J	NA	NA	34.4	38.1	83.2 J	NA	NA	12.1	38.4	41.2 J	NA	NA	54
PETROLEUM HYDROCARBONS (MG/KG)															
DIESEL RANGE ORGANICS, C08-C28	35.7 J	75.4 J	NA	NA	2220	1850	98.9 J	NA	NA	7.56 U	25.9	43.7	NA	NA	7.96 U
DIESEL RANGE ORGANICS, C08-C34	71.4 J	156 J	NA	NA	3490	3010	148 J	NA	NA	8.53 J	64.2	102	NA	NA	10.6 J
GASOLINE RANGE ORGANICS	5.29 U	4.43 U	NA	NA	4.75 J	4.36 U	4.76 U	NA	NA	4.55 U	4.72 U	6.07 J	NA	NA	4.75 U
MISCELLANEOUS PARAMETERS															
SULFATE (mg/kg)	38.7 J	25.8 J	NA	NA	NA	NA	6.12 J	NA	NA	NA	69.9 J	11 UJ	NA	NA	NA
pH (s.u.)	7.77	8.29	NA	NA	NA	NA	7.98	NA	NA	NA	8.74	8.59	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB004				23SB005		23SB006		23SB007	23SB008	23SB009	23SB010	23SB011	23SB012	23SB013	23SB014	23SB015
SAMPLE ID	23SS004-0002	23SB004-0204	23SB004-0406	23SB004-0810	23SS005-0002	23SB005-0810	23SS006-0002	23SB006-0608	23SS007-0002	23SS008-0002	23SS009-0002	23SS010-0002	23SS011-0002	23SS012-0002	23SS013-0002	23SS014-0002	23SS015-0002
SAMPLE DATE	20121007	20140523	20140523	20121007	20121007	20121007	20121007	20121007	20121101	20121101	20121101	20121101	20121101	20121101	20121101	20121031	20121031
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	REMOVED	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL
SUBMATRIX	SS	SB	SB	SB	SS	SB	SS	SB	SS	SS	SS	SS	SS	SS	SS	SS	SS
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	2	4	8	0	8	0	6	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	4	6	10	2	10	2	8	1.8	0.8	1.2	1.6	1.8	2	1.9	0.5	0.8
VOLATILES (MG/KG)																	
1,1,1,2-TETRACHLOROETHANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,1,1-TRICHLOROETHANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,1,2,2-TETRACHLOROETHANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,1,2-TRICHLOROETHANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,1-DICHLOROETHANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,1-DICHLOROETHENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,2,3-TRICHLOROPROPANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,2-DIBROMO-3-CHLOROPROPANE	0.00526 U	NA	NA	0.00444 U	0.216 UJ	0.00453 U	0.00447 U	0.00494 U	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
1,2-DIBROMOETHANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,2-DICHLOROETHANE	0.00263 UJ	NA	NA	0.00222 UJ	0.108 UJ	0.00227 UJ	0.00224 UJ	0.00247 UJ	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
1,2-DICHLOROPROPANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
2-BUTANONE	0.00702 J	NA	NA	0.00444 U	0.216 UJ	0.00453 U	0.00774 J	0.00494 U	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
2-HEXANONE	0.00526 U	NA	NA	0.00444 U	0.216 UJ	0.00453 U	0.00447 U	0.00494 U	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
3-CHLOROPROPENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
4-METHYL-2-PENTANONE	0.00526 U	NA	NA	0.00444 U	0.216 UJ	0.00453 U	0.00447 U	0.00494 U	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
ACETONE	0.071	NA	NA	0.00889 U	0.433 UJ	0.00666 J	0.0913	0.0148 J	0.00733 J	0.0379 J	0.0112 UJ	0.00929 UJ	0.0114 J	0.0102 UJ	0.0107 UJ	0.0104 UJ	0.0103 UJ
ACETONITRILE	0.0263 UR	NA	NA	0.0222 UR	1.08 UR	0.0227 UR	0.0224 UR	0.0247 UR	0.0298 UR	0.0346 UR	0.0279 UR	0.0232 UR	0.0244 UR	0.0256 UR	0.0267 UR	0.0259 UR	0.0257 UR
ACROLEIN	0.0105 UR	NA	NA	0.00889 UR	0.433 UR	0.00907 UR	0.00895 UR	0.00987 UR	0.0119 UR	0.0138 UR	0.0112 UR	0.00929 UR	0.00977 UR	0.0102 UR	0.0107 UR	0.0104 UR	0.0103 UR
ACRYLONITRILE	0.0105 U	NA	NA	0.00889 U	0.433 UJ	0.00907 U	0.00895 U	0.00987 U	0.0119 U	0.0138 U	0.0112 U	0.00929 U	0.00977 U	0.0102 U	0.0107 U	0.0104 U	0.0103 U
BENZENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
BROMODICHLOROMETHANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
BROMOFORM	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
BROMOMETHANE	0.00526 UJ	NA	NA	0.00444 UJ	0.216 UJ	0.00453 UJ	0.00447 UJ	0.00494 UJ	0.00596 UJ	0.00692 UJ	0.00559 UJ	0.00464 UJ	0.00489 UJ	0.00512 UJ	0.00533 UJ	0.00518 UJ	0.00514 UJ
CARBON DISULFIDE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
CARBON TETRACHLORIDE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
CHLOROBENZENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
CHLORODIBROMOMETHANE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
CHLOROETHANE	0.00526 UJ	NA	NA	0.00444 UJ	0.216 UJ	0.00453 UJ	0.00447 UJ	0.00494 UJ	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
CHLOROFORM	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
CHLOROMETHANE	0.00526 UJ	NA	NA	0.00444 UJ	0.216 UJ	0.00453 UJ	0.00447 UJ	0.00494 UJ	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
CHLOROPRENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
CIS-1,2-DICHLOROETHENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
CIS-1,3-DICHLOROPROPENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
DIBROMOMETHANE	0.00263 UJ	NA	NA	0.00222 UJ	0.108 UJ	0.00227 UJ	0.00224 UJ	0.00247 UJ	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
DICHLORODIFLUOROMETHANE	0.00526 UJ	NA	NA	0.00444 UJ	0.216 UJ	0.00453 UJ	0.00447 UJ	0.00494 UJ	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
ETHYL METHACRYLATE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
ETHYLBENZENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
ISOBUTANOL	0.042 U	NA	NA	0.0355 U	1.73 UJ	0.0363 U	0.0358 U	0.0395 U	0.0477 UR	0.0553 UR	0.0447 UR	0.0372 UR	0.0391 UR	0.041 UR	0.0427 UR	0.0414 UR	0.0412 UR
METHACRYLONITRILE	0.0263 U	NA	NA	0.0222 U	1.08 UJ	0.0227 U	0.0224 U	0.0247 U	0.0298 U	0.0346 U	0.0279 U	0.0232 U	0.0244 U	0.0256 U	0.0267 U	0.0259 U	0.0257 U
METHYL IODIDE	0.0105 U	NA	NA	0.00889 U	0.433 UJ	0.00907 U	0.00895 U	0.00987 U	0.0119 U	0.0138 U	0.0112 U	0.00929 U	0.00977 U	0.0102 U	0.0107 U	0.0104 U	0.0103 U
METHYL METHACRYLATE	0.00263 UJ	NA	NA	0.00222 UJ	0.108 UJ	0.00227 UJ	0.00224 UJ	0.00247 UJ	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
METHYLENE CHLORIDE	0.00526 U	NA	NA	0.00444 U	0.216 UJ	0.00453 U	0.00389 J	0.00486 J	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
PROPIONITRILE	0.0263 UR	NA	NA	0.0222 UR	1.08 UR	0.0227 UR	0.0224 UR	0.0247 UR	0.0298 UR	0.0346 UR	0.0279 UR	0.0232 UR	0.0244 UR	0.0256 UR	0.0267 UR	0.0259 UR	0.0257 UR
STYRENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
TETRACHLOROETHENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
TOLUENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
TOTAL XYLENES	0.00788 U	NA	NA	0.00667 U	0.325 UJ	0.0068 U	0.00671 U	0.0074 U	0.00894 U	0.0104 U	0.00838 U	0.00697 U	0.00733 U	0.00768 U	0.008 U	0.00777 U	0.00772 U
TRANS-1,2-DICHLOROETHENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
TRANS-1,3-DICHLOROPROPENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
TRANS-1,4-DICHLORO-2-BUTENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
TRICHLOROETHENE	0.00263 U	NA	NA	0.00222 U	0.108 UJ	0.00227 U	0.00224 U	0.00247 U	0.00298 U	0.00346 U	0.00279 U	0.00232 U	0.00244 U	0.00256 U	0.00267 U	0.00259 U	0.00257 U
TRICHLOROFLUOROMETHANE	0.00526 UJ	NA	NA	0.00444 UJ	0.216 UJ	0.00453 UJ	0.00447 UJ	0.00494 UJ	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
VINYL ACETATE	0.00526 U	NA	NA	0.00444 U	0.216 UJ	0.00453 U	0.00447 U	0.00494 U	0.00596 U	0.00692 U	0.00559 U	0.00464 U	0.00489 U	0.00512 U	0.00533 U	0.00518 U	0.00514 U
VINYL CHLORIDE	0.00263 UJ	NA	NA	0.00222 UJ	0.108 UJ	0.00227 UJ	0.00224 UJ	0.00247 UJ	0.00298 UJ	0.00346 UJ	0.00279 UJ	0.00232 UJ	0.00244 UJ	0.00256 UJ	0.00267 UJ	0.00259 UJ	0.00257 UJ
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																	
1-METHYLNAPHTHALENE	NA	0.37 J	0.039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	0.0256 J	0.51 J	0.039 U	0.00369 U	0.00367 U	0.00365 U	0.0369 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.0397 U	0.00384 U	0.00373 U	0.00422 U	0.0407 U	0.00366 U
ACENAPHTHENE	0.241	4.1	0.039 UJ	0.00369 U	0.00367 U	0.00365 U	0.0369 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.0397 U	0.00384 U	0.00373 U	0.00422 U	0.0407 U	0.00366 U
ACENAPHTHYLENE	0.0351 J	0.37 U	0.039 U	0.00369 U	0.00432 J	0.00365 U	0.0369 U	0.00554 J	0.00417 U	0.00402 U	0.00431 U	0.0397 U	0.00384 U	0.00373 U	0.00422 U	0.0407 U	0.00366 U
ANTHRACENE	0.686	10	0.039 U	0.00369 U	0.00367 U	0.00365 U	0.0369 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.0439 J	0.00384 U	0.00373 U	0.00422 U	0.0407 U	0.00767 U
BAP EQUIVALENT-HALFND	2.19053	20.796	0.112401	0.00369 U	0.0407065	0.00365 U	0.04618295	0.00551633	0.012339585	0.00555384	0.0458075	0.411404	0.00444051	0.00577766	0.0105551	0.185334	0.0645666
BAP EQUIVALENT-POS	2.19053	20.796	0.090951	0.00369 U	0.0407065	0.00365 U	0.00539	0.00094163	0.010044	0.00133284	0.0458075	0.411404	0.00000531	0.00184251	0.0063351	0.164984	0.0645666
BENZO(A)ANTHRACENE	1.61	18	0.052 J	0.00369 U	0.0155	0.00365 U	0.0369 U	0.00414 U	0.00417 U	0.00402 U	0.0156	0.164	0.00384 U	0.00505 J	0.0206	0.0774 J	0.0306
BENZO(A)PYRENE	1.45	13	0.075 J	0.00369 U	0.0273	0.00365 U	0.0369 U	0.00414 U	0.00825 J	0.00402 U	0.0251	0.228	0.00384 U	0.00373 U	0.00422 U	0.129	0.0396
BENZO(B)FLUORANTHENE	1.47	18	0.1	0.00369 U	0.0319	0.00365 U	0.0369 U	0.00414 U	0.0123	0.00775 J	0.0299	0.285	0.00384 U	0.0133	0.0249	0.149	0.0379
BENZO(G,H,I)PERYLENE	0.901	9.2 J	0.058 J	0.00369 U	0.0207	0.00365 U	0.181	0.018	0.00568 J	0.00402 U	0.0308	0.305	0.00384 U	0.00373 U	0.0173	0.183	0.0381
BENZO(K)FLUORANTHENE	1.2	8.9	0.068 J	0.00369 U	0.0211	0.00365 U	0.0369 U	0.00414 U	0.0071 J	0.00499 J	0.0236	0.191	0.00384 U	0.00373 U	0.0206	0.063 J	0.0317
CHRYSENE	1.63	17	0.071 J	0.00369 U	0.0255	0.00365 U	0.0369 U	0.00663 J	0.00417 U	0.00694 J	0.0215	0.194	0.00531 J	0.00751	0.0291	0.114	0.0396
DIBENZO(A,H)ANTHRACENE	0.334	3.3	0.039 UJ	0.00369 U	0.00671 J	0.00365 U	0.0369 U	0.00414 U	0.00417 U	0.00402 U	0.0132	0.109	0.00384 U	0.00373 U	0.00422 U	0.0407 U	0.0143
FLUORANTHENE	3.31	39	0.094 J	0.00369 U	0.0223	0.00365 U	0.0369 U	0.0147	0.0172 J	0.0125 U	0.0263 J	0.297 J	0.0103 U	0.0107 U	0.037 J	0.219 J	0.0923 J
FLUORENE	0.262	5.8	0.039 U	0.00369 U	0.00367 U	0.00365 U	0.0369 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.0397 U	0.00384 U	0.00373 U	0.00422 U	0.0407 U	0.00366 U
INDENO(1,2,3-CD)PYRENE	0.849	7.9 J	0.039 UJ	0.00369 U	0.0172	0.00365 U	0.0539 J	0.00935	0.00493 J	0.00501 J	0.027	0.274	0.00384 U	0.00373 U	0.0155	0.126	0.0346
NAPHTHALENE	0.0495	0.7 J	0.039 U	0.00369 U	0.00367 U	0.00365 U	0.0369 U	0.00414 U	0.00417 U	0.00402 U	0.00431 U	0.0397 U	0.00384 U	0.00373 U	0.00422 U	0.0407 U	0.00366 U
PHENANTHRENE	2.32	39	0.048 J	0.00369 U	0.00644 J	0.00365 U	0.0369 U	0.0158	0.00417 U	0.00606 U	0.0162 U	0.115 J	0.00455 U	0.00541 U	0.015 U	0.086 J	0.0431 U
PYRENE	2.62	30	0.11 J	0.00369 U	0.0235	0.00365 U	0.0496 J	0.0223	0.0146 J	0.00878 U	0.0254 J	0.27 J	0.00771 U	0.00969 U	0.0336 J	0.181 J	0.0723 J
PESTICIDES/PCBS (MG/KG)																	
AROCLOR-1016	0.00182 UJ	NA	NA	NA	0.00184 UJ	NA	0.00179 UJ	NA	0.00214 U	0.00201 UJ	0.00225 UJ	0.00204 UJ	0.00192 U	0.00193 UJ	0.00204 U	0.0397 UJ	0.175 U
AROCLOR-1221	0.00182 UJ	NA	NA	NA	0.00184 UJ	NA	0.00179 UJ	NA	0.00214 U	0.00201 UJ	0.00225 UJ	0.00204 UJ	0.00192 U	0.00193 UJ	0.00204 U	0.0397 UJ	0.175 U
AROCLOR-1232	0.00182 UJ	NA	NA	NA	0.00184 UJ	NA	0.00179 UJ	NA	0.00214 U	0.00201 UJ	0.00225 UJ	0.00204 UJ	0.00192 U	0.00193 UJ	0.00204 U	0.0397 UJ	0.175 U
AROCLOR-1242	0.00182 UJ	NA	NA	NA	0.00184 UJ	NA	0.00179 UJ	NA	0.00214 U	0.00201 UJ	0.00225 UJ	0.00204 UJ	0.00192 U	0.00193 UJ	0.00204 U	0.0397 UJ	0.175 U

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB004				23SB005		23SB006		23SB007	23SB008	23SB009	23SB010	23SB011	23SB012	23SB013	23SB014	23SB015
SAMPLE ID	**23SS004-0002**	**23SB004-0204**	**23SB004-0406**	**23SB004-0810**	**23SS005-0002**	**23SB005-0810**	**23SS006-0002**	**23SB006-0608**	**23SS007-0002**	**23SS008-0002**	**23SS009-0002**	**23SS010-0002**	**23SS011-0002**	**23SS012-0002**	**23SS013-0002**	**23SS014-0002**	**23SS015-0002**
SAMPLE DATE	**20121007**	**20140523**	**20140523**	**20121007**	**20121007**	**20121007**	**20121007**	**20121007**	**20121101**	**20121101**	**20121101**	**20121101**	**20121101**	**20121101**	**20121101**	**20121031**	**20121031**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
MATRIX	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
SAMPLE TYPE	**REMOVED**	**REMOVED**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**REMOVED**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**REMOVED**	**NORMAL**	**NORMAL**	**NORMAL**	**REMOVED**	**NORMAL**
SUBMATRIX	**SS**	**SB**	**SB**	**SB**	**SS**	**SB**	**SS**	**SB**	**SS**	**SS**	**SS**	**SS**	**SS**	**SS**	**SS**	**SS**	**SS**
TOP DEPTH (FEET BELOW GROUND SURFACE)	**0**	**2**	**4**	**8**	**0**	**8**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	**2**	**4**	**6**	**10**	**2**	**10**	**2**	**8**	**1.8**	**0.8**	**1.2**	**1.6**	**1.8**	**2**	**1.9**	**0.5**	**0.8**
AROCLOR-1248	0.00182 UJ	NA	NA	NA	0.00184 UJ	NA	0.00179 UJ	NA	0.00214 U	0.00201 UJ	0.00225 UJ	0.00204 UJ	0.00192 U	0.00193 UJ	0.00204 U	0.0397 UJ	0.0384 U
AROCLOR-1254	0.00182 UJ	NA	NA	NA	0.00184 UJ	NA	0.00179 UJ	NA	0.00214 U	0.00201 UJ	0.00225 UJ	0.0478 J	0.00192 U	0.00193 UJ	0.00293 J	0.00962 J	0.0384 U
AROCLOR-1260	0.00928 J	NA	NA	NA	0.00184 UJ	NA	0.00179 UJ	NA	0.00262 J	0.00201 UJ	0.0054 J	0.0759 J	0.00192 U	0.00193 UJ	0.165	0.0317 J	0.0341
METALS (MG/KG)																	
ANTIMONY	2.28 U	NA	NA	2.24 U	2.29 U	2.32 U	2.29 U	2.57 U	2.75 U	2.54 U	2.82 U	6.72	2.42 U	2.43 U	2.59 U	19.3	2.39 U
ARSENIC	6.14	NA	NA	5.05	7.77	5.27	10.9	11.2	5.13	2.5 J	10.8	12.2	7.69	2.49 J	4.7	8.51	6.19
BARIUM	53.3	NA	NA	48.7	39.4	78.8	85	80.5	115	62.9	84	85.1	54.4	62	103	58.4	73.4
BERYLLIUM	0.583 J	NA	NA	0.352 J	0.572 U	0.436 J	0.587 J	0.494 J	0.612 J	0.389 J	0.603 J	0.429 J	0.509 J	0.429 J	0.791 J	0.605 J	0.511 J
CADMIUM	0.569 U	NA	NA	0.561 U	0.572 U	0.579 U	0.573 U	0.643 U	0.688 U	0.636 U	0.704 U	4.78	0.604 U	0.607 U	0.345 J	1.17 J	0.597 U
CHROMIUM	34.1	NA	NA	21.5	22.9	16.2	24.5	24.3	13.1	9.56	27.4	78.8	19.1	7.31	12.3	19	19.9
COBALT	10.3	NA	NA	4.28	2.92 J	4.47	5.25	5.64	8.95	6.96	7.22	8.34	10.4	6.36	8.8	3.5 J	7.38
COPPER	13.9	NA	NA	12.7	9.17	10.6	19.5	19.9	8.96	5.89	15.6	177	7.15	5.71	16.7	37.7	26.5
LEAD	188	NA	NA	8.73	23	11.2	26.9	13.7	20.5	13.1	25.6	691	13.8	9.98	345	4640	79
MERCURY	0.035 J	NA	NA	0.0265 J	0.0305 J	0.067	0.0464 J	0.0586	0.0566	0.0481	0.0332 U	0.202	0.0356 J	0.0438 J	0.0683	0.0962	0.123
NICKEL	18.1	NA	NA	11.3	9.04	9.62	13	13	9.96	6.94	15.2	21.9	9.03	7.98	16.9	10.7	12.5
SELENIUM	1.42 U	NA	NA	1.4 U	1.43 U	1.45 U	1.43 U	1.61 U	1.72 U	1.59 U	1.76 U	1.48 U	1.51 U	1.52 U	1.62 U	1.64 U	1.49 U
SILVER	0.569 U	NA	NA	0.561 U	0.572 U	0.579 U	0.573 U	0.643 U	0.688 U	0.636 U	0.704 U	3.86	0.604 U	0.607 U	0.647 U	0.679 J	0.597 U
THALLIUM	1.14 U	NA	NA	1.12 U	1.14 U	1.16 U	1.15 U	1.29 U	1.38 U	1.27 U	1.41 U	1.18 U	1.21 U	1.21 U	1.29 U	1.31 U	1.19 U
VANADIUM	17.8	NA	NA	32.1	15.4	12.3	35	40.2	20.1	13.7	38.3	18.7	26.5	11.8	15.6	19.1	26.6
ZINC	97.9	NA	NA	27.7	51.9	24.9	47.5	49.7	42.1	30	53.3	366	33.2	24.7	48.4	72.7	63.3
PETROLEUM HYDROCARBONS (MG/KG)																	
DIESEL RANGE ORGANICS, C08-C28	104	NA	NA	7.66 U	7.49 U	7.53 U	869	108	16 J	17.2	15.7 J	73.8	9.69 J	69	43	25.6	28.8
DIESEL RANGE ORGANICS, C08-C34	147	NA	NA	9.53 J	12 J	11 J	1800	215	30.1	33.6	30.2	130	20.1	88.5	75.6	49.3	61.2
GASOLINE RANGE ORGANICS	4.33 U	NA	NA	4.62 U	4.33 U	4.28 U	3.84 U	4.91 U	5.52 U	6.38 U	5.16 U	4.59 U	4.75 U	5.81 U	55.3	21 J	5.62 U
MISCELLANEOUS PARAMETERS																	
SULFATE (mg/kg)	11.3 UJ	NA	NA	NA	10 J	NA	46.6 J	NA	13.1 U	12.5 U	12.1 J	18.3 J	12 U	11.7 U	12.6 U	12.9 U	11.4 U
pH (s.u.)	8.07	NA	NA	NA	8.19	NA	8.91	NA	6.85	5.97	7.76	8.04	5.68	6.87	6.99	7.99	8.23

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB016	23SB017	23SB018	23SB019	23SB020	23SB021	23SB022	23SB023	23SB024		23SB025		23SB026	23SB026	23SB027		23SB028		23SI
SAMPLE ID	23SS016-0002	23SS017-0002	23SS018-0002	23SS019-0002	23SS020-0002	23SS021-0002	23SS022-0002	23SS023-0002	23SB024-0406	23SB024-0608	23SB025-0406	23SB025-0608	23SB026-0406	23SB026-0608	23SS027-0002	23SB027-0204	23SS028-0002	23SB028-0204	23SS029-0002
SAMPLE DATE	20121031	20121031	20121101	20121101	20121101	20121101	20121101	20121101	20121007	20121007	20121007	20121007	20121007	20121007	20130518	20130518	20130518	20130518	20130518
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SB	SB	SB	SB	SB	SB	SS	SB	SS	SB	SS
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	0	0	0	0	0	0	4	6	4	6	4	6	0	2	0	2	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	0.3	1.3	1.6	2	1.6	2	1.8	2	6	8	6	8	6	8	2	4	2	4	2
VOLATILES (MG/KG)																			
1,1,1,2-TETRACHLOROETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,1,1-TRICHLOROETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,1-DICHLOROETHENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,2,3-TRICHLOROPROPANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	0.00274 U	0.00312 U	0.00257 U	0.00124 J	0.00327 U	0.00145 J	0.00143 J	0.00153 J	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
2-BUTANONE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.0118	0.00592 J	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
2-HEXANONE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
3-CHLOROPROPENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
ACETONE	0.011 UJ	0.0125 UJ	0.00942 J	0.00967 UJ	0.0132 J	0.0114 J	0.0693 J	0.0912 J	0.532 UJ	0.491 UJ	0.52 UJ	0.546 UJ	0.443 UJ	0.41 UJ	NA	NA	NA	NA	NA
ACETONITRILE	0.0274 UR	0.0312 UR	0.0257 UR	0.0242 UR	0.0327 UR	0.0279 UR	0.0274 UR	0.0289 UR	1.33 UR	1.23 UR	1.3 UR	1.36 UR	1.11 UR	1.03 UR	NA	NA	NA	NA	NA
ACROLEIN	0.011 UR	0.0125 UR	0.0103 UR	0.00967 UR	0.0131 UR	0.0111 UR	0.011 UR	0.0116 UR	0.532 UR	0.491 UR	0.52 UR	0.546 UR	0.443 UR	0.41 UR	NA	NA	NA	NA	NA
ACRYLONITRILE	0.011 U	0.0125 U	0.0103 U	0.00967 U	0.0131 U	0.0111 U	0.011 U	0.0116 U	0.532 UJ	0.491 UJ	0.52 UJ	0.546 UJ	0.443 UJ	0.41 UJ	NA	NA	NA	NA	NA
BENZENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
BROMODICHLOROMETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
BROMOFORM	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
BROMOMETHANE	0.00549 UJ	0.00625 UJ	0.00515 UJ	0.00483 UJ	0.00654 UJ	0.00557 UJ	0.00549 UJ	0.00578 UJ	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
CARBON DISULFIDE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
CHLOROBENZENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
CHLORODIBROMOMETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
CHLOROETHANE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
CHLOROFORM	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
CHLOROMETHANE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
CHLOROPRENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
DIBROMOMETHANE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
ETHYL METHACRYLATE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
ETHYLBENZENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
ISOBUTANOL	0.0439 UR	0.05 UR	0.0412 UR	0.0387 UR	0.0523 UR	0.0446 UR	0.0439 UR	0.0462 UR	2.13 UJ	1.97 UJ	2.08 UJ	2.18 UJ	1.77 UJ	1.64 UJ	NA	NA	NA	NA	NA
METHACRYLONITRILE	0.0274 U	0.0312 U	0.0257 U	0.0242 U	0.0327 U	0.0279 U	0.0274 U	0.0289 U	1.33 UJ	1.23 UJ	1.3 UJ	1.36 UJ	1.11 UJ	1.03 UJ	NA	NA	NA	NA	NA
METHYL IODIDE	0.011 U	0.0125 U	0.0103 U	0.00967 U	0.0131 U	0.0111 U	0.011 U	0.0116 U	0.532 UJ	0.491 UJ	0.52 UJ	0.546 UJ	0.443 UJ	0.41 UJ	NA	NA	NA	NA	NA
METHYL METHACRYLATE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
PROPIONITRILE	0.0274 UR	0.0312 UR	0.0257 UR	0.0242 UR	0.0327 UR	0.0279 UR	0.0274 UR	0.0289 UR	1.33 UR	1.23 UR	1.3 UR	1.36 UR	1.11 UR	1.03 UR	NA	NA	NA	NA	NA
STYRENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
TETRACHLOROETHENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
TOLUENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
TOTAL XYLENES	0.00823 U	0.00937 U	0.00772 U	0.00725 U	0.00982 U	0.00836 U	0.00823 U	0.00867 U	0.399 UJ	0.369 UJ	0.39 UJ	0.409 UJ	0.332 UJ	0.308 UJ	NA	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.004 J	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
TRICHLOROETHENE	0.00274 U	0.00312 U	0.00257 U	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
TRICHLOROFLUOROMETHANE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
VINYL ACETATE	0.00549 U	0.00625 U	0.00515 U	0.00483 U	0.00654 U	0.00557 U	0.00549 U	0.00578 U	0.266 UJ	0.246 UJ	0.26 UJ	0.273 UJ	0.222 UJ	0.205 UJ	NA	NA	NA	NA	NA
VINYL CHLORIDE	0.00274 UJ	0.00312 UJ	0.00257 UJ	0.00242 U	0.00327 U	0.00279 U	0.00274 U	0.00289 U	0.133 UJ	0.123 UJ	0.13 UJ	0.136 UJ	0.111 UJ	0.103 UJ	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																			
1-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	0.00412 U	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.0444	0.00477 J	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
ACENAPHTHENE	0.00412 U	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
ACENAPHTHYLENE	0.00412 U	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
ANTHRACENE	0.00412 U	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
BAP EQUIVALENT-HALFND	0.0317066	0.0628782	0.00515721	0.00392 U	0.01951128	0.01472494	0.0138514	0.017197815	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.08198235	0.00418 U	0.0188 U
BAP EQUIVALENT-POS	0.0296466	0.014135	0.000492	0.00392 U	0.0171111	0.0122749	0.0117214	0.014649	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.00714	0.00418 U	0.0188 U
BENZO(A)ANTHRACENE	0.0113	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.00812 J	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
BENZO(A)PYRENE	0.025	0.0464 U	0.00422 U	0.00392 U	0.0149	0.0115	0.00919	0.0122	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
BENZO(B)FLUORANTHENE	0.0144	0.0525 J	0.00492 J	0.00392 U	0.0102	0.00713 J	0.00955	0.0143	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0714 J	0.00418 U	0.0188 U
BENZO(G,H,I)PERYLENE	0.0219	0.0952	0.00422 U	0.00392 U	0.01	0.00408 U	0.00702 J	0.0109	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
BENZO(K)FLUORANTHENE	0.0169	0.0685 J	0.00422 U	0.00392 U	0.00711 J	0.00619 J	0.00695 J	0.0122	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
CHRYSENE	0.0176	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.0109	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
DIBENZO(A,H)ANTHRACENE	0.00412 U	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
FLUORANTHENE	0.0305 J	0.117 J	0.00892 U	0.00481 U	0.017 J	0.0157 J	0.0213 J	0.0283 J	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0725 J	0.00418 U	0.0188 U
FLUORENE	0.00412 U	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
INDENO(1,2,3-CD)PYRENE	0.0189	0.082 J	0.00422 U	0.00392 U	0.0112	0.00408 U	0.00684 J	0.00897 J	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
NAPHTHALENE	0.00412 U	0.0464 U	0.00422 U	0.00392 U	0.00436 U	0.00408 U	0.00426 U	0.00463 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
PHENANTHRENE	0.016 U	0.0613 J	0.0057 U	0.00392 U	0.00818 U	0.00923 U	0.0117 U	0.0167 U	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0677 U	0.00418 U	0.0188 U
PYRENE	0.0258 J	0.105 J	0.00706 U	0.00392 U	0.0144 J	0.0137 J	0.0169 J	0.023 J	0.00369 U	0.00358 U	0.0182 U	0.0369 U	0.00393 U	0.00374 U	0.0187 U	0.00384 U	0.0693 J	0.00418 U	0.0188 U
PESTICIDES/PCBS (MG/KG)																			
AROCLOR-1016	0.00212 U	0.0294 U	0.00209 U	0.00195 U	0.00223 U	0.00204 UJ	0.00211 U	0.00231 U	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA	NA
AROCLOR-1221	0.00212 U	0.0294 U	0.00209 U	0.00195 U	0.00223 U	0.00204 UJ	0.00211 U	0.00231 U	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA	NA
AROCLOR-1232	0.00212 U	0.0294 U	0.00209 U	0.00195 U	0.00223 U	0.00204 UJ	0.00211 U	0.00231 U	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA	NA
AROCLOR-1242	0.00212 U	0.0294 U	0.00209 U	0.00195 U	0.00223 U	0.00204 UJ	0.00211 U	0.00231 U	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB016	23SB017	23SB018	23SB019	23SB020	23SB021	23SB022	23SB023	23SB024		23SB025		23SB026	23SB026	23SB027		23SB028		23SI
SAMPLE ID	23SS016-0002	23SS017-0002	23SS018-0002	23SS019-0002	23SS020-0002	23SS021-0002	23SS022-0002	23SS023-0002	23SB024-0406	23SB024-0608	23SB025-0406	23SB025-0608	23SB026-0406	23SB026-0608	23SS027-0002	23SB027-0204	23SS028-0002	23SB028-0204	23SS029-0002
SAMPLE DATE	20121031	20121031	20121101	20121101	20121101	20121101	20121101	20121101	20121007	20121007	20121007	20121007	20121007	20121007	20130518	20130518	20130518	20130518	20130518
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SB	SB	SB	SB	SB	SB	SS	SB	SS	SB	SS
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	0	0	0	0	0	0	4	6	4	6	4	6	0	2	0	2	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	0.3	1.3	1.6	2	1.6	2	1.8	2	6	8	6	8	6	8	2	4	2	4	2
AROCLOR-1248	0.00212 U	0.0294 U	0.00209 U	0.00195 U	0.00223 U	0.00204 UJ	0.00211 U	0.00231 U	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA	NA
AROCLOR-1254	0.00212 U	0.0154 J	0.00127 J	0.00162 J	0.00223 U	0.00204 UJ	0.00185 J	0.00158 J	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA	NA
AROCLOR-1260	0.0046 J	0.0134	0.00384 J	0.00195 U	0.00398 J	0.00204 UJ	0.00208 J	0.018	0.00184 UJ	NA	0.0018 UJ	NA	0.00189 UJ	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																			
ANTIMONY	2.52 U	6.49	2.61 U	2.46 U	2.76 U	2.6 U	2.56 U	2.72 U	2.22 U	2.06 U	2.33 U	2.37 U	2.49 UJ	2.23 U	NA	NA	NA	NA	NA
ARSENIC	9.32	8.27	5.3	3.64	5.67	3.94	3.51	4.11	19.7	3.51	1.28 J	6.82	6.85 J	10.1	NA	NA	NA	NA	NA
BARIUM	104	65.9	96.1	63.1	113	66	51.2	114	11.8	8.52 J	31.5	74.9	54.3 J	33.7	NA	NA	NA	NA	NA
BERYLLIUM	0.666 J	0.463 J	0.606 J	0.585 J	0.963 J	0.47 J	0.571 J	0.663 J	0.556 U	0.515 U	0.582 U	0.795 J	0.514 J	0.603 J	NA	NA	NA	NA	NA
CADMIUM	0.631 U	0.355 J	0.653 U	0.614 U	0.689 U	0.65 U	0.64 U	0.679 U	0.556 U	0.515 U	0.582 U	0.618 J	0.624 U	0.558 U	NA	NA	NA	NA	NA
CHROMIUM	18.9	22.8	13.5	11.2	12.7	12.3	9.94	8.65	12.6	7.4	7.06	21.2	15.4 J	24	NA	NA	NA	NA	NA
COBALT	9.12	5.62	8.61	11.6	9.82	12.8	14.6	8.22	2.78 U	2.57 U	2.71 J	11.4	2.16 J	3.23 J	NA	NA	NA	NA	NA
COPPER	19	26.8	8.62	7.92	12.2	8.29	6.74	9.67	41.3	4.81	5.26	18.4	10.1 J	10	NA	NA	NA	NA	NA
LEAD	70.2	1920	18.5	11.6	22.9	16.5	12.7	27.4	17.7	5.56	11.2	19.3	10.6	12.9	NA	NA	NA	NA	NA
MERCURY	0.0784	0.0815	0.0562	0.0411 J	0.0685	0.0462	0.065	0.0762	0.0882	0.0448	0.0263 J	0.022 J	0.0462	0.0774	NA	NA	NA	NA	NA
NICKEL	15.6	11.3	10	11.5	19.4	14.8	14.2	11.9	4.3	2.14 J	6.09	18	6.28 J	9.23	NA	NA	NA	NA	NA
SELENIUM	1.58 U	1.77 U	1.63 U	1.54 U	1.72 U	1.63 U	1.6 U	1.7 U	1.39 U	1.29 U	1.46 U	1.48 U	1.56 U	1.4 U	NA	NA	NA	NA	NA
SILVER	0.631 U	0.708 U	0.653 U	0.614 U	0.689 U	0.65 U	0.64 U	0.679 U	0.556 U	0.515 U	0.582 U	0.593 U	0.624 U	0.558 U	NA	NA	NA	NA	NA
THALLIUM	1.26 U	1.42 U	1.31 U	1.23 U	1.38 U	1.3 U	1.28 U	1.36 U	1.11 U	1.03 U	1.16 U	1.19 U	1.25 U	1.12 U	NA	NA	NA	NA	NA
VANADIUM	23.4	22.6	21.7	14.9	20.4	19.4	14.2	12.9	16	6.39	6.23	31.3	20.4 J	40.2	NA	NA	NA	NA	NA
ZINC	53.2	112	37.7	40.4	51.1	45.1	45.1	44.7	7.59 U	3.85 U	15.8	74.3	20.4 J	25.9	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																			
DIESEL RANGE ORGANICS, C08-C28	13.7 J	50.3	20.2	11.3 J	18.9	19.8	14.7 J	21.1	7.58 U	7.15 U	11.5 J	18.3	8.06 U	7.29 U	NA	NA	NA	NA	NA
DIESEL RANGE ORGANICS, C08-C34	27.9	85.9	42.3	24.2	54.6	76	65.4	61.6	10.3 J	9.11 J	32.7	33.3	10.6 J	11.1 J	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	6.36 U	7.45 U	6.27 U	5.54 U	6.32 U	5.78 U	5.96 U	6.15 U	5.32 U	4.91 U	5.2 U	5.46 U	4.77 U	5.03 J	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																			
SULFATE (mg/kg)	12.9 U	14 U	12.7 U	9.87 J	13.4 U	13 J	13 U	13.9 U	33.4 J	NA	95.9 J	NA	21.2 J	NA	NA	NA	NA	NA	NA
pH (s.u.)	7.97	7.92	6.62	6.35	6.83	5.69	6.11	6.6	8.5	NA	8.8	NA	7.89	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	029	23SB030			23SB031	23SB032		23SB033		23SB034		23SB035	23SB036		23SB037		23SB038	23SB039	23SB040
SAMPLE ID	23SB029-0204	23SS030-0002	23SS030-0002-D	23SB030-0204	23SS031-0002	23SS032-0002	23SB032-0204	23SS033-0002	23SS033-0002-D	23SS034-0002	23SB034-0204	23SS035-0002	23SS036-0002	23SB036-0204	23SS037-0002	23SB037-0204	23SS038-0002	23SS039-0002	23SS040-0002
SAMPLE DATE	20130518	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20140328	20140328	20140328
SAMPLE CODE	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SB	SS	SS	SB	SS	SS	SB	SS	SS	SS	SB	SS	SS	SB	SS	SB	SS	SS	SS
TOP DEPTH (FEET BELOW GROUND SURFACE)	2	0	0	2	0	0	2	0	0	0	2	0	0	2	0	2	0	0	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	4	2	2	3	1.5	2	3	1	1	2	4	1	2	4	2	4	2	2	2
VOLATILES (MG/KG)																			
1,1,1,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-TRICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-CHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACROLEIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMODICHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORODIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROPRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ISOBUTANOL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL IODIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PROPIONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL XYLENES	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL ACETATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																			
1-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BAP EQUIVALENT-HALFND	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BAP EQUIVALENT-POS	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PYRENE	0.00395 U	0.00407 U	0.00386 U	0.00379 U	0.00389 U	0.0038 U	0.0039 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PESTICIDES/PCBS (MG/KG)																			
AROCLOR-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	029	23SB030			23SB031	23SB032		23SB033		23SB034		23SB035	23SB036		23SB037		23SB038	23SB039	23SB040
SAMPLE ID	23SB029-0204	23SS030-0002	23SS030-0002-D	23SB030-0204	23SS031-0002	23SS032-0002	23SB032-0204	23SS033-0002	23SS033-0002-D	23SS034-0002	23SB034-0204	23SS035-0002	23SS036-0002	23SB036-0204	23SS037-0002	23SB037-0204	23SS038-0002	23SS039-0002	23SS040-0002
SAMPLE DATE	20130518	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20130519	20140328	20140328	20140328
SAMPLE CODE	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SB	SS	SS	SB	SS	SS	SB	SS	SS	SS	SB	SS	SS	SB	SS	SB	SS	SS	SS
TOP DEPTH (FEET BELOW GROUND SURFACE)	2	0	0	2	0	0	2	0	0	0	2	0	0	2	0	2	0	0	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	4	2	2	3	1.5	2	3	1	1	2	4	1	2	4	2	4	2	2	2
AROCLOR-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																			
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	0.486 UJ	0.979 UJ	0.471 UJ	0.452 UJ	0.901 UJ	0.992 UJ	1.01 UJ	0.944 UJ	0.949 UJ	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA	3.78	3.66	2.63	2.81	17.8	6.65	4.82	5.37	6.04	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA	62.5	62.8	65.8	52.9	52	83.7	80.2	110	62	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA	0.421	0.446 J	0.365	0.287	0.327 J	0.586 J	0.457 J	0.644	0.331 J	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA	0.0645 J	0.245 U	0.118 U	0.113 U	0.225 U	0.248 U	0.253 U	0.236 U	0.237 U	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA	9.48	9.95	6.89	7.73	15.6	9.93	12.3	10.7	16.8	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA	8.09 J	7.89 J	6.44 J	6.21 J	7.39 J	10.9 J	4.34 J	15.4 J	2.9 J	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA	6.29	5.88	4.19	4.79	28.9	11	8.88	6.06	8.47	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA	9.02	8.76	6.01	6.15	27.8	31.2	20.2	9.28	6.23	41	22	23
MERCURY	NA	NA	NA	NA	NA	NA	NA	0.0427	0.0396 J	0.0368 J	0.0454	0.0445	0.0481	0.0364 J	0.0209 J	0.0349 J	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA	8.3	8.04	7.75	7.95	17.7	14.3	10.5	14.3	10.6	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA	0.425 J	0.612 U	0.294 U	0.282 U	0.563 U	0.62 U	0.634 U	0.59 U	0.593 U	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA	0.122 U	0.245 U	0.118 U	0.113 U	0.225 U	0.248 U	0.253 U	0.236 U	0.122 J	NA	NA	NA
THALLIUM	NA	NA	NA	NA	NA	NA	NA	0.365 U	0.49 U	0.353 U	0.339 U	0.45 U	0.496 U	0.634 U	0.472 U	0.474 U	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA	15.5	16	10.5	13.1	16.5	15.1	16.5	17.6	28	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA	33.9	32.1	22.5	25.8	47.8	44.6	34.8	27	29.4	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																			
DIESEL RANGE ORGANICS, C08-C28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIESEL RANGE ORGANICS, C08-C34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																			
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB041	23SB042	23SB043	23SB044	23SB045	23SB045	23SB046	23SB047	23SB048			23SB049	23SB050	23SB053	23SB054	23SB055	23SB056	23SB058	23SI
SAMPLE ID	23SS041-0002	23SS042-0002	23SS043-0002	23SS044-0002	23SS045-0002	23SS045-0002-D	23SS046-0002	23SS047-0002	23SS048-0002	23SB048-0204	23SB048-0406	23SS049-0002	23SS050-0002	23SS053-0002	23SS054-0002	23SS055-0002	23SS056-0002	23SS058-0002	23SS059-0002
SAMPLE DATE	20140328	20140328	20140328	20140328	20140328	20140328	20140328	20140328	20140326	20140523	20140523	20140321	20140321	20140321	20140321	20140321	20140321	20140321	20140321
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	REMOVED	NORMAL	REMOVED	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SB	SB	SS	SS	SS	SS	SS	SS	SS	SS
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	2	2	2	2	2	2	2	2	4	6	2	2	2	2	2	2	2	2
VOLATILES (MG/KG)																			
1,1,1,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-TRICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-CHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACROLEIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMODICHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORODIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROPRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ISOBUTANOL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL IODIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PROPIONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL XYLENES	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL ACETATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																			
1-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.041 U	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.041 U	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U
ACENAPHTHENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.082 J	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U
ACENAPHTHYLENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.061 J	0.038 U	0.041 U	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U
ANTHRACENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.21	0.037 UJ	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.043 J
BAP EQUIVALENT-HALFND	NA	NA	NA	NA	NA	NA	NA	NA	0.087234	0.4959	0.107893	0.47911	0.36458	0.133888	0.22332	0.007653	0.22212	0.00511865	0.2573
BAP EQUIVALENT-POS	NA	NA	NA	NA	NA	NA	NA	NA	0.064434	0.4959	0.086993	0.47911	0.36458	0.116388	0.20382	0.005343	0.20062	0.0023	0.2378
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.26	0.075 J	0.41	0.21 J	0.059 J	0.11	0.0042 J	0.068 J	0.0043 U	0.12
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	NA	NA	0.053 J	0.33	0.068 J	0.33	0.23	0.088	0.16	0.0042 J	0.16	0.0023 J	0.18
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA	NA	0.11	0.52	0.11	0.44	0.44 J	0.17	0.22	0.0067 J	0.23	0.0043 U	0.35
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	NA	NA	NA	0.042 J	0.2	0.05 J	0.17	0.15	0.091	0.17	0.0042 U	0.23	0.0043 U	0.16
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA	NA	0.039 J	0.26	0.041 J	0.17	0.14 J	0.05 J	0.096	0.0043 J	0.071 J	0.0043 U	0.13
CHRYSENE	NA	NA	NA	NA	NA	NA	NA	NA	0.044 J	0.3	0.083	0.41	0.28 J	0.088	0.16	0.01	0.11	0.0043 U	0.2
DIBENZO(A,H)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.071 J	0.038 UJ	0.049 J	0.058 J	0.035 U	0.039 U	0.0042 UJ	0.043 U	0.0043 U	0.039 U
FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA	NA	0.045 J	0.22	0.11	0.84	0.36 J	0.079	0.16	0.057	0.092	0.0047 J	0.22
FLUORENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.099	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U
INDENO(1,2,3-CD)PYRENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.14 J	0.038 UJ	0.13	0.099	0.049 J	0.097	0.0042 UJ	0.1	0.0043 U	0.093
NAPHTHALENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.039 U	0.038 U	0.041 U	0.037 U	0.035 U	0.039 U	0.0042 U	0.043 U	0.0043 U	0.039 U
PHENANTHRENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.032 J	0.068 J	0.7	0.12	0.035 U	0.068 J	0.0071 J	0.043 U	0.0043 U	0.066 J
PYRENE	NA	NA	NA	NA	NA	NA	NA	NA	0.038 U	0.36	0.15	0.62	0.32	0.084	0.15	0.011	0.087	0.0043 U	0.21
PESTICIDES/PCBS (MG/KG)																			
AROCLOR-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB041	23SB042	23SB043	23SB044	23SB045	23SB045	23SB046	23SB047		23SB048		23SB049	23SB050	23SB053	23SB054	23SB055	23SB056	23SB058	23SI
SAMPLE ID	23SS041-0002	23SS042-0002	23SS043-0002	23SS044-0002	23SS045-0002	23SS045-0002-D	23SS046-0002	23SS047-0002	23SS048-0002	23SB048-0204	23SB048-0406	23SS049-0002	23SS050-0002	23SS053-0002	23SS054-0002	23SS055-0002	23SS056-0002	23SS058-0002	23SS059-0002
SAMPLE DATE	20140328	20140328	20140328	20140328	20140328	20140328	20140328	20140328	20140326	20140523	20140523	20140321	20140321	20140321	20140321	20140321	20140321	20140321	20140321
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	REMOVED	NORMAL	REMOVED	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SB	SB	SS	SS	SS	SS	SS	SS	SS	SS
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	2	2	2	2	2	2	2	2	4	6	2	2	2	2	2	2	2	2
AROCLOR-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																			
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	710	87	1000	700	27	24	140	61	40	NA	NA	21	63	NA	NA	NA	NA	NA	NA
MERCURY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																			
DIESEL RANGE ORGANICS, C08-C28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIESEL RANGE ORGANICS, C08-C34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																			
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	8059	23SB059	23SB062	23SB063			23SB064			23SB065		23SB066
SAMPLE ID	23SB059-0204	23SB059-0204-D	23SS062-0002	23SS063-0002	23SB063-0204	23SB063-0406	23SS064-0002	23SB064-0204	23SB064-0406	23SS065-0002	23SS066-0002	23SB066-0204
SAMPLE DATE	20140523	20140523	20140321	20140326	20140326	20140326	20140321	20140321	20140321	20140321	20140321	20140321
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL
SUBMATRIX	SB	SB	SS	SS	SB	SB	SS	SB	SB	SS	SS	SB
TOP DEPTH (FEET BELOW GROUND SURFACE)	2	2	0	0	2	4	0	2	4	0	0	2
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	4	4	2	2	4	6	2	4	6	2	2	4
VOLATILES (MG/KG)												
1,1,1,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-TRICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-CHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACROLEIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMODICHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORODIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROPRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ISOBUTANOL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL IODIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PROPIONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL XYLENES	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL ACETATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)												
1-METHYLNAPHTHALENE	0.0044 U	0.039 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U	0.038 UJ	0.039 UJ	0.21	0.041 U	0.042 UJ
2-METHYLNAPHTHALENE	0.0044 U	0.039 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U	0.038 UJ	0.039 UJ	0.4	0.041 U	0.042 UJ
ACENAPHTHENE	0.0044 U	0.039 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U	0.038 UJ	0.039 UJ	1.5	0.041 U	0.042 UJ
ACENAPHTHYLENE	0.0044 U	0.039 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U	0.038 UJ	0.039 UJ	0.15	0.041 U	0.042 UJ
ANTHRACENE	0.0044 U	0.039 U	0.037 U	0.039 U	0.041 U	0.042 U	0.041 J	0.038 UJ	0.039 UJ	3.3	0.041 U	0.042 UJ
BAP EQUIVALENT-HALFND	0.014439	0.039 U	0.21344	0.49245	0.15956	0.053731	0.19484	0.17868	0.0475645	6.794	0.12557	0.063931
BAP EQUIVALENT-POS	0.011799	0.039 U	0.21344	0.49245	0.13906	0.0283	0.17484	0.15968	0.022	6.794	0.10302	0.0385
BENZO(A)ANTHRACENE	0.0044 U	0.039 U	0.045 J	0.28	0.081 J	0.042 U	0.07 J	0.093 J	0.039 UJ	5.7	0.065 J	0.042 UJ
BENZO(A)PYRENE	0.01	0.039 U	0.09	0.34	0.11	0.024 J	0.14	0.12 J	0.022 J	5	0.083 J	0.033 J
BENZO(B)FLUORANTHENE	0.017	0.039 U	0.17	0.56	0.16	0.043 J	0.21	0.21 J	0.039 UJ	8.4	0.13	0.055 J
BENZO(G,H,I)PERYLENE	0.0093	0.039 UJ	0.15	0.22	0.076 J	0.042 U	0.091	0.1 J	0.039 UJ	2.3	0.045 J	0.042 UJ
BENZO(K)FLUORANTHENE	0.009	0.039 U	0.057 J	0.21	0.066 J	0.042 U	0.13	0.078 J	0.039 UJ	2.8	0.042 J	0.042 UJ
CHRYSENE	0.009	0.039 U	0.07 J	0.35	0.1	0.042 U	0.14	0.1 J	0.039 UJ	6	0.1	0.042 UJ
DIBENZO(A,H)ANTHRACENE	0.0044 UJ	0.039 U	0.095	0.052 J	0.041 U	0.042 U	0.04 UJ	0.038 UJ	0.039 UJ	0.22	0.041 U	0.042 UJ
FLUORANTHENE	0.0044 U	0.039 U	0.083	0.28	0.074 J	0.042 U	0.17	0.1 J	0.039 UJ	14	0.21	0.064 J
FLUORENE	0.0044 U	0.039 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U	0.038 UJ	0.039 UJ	1.7	0.041 U	0.042 UJ
INDENO(1,2,3-CD)PYRENE	0.0044 UJ	0.039 UJ	0.063 J	0.14 J	0.042 J	0.042 U	0.054 J	0.085 J	0.039 UJ	1.3	0.041 U	0.042 UJ
NAPHTHALENE	0.0044 U	0.039 U	0.037 U	0.039 U	0.041 U	0.042 U	0.04 U	0.038 UJ	0.039 UJ	1.7	0.041 U	0.042 UJ
PHENANTHRENE	0.0056 J	0.039 U	0.038 J	0.058 J	0.041 U	0.042 U	0.067 J	0.032 J	0.039 UJ	11	0.12	0.032 J
PYRENE	0.014	0.039 U	0.082	0.53 J	0.15 J	0.042 U	0.16	0.13 J	0.039 UJ	10	0.2	0.066 J
PESTICIDES/PCBS (MG/KG)												
AROCLOR-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	8059	23SB059	23SB062	23SB063			23SB064			23SB065	23SB066	
SAMPLE ID	23SB059-0204	23SB059-0204-D	23SS062-0002	23SS063-0002	23SB063-0204	23SB063-0406	23SS064-0002	23SB064-0204	23SB064-0406	23SS065-0002	23SS066-0002	23SB066-0204
SAMPLE DATE	20140523	20140523	20140321	20140326	20140326	20140326	20140321	20140321	20140321	20140321	20140321	20140321
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL
SUBMATRIX	SB	SB	SS	SS	SB	SB	SS	SB	SB	SS	SS	SB
TOP DEPTH (FEET BELOW GROUND SURFACE)	2	2	0	0	2	4	0	2	4	0	0	2
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	4	4	2	2	4	6	2	4	6	2	2	4
AROCLOR-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)												
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MERCURY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)												
DIESEL RANGE ORGANICS, C08-C28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIESEL RANGE ORGANICS, C08-C34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS												
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION		23SB067			23SB068			23SB069			23SB070			23SB071			23SB072		
SAMPLE ID	23SB066-0406	23SS067-0002	23SS067-0002-D	23SB067-0204	23SS068-0002	23SB068-0204	23SB068-0406	23SS069-0002	23SB069-0204	23SB069-0406	23SS070-0002	23SB070-0204	23SB070-0406	23SS071-0002	23SB071-0204	23SB071-0406	23SS072-0002	23SB072-0204	23SB072-0406
SAMPLE DATE	20140321	20140321	20140321	20140321	20140321	20140321	20140321	20140326	20140326	20140326	20140326	20140326	20140326	20140326	20140326	20140326	20140326	20140326	20140326
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SB	SS	SS	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB
TOP DEPTH (FEET BELOW GROUND SURFACE)	4	0	0	2	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	6	2	2	4	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6
VOLATILES (MG/KG)																			
1,1,1,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-TRICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-CHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACROLEIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMODICHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORODIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROPRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ISOBUTANOL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL IODIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PROPIONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL XYLENES	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL ACETATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																			
1-METHYLNAPHTHALENE	0.0041 UJ	0.042 U	0.042 U	0.0043 U	0.36 U	0.07 UJ	0.37 J	0.034 U	0.0038 U	0.0039 U	2.5	0.0039 U	0.0049 U	0.036 U	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U
2-METHYLNAPHTHALENE	0.0041 J	0.042 U	0.042 U	0.0043 U	0.43 J	0.073 J	0.5 J	0.034 U	0.0038 U	0.0039 U	6.8	0.0039 U	0.0049 U	0.036 U	0.038 U	0.047 J	0.037 U	0.038 U	0.0041 U
ACENAPHTHENE	0.0041 UJ	0.042 U	0.042 U	0.0043 U	3.8	0.39 J	3.6 J	0.034 U	0.0038 U	0.0039 U	0.068 U	0.0039 U	0.0049 U	0.036 U	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U
ACENAPHTHYLENE	0.0041 UJ	0.042 U	0.042 U	0.0043 U	0.74	1 J	0.59 J	0.034 U	0.0038 U	0.0039 U	0.068 U	0.0039 U	0.0049 U	0.12	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U
ANTHRACENE	0.0041 UJ	0.042 J	0.042 U	0.0043 U	11	1.3 J	7.6 J	0.034 U	0.0038 U	0.0039 U	0.068 U	0.0039 U	0.0049 U	0.2	0.038 U	0.039 U	0.051 J	0.038 U	0.0041 U
BAP EQUIVALENT-HALFND	0.0105773	0.52962	0.47362	0.017692	30.884	9.3647	19.078	0.308988	0.0038 U	0.0048709	0.14755	0.0039 U	0.0049 U	3.6498	0.14847	0.039 U	0.82039	0.05983	0.0041 U
BAP EQUIVALENT-POS	0.0085068	0.52962	0.47362	0.015542	30.884	9.3647	19.078	0.308988	0.0038 U	0.0005809	0.10981	0.0039 U	0.0049 U	3.6498	0.12757	0.039 U	0.82039	0.03684	0.0041 U
BENZO(A)ANTHRACENE	0.0046 J	0.25	0.16	0.0088	24	5.7 J	17 J	0.061 J	0.0038 U	0.0039 U	0.097	0.0039 U	0.0049 U	1.9	0.11	0.039 U	0.33	0.038 U	0.0041 U
BENZO(A)PYRENE	0.0062 J	0.37	0.23	0.012	21	5.9 J	12 J	0.19	0.0038 U	0.0039 U	0.088	0.0039 U	0.0049 U	2.4	0.099	0.039 U	0.54	0.032 J	0.0041 U
BENZO(B)FLUORANTHENE	0.01 J	0.65	0.39	0.019	31	8.7 J	18 J	0.23	0.0038 U	0.0052 J	0.12 J	0.0039 U	0.0049 U	4.4	0.17	0.039 U	0.95	0.048 J	0.0041 U
BENZO(G,H,I)PERYLENE	0.012 J	0.23	0.15	0.011	9.6	4.5 J	7.6 J	0.34	0.0038 U	0.0039 U	0.068 U	0.0039 U	0.0049 U	1.4	0.052 J	0.039 U	0.55	0.038 U	0.0041 U
BENZO(K)FLUORANTHENE	0.0041 UJ	0.22 J	0.11 J	0.0068 J	12	3.9 J	7.2 J	0.079	0.0038 U	0.0051 J	0.068 U	0.0039 U	0.0049 U	1.3	0.046 J	0.039 U	0.28	0.038 U	0.0041 U
CHRYSENE	0.0068 J	0.42 J	0.22 J	0.014	24	5.7 J	16 J	0.098	0.0038 U	0.0099	0.11	0.0039 U	0.0049 U	2.8	0.11	0.039 U	0.59	0.04 J	0.0041 U
DIBENZO(A,H)ANTHRACENE	0.0041 UJ	0.055 J	0.18	0.0043 U	3.5	1.5 J	2.6 J	0.075	0.0038 U	0.0039 U	0.068 U	0.0039 U	0.0049 U	0.51	0.038 U	0.039 U	0.12	0.038 U	0.0041 U
FLUORANTHENE	0.012 J	0.85 J	0.45 J	0.031	46	7.5 J	33 J	0.04 J	0.0038 U	0.0039 UJ	0.15	0.0039 UJ	0.0049 UJ	1.7	0.15	0.039 UJ	0.25	0.07 J	0.0041 UJ
FLUORENE	0.0041 UJ	0.042 U	0.042 U	0.0043 U	5	0.55 J	5 J	0.034 U	0.0038 U	0.0039 U	0.068 U	0.0039 U	0.0049 U	0.036 U	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U
INDENO(1,2,3-CD)PYRENE	0.0084 J	0.12	0.073 J	0.0068 J	7.4	4.8 J	8.9 J	0.14 J	0.0038 UJ	0.0039 U	0.068 U	0.0039 U	0.0049 U	0.94 J	0.038 UJ	0.039 U	0.29 J	0.038 U	0.0041 U
NAPHTHALENE	0.0045 J	0.042 U	0.042 U	0.0043 U	0.68 J	0.12 J	0.54 J	0.034 U	0.0038 U	0.0039 U	0.95	0.0039 U	0.0049 U	0.051 J	0.038 U	0.039 U	0.037 U	0.038 U	0.0041 U
PHENANTHRENE	0.0086 J	0.41 J	0.22 J	0.017	34	3.5 J	31 J	0.034 U	0.0038 U	0.0058 J	0.16	0.0039 U	0.0049 U	0.26	0.12	0.039 U	0.072 J	0.034 J	0.0041 U
PYRENE	0.013 J	0.65	0.44	0.024	31	7 J	25 J	0.11 J	0.0038 UJ	0.0039 U	0.068 U	0.0039 U	0.0049 U	3.3 J	0.23 J	0.039 U	0.53 J	0.072 J	0.0041 U
PESTICIDES/PCBS (MG/KG)																			
AROCLOR-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION		23SB067			23SB068			23SB069			23SB070			23SB071			23SB072		
SAMPLE ID	**23SB066-0406**	**23SS067-0002**	**23SS067-0002-D**	**23SB067-0204**	**23SS068-0002**	**23SB068-0204**	**23SB068-0406**	**23SS069-0002**	**23SB069-0204**	**23SB069-0406**	**23SS070-0002**	**23SB070-0204**	**23SB070-0406**	**23SS071-0002**	**23SB071-0204**	**23SB071-0406**	**23SS072-0002**	**23SB072-0204**	**23SB072-0406**
SAMPLE DATE	**20140321**	**20140321**	**20140321**	**20140321**	**20140321**	**20140321**	**20140321**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**
SAMPLE CODE	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
MATRIX	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
SAMPLE TYPE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**REMOVED**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**REMOVED**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SUBMATRIX	**SB**	**SS**	**SS**	**SB**	**SS**	**SB**	**SB**	**SS**	**SB**	**SB**	**SS**	**SB**	**SB**	**SS**	**SB**	**SB**	**SS**	**SB**	**SB**
TOP DEPTH (FEET BELOW GROUND SURFACE)	**4**	**0**	**0**	**2**	**0**	**2**	**4**	**0**	**2**	**4**	**0**	**2**	**4**	**0**	**2**	**4**	**0**	**2**	**4**
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	**6**	**2**	**2**	**4**	**2**	**4**	**6**	**2**	**4**	**6**	**2**	**4**	**6**	**2**	**4**	**6**	**2**	**4**	**6**
AROCLOR-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																			
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MERCURY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																			
DIESEL RANGE ORGANICS, C08-C28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIESEL RANGE ORGANICS, C08-C34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																			
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB073			23SB074			23SB075			23SB076		23SB077	23SB078		23SB079	23SB080	23SB081	23SB082
SAMPLE ID	23SS073-0002	23SB073-0204	23SB073-0406	23SS074-0002	23SB074-0204	23SB074-0406	23SS075-0002	23SB075-0204	23SB075-0406	23SS076-0002	23SB076-0203	23SS077-0002	23SS078-0001	23SS078-0001-D	23SS079-0002	23SS080-0002	23SS081-0002	23SS082-0002
SAMPLE DATE	20140326	20140523	20140523	20140326	20140326	20140326	20140326	20140326	20140326	20140417	20140417	20140417	20140417	20140417	20140417	20140417	20140417	20140523
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SS	SS	SS	SS	SS	SS	SS
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	2	4	0	2	4	0	2	4	0	2	0	0	0	0	0	0	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	4	6	2	4	6	2	4	6	2	3	2	1	1	2	2	2	2
VOLATILES (MG/KG)																		
1,1,1,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-TRICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-CHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACROLEIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMODICHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORODIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROPRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ISOBUTANOL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL IODIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PROPIONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL XYLENES	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL ACETATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																		
1-METHYLNAPHTHALENE	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHENE	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	0.0041 J	0.039 U	0.036 U	0.0077	0.039 U	0.039 U	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U	0.0038 U	0.036 J	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
BAP EQUIVALENT-HALFND	0.082008	0.074384	0.077884	0.113318	0.0425645	0.039 U	0.0038 U	0.17964	0.047913	NA	NA	NA	NA	NA	NA	NA	NA	NA
BAP EQUIVALENT-POS	0.082008	0.052739	0.058084	0.113318	0.017	0.039 U	0.0038 U	0.16164	0.047913	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	0.041	0.039 U	0.044 J	0.048	0.039 U	0.039 U	0.0038 U	0.12	0.033	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	0.056	0.04 J	0.046 J	0.079	0.017 J	0.039 U	0.0038 U	0.12	0.031	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	0.087	0.08	0.073 J	0.16	0.039 U	0.039 U	0.0038 U	0.21	0.045	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	0.046	0.054 J	0.041 J	0.074	0.039 U	0.039 U	0.0038 U	0.088	0.018	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	0.035	0.039 U	0.033 J	0.043	0.039 U	0.039 U	0.0038 U	0.08	0.018	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	0.058	0.039 J	0.054 J	0.088	0.039 U	0.039 U	0.0038 U	0.14	0.033	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE	0.01	0.039 U	0.036 UJ	0.0084	0.039 U	0.039 U	0.0038 U	0.036 U	0.0077 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	0.058	0.052 J	0.052 J	0.069	0.039 U	0.039 U	0.0038 UJ	0.22	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORENE	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	0.028 J	0.047 J	0.036 UJ	0.046 J	0.039 U	0.039 UJ	0.0038 U	0.077 J	0.012 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	0.004 U	0.039 U	0.036 U	0.0038 U	0.039 U	0.039 U	0.0038 U	0.036 U	0.0047 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	0.017	0.039 U	0.036 U	0.013	0.039 U	0.039 U	0.0038 U	0.15	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
PYRENE	0.097 J	0.058 J	0.081	0.12 J	0.039 U	0.039 UJ	0.0038 U	0.3 J	0.041 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
PESTICIDES/PCBS (MG/KG)																		
AROCLOR-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB073			23SB074			23SB075			23SB076		23SB077	23SB078		23SB079	23SB080	23SB081	23SB082
SAMPLE ID	**23SS073-0002**	**23SB073-0204**	**23SB073-0406**	**23SS074-0002**	**23SB074-0204**	**23SB074-0406**	**23SS075-0002**	**23SB075-0204**	**23SB075-0406**	**23SS076-0002**	**23SB076-0203**	**23SS077-0002**	**23SS078-0001**	**23SS078-0001-D**	**23SS079-0002**	**23SS080-0002**	**23SS081-0002**	**23SS082-0002**
SAMPLE DATE	**20140326**	**20140523**	**20140523**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140326**	**20140417**	**20140417**	**20140417**	**20140417**	**20140417**	**20140417**	**20140417**	**20140417**	**20140523**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
MATRIX	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
SAMPLE TYPE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SUBMATRIX	**SS**	**SB**	**SB**	**SS**	**SB**	**SB**	**SS**	**SB**	**SB**	**SS**	**SB**	**SS**	**SS**	**SS**	**SS**	**SS**	**SS**	**SS**
TOP DEPTH (FEET BELOW GROUND SURFACE)	**0**	**2**	**4**	**0**	**2**	**4**	**0**	**2**	**4**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	**2**	**4**	**6**	**2**	**4**	**6**	**2**	**4**	**6**	**2**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**
AROCLOR-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																		
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA	NA	NA	59	15	58	29	31	19	12	21	41
MERCURY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																		
DIESEL RANGE ORGANICS, C08-C28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIESEL RANGE ORGANICS, C08-C34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																		
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB083				23SB084			23SB085			23SB086		23SB086	23SB087			23SB088		
SAMPLE ID	23SS083-0002	23SB083-0204	23SB083-0406	23SB083-0406-D	23SS084-0002	23SB084-0204	23SB084-0406	23SS085-0002	23SB085-0204	23SB085-0406	23SS086-0002	23SB086-0204	23SB086-0406	23SS087-0002	23SB087-0204	23SB087-0406	23SS088-0002	23SB088-0204	23SB088-0406
SAMPLE DATE	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	REMOVED	REMOVED	REMOVED	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SB	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	2	4	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	4	6	6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6
VOLATILES (MG/KG)																			
1,1,1,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-TRICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-CHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACROLEIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMODICHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORODIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROPRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ISOBUTANOL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL IODIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PROPIONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL XYLENES	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL ACETATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																			
1-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BAP EQUIVALENT-HALFND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BAP EQUIVALENT-POS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FLUORENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	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	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PESTICIDES/PCBS (MG/KG)																			
AROCLOR-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB083				23SB084			23SB085			23SB086		23SB086	23SB087			23SB088		
SAMPLE ID	23SS083-0002	23SB083-0204	23SB083-0406	23SB083-0406-D	23SS084-0002	23SB084-0204	23SB084-0406	23SS085-0002	23SB085-0204	23SB085-0406	23SS086-0002	23SB086-0204	23SB086-0406	23SS087-0002	23SB087-0204	23SB087-0406	23SS088-0002	23SB088-0204	23SB088-0406
SAMPLE DATE	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	REMOVED	REMOVED	REMOVED	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SUBMATRIX	SS	SB	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	2	4	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	4	6	6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6
AROCLOR-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																			
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	54	24	22 J	73 J	430	13	14	910	490	690	14	12	4.9	4800 J	18 J	14 J	11	29 J	14 J
MERCURY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM HYDROCARBONS (MG/KG)																			
DIESEL RANGE ORGANICS, C08-C28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIESEL RANGE ORGANICS, C08-C34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																			
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB089					23SB090			23SB091			23SB092			23SB093	23SB094	NA
SAMPLE ID	23SS089-0002	23SS089-0002-D	23SB089-0204	23SB089-0204-D	23SB089-0406	23SS090-0002	23SB090-0204	23SB090-0406	23SS091-0002	23SB091-0204	23SB091-0406	23SS092-0002	23SB092-0204	23SB092-0406	23SB093C	23SB094C	L14020741-01
SAMPLE DATE	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20141209	20141209	20140212
SAMPLE CODE	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	COMPOSITE	COMPOSITE	NORMAL
SUBMATRIX	SS	SS	SB	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB	SB	SB	BACKFILL TOPSOIL
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	2	2	4	0	2	4	0	2	4	0	2	4	NA	NA	NA
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	2	4	4	6	2	4	6	2	4	6	2	4	6	NA	NA	NA
VOLATILES (MG/KG)																	
1,1,1,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-TRICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-CHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACETONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACROLEIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00483 U
BROMODICHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORODIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLOROPRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIBROMOMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00483 U
ISOBUTANOL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHACRYLONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL IODIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL METHACRYLATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PROPIONITRILE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00483 U
TOTAL XYLENES	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00483 U
TRANS-1,2-DICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,4-DICHLORO-2-BUTENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRICHLOROFLUOROMETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL ACETATE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (MG/KG)																	
1-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	0.034 U	0.035 U	0.038 U	0.036 U	0.036 U	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA	NA
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	0.034 U	0.035 U	0.038 U	0.036 U	0.036 U	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA	0.162 U
ACENAPHTHENE	NA	NA	NA	NA	NA	0.034 U	0.035 U	0.038 U	0.15	0.036 U	0.037 U	0.0038 U	0.0046 J	0.004 U	NA	NA	0.162 U
ACENAPHTHYLENE	NA	NA	NA	NA	NA	0.14	0.06 J	0.038 U	0.036 U	0.036 U	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA	162 U
ANTHRACENE	NA	NA	NA	NA	NA	0.098	0.058 J	0.038 U	0.37	0.082	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA	0.162 U
BAP EQUIVALENT-HALFND	NA	NA	NA	NA	NA	0.98843	0.55097	0.043968	1.4863	0.30106	0.037 U	0.0048581	0.0048413	0.004 U	NA	NA	0.162 U
BAP EQUIVALENT-POS	NA	NA	NA	NA	NA	0.98843	0.55097	0.000078	1.4863	0.28306	0.037 U	0.0008681	0.0004413	0.004 U	NA	NA	0.162 U
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	0.45	0.28	0.038 U	0.99	0.22	0.037 U	0.0041 J	0.004 U	0.004 U	NA	NA	0.162 U
BENZO(A)PYRENE	NA	NA	NA	NA	NA	0.64	0.36	0.038 U	0.97	0.22	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA	0.162 U
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	1.1	0.58	0.038 U	1.3	0.24	0.037 U	0.0043 J	0.004 J	0.004 U	NA	NA	0.162 U
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	0.48	0.23	0.038 U	0.71	0.21	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA	0.162 U
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	0.29	0.26	0.038 U	0.63	0.18	0.037 U	0.0024 J	0.0037 J	0.004 U	NA	NA	0.162 U
CHRYSENE	NA	NA	NA	NA	NA	0.53	0.37	0.078	1	0.26	0.037 U	0.0041 J	0.0043 J	0.004 U	NA	NA	0.162 U
DIBENZO(A,H)ANTHRACENE	NA	NA	NA	NA	NA	0.16 J	0.085 J	0.038 UJ	0.23	0.036 U	0.037 U	0.0038 UJ	0.004 UJ	0.004 UJ	NA	NA	0.162 U
FLUORANTHENE	NA	NA	NA	NA	NA	0.64	0.48	0.053 J	1.9	0.4	0.037 U	0.006 J	0.004 U	0.004 U	NA	NA	0.162 U
FLUORENE	NA	NA	NA	NA	NA	0.034 U	0.035 U	0.038 U	0.17	0.036 U	0.037 U	0.0038 U	0.0046 J	0.004 U	NA	NA	0.162 U
INDENO(1,2,3-CD)PYRENE	NA	NA	NA	NA	NA	0.3 J	0.17 J	0.038 UJ	0.5	0.15	0.037 U	0.0038 UJ	0.004 UJ	0.004 UJ	NA	NA	0.162 U
NAPHTHALENE	NA	NA	NA	NA	NA	0.034 U	0.035 U	0.038 U	0.036 U	0.036 U	0.037 U	0.0038 U	0.004 U	0.004 U	NA	NA	0.162 U
PHENANTHRENE	NA	NA	NA	NA	NA	0.095	0.073	0.038 U	1.4	0.28	0.037 U	0.0044 J	0.0048 J	0.0032 J	NA	NA	0.162 U
PYRENE	NA	NA	NA	NA	NA	1	0.71	0.095	2 J	0.45 J	0.037 UJ	0.0081	0.004 U	0.004 U	NA	NA	0.162 U
PESTICIDES/PCBS (MG/KG)																	
AROCLOR-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE B-1

RFI AND POST-RFI SOIL SAMPLE RESULTS AND BACKFILL CONCENTRATIONS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SB089					23SB090			23SB091			23SB092			23SB093	23SB094	NA
SAMPLE ID	23SS089-0002	23SS089-0002-D	23SB089-0204	23SB089-0204-D	23SB089-0406	23SS090-0002	23SB090-0204	23SB090-0406	23SS091-0002	23SB091-0204	23SB091-0406	23SS092-0002	23SB092-0204	23SB092-0406	23SB093C	23SB094C	L14020741-01
SAMPLE DATE	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20140523	20141209	20141209	20140212
SAMPLE CODE	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SAMPLE TYPE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	REMOVED	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	COMPOSITE	COMPOSITE	NORMAL
SUBMATRIX	SS	SS	SB	SB	SB	SS	SB	SB	SS	SB	SB	SS	SB	SB	SB	SB	BACKFILL TOPSOIL
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	2	2	4	0	2	4	0	2	4	0	2	4	NA	NA	NA
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	2	2	4	4	6	2	4	6	2	4	6	2	4	6	NA	NA	NA
AROCLOR-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (MG/KG)																	
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.723 U
ARSENIC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.3
BARIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12.4
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.362 U
CADMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.362 U
CHROMIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.92
COBALT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5
COPPER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.35
LEAD	15 J	17 J	13 J	12 J	13 J	NA	NA	NA	NA	NA	NA	12	14	11	22	18	2.33
MERCURY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.249 U
NICKEL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.33
SELENIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.169 J
SILVER	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.45 U
THALLIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0636
VANADIUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.8
ZINC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.1
PETROLEUM HYDROCARBONS (MG/KG)																	
DIESEL RANGE ORGANICS, C08-C28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIESEL RANGE ORGANICS, C08-C34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GASOLINE RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS																	
SULFATE (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (s.u.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Abbreviations:
BAP - Benzo(a)pyrene
J - Estimated concentration
Halfnd - Calculated using one-half the non-detect values
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
PCBs - polychlorinated biphenyls
Pos - Calculated using positive detections only
s.u. - Standard units
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an estimated value
UR - Not detected; however, the sample-specific quantitation limit is unreliable and has been rejected

APPENDIX B.2

SWMU 23 ANALYTICAL DATA FOR SEDIMENT

TABLE B-2

RFI SEDIMENT SAMPLE RESULTS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SW/SD001	23SW/SD001	23SW/SD002	23SW/SD003	23SW/SD004	23SW/SD005	23SW/SD006	23SW/SD008	23SW/SD009	23SW/SD009
SAMPLE ID	23SD001-0006	23SD001-0006-D	23SD002-0006	23SD003-0006	23SD004-0006	23SD005-0006	23SD006-0006	23SD008-0006	23SD009-0006	23SD009-0006-D
SAMPLE DATE	20121008	20121008	20121008	20121008	20121008	20121008	20121008	20121008	20130519	20130519
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5
VOLATILES (mg/kg)										
1,1,1,2-Tetrachloroethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	NA	NA
1,1,1-Trichloroethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
1,1,2,2-Tetrachloroethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
1,1,2-Trichloroethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
1,1,2-Trichlorotrifluoroethane	NA	NA	NA	NA	NA	NA	NA	NA	0.00391 U	0.00439 U
1,1-Dichloroethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
1,1-Dichloroethene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 UJ	0.0022 U
1,2,3-Trichloropropane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 UJ	0.0022 U
1,2-Dibromo-3-Chloropropane	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 U
1,2-Dibromoethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
1,2-Dichloroethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 UJ
1,2-Dichloropropane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
2-Butanone	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 UJ
2-Hexanone	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 U
3-Chloropropene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	NA	NA
4-Methyl-2-Pentanone	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 UJ
Acetone	1.1 UJ	1.07 UJ	0.591 UJ	0.521 UJ	0.528 UJ	0.542 UJ	0.557 UJ	1.72 UJ	0.00782 U	0.00879 U
Acetonitrile	2.76 UR	2.68 UR	1.48 UR	1.3 UR	1.32 UR	1.36 UR	1.39 UR	4.3 UR	NA	NA
Acrolein	1.1 UR	1.07 UR	0.591 UR	0.521 UR	0.528 UR	0.542 UR	0.557 UR	1.72 UR	NA	NA
Acrylonitrile	1.1 UJ	1.07 UJ	0.591 UJ	0.521 UJ	0.528 UJ	0.542 UJ	0.557 UJ	1.72 UJ	NA	NA
Benzene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
Bromodichloromethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Bromoform	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Bromomethane	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 U
Carbon Disulfide	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Carbon Tetrachloride	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Chlorobenzene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Chlorodibromomethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Chloroethane	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 U
Chloroform	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Chloromethane	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 U
Chloroprene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	NA	NA
cis-1,2-Dichloroethene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
cis-1,3-Dichloropropene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
Dibromomethane	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	NA	NA
Dichlorodifluoromethane	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 UJ	0.00439 U
Ethyl Methacrylate	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	NA	NA
Ethylbenzene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	4.76 J	0.00196 U	0.0022 U
Isobutanol	4.41 UJ	4.29 UJ	2.36 UJ	2.08 UJ	2.11 UJ	2.17 UJ	2.23 UJ	6.88 UJ	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
m+p-Xylenes	NA	NA	NA	NA	NA	NA	NA	NA	0.00391 U	0.00439 U
Methacrylonitrile	2.76 UJ	2.68 UJ	1.48 UJ	1.3 UJ	1.32 UJ	1.36 UJ	1.39 UJ	4.3 UJ	NA	NA
Methyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	0.00391 UJ	0.00439 UJ
Methyl Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
Methyl Iodide	1.1 UJ	1.07 UJ	0.591 UJ	0.521 UJ	0.528 UJ	0.542 UJ	0.557 UJ	1.72 UJ	NA	NA
Methyl Methacrylate	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	NA	NA
Methyl Tert-Butyl Ether	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
Methylene Chloride	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 U
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	0.00196 U	0.0022 U
Propionitrile	2.76 UR	2.68 UR	1.48 UR	1.3 UR	1.32 UR	1.36 UR	1.39 UR	4.3 UR	NA	NA
Styrene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
Tetrachloroethene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 UJ	0.0022 U
Toluene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	2.64 J	0.00196 U	0.0022 U
Total Xylenes	0.828 UJ	0.804 UJ	0.443 UJ	0.39 UJ	0.396 UJ	0.407 UJ	0.418 UJ	30.5 J	0.00587 U	0.00659 U
trans-1,2-Dichloroethene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
trans-1,3-Dichloropropene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
trans-1,4-Dichloro-2-Butene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	NA	NA
Trichloroethene	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00124 J	0.0012 J
Trichlorofluoromethane	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	0.00391 U	0.00439 U
Vinyl Acetate	0.552 UJ	0.536 UJ	0.295 UJ	0.26 UJ	0.264 UJ	0.271 UJ	0.279 UJ	0.861 UJ	NA	NA
Vinyl Chloride	0.276 UJ	0.268 UJ	0.148 UJ	0.13 UJ	0.132 UJ	0.136 UJ	0.139 UJ	0.43 UJ	0.00196 U	0.0022 U
POLYCYCLIC AROMATIC HYDROCARBONS (mg/kg)										
2-Methylnaphthalene	0.0347 U	0.0342 U	0.0217 U	0.00424 U	0.00834	0.0216 U	0.00418 U	26.5	0.0187 U	0.0223 U
Acenaphthene	0.0347 U	0.0342 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00418 U	1.54	0.0187 U	0.0223 U
Acenaphthylene	0.0347 U	0.0342 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00685 J	0.0392 U	0.0187 U	0.0223 U
Anthracene	0.0347 U	0.0342 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00418 U	0.0392 U	0.0187 U	0.0223 U
Benzo(a)anthracene	0.0347 U	0.0587 J	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00418 U	0.61	0.0187 U	0.0387 J
Benzo(a)pyrene	0.0734	0.101	0.0303 J	0.00604 J	0.00889	0.0216 U	0.255	0.0392 U	0.0187 U	0.0434 J
Benzo(b)fluoranthene	0.114	0.092	0.0399 J	0.00583 J	0.00846	0.0226 J	0.254	0.0392 U	0.0187 U	0.0537
Benzo(g,h,i)perylene	0.0858	0.0342 U	0.036 J	0.00424 U	0.00998	0.0216 U	0.185	0.0392 U	0.0187 U	0.0361 J
Benzo(k)fluoranthene	0.082	0.125	0.0217 U	0.00493 J	0.00476 J	0.0216 U	0.141	0.0392 U	0.0187 U	0.0359 J
Chrysene	0.0989	0.103	0.0297 J	0.00424 U	0.00854	0.0216 U	0.00418 U	0.962	0.0187 U	0.0545
Dibenzo(a,h)anthracene	0.0347 U	0.0342 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.0884	0.0392 U	0.0187 U	0.0223 U
Fluoranthene	0.101	0.103	0.04 J	0.0119	0.00901	0.0231 J	0.0084	1.5	0.0187 U	0.0405 J

TABLE B-2

RFI SEDIMENT SAMPLE RESULTS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SW/SD001	23SW/SD001	23SW/SD002	23SW/SD003	23SW/SD004	23SW/SD005	23SW/SD006	23SW/SD008	23SW/SD009	23SW/SD009
SAMPLE ID	23SD001-0006	23SD001-0006-D	23SD002-0006	23SD003-0006	23SD004-0006	23SD005-0006	23SD006-0006	23SD008-0006	23SD009-0006	23SD009-0006-D
SAMPLE DATE	20121008	20121008	20121008	20121008	20121008	20121008	20121008	20121008	20130519	20130519
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
TOP DEPTH (FEET BELOW GROUND SURFACE)	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH (FEET BELOW GROUND SURFACE)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5
Fluorene	0.0347 U	0.0342 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00418 U	0.0392 U	0.0187 U	0.0223 U
Indeno(1,2,3-cd)pyrene	0.0634 J	0.0791	0.0257 J	0.00492 J	0.00526 J	0.0216 U	0.164	0.23	0.0187 U	0.0351 J
Naphthalene	0.0347 U	0.0342 U	0.0217 U	0.00424 U	0.00392 U	0.0216 U	0.00418 U	12.2	0.0187 U	0.0223 U
Phenanthrene	0.0347 U	0.0342 U	0.0217 U	0.00424 U	0.012	0.0216 U	0.00418 U	4.24	0.0187 U	0.0223 U
Pyrene	0.0929	0.11	0.0397 J	0.00948	0.0157	0.0234 J	0.0628	2.56	0.0187 U	0.0435 J
PCBs (mg/kg)										
Aroclor-1016	0.00341 UJ	0.00334 UJ	0.00208 UJ	0.00209 UJ	0.00203 UJ	0.00213 UJ	0.00217 UJ	0.00386 UJ	NA	NA
Aroclor-1221	0.00341 UJ	0.00334 UJ	0.00208 UJ	0.00209 UJ	0.00203 UJ	0.00213 UJ	0.00217 UJ	0.00386 UJ	NA	NA
Aroclor-1232	0.00341 UJ	0.00334 UJ	0.00208 UJ	0.00209 UJ	0.00203 UJ	0.00213 UJ	0.00217 UJ	0.00386 UJ	NA	NA
Aroclor-1242	0.00341 UJ	0.00334 UJ	0.00208 UJ	0.00209 UJ	0.00203 UJ	0.00213 UJ	0.00217 UJ	0.00386 UJ	NA	NA
Aroclor-1248	0.00341 UJ	0.00334 UJ	0.00208 UJ	0.00209 UJ	0.00203 UJ	0.00213 UJ	0.00217 UJ	0.00386 UJ	NA	NA
Aroclor-1254	0.00341 UJ	0.00334 UJ	0.00208 UJ	0.00209 UJ	0.00203 UJ	0.00298 J	0.00217 UJ	0.00974 J	NA	NA
Aroclor-1260	0.0105 J	0.00702 J	0.0108 J	0.0063 J	0.00264 J	0.00224 J	0.00217 UJ	0.00386 UJ	NA	NA
METALS (mg/kg)										
Antimony	4.42 U	4.01 U	2.58 U	2.74 U	2.52 U	2.66 U	2.59 U	12.4	2.34 UJ	1.13 UJ
Arsenic	9.84	8.68	7.16	12.3	12.2	4.59	8.22	8.24	5.88	5.2
Barium	219	151	79.8	108	112	20.9	25.3	2290	27.3	39.6
Beryllium	0.766 J	0.659 J	0.7 J	1.32 J	1.48 J	0.526 J	0.672 J	1.27 U	0.46	0.543 J
Cadmium	0.76 J	0.963 J	0.478 J	0.684 U	0.629 U	0.665 U	0.648 U	29.7	0.586 U	0.282 U
Chromium	22	22.3	20.5	24.2	35.2	9.63	15.2	79.4	13.3 J	11.5 J
Cobalt	12.2	10.1	12.7	62	52.4	5.11	4.65	10.4	5.55	4.41 J
Copper	34.4	35.3	14.1	13.8	17.5	6.1	7.21	553	7.2	8.18
Lead	52.3	70.3	32.6	28.1	28.4	29.8	9.19	287	28.3 J	32.4 J
Mercury	0.14	0.134	0.0526	0.0578	0.0385 J	0.0196 J	0.0406 J	0.211	0.0171 J	0.0524
Nickel	18.3	15.7	17.4	35.7	48.1	19.5	24.5	34.4	25.9	32
Selenium	2.76 U	2.51 U	1.61 U	1.71 U	1.57 U	1.66 U	1.62 U	3.18 U	1.46 U	0.706 U
Silver	1.1 U	1 U	0.959 J	0.684 U	0.629 U	0.665 U	0.648 U	9.08	0.586 U	0.282 U
Thallium	2.21 U	2.01 U	1.29 U	1.37 U	1.26 U	1.33 U	1.3 U	2.54 U	1.17 UJ	0.565 UJ
Vanadium	35.2	30	19.8	26.1	33.9	9.1	17.8	15	15.6	11.1
Zinc	207	217	67.2	80	103	42.1	47.6	1940	53.8	54.9
PETROLEUM HYDROCARBONS (mg/kg)										
Diesel Range Orgnnics, C08-C28	NA	NA	NA	NA	NA	NA	NA	48600 U	NA	NA
Diesel Range Orgnnics, C08-C34	NA	NA	NA	NA	NA	NA	NA	48600 U	NA	NA
Gasoline Range Organics	NA	NA	NA	NA	NA	NA	NA	504	NA	NA
MISCELLANEOUS PARAMETERS (mg/kg)										
Total Organic Carbon	46200	60000	26300	24200	9830	4710	15900	89300	NA	NA

Abbreviations:
J - Estimated concentration
ID - Identifier
mg/kg - Milligram per kilogram
NA - Not available/not analyzed
PCBs - polychlorinated biphenyls
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an estimated value
UR - Not detected; however, the sample-specific quantitation limit is unreliable and has been rejected

APPENDIX B.3

SWMU 23 ANALYTICAL DATA FOR SURFACE WATER

TABLE B-3

RFI SURFACE WATER SAMPLE RESULTS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	23SW/SD001	23SW/SD001	23SW/SD002	23SW/SD003	23SW/SD004	23SW/SD005	23SW/SD006
SAMPLE ID	23SW001	23SW001-D	23SW002	23SW003	23SW004	23SW005	23SW006
SAMPLE DATE	20121008	20121008	20121008	20121008	20121008	20121008	20121008
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
POLYCYCLIC AROMATIC HYDROCARBONS (µg/L)							
2-Methylnaphthalene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Acenaphthene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Acenaphthylene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Anthracene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Benzo(a)anthracene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Benzo(a)pyrene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Benzo(b)fluoranthene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Benzo(g,h,i)perylene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Benzo(k)fluoranthene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Chrysene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Dibenzo(a,h)anthracene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Fluoranthene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Fluorene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Indeno(1,2,3-cd)pyrene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Naphthalene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
Phenanthrene	1 U	1 U	0.2 U	0.2 U	0.2 U	0.192 U	0.2 U
Pyrene	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.0962 U	0.1 U
TOTAL METALS (µg/L)							
Antimony	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Arsenic	2.16 J	1.52 J	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Barium	144	121	56.4	47.8	47.9	43.9	39
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chromium	3.21 J	2.12 J	1 UJ	0.56 J	0.681 J	1 UJ	1 UJ
Cobalt	3.44	2.59 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Copper	10.7	8.97	1.79 J	1.31 J	1.26 J	2 U	2 U
Lead	16.3	13.9	0.75 U	0.75 U	0.685 J	0.814	0.75 U
Mercury	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Nickel	4.26	2.86	1.25 J	1.08 J	2.59	4.9	12.8
Selenium	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U
Silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Thallium	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vanadium	7.29 J	5.81 J	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
Zinc	62.6 J	44.5 J	1.93 J	1.31 J	2.87 J	6.37 J	13.3 J
DISSOLVED METALS (µg/L)							
Antimony	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Arsenic	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Barium	73	72.5	54.4	47.8	47.4	42	38.9
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chromium	1 U	1 U	1 U	1 U	1 U	1 U	1 U

TABLE B-3

RFI SURFACE WATER SAMPLE RESULTS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

LOCATION	**23SW/SD001**	**23SW/SD001**	**23SW/SD002**	**23SW/SD003**	**23SW/SD004**	**23SW/SD005**	**23SW/SD006**
SAMPLE ID	**23SW001**	**23SW001-D**	**23SW002**	**23SW003**	**23SW004**	**23SW005**	**23SW006**
SAMPLE DATE	**20121008**	**20121008**	**20121008**	**20121008**	**20121008**	**20121008**	**20121008**
SAMPLE CODE	**ORIG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
Cobalt	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Copper	1.42 J	1.32 J	1.6 J	2 U	2.46 J	2 U	2 U
Lead	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Mercury	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Nickel	0.907 J	0.772 J	1.06 J	0.959 J	3.92	4.25	12.2
Selenium	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U
Silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Thallium	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	1.82 J	1.52 J	2.5 J	2.5 U	4.75 J	4.62 J	14
MISCELLANEOUS PARAMETERS (MG/L)							
Hardness as CaCO3	228	222	193	162	226	321	295

Abbreviations:
J - Estimated concentration
ID - Identifier
mg/L - Milligram per liter
U - Not detected at a concentration greater than the sample-specific quantitation limit
UJ - Not detected at a concentration greater than the sample-specific quantitation limit, which is an estimated value
µg/L - Microgram per liter

APPENDIX C

SUPPORTING INFORMATION FOR HUMAN HEALTH RISK ASSESSMENT

C.1 Samples Used in Risk Assessment
C.2 RAGS Part D Tables
C.3 ProUCL Outputs
C.4 Derivation of Adolescent Trespasser Skin Surface Area
C.5 Sample Calculations
C.6 RAGS Part D Tables for Chemicals Present at Naturally Occurring Levels
C.7 Thiessen Polygon Evaluation

APPENDIX C.1

SAMPLES USED IN RISK ASSESSMENT

TABLE 1
SAMPLES USED IN THE HUMAN HEALTH RISH ASSESSMENT

Surface Soil		Subsurface Soil		Surface Water	Sediment
23SS001-0002	23SS046-0002	23SB001-0204	23SB068-0204	23SW001	23SD001-0006
23SS005-0002	23SS047-0002	23SB001-0406	23SB068-0406	23SW002	23SD002-0006
23SS007-0002	23SS048-0002	23SB001-1012	23SB069-0204	23SW003	23SD003-0006
23SS008-0002	23SS049-0002	23SB002-0204	23SB069-0406	23SW004	23SD004-0006
23SS009-0002	23SS050-0002	23SB002-0406	23SB070-0204	23SW005	23SD005-0006
23SS011-0002	23SS053-0002	23SB002-1012	23SB070-0406	23SW006	23SD006-0006
23SS012-0002	23SS054-0002	23SB003-0204	23SB071-0204		23SD009-0006
23SS013-0002	23SS055-0002	23SB003-0406	23SB071-0406		
23SS014-0002	23SS056-0002	23SB003-0810	23SB072-0204		
23SS015-0002	23SS058-0002	23SB004-0406	23SB072-0406		
23SS016-0002	23SS059-0002	23SB004-0810	23SB073-0204		
23SS017-0002	23SS062-0002	23SB005-0810	23SB073-0406		
23SS018-0002	23SS063-0002	23SB006-0608	23SB074-0204		
23SS019-0002	23SS064-0002	23SB024-0406	23SB074-0406		
23SS020-0002	23SS066-0002	23SB024-0608	23SB075-0204		
23SS021-0002	23SS067-0002	23SB025-0406	23SB075-0406		
23SS022-0002	23SS069-0002	23SB025-0608	23SB076-0203		
23SS023-0002	23SS070-0002	23SB026-0406	23SB083-0204		
23SS027-0002	23SS072-0002	23SB026-0608	23SB083-0406		
23SS028-0002	23SS073-0002	23SB027-0204	23SB084-0204		
23SS029-0002	23SS074-0002	23SB028-0204	23SB084-0406		
23SS030-0002	23SS075-0002	23SB029-0204	23SB085-0204		
23SS031-0002	23SS076-0002	23SB030-0204	23SB085-0406		
23SS032-0002	23SS077-0002	23SB032-0204	23SB086-0204		
23SS033-0002	23SS078-0001	23SB034-0204	23SB086-0406		
23SS034-0002	23SS079-0002	23SB036-0204	23SB087-0204		
23SS035-0002	23SS080-0002	23SB037-0204	23SB087-0406		
23SS036-0002	23SS081-0002	23SB048-0204	23SB088-0204		
23SS037-0002	23SS082-0002	23SB048-0406	23SB088-0406		
23SS038-0002	23SS083-0002	23SB059-0204	23SB089-0204		
23SS039-0002	23SS085-0002	23SB063-0204	23SB089-0406		
23SS040-0002	23SS086-0002	23SB063-0406	23SB090-0204		
23SS042-0002	23SS088-0002	23SB064-0204	23SB090-0406		
23SS043-0002	23SS089-0002	23SB064-0406	23SB091-0204		
23SS044-0002	23SS091-0002	23SB066-0204	23SB091-0406		
23SS045-0002	23SS092-0002	23SB066-0406	23SB092-0204		
		23SB067-0204	23SB092-0406		

APPENDIX C.2

RAGS-PART D TABLES

RAGS Part D Table 1

Selection of Exposure Pathways

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 23 BATTERY SHOP BUILDING 36
NSA CRANE, CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	SWMU 23	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with surface soil during excavation activities.
				Industrial Worker	Adult	Ingestion Dermal	Quant Quant	Industrial workers may contact surface soil during normal work activities.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Trespassers may contact surface soil while at the site.
		Air	SWMU 23	Construction Workers	Adult	Inhalation	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Industrial Worker	Adult	Inhalation	Quant	Industrial workers may be exposed to fugitive dust and volatile emissions during work activities.
				Trespassers	Adolescent	Inhalation	Quant	Trespassers may be exposed to fugitive dust and volatile emissions while at the site.
	Subsurface Soil	Subsurface Soil	SWMU 23	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Industrial Worker	Adult	Ingestion Dermal	Quant Quant	Although exposures to subsurface soil by industrial workers is considered unlikely at the site this scenario is included to aid in future risk management decisions.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Although exposures to subsurface soil by trespassers is considered unlikely at the site this scenario is included to aid in future risk management decisions.
		Air	SWMU 23	Construction Workers	Adult	Inhalation	Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Industrial Worker	Adult	Inhalation	Quant	Although exposures to subsurface soil by industrial workers is considered unlikely at the site this scenario is included to aid in future risk management decisions.
				Trespassers	Adolescent	Inhalation	Quant	Although exposures to subsurface soil by trespassers is considered unlikely at the site this scenario is included to aid in future risk management decisions.
	Surface Water	Surface Water	SWMU 23	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not exposed to surface water.
				Industrial Worker	Adult	Ingestion Dermal	None None	Industrial workers are not exposed to surface water.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Trespassers may be exposed to surface water while at the site.
	Sediment	Sediment	SWMU 23	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not exposed to sediment.
				Industrial Worker	Adult	Ingestion Dermal	None None	Industrial workers are not exposed to sediment.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Trespassers may be exposed to sediment while at the site.
Future	Surface Soil	Surface Soil	SWMU 23	Recreational Users	Child	Ingestion Dermal	Quant Quant	Recreational users may contact surface soil while at the site.
					Adult	Ingestion Dermal	Quant Quant	

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 23 BATTERY SHOP BUILDING 36
NSA 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 Soil	Surface Soil	SWMU 23	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	
						Dermal	Quant	
		Air	SWMU 23	Recreational Users	Child	Inhalation	Quant	Recreational users may be exposed to fugitive dust and volatile emissions while at the site.
					Adult	Inhalation	Quant	
				Residents	Child	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	
	Subsurface Soil	Subsurface Soil	SWMU 23	Recreational Users	Child	Ingestion	Quant	Although exposures to subsurface soil by recreational users is considered unlikely at the site this scenario is included to aid in future risk management decisions.
						Dermal	Quant	
					Adult	Ingestion	Quant	
						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	
						Dermal	Quant	
	Subsurface Soil	Air	SWMU 23	Recreational Users	Child	Inhalation	Quant	Although exposures to subsurface soil by recreational users is considered unlikely at the site this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	
				Residents	Child	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	
	Surface Water	Surface Water	SWMU 23	Recreational Users	Child	Ingestion	Quant	Recreational users may be exposed to surface water while at the site.
						Dermal	Quant	
					Adult	Ingestion	Quant	
						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	
						Dermal	Quant	

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 23 BATTERY SHOP BUILDING 36
NSA CRANE, CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Sediment	Sediment	SWMU 23	Recreational Users	Child	Ingestion	Quant	Recreational users may be exposed to sediment while at the site.
						Dermal	Quant	
					Adult	Ingestion	Quant	
						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	
						Dermal	Quant	

Notes:
Quant - Quantitative.

RAGS Part D Table 2

Occurrence, Distribution and Selection Of Chemicals of Potential Concern

LIST OF TABLES

RAGS PART D TABLE 2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Table No.

2.1 Surface Soil - Direct Contact

2.2 Subsurface Soil - Direct Contact

2.3 Surface Water

2.4 Sediment

TABLE 2.1
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[1]	Concentration Used for Screening[2]	Background Upper Tolerance Limit[3]	USEPA RSL Residential Soil[4]	IDEM Residential Soil[5]	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
SWMU 23	**Volatile Organic Compounds**													
	107-06-2	1,2-Dichloroethane	0.00124 J	0.00153 J	mg/kg	23SS023-0002	4/16	0.00244 - 0.108	0.00153	NA	0.46 C	6.4 C	No	BSL
	78-93-3	2-Butanone	0.00592 J	0.0405 J	mg/kg	23SS001-0002	3/16	0.00483 - 0.216	0.0405	NA	2,700 N	28,000 S	No	BSL
	67-64-1	Acetone	0.00733 J	0.234 J	mg/kg	23SS001-0002	9/16	0.00967 - 0.433	0.234	NA	6,100 N	85,000 N	No	BSL
	71-43-2	Benzene	0.0018 J	0.0018 J	mg/kg	23SS001-0002	1/21	0.00242 - 0.108	0.0018	NA	1.2 C	17 C	No	BSL
	75-15-0	Carbon Disulfide	0.00888 J	0.00888 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00888	NA	77 N	740 S	No	BSL
	67-66-3	Chloroform	0.00514 J	0.00514 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00514	NA	0.32 C	4.5 C	No	BSL
	127-18-4	Tetrachloroethene	0.00539 J	0.00539 J	mg/kg	23SS001-0002	1/16	0.00242 - 0.108	0.00539	NA	8.1 N	110 N	No	BSL
	108-88-3	Toluene	0.0094 J	0.0094 J	mg/kg	23SS001-0002	1/21	0.00242 - 0.108	0.0094	NA	490 N	820 S	No	BSL
	110-57-6	trans-1,4-Dichloro-2-Butene	0.004 J	0.004 J	mg/kg	23SS023-0002	1/16	0.00242 - 0.108	0.004	NA	0.0074 C	0.1 C	No	BSL
	Polycyclic Aromatic Hydrocarbons													
	90-12-0	1-Methylnaphthalene	2.5	2.5	mg/kg	23SS070-0002	1/22	0.0038 - 0.043	2.5	NA	18 C	240 C	No	BSL
	91-57-6	2-Methylnaphthalene	6.8	6.8	mg/kg	23SS070-0002	1/49	0.00366 - 0.162	6.8	NA	24 N	320 N	No	BSL
	83-32-9	Acenaphthene	0.082 J	0.15	mg/kg	23SS091-0002	2/49	0.00366 - 0.162	0.15	NA	360 N	4,900 N	No	BSL
	208-96-8	Acenaphthylene	0.0041 J	0.0077	mg/kg	23SS074-0002	3/49	0.00366 - 0.162	0.0077	NA	360 N[7]	NA	No	BSL
	120-12-7	Anthracene	0.041 J	0.37	mg/kg	23SS091-0002	6/49	0.00367 - 0.162	0.37	NA	1,800 N	24,000 N	No	BSL
	56-55-3	**Benzo(a)anthracene**	0.0041 J	0.99	mg/kg	23SS091-0002	27/49	0.0038 - 0.162	0.99	NA	**0.16 C**	2.1 C	**Yes**	ASL
	50-32-8	**Benzo(a)pyrene**	0.0023 J	0.97	mg/kg	23SS091-0002	30/49	0.00373 - 0.162	0.97	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
	205-99-2	**Benzo(b)fluoranthene**	0.0043 J	1.3	mg/kg	23SS091-0002	35/49	0.0038 - 0.162	1.3	NA	**0.16 C**	2.1 C	**Yes**	ASL
	191-24-2	Benzo(g,h,i)perylene	0.00568 J	0.71	mg/kg	23SS091-0002	27/49	0.00373 - 0.162	0.71	NA	180 N[8]	NA	No	BSL
	207-08-9	Benzo(k)fluoranthene	0.0024 J	0.63	mg/kg	23SS091-0002	31/49	0.00373 - 0.162	0.63	NA	1.6 C	21 C	No	BSL
	218-01-9	Chrysene	0.0041 J	1	mg/kg	23SS091-0002	30/49	0.0038 - 0.162	1	NA	16 C	210 C	No	BSL
	53-70-3	**Dibenzo(a,h)anthracene**	0.00671 J	0.23	mg/kg	23SS091-0002	13/49	0.00373 - 0.162	0.23	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
	206-44-0	Fluoranthene	0.0047 J	1.9	mg/kg	23SS091-0002	33/49	0.0038 - 0.162	1.9	NA	240 N	3,200 N	No	BSL
	86-73-7	Fluorene	0.099	0.17	mg/kg	23SS091-0002	2/49	0.00366 - 0.162	0.17	NA	240 N	3,200 N	No	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	0.00493 J	0.5	mg/kg	23SS091-0002	26/49	0.00373 - 0.162	0.5	NA	**0.16 C**	2.1 C	**Yes**	ASL
	91-20-3	Naphthalene	0.95	0.95	mg/kg	23SS070-0002	1/49	0.00366 - 0.162	0.95	NA	3.8 C	53 C	No	BSL
	85-01-8	Phenanthrene	0.0044 J	1.4	mg/kg	23SS091-0002	18/49	0.0038 - 0.162	1.4	NA	180 N[8]	NA	No	BSL
	129-00-0	Pyrene	0.0081	2 J	mg/kg	23SS091-0002	30/49	0.0038 - 0.162	2	NA	180 N	2,400 N	No	BSL
	Pesticides/PCBs													
	11097-69-1	**Aroclor-1254**	0.00127 J	0.191 J	mg/kg	23SS001-0002	6/16	0.00184 - 0.0384	0.191	NA	**0.12 N**	1.5 N	**Yes**	ASL
	11096-82-5	Aroclor-1260	0.00208 J	0.186 J	mg/kg	23SS001-0002	10/16	0.00184 - 0.00204	0.186	NA	0.24 C	3.4 C	No	BSL
	Metals													
	7440-38-2	**Arsenic**	2.3	17.8	mg/kg	23SS035-0002	26/26	--	17.8	**11.83**	**0.68 C**	**9.4 C**	**Yes**	ASL
	7440-39-3	Barium	12.4	115	mg/kg	23SS007-0002	26/26	--	115	211	1,500 N	21,000 N	No	BSL, BKG
	7440-41-7	Beryllium	0.327 J	0.963 J	mg/kg	23SS020-0002	20/26	0.362 - 0.572	0.963		16 N	220 N	No	BSL
	7440-43-9	Cadmium	0.0645 J	0.345 J	mg/kg	23SS013-0002	2/26	0.118 - 0.704	0.345	6.05	7.1 N	98 N	No	BSL, BKG
	7440-47-3	**Chromium**	4.92	29.5 J	mg/kg	23SS001-0002	26/26	--	29.5	**28.7**	**0.3 C[9]**	**4.2 C[9]**	**Yes**	ASL
	7440-48-4	Cobalt	2.5	15.4 J	mg/kg	23SS037-0002	26/26	--	15.4	32.4	**2.3 N**	32 N	No	BKG
	7440-50-8	Copper	3.35	39.8	mg/kg	23SS001-0002	26/26	--	39.8	**17.6**	310 N	4,300 N	No	BSL
	7439-92-1	Lead	2.33	345	mg/kg	23SS013-0002	48/48	--	345	**27**	400	400	No	BSL
	7439-97-6	Mercury	0.0209 J	0.692 J	mg/kg	23SS001-0002	20/26	0.0332 - 0.249	0.692	**0.077**	2.3 N[10]	3.1 S	No	BSL
	7440-02-0	Nickel	5.33	19.4	mg/kg	23SS020-0002	26/26	--	19.4	22.1	150 N	2,100 N	No	BSL, BKG
	7782-49-2	Selenium	0.169 J	0.425 J	mg/kg	23SS033-0002	6/26	0.294 - 1.76	0.425	0.81	39 N	550 N	No	BSL, BKG
	7440-62-2	Vanadium	5.8	38.3	mg/kg	23SS009-0002	26/26	--	38.3	51.2	39 N	550 N	No	BSL, BKG
	7440-66-6	Zinc	11.1	127 J	mg/kg	23SS001-0002	26/26	--	127	**65.6**	2,300 N	32,000 N	No	BSL
	Miscellaneous Parameters													
	14808-79-8	Sulfate	9.87 J	38.7 J	mg/kg	23SS001-0002	5/16	11.4 - 13.9	38.7	NA	NA	NA	No	NTX
	--	pH	5.68	8.23	S.U.	23SS015-0002	16/16	-	8.23	NA	NA	NA	No	NTX
	Petroleum Hydrocarbons													
	--	DRO (C08-C28)	9.69 J	69	mg/kg	23SS012-0002	15/16	7.49 - 7.49	69	NA	NA	NA	No	NTX
	--	DRO (C08-C34)	12 J	88.5	mg/kg	23SS012-0002	16/16	-	88.5	NA	NA	NA	No	NTX
	--	Gasoline Range Organics	55.3	55.3	mg/kg	23SS013-0002	1/16	4.33 - 6.38	55.3	NA	NA	NA	No	NTX

TABLE 2.1
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - Upper tolerance limits (representing 95 percent coverage of the soil population with 95 percent confidence), Final Base-Wide Background Soil Investigation Report for NSWC, Tetra Tech, 2001.
4 - USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, June 2015. The noncarcinogenic values (denoted with a "N" flag) 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).
5 - IDEM Closure Guide, March 2, 2015.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is determined to be greater than site background.
7 - Value is for acenaphthene.
8 - Value is for pyrene.
9 - Value is for hexavalent chromium.
10 - Value is for mercuric chloride (and other mercury salts).
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Definitions:
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
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 = Less than background concentration
BSL = Below COPC screening level
NTX = No toxicity criteria

Associated Samples:

23SS001-0002	23SS045-0002	23SS091-0002
23SS005-0002	23SS046-0002	23SS092-0002
23SS007-0002	23SS047-0002	
23SS008-0002	23SS048-0002	
23SS009-0002	23SS049-0002	
23SS011-0002	23SS050-0002	
23SS012-0002	23SS053-0002	
23SS013-0002	23SS054-0002	
23SS014-0002	23SS055-0002	
23SS015-0002	23SS056-0002	
23SS016-0002	23SS058-0002	
23SS017-0002	23SS059-0002	
23SS018-0002	23SS062-0002	
23SS019-0002	23SS063-0002	
23SS020-0002	23SS064-0002	
23SS021-0002	23SS066-0002	
23SS022-0002	23SS067-0002	
23SS023-0002	23SS069-0002	
23SS027-0002	23SS070-0002	
23SS028-0002	23SS072-0002	
23SS029-0002	23SS073-0002	
23SS030-0002	23SS074-0002	
23SS031-0002	23SS075-0002	
23SS032-0002	23SS076-0002	
23SS033-0002	23SS077-0002	
23SS034-0002	23SS078-0001	
23SS035-0002	23SS079-0002	
23SS036-0002	23SS080-0002	
23SS037-0002	23SS081-0002	
23SS038-0002	23SS082-0002	
23SS039-0002	23SS083-0002	
23SS040-0002	23SS085-0002	
23SS042-0002	23SS086-0002	
23SS043-0002	23SS088-0002	
23SS044-0002	23SS089-0002	

TABLE 2.2
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA 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 Nondetects[2]	Concentration Used for Screening[3]	Background Upper Tolerance Limit[3]	USEPA RSL Residential Soil[4]	IDEM Residential Soil[5]	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
SWMU 23	**Volatile Organic Compounds**													
	78-93-3	2-Butanone	0.0043 J	0.00553 J	mg/kg	23SB003-0810	2/12	0.00444 - 0.273	0.00553	NA	2,700 N	28,000 S	No	BSL
	67-64-1	Acetone	0.00666 J	0.101	mg/kg	23SB003-0810	4/12	0.00889 - 0.546	0.101	NA	6,100 N	85,000 N	No	BSL
	75-15-0	Carbon Disulfide	0.00113 J	0.00113 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.00113	NA	77 N	740 S	No	BSL
	156-59-2	cis-1,2-Dichloroethene	0.0012 J	0.0012 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.0012	NA	16 N	220 N	No	BSL
	75-09-2	Methylene Chloride	0.00486 J	0.00486 J	mg/kg	23SB006-0608	1/12	0.00425 - 0.273	0.00486	NA	35 N	490 N	No	BSL
	108-88-3	Toluene	0.00178 J	0.00378 J	mg/kg	23SB001-1012	2/14	0.00222 - 0.136	0.00378	NA	490 N	820 S	No	BSL
	75-01-4	Vinyl Chloride	0.00144 J	0.00144 J	mg/kg	23SB001-1012	1/12	0.00222 - 0.136	0.00144	NA	0.059 C	0.83 C	No	BSL
	Polycyclic Aromatic Hydrocarbons													
	90-12-0	1-Methylnaphthalene	0.048 J	0.37 J	mg/kg	23SB068-0406	2/39	0.0038 - 0.07	0.37	NA	18 C	240 C	No	BSL
	91-57-6	2-Methylnaphthalene	0.0041 J	0.5 J	mg/kg	23SB068-0406	7/58	0.00358 - 0.162	0.5	NA	24 N	320 N	No	BSL
	83-32-9	Acenaphthene	0.0046 J	3.6 J	mg/kg	23SB068-0406	3/58	0.00358 - 0.162	3.6	NA	360 N	4,900 N	No	BSL
	208-96-8	Acenaphthylene	0.00554 J	1 J	mg/kg	23SB068-0204	7/58	0.00358 - 0.162	1	NA	360 N[7]	NA	No	BSL
	120-12-7	Anthracene	0.00427 J	7.6 J	mg/kg	23SB068-0406	6/58	0.00358 - 0.162	7.6	NA	1,800 N	24,000 N	No	BSL
	56-55-3	**Benzo(a)anthracene**	0.0046 J	17 J	mg/kg	23SB068-0406	18/58	0.00358 - 0.162	17	NA	**0.16 C**	**2.1 C**	**Yes**	ASL
	50-32-8	**Benzo(a)pyrene**	0.0045 J	12 J	mg/kg	23SB068-0406	27/58	0.00358 - 0.162	12	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
	205-99-2	**Benzo(b)fluoranthene**	0.004 J	18 J	mg/kg	23SB068-0406	27/58	0.00358 - 0.162	18	NA	**0.16 C**	**2.1 C**	**Yes**	ASL
	191-24-2	Benzo(g,h,i)perylene	0.0093	7.6 J	mg/kg	23SB068-0406	23/58	0.00358 - 0.162	7.6	NA	180 N[8]	NA	No	BSL
	207-08-9		0.0025 J	7.2 J	mg/kg	23SB068-0406	21/58	0.00358 - 0.162	7.2	NA	**1.6 C**	21 C	**Yes**	ASL
	218-01-9	Chrysene	0.0043 J	16 J	mg/kg	23SB068-0406	26/58	0.00358 - 0.162	16	NA	16 C	210 C	No	BSL
	53-70-3	**Dibenzo(a,h)anthracene**	0.0077 J	2.6 J	mg/kg	23SB068-0406	7/58	0.00358 - 0.162	2.6	NA	**0.016 C**	**0.21 C**	**Yes**	ASL
	206-44-0	Fluoranthene	0.0053 J	33 J	mg/kg	23SB068-0406	24/58	0.00358 - 0.162	33	NA	240 N	3,200 N	No	BSL
	86-73-7	Fluorene	0.0046 J	5 J	mg/kg	23SB068-0406	3/58	0.00358 - 0.162	5	NA	240 N	3,200 N	No	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	0.0068 J	8.9 J	mg/kg	23SB068-0406	15/58	0.00358 - 0.162	8.9	NA	**0.16 C**	**2.1 C**	**Yes**	ASL
	91-20-3	Naphthalene	0.0045 J	0.54 J	mg/kg	23SB068-0406	3/58	0.00358 - 0.162	0.54	NA	3.8 C	53 C	No	BSL
	85-01-8	Phenanthrene	0.0032 J	31 J	mg/kg	23SB068-0406	24/58	0.00358 - 0.162	31	NA	180 N[8]	NA	No	BSL
	129-00-0	Pyrene	0.0056 J	25 J	mg/kg	23SB068-0406	28/58	0.00358 - 0.162	25	NA	180 N	2,400 N	No	BSL
	Metals													
	7440-38-2	**Arsenic**	1.28 J	19.7	mg/kg	23SB024-0406	17/17	--	19.7	**12.5**	**0.68 C**	**9.4 C**	**Yes**	ASL
	7440-39-3	Barium	8.52 J	88.4	mg/kg	23SB001-1012	17/17	--	88.4	115	1,500 N	21,000 N	No	BSL, BKG
	7440-41-7	Beryllium	0.287	0.795 J	mg/kg	23SB025-0608	12/17	0.362 - 0.582	0.795	NA	16 N	220 N	No	BSL
	7440-43-9	Cadmium	0.618 J	0.618 J	mg/kg	23SB025-0608	1/17	0.113 - 0.643	0.618	0.8	7.1 N	98 N	No	BSL, BKG
	7440-47-3	Chromium	4.92	29.8	mg/kg	23SB003-0810	17/17	--	29.8	33	**0.3 C[9]**	**4.2 C[9]**	No	BKG
	7440-48-4	Cobalt	2.16 J	11.4	mg/kg	23SB025-0608	15/17	2.57 - 2.78	11.4	21.2	**2.3 N**	32 N	No	BKG
	7440-50-8	Copper	3.35	41.3	mg/kg	23SB024-0406	17/17	--	41.3	**33.3**	310 N	4,300 N	No	BSL
	7439-92-1	Lead	2.33	29 J	mg/kg	23SB088-0204	32/32	--	29	**19.6**	400	400	No	BSL
	7439-97-6	Mercury	0.022 J	0.0882	mg/kg	23SB024-0406	15/17	0.249 - 0.249	0.0882	0.18	2.3 N[10]	3.1 S	No	BSL, BKG
	7440-02-0	Nickel	2.14 J	18	mg/kg	23SB025-0608	17/17	--	18	29.6	150 N	2,100 N	No	BSL, BKG
	7782-49-2	Selenium	0.169 J	0.169 J	mg/kg	23SB085-0204, 23SB085-0406	2/17	0.282 - 1.61	0.169	1.07	39 N	550 N	No	BSL, BKG
	7440-22-4	Silver	0.122 J	0.122 J	mg/kg	23SB037-0204	1/17	0.113 - 1.45	0.122	0.13	39 N	550 N	No	BSL, BKG
	7440-62-2	Vanadium	5.8	51.2	mg/kg	23SB003-0810	17/17	--	51.2	69.1	**39 N**	550 N	No	BKG
	7440-66-6	Zinc	11.1	74.3	mg/kg	23SB025-0608	15/17	3.85 - 7.59	74.3	83.3	2,300 N	32,000 N	No	BSL, BKG
	Miscellaneous Parameters													
	14808-79-8	Sulfate	21.2 J	95.9 J	mg/kg	23SB025-0406	3/3	-	95.9	NA	NA	NA	No	NTX
	--	pH	7.89	8.8	S.U.	23SB025-0406	3/3	-	8.8	NA	NA	NA	No	NTX
	Petroleum Hydrocarbons													
	--	DRO (C08-C28)	11.5 J	2,220	mg/kg	23SB001-1012	4/12	7.15 - 8.06	2,220	NA	NA	NA	No	NTX
	--	DRO (C08-C34)	8.53 J	3,490	mg/kg	23SB001-1012	12/12	-	3,490	NA	NA	NA	No	NTX
	--	Gasoline Range Organics	4.75 J	5.03 J	mg/kg	23SB026-0608	2/12	4.28 - 5.46	5.03	NA	NA	NA	No	NTX

TABLE 2.2
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - Upper tolerance limits (representing 95 percent coverage of the soil population with 95 percent confidence), Final Base-Wide Background Soil Investigation Report for NSWC, Tetra Tech, 2001.
4 - USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, June 2015. The noncarcinogenic values (denoted with a "N" flag) 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).
5 - IDEM Closure Guide, March 2, 2015.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is determined to be greater than site background.
7 - Value is for acenaphthene.
8 - Value is for pyrene.
9 - Value is for hexavalent chromium.
10 - Value is for mercuric chloride (and other mercury salts).
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Definitions:
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
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 = Less than background concentration
BSL = Below COPC screening level
NTX = No toxicity criteria

Associated Samples:

23SB001-0204	23SB068-0204
23SB001-0406	23SB068-0406
23SB001-1012	23SB069-0204
23SB002-0204	23SB069-0406
23SB002-0406	23SB070-0204
23SB002-1012	23SB070-0406
23SB003-0204	23SB071-0204
23SB003-0406	23SB071-0406
23SB003-0810	23SB072-0204
23SB004-0406	23SB072-0406
23SB004-0810	23SB073-0204
23SB005-0810	23SB073-0406
23SB006-0608	23SB074-0204
23SB024-0406	23SB074-0406
23SB024-0608	23SB075-0204
23SB025-0406	23SB075-0406
23SB025-0608	23SB076-0203
23SB026-0406	23SB083-0204
23SB026-0608	23SB083-0406
23SB027-0204	23SB084-0204
23SB028-0204	23SB084-0406
23SB029-0204	23SB085-0204
23SB030-0204	23SB085-0406
23SB032-0204	23SB086-0204
23SB034-0204	23SB086-0406
23SB036-0204	23SB087-0204
23SB037-0204	23SB087-0406
23SB048-0204	23SB088-0204
23SB048-0406	23SB088-0406
23SB059-0204	23SB089-0204
23SB063-0204	23SB089-0406
23SB063-0406	23SB090-0204
23SB064-0204	23SB090-0406
23SB064-0406	23SB091-0204
23SB066-0204	23SB091-0406
23SB066-0406	23SB092-0204
23SB067-0204	23SB092-0406

TABLE 2.3
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE WATER
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[1]	Concentration Used for Screening[2]	Background Upper Tolerance Limit[3]	USEPA RSL Tapwater[4]	USEPA MCL[5]	IDEM Groundwater Residential[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
SWMU 23	**Total Metals (Unfiltered)**														
	7440-38-2	**Arsenic**	2.16 J	2.16 J	ug/L	23SW001	1/6	1.5 - 1.5	2.16	NA	**0.052 C**	10	10 M	**Yes**	ASL
	7440-39-3	Barium	39	144	ug/L	23SW001	6/6	-	144	NA	380 N	2,000	2,000 M	No	BSL
	7440-47-3	**Chromium**	0.56 J	3.21 J	ug/L	23SW001	3/6	1 - 1	3.21	NA	**0.035 C[8]**	100	**0.35 C[8]**	**Yes**	ASL
	7440-48-4	**Cobalt**	3.44	3.44	ug/L	23SW001	1/6	2.5 - 2.5	3.44	NA	**0.6 N**	NA	6 N	**Yes**	ASL
	7440-50-8	Copper	1.26 J	10.7	ug/L	23SW001	4/6	2 - 2	10.7	NA	80 N	1,300 [9]	1,300 M	No	BSL
	7439-89-6	**Lead**	0.685 J	16.3	ug/L	23SW001	3/6	0.75 - 0.75	16.3	NA	**15**	**15 [9]**	**15 M**	**Yes**	ASL
	7439-92-1	Nickel	1.08 J	12.8	ug/L	23SW006	6/6	-	12.8	NA	39 N	NA	390 N	No	BSL
	7440-62-2	Vanadium	7.29 J	7.29 J	ug/L	23SW001	1/6	2.5 - 2.5	7.29	NA	8.6 N	NA	86 N	No	BSL
	7440-66-6	Zinc	1.31 J	62.6 J	ug/L	23SW001	6/6	-	62.6	NA	600 N	NA	6,000 N	No	BSL
	Dissolved Metals (Filtered)														
	7440-39-3	Barium	38.9	73	ug/L	23SW001	6/6	-	73	NA	380 N	2,000	2,000 M	No	BSL
	7440-50-8	Copper	1.42 J	2.46 J	ug/L	23SW004	3/6	2 - 2	2.46	NA	80 N	1,300 [9]	1,300 M	No	BSL
	7439-92-1	Nickel	0.907 J	12.2	ug/L	23SW006	6/6	-	12.2	NA	39 N	NA	390 N	No	BSL
	7440-66-6	Zinc	1.82 J	14	ug/L	23SW006	5/6	2.5 - 2.5	14	NA	600 N	NA	6,000 N	No	BSL

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - No background data is available for surface water.
4 - USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, June 2015. The noncarcinogenic values (denoted with a "N" flag) are the screening level 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).
5 - 2012 Edition of the Drinking Water Standards and Health Advisories (USEPA, April 2012).
6 - IDEM Closure Guide, March 2, 2015.
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level.
8 - Values are for hexavalent chromium.
9 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Associated Samples
23SW001
23SW002
23SW003
23SW004
23SW005
23SW006

Definitions:
C = Carcinogen
CAS = Chemical Abstracts Service
COPC = Chemical Of Potential Concern
J = Estimated value
M = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available

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

For elimination as a COPC:
BSL = Below COPC Screening Level

TABLE 2.4
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[1]	Concentration Used for Screening[2]	Background Upper Tolerance Limit[3]	USEPA RSL Residential Soil[4]	IDEM Residential Soil[5]	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
SWMU 23	**Volatile Organic Compounds**													
	79-01-6	Trichloroethene	1.24 J	1.24 J	ug/kg	23SD009-0006	1/7	130 - 276	1.24	NA	410 N	5,700 N	No	BSL
	Polycyclic Aromatic Hydrocarbons													
	91-57-6	2-Methylnaphthalene	8.34	8.34	ug/kg	23SD004-0006	1/7	4.18 - 34.7	8.34	NA	24,000 N	320,000 N	No	BSL
	208-96-8	Acenaphthylene	6.85 J	6.85 J	ug/kg	23SD006-0006	1/7	3.92 - 34.7	6.85	NA	360,000 N[7]	NA	No	BSL
	50-32-8	**Benzo(a)pyrene**	6.04 J	255	ug/kg	23SD006-0006	5/7	18.7 - 21.6	255	NA	**16 C**	**210 C**	**Yes**	ASL
	205-99-2	**Benzo(b)fluoranthene**	5.83 J	254	ug/kg	23SD006-0006	6/7	18.7 - 18.7	254	NA	**160 C**	2,100 C	**Yes**	ASL
	191-24-2	Benzo(g,h,i)perylene	9.98	185	ug/kg	23SD006-0006	4/7	4.24 - 21.6	185	NA	180,000 N[8]	NA	No	BSL
	207-08-9	Benzo(k)fluoranthene	4.76 J	141	ug/kg	23SD006-0006	4/7	18.7 - 21.7	141	NA	1,600 C	21,000 C	No	BSL
	218-01-9	Chrysene	8.54	98.9	ug/kg	23SD001-0006	3/7	4.18 - 21.6	98.9	NA	16,000 C	210,000 C	No	BSL
	53-70-3	**Dibenzo(a,h)anthracene**	88.4	88.4	ug/kg	23SD006-0006	1/7	3.92 - 34.7	88.4	NA	**15 C**	210 C	**Yes**	ASL
	206-44-0	Fluoranthene	8.4	101	ug/kg	23SD001-0006	6/7	18.7 - 18.7	101	NA	240,000 N	3,200,000 N	No	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	4.92 J	164	ug/kg	23SD006-0006	5/7	18.7 - 21.6	164	NA	**160 C**	2,100 C	**Yes**	ASL
	85-01-8	Phenanthrene	12	12	ug/kg	23SD004-0006	1/7	4.18 - 34.7	12	NA	180,000 N[8]	NA	No	BSL
	129-00-0	Pyrene	9.48	92.9	ug/kg	23SD001-0006	6/7	18.7 - 18.7	92.9	NA	180,000 N	2,400,000 N	No	BSL
	PCBs													
	11097-69-1	Aroclor-1254	2.98 J	2.98 J	ug/kg	23SD005-0006	1/6	2.03 - 3.41	2.98	NA	120 N	1,500 N	No	BSL
	11096-82-5	Aroclor-1260	2.24 J	10.8 J	ug/kg	23SD002-0006	5/6	2.17 - 2.17	10.8	NA	240 C	3,400 C	No	BSL
	Metals													
	7440-38-2	**Arsenic**	4.59	12.3	mg/kg	23SD003-0006	7/7	-	12.3	**11.83**	**0.68 C**	**9.4 C**	**Yes**	ASL
	7440-39-3	Barium	20.9	219	mg/kg	23SD001-0006	7/7	-	219	**211**	1,500 N	21,000 N	No	BSL
	7440-41-7	Beryllium	0.46	1.48 J	mg/kg	23SD004-0006	7/7	-	1.48	**0.93**	16 N	220 N	No	BSL
	7440-43-9	Cadmium	0.478 J	0.76 J	mg/kg	23SD001-0006	2/7	0.586 - 0.684	0.76	6.05	7.1 N	98 N	No	BSL, BKG
	7440-47-3	**Chromium**	9.63	35.2	mg/kg	23SD004-0006	7/7	-	35.2	**28.7**	**0.3 C[9]**	**4.2 C[9]**	**Yes**	ASL
	7440-48-4	**Cobalt**	4.65	62	mg/kg	23SD003-0006	7/7	-	62	**32.4**	**2.3 N**	**32 N**	**Yes**	ASL
	7440-50-8	Copper	6.1	34.4	mg/kg	23SD001-0006	7/7	-	34.4	**17.6**	310 N	4,300 N	No	BSL
	7439-92-1	Lead	9.19	52.3	mg/kg	23SD001-0006	7/7	-	52.3	**27**	400	400	No	BSL
	7439-97-6	Mercury	0.0171 J	0.14	mg/kg	23SD001-0006	7/7	-	0.14	**0.077**	2.3 N[10]	32 N[10]	No	BSL
	7440-02-0	Nickel	17.4	48.1	mg/kg	23SD004-0006	7/7	-	48.1	**22.1**	150 N	2,100 N	No	BSL
	7440-22-4	Silver	0.959 J	0.959 J	mg/kg	23SD002-0006	1/7	0.586 - 1.1	0.959	**0.13**	39 N	550 N	No	BSL
	7440-62-2	Vanadium	9.1	35.2	mg/kg	23SD001-0006	7/7	-	35.2	51.2	39 N	550 N	No	BSL, BKG
	7440-66-6	Zinc	42.1	207	mg/kg	23SD001-0006	7/7	-	207	**65.6**	2,300 N	32,000 N	No	BSL

Footnotes:
1 - Values presented are sample-specific quantitation limits.
2 - The maximum detected concentration is used for screening purposes.
3 - Upper tolerance limits (representing 95 percent coverage of the soil population with 95 percent confidence), Final Base-Wide Background Soil Investigation Report for NSWC, Tetra Tech, 2001.
4 - USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, June 2015. The noncarcinogenic values (denoted with a "N" flag) are the screening level 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).
5 - IDEM Closure Guide, March 1, 2015.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level. and is determined to be greater than site background.
7 - Value is for acenaphthene.
8 - Value is for pyrene.
9 - Value is for hexavalent chromium.
10 - Value is for mercuric chloride (and other mercury salts).
Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the

Associated Samples
23SD001-0006
23SD002-0006
23SD003-0006
23SD004-0006
23SD005-0006
23SD006-0006
23SD009-0006

Definitions:
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
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 = Less than Background Concentration
BSL = Below COPC Screening Level

RAGS Part D Table 3

Medium-Specific Exposure Point Concentration Summary

LIST OF TABLES

RAGS PART D TABLE 3

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Table No.

3.1.RME	Surface Soil
3.2.RME	Subsurface Soil
3.3.RME	Surface Water
3.4.RME	Sediment

TABLE 3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current
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 23	Benzo(a)anthracene	mg/kg	0.080	0.137 (G)	0.99	0.137	mg/kg	95% Adjusted Gamma KM-UCL	ProUCL 5.0.00
	Benzo(a)pyrene	mg/kg	0.100	0.155 (G)	0.97	0.155	mg/kg	95% Adjusted Gamma KM-UCL	ProUCL 5.0.00
	Benzo(b)fluoranthene	mg/kg	0.150	0.235 (G)	1.3	0.235	mg/kg	95% Adjusted Gamma KM-UCL	ProUCL 5.0.00
	Dibenzo(a,h)anthracene	mg/kg	0.030	0.031 (AN)	0.23	0.031	mg/kg	95% KM (t) UCL	ProUCL 5.0.00
	Indeno(1,2,3-cd)pyrene	mg/kg	0.056	0.080 (G)	0.5	0.080	mg/kg	95% Adjusted Gamma KM-UCL	ProUCL 5.0.00
	Aroclor-1254	mg/kg	0.014	0.092 (NP)	0.191 J	0.092	mg/kg	97.5% KM (Chebyshev) UCL	ProUCL 5.0.00
	Arsenic	mg/kg	5.33	6.60 (G)	17.8	6.6	mg/kg	95% Adjusted Gamma UCL	ProUCL 5.0.00
	Chromium	mg/kg	12.5	14.8 (AN)	29.5 J	14.8	mg/kg	95% Student's-t UCL	ProUCL 5.0.00

AN = Approximate normal
G = Gamma
NP = Non-parametric

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: 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 23	Benzo(a)anthracene	mg/kg	0.429	3.54 (L)	17 J	3.54	mg/kg	99% KM (Chebyshev) UCL	ProUCL 5.0.00
	Benzo(a)pyrene	mg/kg	0.353	1.36 (AL)	12 J	1.36	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.0.00
	Benzo(b)fluoranthene	mg/kg	0.528	2.03 (L)	18 J	2.03	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.0.00
	Benzo(k)fluoranthene	mg/kg	0.224	1.63 (L)	7.2 J	1.63	mg/kg	99% KM (Chebyshev) UCL	ProUCL 5.0.00
	Dibenzo(a,h)anthracene	mg/kg	0.086	0.356 (AG)	2.6 J	0.356	mg/kg	95% Approximate Gamma KM-UCL	ProUCL 5.0.00
	Indeno(1,2,3-cd)pyrene	mg/kg	0.262	2.02 (NP)	8.9 J	2.02	mg/kg	99% KM (Chebyshev) UCL	ProUCL 5.0.00
	Arsenic	mg/kg	7.04	9.03 (N)	19.7	9.03	mg/kg	95% Student's-t UCL	ProUCL 5.0.00

N = Normal
AG = Approximate gamma
AL = Approximate lognormal
L = Lognormal

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.3.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSA 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 23	Arsenic	ug/L	0.985	(1)	2.16 J	2.16	ug/L	Maximum Detected Concentration	(1)
	Chromium	ug/L	0.992	(1)	3.21	3.21	ug/L	Maximum Detected Concentration	(1)
	Cobalt	ug/L	1.62	(1)	3.44 J	3.44	ug/L	Maximum Detected Concentration	(1)
	Lead	ug/L	3.15	(1)	16.3	3.15	ug/L	Arithmetic Mean Concentration	(2)

AN = Approximate normal
1 - There were an insufficient number of samples to calculate statistisc therefore the maximum detected concentration was used as the exposure point concentration.
2 - USEPA Guidance recommends using the average concentration for the exposure point concentration for lead.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.4.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSA 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 23	Benzo(a)pyrene	mg/kg	0.058	0.125 (AN)	0.255	0.125	mg/kg	95% KM (t) UCL	ProUCL 5.0.00
	Benzo(b)fluoranthene	mg/kg	0.066	0.133 (AN)	0.254	0.133	mg/kg	95% KM (t) UCL	ProUCL 5.0.00
	Dibenzo(a,h)anthracene	mg/kg	0.022	(1)	0.0884	0.088	mg/kg	Maximum Detected Concentration	(1)
	Indeno(1,2,3-cd)pyrene	mg/kg	0.072	0.084 (N)	0.164	0.084	mg/kg	95% KM (t) UCL	ProUCL 5.0.00
	Arsenic	mg/kg	8.94	10.8 (N)	12.3	10.8	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Chromium	mg/kg	29.4	26.2 (N)	35.2	26.2	mg/kg	95% Approximate Gamma UCL	ProUCL 5.0.00
	Cobalt	mg/kg	22.8	76.13 (G)	62	62	mg/kg	Maximum Detected Concentration	(2)

AN = Approximate normal
G = Gamma
N = Normal
1 - There are less than four detected concentrations. Reliable statistics cannot be computed. The Maximum concentration was used as the exposure point concentration.
2 - The recommended UCL exceeds the maximum detected concentration therefore the maximum detected concentration was used as the exposure point concentration.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

RAGS Part D Table 4

Values Used For Daily Intake Calculations

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VALUES USED FOR DAILY INTAKE CALCULATIONS

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4.2.RME Construction Workers Exposed to Air Emissions from Surface Soil/Subsurface Soil
4.3.RME Industrial Workers Exposed to Surface Soil/Subsurface Soil
4.4.RME Industrial Workers Exposed to Air Emissions from Surface Soil/Subsurface Soil
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Central Tendency Exposures

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TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKERS- SOILS

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	330	mg/day	USEPA, 2002b	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 2002b	BW x AT
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	
Dermal	Construction Workers	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	

Notes:

1 - Professional judgment. Assumes a 30 week construction project over one year.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002a:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.2.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKERS - SOILS TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	150	days/year	(1)	AT x 24 hours/day
				ED	Exposure Duration	1	years	(1)	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
				PEF	Particulate Emission Factor	1.34E+06	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	14.31	g/m2-s per kg/m3	USEPA, 2002a	

Notes:

1 - Professional judgment. Assumes a 30 week construction project over one year.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - INDUSTRIAL WORKERS - SOIL

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Workers	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 2014	BW x AT
				EF	Exposure Frequency	250	days/year	USEPA, 2014	
				ED	Exposure Duration	25	years	USEPA, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 2014	
Dermal	Industrial Workers	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3527	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.12	mg/cm2/event	USEPA, 2014	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	250	days/year	USEPA, 2014	
				ED	Exposure Duration	25	years	USEPA, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 2014	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - INDUSTRIAL WORKERS - SOIL TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Workers	Adult	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	250	days/year	USEPA, 2014	AT x 24 hours/day
				ED	Exposure Duration	25	years	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	

Notes:

1 - Length of typical work day.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT TRESPASSERS - SOILS

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2011	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 2011	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	10	years	(2)	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 2014	
Dermal	Trespassers	Adolescent	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3,750	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	10	years	(2)	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 2014	

Notes:

For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

1 - Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.

2 - Older child from age 6 to 17.

3 - Assumes face, forearms, hands, and lower legs are exposed (USEPA, 2011).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT TRESPASSERS - SOILS TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Trespassers	Adolescent	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	4	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	26	days/year	(1)	AT x 24 hours/day
				ED	Exposure Duration	10	years	(2)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	

Notes:

For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

1 - Professional judgment. Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.

2 - Older child from age 6 to 17.

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT TRESPASSERS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hour	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	4	hours/event	(1)	CW x CF x CR x ET x EF x ED
				EF	Exposure Frequency	52	events/year	(1)	BW x AT
				ED	Exposure Duration	10	years	(2), USEPA, 1989, 2005	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	
Dermal	Trespassers	Adolescent	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	4	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	3,750	cm2	(3)	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	For organics if tevent > t*
				ED	Exposure Duration	10	years	(2), USEPA, 1989, 2005	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				BW	Body Weight	45	kg	USEPA, 2011	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	

Notes:

1 - Professional judgment. Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.

2 - For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

3 - Assumes face, forearms, hands, and lower legs are exposed (USEPA, 2011).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition. Table 3-93. Value is upper confidence limit for fishing.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.8.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT TRESPASSERS - SEDIMENT

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2011	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CSx IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	10	years	(2), USEPA, 1989, 2005	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	
Dermal	Trespassers	Adolescent	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,750	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	10	years	(2), USEPA, 1989, 2005	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	

Notes:

1 - Professional judgment. Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.

2 - For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

3 - Assumes face, forearms, hands, and lower legs are exposed (USEPA, 2011).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.9.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - RECREATIONAL USERS - SOILS
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Child	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	52	days/year	(2)	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	52	days/year	(2)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Recreational User	Child	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	52	days/year	(2)	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	

TABLE 4.9.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - RECREATIONAL USERS - SOILS

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Recreational User	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	52	days/year	(2)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - The recreational user is assumed to be at the site only a portion of the day.

2 - Assume four days a week in warm weather months for RME and two days a week for CTE.

3 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.10.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - RECREATIONAL USERS - SOILS TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational User	Child	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	4	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	52	days/year	(1)	AT x 24 hours/day
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	
		Adult	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	4	hours/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment.

2 - Assume four days a week in warm weather months for RME and two days a week for CTE.

3 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.11.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - RECREATIONAL USERS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Child	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hr	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	4	hours/event	(1)	CW x CF x CR x ET x EF x ED
				EF	Exposure Frequency	52	events/year	(1)	BW x AT
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
		Adult	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	
				CR	Contact Rate	0.01	L/hour	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	4	hours/event	(1)	
				EF	Exposure Frequency	52	events/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Recreational User	Child	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	4	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	For organics if tevent > t*
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	

TABLE 4.11.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - RECREATIONAL USERS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Recreational User	Adult	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002a	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	4	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	For organics if tevent > t*
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment., Assume two days a week in warm weather months for RME and one day a week for CTE.

2 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition. Table 3-93. Value is upper confidence limit for fishing.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.12.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - RECREATIONAL USERS - SEDIMENT
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Child	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Recreational User	Child	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	

TABLE 4.12.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - RECREATIONAL USERS - SEDIMENT

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Recreational User	Adult	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment. Assume two days a week in warm weather months for RME and one day a week for CTE.

2 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.13.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - RESIDENTS - SOILS
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 2014	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				FI	Fraction Ingested	1	unitless	USEPA, 2014	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

TABLE 4.13.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - RESIDENTS - SOILS
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Child	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2004	
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.14.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - RESIDENTS SOILS TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Child	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014	CA x ET x EF x ED
				EF	Exposure Frequency	350	days/year	USEPA, 2014	AT x 24 hours/day
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	
		Adult	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(1), USEPA, 2005, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.15.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - RESIDENTS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hr	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	4	hours/event	(1)	CW x CF x CR x ET x EF x ED
				EF	Exposure Frequency	52	events/year	(1)	BW x AT
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
		Adult	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	
				CR	Contact Rate	0.01	L/hour	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	4	hours/event	(1)	
				EF	Exposure Frequency	52	events/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Resident	Child	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	4	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	For organics if tevent > t*
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	

TABLE 4.15.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - RESIDENTS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002a	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	4	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	For organics if tevent > t*
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment.

2 - Assume two days a week in warm weather months for RME and one day a week for CTE.

3 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition. Table 3-93. Value is upper confidence limit for fishing.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.16.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - RESIDENTS - SEDIMENT
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Resident	Child	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	

TABLE 4.16.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - RESIDENTS - SEDIMENT
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	52	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment. Assume two days a week in warm weather months for RME and one day a week for CTE.

2 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.1.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CONSTRUCTION WORKERS - SOILS

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	165	mg/day	(1)	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 2002b	BW x AT
				EF	Exposure Frequency	75	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	
Dermal	Construction Workers	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.1	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	75	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	

Notes:

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002a:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.2.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CONSTRUCTION WORKERS - SOILS TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	75	days/year	(1)	AT x 24 hours/day
				ED	Exposure Duration	1	years	(1)	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
				PEF	Particulate Emission Factor	1.34E+06	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	14.31	g/m2-s per kg/m3	USEPA, 2002a	

Notes:

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

TABLE 4.3.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - INDUSTRIAL WORKERS - SOIL

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Workers	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1993	BW x AT
				EF	Exposure Frequency	219	days/year	USEPA, 1993	
				ED	Exposure Duration	9	years	USEPA, 1993	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3285	days	USEPA, 2014	
Dermal	Industrial Workers	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	219	days/year	USEPA, 1993	
				ED	Exposure Duration	9	years	USEPA, 1993	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3285	days	USEPA, 2014	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.4.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - INDUSTRIAL WORKERS - SOIL TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Workers	Adult	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	219	days/year	USEPA, 1993	AT x 24 hours/day
				ED	Exposure Duration	9	years	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	3285	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	

Notes:

1 - Length of typical work day.

Sources:

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.5.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT TRESPASSERS - SOILS

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CSs x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1993	BW x AT
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	10	years	(2)	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 2014	
Dermal	Trespassers	Adolescent	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3,750	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	10	years	(2)	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 2014	

Notes:

For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

1 - Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.

2 - Older child from age 6 to 17.

3 - Assumes face, forearms, hands, and lower legs are exposed (USEPA, 2011).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.6.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT TRESPASSERS - SOILS TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Trespassers	Adolescent	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	2	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	13	days/year	(1)	AT x 24 hours/day
				ED	Exposure Duration	10	years	(2)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at	68.18	g/m2-s per	USEPA, 2002a	
					center of source	Chemical-specific	kg/m3		

Notes:

1 - Professional judgment. Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.

2 - Older child from age 6 to 17.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.7.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT TRESPASSERS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hour	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	2	hours/event	(1)	CW x CF x CR x ET x EF x ED
				EF	Exposure Frequency	26	events/year	(1)	BW x AT
				ED	Exposure Duration	10	years	(2), USEPA, 1989, 2005	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	
Dermal	Trespassers	Adolescent	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	2	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	3,750	cm2	(3)	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	26	days/year	(1)	For organics if tevent > t*
				ED	Exposure Duration	10	years	(2), USEPA, 1989, 2005	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				BW	Body Weight	45	kg	USEPA, 2011	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	

Notes:

1 - Professional judgment. Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.

2 - For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

3 - Assumes face, forearms, hands, and lower legs are exposed (USEPA, 2011).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition. Table 3-93. Value is upper confidence limit for fishing.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.8.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT TRESPASSERS - SEDIMENT

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespassers	Adolescent	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	0.5	unitless	(1)	BW x AT
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	10	years	(2), USEPA, 1989, 2005	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	
Dermal	Trespassers	Adolescent	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,750	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	10	years	(2), USEPA, 1989, 2005	
				BW	Body Weight	45	kg	USEPA, 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 2014	

Notes:

1 - Professional judgment. Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.

2 - For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

3 - Assumes face, forearms, hands, and lower legs are exposed (USEPA, 2011).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.9.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - RECREATIONAL USERS - SOILS
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Child	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	26	days/year	(2)	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
		Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Recreational User	Child	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(2)	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	

TABLE 4.9.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - RECREATIONAL USERS - SOILS

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Recreational User	Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - The recreational user is assumed to be at the site only a portion of the day.

2 - Assume four days a week in warm weather months for CTE and two days a week for CTE.

3 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.10.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - RECREATIONAL USERS - SOILS TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational User	Child	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	2	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	26	days/year	(1)	AT x 24 hours/day
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	
		Adult	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	2	hours/day	(1)	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment.

2 - Assume four days a week in warm weather months for CTE and two days a week for CTE.

3 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.11.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - RECREATIONAL USERS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Child	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hr	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	2	hours/event	(1)	CW x CF x CR x ET x EF x ED
				EF	Exposure Frequency	26	events/year	(1)	BW x AT
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
		Adult	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	
				CR	Contact Rate	0.01	L/hour	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	2	hours/event	(1)	
				EF	Exposure Frequency	26	events/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Recreational User	Child	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm3	- -	BW x AT
				Kp	PeCTEability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	2	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	26	days/year	(1)	For organics if tevent > t*
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	

TABLE 4.11.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - RECREATIONAL USERS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Recreational User	Adult	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002a	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm3	- -	BW x AT
				Kp	PeCTEability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	2	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	26	days/year	(1)	For organics if tevent > t*
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment., Assume two days a week in warm weather months for CTE and one day a week for CTE.

2 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition. Table 3-93. Value is upper confidence limit for fishing.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.12.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - RECREATIONAL USERS - SEDIMENT
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Child	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	(1)	BW x AT
				FI	Fraction Ingested	0.5	unitless	USEPA, 1993	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 1989	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Recreational User	Child	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	

TABLE 4.12.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - RECREATIONAL USERS - SEDIMENT

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Recreational User	Adult	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	70	kg	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 1989	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment. Assume two days a week in warm weather months for CTE and one day a week for CTE.

2 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.13.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - RESIDENTS - SOILS
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 1993	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				FI	Fraction Ingested	1	unitless	USEPA, 1993	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

TABLE 4.13.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - RESIDENTS - SOILS
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Child	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	USEPA, 2004	
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.14.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - RESIDENTS SOILS TO AIR

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Child	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 1993	CA x ET x EF x ED
				EF	Exposure Frequency	234	days/year	USEPA, 1993	AT x 24 hours/day
				ED1	Exposure Duration (Age 0 - 2)	1	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(1), USEPA, 2005, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA, 2002a	
		Adult	SWMU 23	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 1993	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(1), USEPA, 2005, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.32E+09	m3/kg	USEPA 2004	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	68.18	g/m2-s per kg/m3	USEPA 2008	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.15.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - RESIDENTS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	Chronic Daily Intake (CDI) (mg/kg/day) =
				CR	Contact Rate	0.01	L/hr	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	2	hours/event	(1)	CW x CF x CR x ET x EF x ED
				EF	Exposure Frequency	26	events/year	(1)	BW x AT
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
		Adult	SWMU 23	CW	Chemical Concentration in Water	Max or 95% UCL	ug/L	USEPA, 2002	
				CR	Contact Rate	0.01	L/hour	USEPA, 2011	
				CF	Conversion factor	0.001	mg/ug	- -	
				ET	Exposure Time	2	hours/event	(1)	
				EF	Exposure Frequency	26	events/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Resident	Child	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm3	- -	BW x AT
				Kp	PeCTEability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	2	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	26	days/year	(2)	For organics if tevent > t*
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	

TABLE 4.15.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - RESIDENTS - SURFACE WATER

NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	SWMU 23	DAevent	Absorbed dose per event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Water	Max or 95% UCL	mg/kg	USEPA, 2002	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm3	- -	BW x AT
				Kp	PeCTEability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	2	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	26	days/year	(1)	For organics if tevent > t*
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment.

2 - Assume two days a week in warm weather months for CTE and one day a week for CTE.

3 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2011: Exposure Factors Handbook: 2011 Edition. Table 3-93. Value is upper confidence limit for fishing.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.16.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - RESIDENTS - SEDIMENT
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	(1)	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
		Adult	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.
Dermal	Resident	Child	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	

TABLE 4.16.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - RESIDENTS - SEDIMENT
NSWC CRANE, CRANE INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	SWMU 23	CS	Chemical concentration in sediment	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
		Lifelong (Child/Adult)	SWMU 23	--	--	--	--	--	Child/adult cancer risk will be calculated as the sum of the child cancer risk and adult cancer risk.

Notes:

1 - Professional judgment. Assume two days a week in warm weather months for CTE and one day a week for CTE.

2 - For non-mutagenic chemicals children will be evaluated as one age group (0 - 6 years) and adults as one age group (7 - 26 years). For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years and residential adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

RAGS Part D Table 5

Non-Cancer Toxicity Data

LIST OF TABLES
RAGS PART D TABLE 5
NON-CANCER TOXICITY DATA

Table No.

5-1 Non-Cancer Toxicity Data - Oral/Dermal
5-2 Non-Cancer Toxicity Data - Inhalation

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SWMU 23 - BATTERY SHOP BUILDING 36
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
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
PCBs										
Aroclor-1254	Subchronic	3.0E-05	mg/kg/day	1	3.0E-05	mg/kg/day	Central Nervous System	300/1	ATSDR	11/2000
	Chronic	2.0E-05	mg/kg/day	1	2.0E-05	mg/kg/day	Whole Body	300/1	IRIS	9/16/2015
Inorganics										
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, Cardiovascular System	3/1	IRIS	9/16/2015
Chromium[3]	Subchronic	5.0E-03	mg/kg/day	0.025	1.3E-04	mg/kg/day	Kidney	100/1	ATSDR	9/2012
	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	None Reported	300/3	IRIS	9/16/2015
Cobalt	Subchronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Thyroid	300/1	PPRTV	8/25/2008
	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Thyroid	3000/1	PPRTV	8/25/2008
Lead	NA	NA	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 dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.
3 - Values are for hexavalent chromium.

Definitions:
ATSDR = Agency for Toxic Substances and Disease Registry.
IRIS = Integrated Risk Information System
NA = Not Available.
PPRTV = Provisional Peer Reviewed Toxicity Value.

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SWMU 23 - BATTERY SHOP BUILDING 36
NSWC CRANE, CRANE INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD(1)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Semivolatile Organic Compounds									
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs									
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics									
Arsenic	Chronic	1.5E-05	mg/m3	4.3E-06	(mg/kg/day)	Skin, Cardiovascular System	NA	Cal EPA	9/2009
Chromium(2)	Subchronic	3.0E-04	mg/m3	8.6E-05	(mg/kg/day)	Respiratory	30/1	ATSDR	9/2012
	Chronic	1.0E-04	mg/m3	2.9E-05	(mg/kg/day)	Respiratory	300/1	IRIS	9/16/2015
Cobalt	Subchronic	2.0E-05	mg/m3	5.7E-06	(mg/kg/day)	Respiratory	100/1	PPRTV	8/25/2008
	Chronic	6.0E-06	mg/m3	1.7E-06	(mg/kg/day)	Respiratory	300/1	PPRTV	8/25/2008
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
1 - Extrapolated RfD = RfC *20m^3/day / 70 kg
2 - Values are for hexavalent chromium.

Definitions:
ATSDR = Agency for Toxic Substances and Disease Registry.
Cal EPA = California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009.
IRIS = Integrated Risk Information System
NA = Not Applicable
PPRTV = Provisional Peer Reviewed Toxicity Value.

RAGS Part D Table 6

Cancer Toxicity Data

LIST OF TABLES
RAGS PART D TABLE 6
CANCER TOXICITY DATA

Table No.

6-1 Cancer Toxicity Data - Oral/Dermal
6-2 Cancer Toxicity Data - Inhalation

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SWMU 23 - BATTERY SHOP BUILDING 36
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[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Benzo(a)pyrene[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	9/16/2015
Benzo(b)fluoranthene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Benzo(k)fluoranthene[3]	7.3E-02	$(mg/kg/day)^{-1}$	1	7.3E-02	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Dibenzo(a,h)anthracene[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Indeno(1,2,3-cd)pyrene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
PCBs								
Aroclor-1254	2.0E+00	$(mg/kg/day)^{-1}$	1	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(2)	9/1996
Inorganics								
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A / human carcinogen	IRIS	9/16/2015
Chromium[3,4]	5.0E-01	$(mg/kg/day)^{-1}$	0.025	2.0E+01	$(mg/kg/day)^{-1}$	Carcinogenic potential cannot be determined (Oral route)	NJDEP	4/8/2009
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	B2 / Probable human carcinogen	IRIS	9/16/2015

Notes:

1 - USEPA, 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 / Oral absorption efficiency for dermal.

3 - Carcinogenic PAHs and hexavalent chromium are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

4 - Values are for hexavalent chromium.

IRIS = Integrated Risk Information System.

NA = Not Available.

NJDEP = New Jersey Department of Environmental Protection.

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

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

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
SWMU 23 - BATTERY SHOP BUILDING 36
NSWC CRANE, CRANE INDIANA

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Semivolatile Organic Compounds							
Benzo(a)anthracene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Benzo(a)pyrene[2]	1.1E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Benzo(b)fluoranthene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Benzo(k)fluoranthene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Dibenzo(a,h)anthracene[2]	1.2E-03	$(ug/m^3)^{-1}$	4.2E+00	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
Indeno(1,2,3-cd)pyrene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA(1)	9/2009
PCBs							
Aroclor-1254	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	9/1996
Inorganics							
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	9/16/2015
Chromium[2,3]	8.4E-02	$(ug/m^3)^{-1}$	2.9E+02	$(mg/kg/day)^{-1}$	Known/likely human carcinogen (Inhalation route)	IRIS	9/16/2015
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	3.2E+01	$(mg/kg/day)^{-1}$	NA	PPRTV	8/25/2008
Lead	NA	NA	NA	NA	B2 / Probable human carcinogen	IRIS	9/16/2015

Notes:
1 - Inhalation CSF = Unit Risk * 70 kg / $20m^3$/day.
2 - Carcinogenic PAHs and hexavalent chromium are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).
3 - Values are for hexavalent chromium.

Definitions:
Cal EPA(1) = California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009.
USEPA(1) = USEPA, 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.
PPRTV = Provisional Peer Reviewed Toxicity Value.

RAGS Part D Table 7

Calculation of Cancer Risks and Non-Cancer Hazards

LIST OF TABLES

RAGS PART D TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Table No.

Reasonable Maximum Exposures

7.1.RME	Construction Workers
7.2.RME	Industrial Workers
7.3.RME	Adolescent Trespassers
7.4.RME	Child Recreational Users
7.5.RME	Adult Recreational Users
7.6.RME	Child Residents
7.7.RME	Adult Residents

Central Tendency Exposures

7.1.CTE	Construction Workers
7.2.CTE	Industrial Workers
7.3.CTE	Adolescent Trespassers
7.4.CTE	Child Recreational Users
7.5.CTE	Adult Recreational Users
7.6.CTE	Child Residents
7.7.CTE	Adult Residents

Cancer risks and hazard indices are reported to one significant figures on the Table 7s to assist in reproducing the results.

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Crane SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	3.3E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	3.8E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-08	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	5.7E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-09	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	7.5E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5E-09	5.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	1.9E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-09	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	2.2E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	4E-09	1.6E-07	(mg/kg/day)	3.0E-05	(mg/kg/day)	0.005
				Arsenic	6.6	mg/kg	9.6E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1E-07	6.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Chromium	14.8	mg/kg	3.6E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	2E-07	2.5E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								3E-07					0.03
			Dermal	Benzo(a)anthracene	0.137	mg/kg	1.4E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-09	9.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.6E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	2.4E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	3.1E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-09	2.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	8.1E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-10	5.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	1.0E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-09	7.0E-08	(mg/kg/day)	3.0E-05	(mg/kg/day)	0.002
				Arsenic	6.6	mg/kg	1.5E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-08	1.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								4E-08					0.006
		Exposure Point Total									3E-07					0.04
	Exposure Medium Total										3E-07					0.04
	Air	Crane SWMU 23	Inhalation	Benzo(a)anthracene	2.4E-07	mg/m^3	4.7E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	5E-11	3.3E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-07	mg/m^3	2.4E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	3E-10	1.6E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-07	mg/m^3	3.5E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	4E-11	2.5E-08	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.3E-08	mg/m^3	4.5E-11	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	5E-11	3.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.0E-08	mg/m^3	1.2E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	1E-11	8.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	5.6E-07	mg/m^3	1.1E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	6E-10	7.7E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	4.9E-06	mg/m^3	9.6E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4E-08	6.7E-07	(mg/m^3)	1.5E-05	(mg/m^3)	0.04
				Chromium	1.1E-05	mg/m^3	2.2E-08	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	2E-06	1.5E-06	(mg/m^3)	3.0E-04	(mg/m^3)	0.005
			Exp. Route Total								2E-06					0.05
		Exposure Point Total									2E-06					0.05
	Exposure Medium Total										2E-06					0.05
Medium Total											2E-06					0.09
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	8.6E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-08	6.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	3.3E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-07	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	4.9E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-08	3.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	3.9E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	3E-09	2.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	8.6E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6E-08	6.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	4.9E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-08	3.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.3E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-07	9.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
			Exp. Route Total								6E-07					0.03
			Dermal	Benzo(a)anthracene	3.54	mg/kg	3.6E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-08	2.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	1.4E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-07	9.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	2.0E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.6E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	1E-09	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	3.6E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-08	2.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	2.0E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	2.1E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3E-08	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
			Exp. Route Total								2E-07					0.005
		Exposure Point Total									8E-07					0.04
	Exposure Medium Total										8E-07					0.04

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	Crane SWMU 23	Inhalation	Benzo(a)anthracene	6.2E-06	mg/m^3	1.2E-08	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	1E-09	8.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-06	mg/m^3	2.0E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2E-09	1.4E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-06	mg/m^3	2.9E-09	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-10	2.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-06	mg/m^3	2.4E-09	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-10	1.6E-07	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-07	mg/m^3	5.3E-10	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	6E-10	3.7E-08	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-06	mg/m^3	2.9E-09	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-10	2.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.7E-06	mg/m^3	1.3E-08	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	6E-08	9.2E-07	(mg/m^3)	1.5E-05	(mg/m^3)	0.06
			Exp. Route Total								6E-08					0.06
		Exposure Point Total									6E-08					0.06
	Exposure Medium Total										6E-08					0.06
Medium Total											9E-07					0.10

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Crane SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	4.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-08	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	4.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-07	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	7.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-08	2.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	9.5E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-08	2.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	2.4E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	6.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	2.8E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	6E-08	7.9E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.004
				Arsenic	6.6	mg/kg	1.2E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-06	3.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Chromium	14.8	mg/kg	4.5E-06	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	2E-06	1.3E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.004
			Exp. Route Total								5E-06					0.02
			Dermal	Benzo(a)anthracene	0.137	mg/kg	2.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	6.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	2.6E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-07	7.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	3.9E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-08	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	5.2E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-08	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	1.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	3.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	1.7E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3E-08	4.7E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.002
				Arsenic	6.6	mg/kg	2.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4E-07	7.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								7E-07					0.004
		Exposure Point Total									6E-06					0.02
	Exposure Medium Total										6E-06					0.02
	Air	Crane SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	2.5E-09	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-10	7.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	9.8E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1E-11	2.7E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	1.5E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-12	4.1E-11	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	2.0E-12	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	2E-12	5.5E-12	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	5.0E-12	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	6E-13	1.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	9.0E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	5E-09	2.5E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	4.1E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2E-09	1.1E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.00007
				Chromium	1.1E-08	mg/m^3	9.0E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	8E-08	2.5E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00003
			Exp. Route Total								9E-08					0.0001
		Exposure Point Total									9E-08					0.0001
	Exposure Medium Total										9E-08					0.0001
Medium Total											6E-06					0.02
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	1.1E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	8E-07	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	4.2E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-06	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	6.2E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-07	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	5.0E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	4E-08	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	1.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8E-07	3.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	6.2E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-07	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.7E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3E-06	4.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								9E-06					0.02
			Dermal	Benzo(a)anthracene	3.54	mg/kg	5.9E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-07	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	2.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-06	6.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	3.4E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-07	9.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	2.7E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	2E-08	7.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	6.0E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-07	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	3.4E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-07	9.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	3.5E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-07	9.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
			Exp. Route Total								4E-06					0.003
		Exposure Point Total									1E-05					0.02
	Exposure Medium Total										1E-05					0.02

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	Crane SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	6.6E-08	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	7E-09	1.8E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	8.2E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	9E-11	2.3E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	1.2E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	1E-11	3.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	9.8E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	1E-11	2.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	2.2E-11	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	3E-11	6.2E-11	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	1.2E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	1E-11	3.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	5.5E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2E-09	1.6E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0001
			Exp. Route Total								9E-09					0.0001
		Exposure Point Total									9E-09					0.0001
	Exposure Medium Total										9E-09					0.0001
Medium Total											1E-05					0.02

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	9.3E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-09	2.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.1E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8E-08	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.6E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	3.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	2.1E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-08	4.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	5.4E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-09	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	2.1E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	4E-09	1.5E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0008
				Arsenic	6.6	mg/kg	8.9E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1E-07	6.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Chromium	14.8	mg/kg	1.0E-06	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	5E-07	2.3E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0008
			Exp. Route Total								7E-07					0.004
			Dermal	Benzo(a)anthracene	0.137	mg/kg	9.1E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-09	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.0E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-08	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.6E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	3.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	2.1E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-08	4.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	5.3E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-09	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	2.2E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	4E-09	1.5E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0008
				Arsenic	6.6	mg/kg	3.4E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-08	2.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.002
		Exposure Point Total									9E-07					0.006
	Exposure Medium Total										9E-07					0.006
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	1.6E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-11	3.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	6.1E-13	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	7E-13	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	9.2E-13	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	1E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	1.2E-13	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	1E-13	2.9E-13	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	3.1E-13	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-14	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	1.9E-10	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1E-10	1.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	8.5E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4E-11	6.0E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.000004
				Chromium	1.1E-08	mg/m^3	5.6E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	5E-09	1.3E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000001
			Exp. Route Total								5E-09					0.000005
		Exposure Point Total									5E-09					0.000005
	Exposure Medium Total										5E-09					0.000005
Medium Total											9E-07					0.006
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	2.4E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-07	5.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	9.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-07	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.4E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.1E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	8E-09	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.4E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-07	5.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.4E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.2E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-07	8.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
			Exp. Route Total								2E-06					0.003
			Dermal	Benzo(a)anthracene	3.54	mg/kg	2.3E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-07	5.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	9.0E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-07	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.3E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-08	3.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.1E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	8E-09	2.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.4E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-07	5.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.3E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-08	3.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	4.6E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7E-08	3.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
			Exp. Route Total								1E-06					0.001
		Exposure Point Total									3E-06					0.004
	Exposure Medium Total										3E-06					0.004

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	4.1E-09	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	5E-10	9.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	5.1E-12	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	6E-12	1.2E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	7.7E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	8E-13	1.8E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	6.1E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	7E-13	1.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	1.4E-12	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	2E-12	3.2E-12	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	7.7E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	8E-13	1.8E-11	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	1.2E-11	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	5E-11	8.1E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.000005
			Exp. Route Total								6E-10					0.000005
		Exposure Point Total									6E-10					0.000005
	Exposure Medium Total										6E-10					0.000005
Medium Total											3E-06					0.004
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	3.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6E-08	2.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0009
				Chromium	3.21	ug/L	1.7E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	9E-08	4.1E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Cobalt	3.44	ug/L	6.2E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Lead	3.15	ug/L	5.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.002
			Dermal	Arsenic	2.16	ug/L	1.5E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2E-08	1.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Chromium	3.21	ug/L	1.3E-07	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	3E-06	3.1E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.004
				Cobalt	3.44	ug/L	9.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Lead	3.15	ug/L	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3E-06					0.005
		Exposure Point Total									3E-06					0.007
	Exposure Medium Total										3E-06					0.007
Medium Total											3E-06					0.007
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	4.2E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-08	9.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	4.5E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-09	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	3.0E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2E-08	7.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	2.8E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2E-09	6.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	7.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1E-07	5.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Chromium	26.2	mg/kg	8.9E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	4E-07	2.1E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0007
				Cobalt	62	mg/kg	7.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								6E-07					0.02
			Dermal	Benzo(a)pyrene	0.125	mg/kg	8.3E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6E-08	1.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	8.8E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6E-09	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	5.8E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-08	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	5.6E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4E-09	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	5.5E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8E-08	3.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.001
		Exposure Point Total									8E-07					0.02
	Exposure Medium Total										8E-07					0.02
Medium Total											8E-07					0.02
Total Surface Soil, Surface Water, and Sediment Risks											5E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.03
Total Subsurface Soil, Surface Water, and Sediment Risks											7E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	5.9E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-08	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	6.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5E-07	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.0E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-08	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.3E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9E-08	2.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	3.5E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-08	7.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	7.5E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-08	8.7E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.004
				Arsenic	6.6	mg/kg	3.2E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-07	3.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Chromium	14.8	mg/kg	6.4E-06	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	3E-06	1.4E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								4E-06					0.02
			Dermal	Benzo(a)anthracene	0.137	mg/kg	3.7E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-08	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	4.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-07	9.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	6.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-08	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	8.3E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6E-08	1.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	2.1E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	4.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	5.0E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1E-08	5.8E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.003
				Arsenic	6.6	mg/kg	7.7E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1E-07	8.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								6E-07					0.006
		Exposure Point Total									5E-06					0.03
	Exposure Medium Total										5E-06					0.03
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	3.4E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	4E-11	7.3E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	1.3E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1E-12	2.8E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	2.0E-12	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-13	4.3E-12	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	2.6E-13	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	3E-13	5.7E-13	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	6.6E-13	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	7E-14	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	2.2E-10	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1E-10	2.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	1.0E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4E-11	1.2E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.000008
				Chromium	1.1E-08	mg/m^3	1.2E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-08	2.6E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
			Exp. Route Total								1E-08					0.00001
		Exposure Point Total									1E-08					0.00001
	Exposure Medium Total										1E-08					0.00001
Medium Total											5E-06					0.03
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	1.5E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-06	3.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	5.9E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-06	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	8.8E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-07	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	7.1E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	5E-08	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	1.5E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-06	3.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	8.8E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-07	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	4.4E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7E-07	5.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								8E-06					0.02
			Dermal	Benzo(a)anthracene	3.54	mg/kg	9.5E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-07	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	3.6E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-06	8.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	5.4E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-07	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	4.4E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	3E-08	9.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	9.6E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-07	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	5.4E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-07	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-07	1.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
			Exp. Route Total								5E-06					0.004
		Exposure Point Total									1E-05					0.02
	Exposure Medium Total										1E-05					0.02

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	8.8E-09	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-09	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	1.1E-11	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	1E-11	2.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	1.6E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-12	3.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	1.3E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-12	2.8E-11	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	2.9E-12	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	3E-12	6.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	1.6E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-12	3.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	1.4E-11	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	6E-11	1.6E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00001
			Exp. Route Total								1E-09					0.00001
		Exposure Point Total									1E-09					0.00001
	Exposure Medium Total										1E-09					0.00001
Medium Total											1E-05					0.02
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	7.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1E-07	8.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Chromium	3.21	ug/L	5.6E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	3E-07	1.2E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0004
				Cobalt	3.44	ug/L	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Lead	3.15	ug/L	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4E-07					0.007
			Dermal	Arsenic	2.16	ug/L	1.7E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3E-08	1.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Chromium	3.21	ug/L	2.6E-07	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	5E-06	5.8E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.008
				Cobalt	3.44	ug/L	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Lead	3.15	ug/L	2.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5E-06					0.009
		Exposure Point Total									5E-06					0.02
	Exposure Medium Total										5E-06					0.02
Medium Total											5E-06					0.02
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	5.4E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-07	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	5.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4E-08	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	3.8E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-07	8.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	3.6E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-08	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	5.3E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8E-07	6.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Chromium	26.2	mg/kg	1.1E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	6E-06	2.5E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.008
				Cobalt	62	mg/kg	5.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.9E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
			Exp. Route Total								8E-06					0.2
			Dermal	Benzo(a)pyrene	0.125	mg/kg	3.4E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2E-07	7.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	3.6E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-08	7.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	2.4E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2E-07	5.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	2.3E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2E-08	4.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	1.3E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2E-07	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								7E-07					0.005
		Exposure Point Total									9E-06					0.2
	Exposure Medium Total										9E-06					0.2
Medium Total											9E-06					0.2
Total Surface Soil, Surface Water, and Sediment Risks											2E-05	Total Surface Soil, Surface Water, and Sediment HIs				0.3
Total Subsurface Soil, Surface Water, and Sediment Risks											2E-05	Total Subsurface Soil, Surface Water, and Sediment HIs				0.2

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	7.0E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-09	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	7.9E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6E-08	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.6E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	2.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	4.1E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-09	7.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	2.3E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	5E-09	8.2E-09	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0004
				Arsenic	6.6	mg/kg	1.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-07	3.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Chromium	14.8	mg/kg	7.5E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	4E-07	1.3E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0004
			Exp. Route Total								7E-07					0.002
			Dermal	Benzo(a)anthracene	0.137	mg/kg	7.6E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-09	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	8.6E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6E-08	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	2.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.7E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	3.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	4.5E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-09	7.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	2.8E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	6E-09	9.7E-09	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0005
				Arsenic	6.6	mg/kg	4.2E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6E-08	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.0010
		Exposure Point Total									9E-07					0.003
	Exposure Medium Total										9E-07					0.003
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	4.2E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	5E-11	7.3E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	1.6E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2E-12	2.8E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	2.4E-12	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-13	4.3E-12	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	3.3E-13	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	4E-13	5.7E-13	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	8.3E-13	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	9E-14	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	7.5E-10	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	4E-10	2.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	3.4E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1E-10	1.2E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.000008
				Chromium	1.1E-08	mg/m^3	1.5E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-08	2.6E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
			Exp. Route Total								1E-08					0.00001
		Exposure Point Total									1E-08					0.00001
	Exposure Medium Total										1E-08					0.00001
Medium Total											9E-07					0.003
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	1.8E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	6.9E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5E-07	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.0E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-08	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	8.3E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	6E-09	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	1.8E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-07	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.0E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-08	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.4E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-07	4.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
			Exp. Route Total								1E-06					0.002
			Dermal	Benzo(a)anthracene	3.54	mg/kg	2.0E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	3.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	7.6E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6E-07	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.1E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	8E-08	2.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	9.1E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	7E-09	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.0E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-07	3.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.1E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	8E-08	2.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	5.8E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	9E-08	2.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
			Exp. Route Total								1E-06					0.0007
		Exposure Point Total									2E-06					0.003
	Exposure Medium Total										2E-06					0.003

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	1.1E-08	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-09	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	1.4E-11	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	2E-11	2.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	2.0E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-12	3.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	1.6E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-12	2.8E-11	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	3.7E-12	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	4E-12	6.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	2.0E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-12	3.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	4.6E-11	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	2E-10	1.6E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00001
			Exp. Route Total								1E-09					0.00001
		Exposure Point Total									1E-09					0.00001
	Exposure Medium Total										1E-09					0.00001
Medium Total											2E-06					0.003
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	4.4E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7E-08	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Chromium	3.21	ug/L	1.3E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	7E-08	2.3E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00008
				Cobalt	3.44	ug/L	7.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Lead	3.15	ug/L	6.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1E-07					0.001
			Dermal	Arsenic	2.16	ug/L	2.6E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4E-08	9.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Chromium	3.21	ug/L	1.6E-07	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	3E-06	2.7E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.004
				Cobalt	3.44	ug/L	1.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Lead	3.15	ug/L	3.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3E-06					0.005
		Exposure Point Total									3E-06					0.006
	Exposure Medium Total										3E-06					0.006
Medium Total											3E-06					0.006
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	6.4E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5E-08	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	6.8E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5E-09	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	4.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-08	7.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	4.3E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-09	7.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	1.6E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2E-07	5.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Chromium	26.2	mg/kg	1.3E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	7E-07	2.3E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0008
				Cobalt	62	mg/kg	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								1E-06					0.02
			Dermal	Benzo(a)pyrene	0.125	mg/kg	7.0E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5E-08	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	7.4E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5E-09	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	4.9E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-08	8.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	4.7E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-09	8.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	6.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1E-07	2.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.0008
		Exposure Point Total									1E-06					0.02
	Exposure Medium Total										1E-06					0.02
Medium Total											1E-06					0.02
										Total Surface Soil, Surface Water, and Sediment Risks	5E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.03
										Total Subsurface Soil, Surface Water, and Sediment Risks	6E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	8.0E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-07	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	9.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-06	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.4E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-06	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.8E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-06	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	4.7E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-07	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	1.0E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-07	1.2E-06	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.06
				Arsenic	6.6	mg/kg	4.3E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6E-06	5.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Chromium	14.8	mg/kg	8.6E-05	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	4E-05	1.9E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.06
			Exp. Route Total								6E-05					0.3
			Dermal	Benzo(a)anthracene	0.137	mg/kg	2.5E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-07	5.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	2.8E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-06	6.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	4.2E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-07	9.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	5.6E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-07	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	1.4E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	3.3E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	7E-08	3.9E-07	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.02
				Arsenic	6.6	mg/kg	5.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8E-07	6.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								4E-06					0.04
		Exposure Point Total									6E-05					0.3
	Exposure Medium Total										6E-05					0.3
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	1.4E-08	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-09	3.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	5.3E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	6E-11	1.2E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	7.9E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	9E-12	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	1.1E-11	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	1E-11	2.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	2.7E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-12	5.8E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	9.0E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	5E-09	1.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	4.1E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2E-09	4.8E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0003
				Chromium	1.1E-08	mg/m^3	4.8E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	4E-07	1.1E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
			Exp. Route Total								4E-07					0.0004
		Exposure Point Total									4E-07					0.0004
	Exposure Medium Total										4E-07					0.0004
Medium Total											6E-05					0.3
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	2.1E-05	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-05	4.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	7.9E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6E-05	1.7E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.2E-05	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-06	2.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	9.5E-06	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	7E-07	2.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.1E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-05	4.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.2E-05	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-06	2.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	5.9E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	9E-06	6.9E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
			Exp. Route Total								1E-04					0.2
			Dermal	Benzo(a)anthracene	3.54	mg/kg	6.4E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-06	1.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	2.5E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-05	5.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	3.7E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-06	8.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	2.9E-06	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	2E-07	6.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	6.4E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5E-06	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	3.6E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-06	8.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	7.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1E-06	8.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
			Exp. Route Total								4E-05					0.03
		Exposure Point Total									1E-04					0.2
	Exposure Medium Total										1E-04					0.2

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	3.6E-07	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	4E-08	7.8E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	4.4E-10	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	5E-10	9.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	6.6E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	7E-11	1.4E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	5.3E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	6E-11	1.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	1.2E-10	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	1E-10	2.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	6.6E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	7E-11	1.4E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	5.6E-10	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	2E-09	6.5E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0004
			Exp. Route Total								4E-08					0.0004
		Exposure Point Total									4E-08					0.0004
	Exposure Medium Total										4E-08					0.0004
Medium Total											1E-04					0.2
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	7.0E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1E-07	8.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Chromium	3.21	ug/L	5.6E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	3E-07	1.2E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0004
				Cobalt	3.44	ug/L	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Lead	3.15	ug/L	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4E-07					0.007
			Dermal	Arsenic	2.16	ug/L	1.7E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3E-08	1.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Chromium	3.21	ug/L	2.6E-07	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	5E-06	5.8E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.008
				Cobalt	3.44	ug/L	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Lead	3.15	ug/L	2.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5E-06					0.009
		Exposure Point Total									5E-06					0.02
	Exposure Medium Total										5E-06					0.02
Medium Total											5E-06					0.02
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	5.4E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-07	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	5.8E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4E-08	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	3.8E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-07	8.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	3.6E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-08	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	5.3E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8E-07	6.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Chromium	26.2	mg/kg	1.1E-05	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	6E-06	2.5E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.008
				Cobalt	62	mg/kg	5.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.9E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
			Exp. Route Total								8E-06					0.2
			Dermal	Benzo(a)pyrene	0.125	mg/kg	3.4E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2E-07	7.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	3.6E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-08	7.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	2.4E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2E-07	5.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	2.3E-08	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2E-08	4.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	1.3E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2E-07	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								7E-07					0.005
		Exposure Point Total									9E-06					0.2
	Exposure Medium Total										9E-06					0.2
Medium Total											9E-06					0.2
Total Surface Soil, Surface Water, and Sediment Risks											7E-05	Total Surface Soil, Surface Water, and Sediment HIs				0.5
Total Subsurface Soil, Surface Water, and Sediment Risks											1E-04	Total Subsurface Soil, Surface Water, and Sediment HIs				0.4

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	9.4E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-08	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8E-07	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.6E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	2.1E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-07	3.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	5.5E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-08	9.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	3.1E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	6E-08	1.1E-07	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.006
				Arsenic	6.6	mg/kg	1.4E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-06	4.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Chromium	14.8	mg/kg	1.0E-05	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	5E-06	1.8E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.006
			Exp. Route Total								8E-06					0.03
			Dermal	Benzo(a)anthracene	0.137	mg/kg	5.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-08	9.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	5.8E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-07	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	8.8E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-08	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9E-08	2.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	3.0E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	5.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	1.9E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	4E-08	6.5E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.003
				Arsenic	6.6	mg/kg	2.9E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4E-07	1.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								1E-06					0.006
		Exposure Point Total									9E-06					0.04
	Exposure Medium Total										9E-06					0.04
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	1.7E-08	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-09	3.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	6.6E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	7E-11	1.2E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	9.9E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	1E-11	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	1.3E-11	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	2E-11	2.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	3.3E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	4E-12	5.8E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	3.0E-08	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	2E-08	1.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	1.4E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	6E-09	4.8E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0003
				Chromium	1.1E-08	mg/m^3	6.0E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	5E-07	1.1E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
			Exp. Route Total								5E-07					0.0004
		Exposure Point Total									5E-07					0.0004
	Exposure Medium Total										5E-07					0.0004
Medium Total											1E-05					0.04
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	2.4E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-06	4.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	9.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-06	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.4E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-06	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.1E-06	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	8E-08	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.4E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-06	4.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.4E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-06	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.9E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3E-06	6.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								2E-05					0.02
			Dermal	Benzo(a)anthracene	3.54	mg/kg	1.3E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-07	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	5.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-06	8.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	7.6E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-07	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	6.1E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	4E-08	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9E-07	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	7.6E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-07	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	3.9E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6E-07	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
			Exp. Route Total								8E-06					0.005
		Exposure Point Total									3E-05					0.03
	Exposure Medium Total										3E-05					0.03

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	4.4E-07	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	5E-08	7.8E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	5.5E-10	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	6E-10	9.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	8.2E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	9E-11	1.4E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	6.6E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	7E-11	1.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	1.5E-10	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	2E-10	2.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	8.2E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	9E-11	1.4E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	1.9E-09	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	8E-09	6.5E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0004
			Exp. Route Total								6E-08					0.0004
		Exposure Point Total									6E-08					0.0004
	Exposure Medium Total										6E-08					0.0004
Medium Total											3E-05					0.03
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	4.4E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7E-08	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Chromium	3.21	ug/L	1.3E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	7E-08	2.3E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00008
				Cobalt	3.44	ug/L	7.0E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Lead	3.15	ug/L	6.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1E-07					0.001
			Dermal	Arsenic	2.16	ug/L	2.6E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	4E-08	9.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Chromium	3.21	ug/L	1.6E-07	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	3E-06	2.7E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.004
				Cobalt	3.44	ug/L	1.7E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Lead	3.15	ug/L	3.9E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3E-06					0.005
		Exposure Point Total									3E-06					0.006
	Exposure Medium Total										3E-06					0.006
Medium Total											3E-06					0.006
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	6.4E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5E-08	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	6.8E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5E-09	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	4.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-08	7.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	4.3E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-09	7.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	1.6E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2E-07	5.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Chromium	26.2	mg/kg	1.3E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	7E-07	2.3E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0008
				Cobalt	62	mg/kg	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								1E-06					0.02
			Dermal	Benzo(a)pyrene	0.125	mg/kg	7.0E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5E-08	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	7.4E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5E-09	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	4.9E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-08	8.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	4.7E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-09	8.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	6.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1E-07	2.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.0008
		Exposure Point Total									1E-06					0.02
	Exposure Medium Total										1E-06					0.02
Medium Total											1E-06					0.02
Total Surface Soil, Surface Water, and Sediment Risks											1E-05	Total Surface Soil, Surface Water, and Sediment HIs				0.07
Total Subsurface Soil, Surface Water, and Sediment Risks											3E-05	Total Subsurface Soil, Surface Water, and Sediment HIs				0.06

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Crane SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	8.3E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-10	5.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	9.4E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-09	6.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.4E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-09	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.9E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-09	1.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	4.8E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-10	3.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	5.6E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1E-09	3.9E-08	(mg/kg/day)	3.0E-05	(mg/kg/day)	0.001
				Arsenic	6.6	mg/kg	2.4E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4E-08	1.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.006
				Chromium	14.8	mg/kg	9.0E-08	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	5E-08	6.3E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								1E-07					0.008
			Dermal	Benzo(a)anthracene	0.137	mg/kg	2.3E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-10	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	2.6E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-09	1.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	3.9E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-10	2.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	5.2E-11	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-10	3.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	1.3E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-11	9.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	1.7E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3E-10	1.2E-08	(mg/kg/day)	3.0E-05	(mg/kg/day)	0.0004
				Arsenic	6.6	mg/kg	2.6E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4E-09	1.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								7E-09					0.0010
		Exposure Point Total									1E-07					0.009
	Exposure Medium Total										1E-07					0.009
	Air	Crane SWMU 23	Inhalation	Benzo(a)anthracene	2.4E-07	mg/m^3	2.3E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-11	1.6E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-07	mg/m^3	1.2E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1E-10	8.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-07	mg/m^3	1.8E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-11	1.2E-08	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.3E-08	mg/m^3	2.2E-11	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	3E-11	1.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.0E-08	mg/m^3	5.9E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	6E-12	4.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	5.6E-07	mg/m^3	5.5E-10	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	3E-10	3.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	4.9E-06	mg/m^3	4.8E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2E-08	3.4E-07	(mg/m^3)	1.5E-05	(mg/m^3)	0.02
				Chromium	1.1E-05	mg/m^3	1.1E-08	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	9E-07	7.5E-07	(mg/m^3)	3.0E-04	(mg/m^3)	0.003
			Exp. Route Total								9E-07					0.02
		Exposure Point Total									9E-07					0.02
	Exposure Medium Total										9E-07					0.02
Medium Total											1E-06					0.03
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	2.1E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	8.2E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6E-08	5.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	8.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	9.9E-09	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	7E-10	6.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.2E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-08	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	8.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	3.3E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-08	2.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.008
			Exp. Route Total								2E-07					0.008
			Dermal	Benzo(a)anthracene	3.54	mg/kg	5.9E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-09	4.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	2.3E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-08	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	3.4E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	2.7E-09	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	2E-10	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	6.0E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-09	4.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	3.4E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	3.5E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-09	2.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
			Exp. Route Total								4E-08					0.0008
		Exposure Point Total									2E-07					0.009
	Exposure Medium Total										2E-07					0.009

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	Crane SWMU 23	Inhalation	Benzo(a)anthracene	6.2E-06	mg/m^3	6.1E-09	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	7E-10	4.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-06	mg/m^3	9.8E-10	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	1E-09	6.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-06	mg/m^3	1.5E-09	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-10	1.0E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-06	mg/m^3	1.2E-09	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-10	8.2E-08	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-07	mg/m^3	2.6E-10	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	3E-10	1.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-06	mg/m^3	1.5E-09	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-10	1.0E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.7E-06	mg/m^3	6.6E-09	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	3E-08	4.6E-07	(mg/m^3)	1.5E-05	(mg/m^3)	0.03
			Exp. Route Total								3E-08					0.03
		Exposure Point Total									3E-08					0.03
	Exposure Medium Total										3E-08					0.03
Medium Total											2E-07					0.04

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Crane SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	6.6E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-09	5.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	7.5E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5E-08	5.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.1E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	8E-09	8.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.5E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	3.9E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-09	3.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	4.4E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	9E-09	3.5E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.002
				Arsenic	6.6	mg/kg	1.9E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3E-07	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Chromium	14.8	mg/kg	7.1E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	4E-07	5.6E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
			Exp. Route Total								8E-07					0.009
			Dermal	Benzo(a)anthracene	0.137	mg/kg	1.1E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	8E-10	8.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.3E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9E-09	1.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.9E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-09	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	2.6E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-09	2.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	6.6E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-10	5.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	8.2E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-09	6.4E-09	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0003
				Arsenic	6.6	mg/kg	1.3E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-08	9.8E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								4E-08					0.0006
		Exposure Point Total									8E-07					0.010
	Exposure Medium Total										8E-07					0.010
	Air	Crane SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	8.0E-10	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	9E-11	6.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	3.1E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	3E-12	2.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	4.6E-12	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	5E-13	3.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	6.2E-13	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	7E-13	4.8E-12	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	1.6E-12	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-13	1.2E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	2.8E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	2E-09	2.2E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	1.3E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	6E-10	1.0E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.00007
				Chromium	1.1E-08	mg/m^3	2.8E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	2E-08	2.2E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00002
			Exp. Route Total								2E-08					0.00009
		Exposure Point Total									2E-08					0.00009
	Exposure Medium Total										2E-08					0.00009
Medium Total											8E-07					0.010
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	1.7E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	6.6E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5E-07	5.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	9.8E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-08	7.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	7.9E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	6E-09	6.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	1.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-07	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	9.7E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-08	7.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	2.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4E-07	2.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
			Exp. Route Total								1E-06					0.007
			Dermal	Benzo(a)anthracene	3.54	mg/kg	2.9E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	1.1E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8E-08	8.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.7E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.3E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	9E-10	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.9E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-08	2.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.7E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.7E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3E-08	1.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
			Exp. Route Total								2E-07					0.0004
		Exposure Point Total									1E-06					0.007
	Exposure Medium Total										1E-06					0.007

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	Crane SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	2.1E-08	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-09	1.6E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	2.6E-11	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	3E-11	2.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	3.9E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	4E-12	3.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	3.1E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	3E-12	2.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	6.9E-12	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	8E-12	5.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	3.9E-11	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	4E-12	3.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	1.7E-10	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	7E-10	1.4E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.00009
			Exp. Route Total								3E-09					0.00009
		Exposure Point Total									3E-09					0.00009
	Exposure Medium Total										3E-09					0.00009
Medium Total											1E-06					0.007

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	2.3E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	5.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	2.6E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-08	6.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	4.0E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-09	9.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	5.3E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-09	1.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	1.4E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-09	3.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	5.2E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1E-09	3.6E-09	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0002
				Arsenic	6.6	mg/kg	2.2E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3E-08	1.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Chromium	14.8	mg/kg	2.5E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	1E-07	5.9E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
			Exp. Route Total								2E-07					0.0009
			Dermal	Benzo(a)anthracene	0.137	mg/kg	9.1E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-10	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.0E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-09	2.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.6E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-09	3.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	2.1E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-09	4.8E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	5.3E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-10	1.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	2.2E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	4E-10	1.5E-09	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.00008
				Arsenic	6.6	mg/kg	3.4E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-09	2.4E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00008
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								2E-08					0.0002
		Exposure Point Total									2E-07					0.001
	Exposure Medium Total										2E-07					0.001
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	2.1E-06	mg/m^3	2.7E-09	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-10	6.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	1.5E-13	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2E-13	3.6E-13	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	2.3E-13	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-14	5.3E-13	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	3.1E-14	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	4E-14	7.1E-14	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	7.8E-14	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	9E-15	1.8E-13	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	7.4E-06	mg/m^3	3.1E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	2E-09	2.2E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	2.1E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	9E-12	1.5E-11	(mg/m^3)	1.5E-05	(mg/m^3)	1.0E-6
				Chromium	1.1E-08	mg/m^3	1.4E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-09	3.3E-11	(mg/m^3)	1.0E-04	(mg/m^3)	3.3E-7
			Exp. Route Total								3E-09					0.000001
		Exposure Point Total									3E-09					0.000001
	Exposure Medium Total										3E-09					0.000001
Medium Total											2E-07					0.001
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	6.0E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-08	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	2.3E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-07	5.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	3.4E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	2.8E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	2E-09	6.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	6.0E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-08	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	3.4E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	3.1E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-08	2.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
			Exp. Route Total								4E-07					0.0007
			Dermal	Benzo(a)anthracene	3.54	mg/kg	2.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	5.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	9.0E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-08	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.1E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	8E-10	2.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.4E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-08	5.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	4.6E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7E-09	3.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
			Exp. Route Total								1E-07					0.0001
		Exposure Point Total									5E-07					0.0008
	Exposure Medium Total										5E-07					0.0008

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	5.5E-05	mg/m^3	7.0E-08	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	8E-09	1.6E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	1.3E-12	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	1E-12	3.0E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	1.9E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-13	4.5E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	1.5E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-13	3.6E-12	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	3.4E-13	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	4E-13	8.0E-13	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	1.9E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-13	4.5E-12	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	2.9E-12	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	1E-11	2.0E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.000001
			Exp. Route Total								8E-09					0.000001
		Exposure Point Total									8E-09					0.000001
	Exposure Medium Total										8E-09					0.000001
Medium Total											5E-07					0.0008
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	9.8E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1E-08	6.8E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Chromium	3.21	ug/L	4.4E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	2E-08	1.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00003
				Cobalt	3.44	ug/L	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Lead	3.15	ug/L	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3E-08					0.0006
			Dermal	Arsenic	2.16	ug/L	3.7E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6E-09	2.6E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00009
				Chromium	3.21	ug/L	3.3E-08	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	7E-07	7.6E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.001
				Cobalt	3.44	ug/L	2.3E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00005
				Lead	3.15	ug/L	5.3E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								7E-07					0.001
		Exposure Point Total									7E-07					0.002
	Exposure Medium Total										7E-07					0.002
Medium Total											7E-07					0.002
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	1.1E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8E-09	2.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	1.1E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	8E-10	2.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	7.5E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5E-09	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	7.1E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	5E-10	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	1.8E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3E-08	1.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Chromium	26.2	mg/kg	2.2E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	1E-07	5.2E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Cobalt	62	mg/kg	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
			Exp. Route Total								1E-07					0.005
			Dermal	Benzo(a)pyrene	0.125	mg/kg	8.3E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	6E-09	1.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	8.8E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	6E-10	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	5.8E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-09	1.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	5.6E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4E-10	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	5.5E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	8E-09	3.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								2E-08					0.0001
		Exposure Point Total									1E-07					0.005
	Exposure Medium Total										1E-07					0.005
Medium Total											1E-07					0.005
Total Surface Soil, Surface Water, and Sediment Risks											1E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.008
Total Subsurface Soil, Surface Water, and Sediment Risks											1E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.008

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	6.0E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-09	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	6.8E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5E-08	3.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.0E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	7E-09	5.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.4E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	7.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	3.5E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-09	1.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	6.2E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1E-09	2.2E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.001
				Arsenic	6.6	mg/kg	2.7E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4E-08	9.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Chromium	14.8	mg/kg	6.5E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	3E-07	3.5E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								4E-07					0.005
			Dermal	Benzo(a)anthracene	0.137	mg/kg	1.5E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-09	8.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.7E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	9.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	2.6E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	3.4E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-09	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	8.7E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-10	4.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	1.7E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3E-10	5.8E-09	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0003
				Arsenic	6.6	mg/kg	2.6E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4E-09	8.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								2E-08					0.0006
		Exposure Point Total									4E-07					0.006
	Exposure Medium Total										4E-07					0.006
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	3.4E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	4E-12	1.8E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	1.3E-13	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1E-13	7.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	2.0E-13	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-14	1.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	2.6E-14	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	3E-14	1.4E-13	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	6.7E-14	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	7E-15	3.6E-13	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	1.9E-11	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1E-11	6.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	8.5E-13	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4E-12	3.0E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.000002
				Chromium	1.1E-08	mg/m^3	1.2E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-09	6.5E-11	(mg/m^3)	1.0E-04	(mg/m^3)	6.5E-7
			Exp. Route Total								1E-09					0.000003
		Exposure Point Total									1E-09					0.000003
	Exposure Medium Total										1E-09					0.000003
Medium Total											4E-07					0.006
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	1.6E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	8.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	6.0E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-07	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	8.9E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-08	4.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	7.2E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	5E-09	3.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	1.6E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-07	8.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	8.9E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-08	4.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	3.7E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6E-08	1.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
			Exp. Route Total								8E-07					0.004
			Dermal	Benzo(a)anthracene	3.54	mg/kg	3.9E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-08	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	1.5E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-07	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	2.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.8E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	1E-09	9.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	3.9E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-08	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	2.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	3.5E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-09	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
			Exp. Route Total								2E-07					0.0004
		Exposure Point Total									1E-06					0.004
	Exposure Medium Total										1E-06					0.004

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	8.9E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-10	4.8E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	1.1E-12	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	1E-12	5.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	1.7E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-13	8.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	1.3E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-13	7.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	3.0E-13	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	4E-13	1.6E-12	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	1.7E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-13	8.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	1.2E-12	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	5E-12	4.0E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.000003
			Exp. Route Total								1E-10					0.000003
		Exposure Point Total									1E-10					0.000003
	Exposure Medium Total										1E-10					0.000003
Medium Total											1E-06					0.004
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	5.9E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	9E-09	2.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
				Chromium	3.21	ug/L	5.7E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	3E-08	3.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Cobalt	3.44	ug/L	9.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Lead	3.15	ug/L	8.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4E-08					0.002
			Dermal	Arsenic	2.16	ug/L	1.4E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2E-09	4.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Chromium	3.21	ug/L	2.7E-08	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	5E-07	1.4E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.002
				Cobalt	3.44	ug/L	8.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Lead	3.15	ug/L	2.0E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5E-07					0.002
		Exposure Point Total									5E-07					0.004
	Exposure Medium Total										5E-07					0.004
Medium Total											5E-07					0.004
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	5.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-08	3.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	5.9E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4E-09	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	3.9E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-08	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	3.7E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-09	2.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	4.4E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7E-08	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Chromium	26.2	mg/kg	1.2E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	6E-07	6.2E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Cobalt	62	mg/kg	4.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
			Exp. Route Total								7E-07					0.06
			Dermal	Benzo(a)pyrene	0.125	mg/kg	1.4E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1E-08	7.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	1.4E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1E-09	7.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	9.6E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	7E-09	5.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	9.1E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	7E-10	4.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	4.2E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6E-09	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								2E-08					0.0005
		Exposure Point Total									7E-07					0.06
	Exposure Medium Total										7E-07					0.06
Medium Total											7E-07					0.06
Total Surface Soil, Surface Water, and Sediment Risks											2E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.07
Total Subsurface Soil, Surface Water, and Sediment Risks											2E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.07

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	4.8E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-10	3.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	5.4E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-09	3.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	8.2E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-10	5.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.1E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8E-10	6.9E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	2.8E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-10	1.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	2.0E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	4E-10	2.1E-09	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0001
				Arsenic	6.6	mg/kg	8.8E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1E-08	8.8E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Chromium	14.8	mg/kg	5.2E-08	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	3E-08	3.3E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
			Exp. Route Total								5E-08					0.0005
			Dermal	Benzo(a)anthracene	0.137	mg/kg	1.5E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-10	9.6E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.7E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-09	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	2.6E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-10	1.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	3.4E-11	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-10	2.2E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	8.8E-11	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-11	5.6E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	6.9E-11	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1E-10	6.9E-10	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.00003
				Arsenic	6.6	mg/kg	1.1E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-09	1.1E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00004
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								4E-09					0.00007
		Exposure Point Total									5E-08					0.0006
	Exposure Medium Total										5E-08					0.0006
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	2.9E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-12	1.8E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	1.1E-13	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1E-13	7.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	1.7E-13	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-14	1.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	2.2E-14	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	3E-14	1.4E-13	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	5.7E-14	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	6E-15	3.6E-13	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	6.5E-11	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	4E-11	6.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	3.0E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1E-11	3.0E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.000002
				Chromium	1.1E-08	mg/m^3	1.0E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	8E-10	6.5E-11	(mg/m^3)	1.0E-04	(mg/m^3)	6.5E-7
			Exp. Route Total								9E-10					0.000003
		Exposure Point Total									9E-10					0.000003
	Exposure Medium Total										9E-10					0.000003
Medium Total											5E-08					0.0006
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	1.2E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	7.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	4.8E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4E-08	3.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	7.1E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-09	4.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	5.7E-09	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	4E-10	3.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	1.2E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9E-09	7.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	7.1E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-09	4.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.2E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-08	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
			Exp. Route Total								9E-08					0.0004
			Dermal	Benzo(a)anthracene	3.54	mg/kg	3.9E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-09	2.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	1.5E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	9.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	2.2E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.8E-09	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	1E-10	1.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	3.9E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-09	2.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	2.2E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.5E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-09	1.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00005
			Exp. Route Total								2E-08					0.00005
		Exposure Point Total									1E-07					0.0005
	Exposure Medium Total										1E-07					0.0005

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	7.6E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	8E-11	4.8E-09	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	9.3E-13	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	1E-12	5.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	1.4E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-13	8.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	1.1E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-13	7.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	2.5E-13	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	3E-13	1.6E-12	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	1.4E-12	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-13	8.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	4.0E-12	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	2E-11	4.0E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.000003
			Exp. Route Total								1E-10					0.000003
		Exposure Point Total									1E-10					0.000003
	Exposure Medium Total										1E-10					0.000003
Medium Total											1E-07					0.0005
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	3.8E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6E-09	3.8E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Chromium	3.21	ug/L	9.0E-09	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	5E-09	5.7E-08	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00002
				Cobalt	3.44	ug/L	6.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.1E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Lead	3.15	ug/L	5.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1E-08					0.0003
			Dermal	Arsenic	2.16	ug/L	2.3E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3E-09	2.3E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00008
				Chromium	3.21	ug/L	1.1E-08	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	2E-07	6.9E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.0009
				Cobalt	3.44	ug/L	1.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00005
				Lead	3.15	ug/L	3.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.001
		Exposure Point Total									2E-07					0.001
	Exposure Medium Total										2E-07					0.001
Medium Total											2E-07					0.001
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	5.0E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-09	3.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	5.3E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4E-10	3.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	3.5E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-09	2.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	3.4E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2E-10	2.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	1.7E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3E-08	1.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Chromium	26.2	mg/kg	1.0E-07	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	5E-08	6.7E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Cobalt	62	mg/kg	1.6E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
			Exp. Route Total								9E-08					0.006
			Dermal	Benzo(a)pyrene	0.125	mg/kg	1.6E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1E-09	1.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	1.7E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1E-10	1.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	1.1E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	8E-10	7.0E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	1.1E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	8E-11	6.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	2.0E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3E-09	2.0E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00007
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								5E-09					0.00007
		Exposure Point Total									1E-07					0.006
	Exposure Medium Total										1E-07					0.006
Medium Total											1E-07					0.006
Total Surface Soil, Surface Water, and Sediment Risks											4E-07	Total Surface Soil, Surface Water, and Sediment HIs				0.008
Total Subsurface Soil, Surface Water, and Sediment Risks											4E-07	Total Subsurface Soil, Surface Water, and Sediment HIs				0.008

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	1.1E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	8E-08	5.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.2E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9E-07	6.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.9E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	2.5E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-07	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	6.4E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	5E-08	3.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	1.1E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-08	3.9E-07	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.02
				Arsenic	6.6	mg/kg	4.8E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7E-07	1.7E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.06
				Chromium	14.8	mg/kg	1.2E-05	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	6E-06	6.3E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.02
			Exp. Route Total								8E-06					0.10
			Dermal	Benzo(a)anthracene	0.137	mg/kg	1.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-09	7.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.5E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-07	8.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	2.3E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-08	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	3.0E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-08	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	7.8E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-09	4.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	1.5E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3E-09	5.2E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.003
				Arsenic	6.6	mg/kg	2.3E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3E-08	8.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.006
		Exposure Point Total									8E-06					0.1
	Exposure Medium Total										8E-06					0.1
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	3.7E-09	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	4E-10	2.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	1.4E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2E-11	7.7E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	2.1E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-12	1.2E-10	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	2.9E-12	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	3E-12	1.5E-11	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	7.3E-12	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	8E-13	3.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	2.0E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1E-09	7.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	9.2E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4E-10	3.2E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0002
				Chromium	1.1E-08	mg/m^3	1.3E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-07	7.1E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00007
			Exp. Route Total								1E-07					0.0003
		Exposure Point Total									1E-07					0.0003
	Exposure Medium Total										1E-07					0.0003
Medium Total											8E-06					0.1
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	2.8E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-06	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	1.1E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8E-06	5.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.6E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-06	8.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.3E-06	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	9E-08	7.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.8E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-06	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.6E-06	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-06	8.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	6.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1E-06	2.3E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.08
			Exp. Route Total								2E-05					0.08
			Dermal	Benzo(a)anthracene	3.54	mg/kg	3.5E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-07	1.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9E-07	7.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	2.0E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.6E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	1E-08	8.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	3.5E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-07	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	2.0E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-07	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	3.1E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5E-08	1.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
			Exp. Route Total								2E-06					0.004
		Exposure Point Total									2E-05					0.08
	Exposure Medium Total										2E-05					0.08

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	9.6E-08	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-08	5.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	1.2E-10	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	1E-10	6.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	1.8E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-11	9.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	1.4E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-11	7.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	3.2E-11	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	4E-11	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	1.8E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-11	9.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	1.2E-10	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	5E-10	4.4E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0003
			Exp. Route Total								1E-08					0.0003
		Exposure Point Total									1E-08					0.0003
	Exposure Medium Total										1E-08					0.0003
Medium Total											2E-05					0.08
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	5.9E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	9E-09	2.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
				Chromium	3.21	ug/L	5.7E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	3E-08	3.0E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Cobalt	3.44	ug/L	9.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Lead	3.15	ug/L	8.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4E-08					0.002
			Dermal	Arsenic	2.16	ug/L	1.4E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2E-09	4.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Chromium	3.21	ug/L	2.7E-08	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	5E-07	1.4E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.002
				Cobalt	3.44	ug/L	8.9E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.1E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Lead	3.15	ug/L	2.0E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5E-07					0.002
		Exposure Point Total									5E-07					0.004
	Exposure Medium Total										5E-07					0.004
Medium Total											5E-07					0.004
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	5.5E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	4E-08	3.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	5.9E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	4E-09	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	3.9E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-08	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	3.7E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-09	2.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	4.4E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7E-08	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Chromium	26.2	mg/kg	1.2E-06	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	6E-07	6.2E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Cobalt	62	mg/kg	4.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
			Exp. Route Total								7E-07					0.06
			Dermal	Benzo(a)pyrene	0.125	mg/kg	1.4E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1E-08	7.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	1.4E-09	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1E-09	7.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	9.6E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	7E-09	5.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	9.1E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	7E-10	4.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	4.2E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6E-09	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								2E-08					0.0005
		Exposure Point Total									7E-07					0.06
	Exposure Medium Total										7E-07					0.06
Medium Total											7E-07					0.06
Total Surface Soil, Surface Water, and Sediment Risks											9E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.2
Total Subsurface Soil, Surface Water, and Sediment Risks											2E-05	Total Subsurface Soil, Surface Water, and Sediment HIs				0.1

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	0.137	mg/kg	8.6E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-09	5.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	9.7E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7E-08	6.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	1.5E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	9.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	1.9E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	1.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	5.0E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	4E-09	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	3.7E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	7E-09	3.7E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.002
				Arsenic	6.6	mg/kg	1.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-07	1.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Chromium	14.8	mg/kg	9.3E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	5E-07	5.9E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
			Exp. Route Total								8E-07					0.009
			Dermal	Benzo(a)anthracene	0.137	mg/kg	1.4E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-09	8.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	0.155	mg/kg	1.5E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1E-08	9.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.235	mg/kg	2.3E-09	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-09	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.031	mg/kg	3.1E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-09	1.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.08	mg/kg	7.9E-10	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	6E-10	5.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1254	0.092	mg/kg	6.2E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1E-09	6.2E-09	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.0003
				Arsenic	6.6	mg/kg	9.6E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1E-08	9.6E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Chromium	14.8	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
			Exp. Route Total								3E-08					0.0006
		Exposure Point Total									8E-07					0.010
	Exposure Medium Total										8E-07					0.010
	Air	SWMU 23	Inhalation	Benzo(a)anthracene	3.1E-08	mg/m^3	3.1E-09	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	3E-10	2.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.2E-10	mg/m^3	1.2E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1E-11	7.7E-11	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.8E-10	mg/m^3	1.8E-11	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	2E-12	1.2E-10	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.4E-11	mg/m^3	2.4E-12	(mg/m^3)	1.2E-03	$(ug/m^3)^{-1}$	3E-12	1.5E-11	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	6.1E-11	mg/m^3	6.1E-12	(mg/m^3)	1.1E-04	$(ug/m^3)^{-1}$	7E-13	3.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1254	1.1E-07	mg/m^3	7.1E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	4E-09	7.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	5.0E-09	mg/m^3	3.2E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1E-09	3.2E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0002
				Chromium	1.1E-08	mg/m^3	1.1E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	9E-08	7.1E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00007
			Exp. Route Total								1E-07					0.0003
		Exposure Point Total									1E-07					0.0003
	Exposure Medium Total										1E-07					0.0003
Medium Total											9E-07					0.01
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Benzo(a)anthracene	3.54	mg/kg	2.2E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	2E-07	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	8.5E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6E-07	5.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	1.3E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-08	8.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.0E-07	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	7E-09	6.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	2.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2E-07	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	1.3E-07	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	9E-08	8.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	2.2E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3E-07	2.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
			Exp. Route Total								1E-06					0.007
			Dermal	Benzo(a)anthracene	3.54	mg/kg	3.5E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	3E-08	2.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(a)pyrene	1.36	mg/kg	1.3E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9E-08	8.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	2.03	mg/kg	2.0E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(k)fluoranthene	1.63	mg/kg	1.6E-08	(mg/kg/day)	7.3E-02	$(mg/kg/day)^{-1}$	1E-09	1.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.356	mg/kg	3.5E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3E-08	2.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	2.02	mg/kg	2.0E-08	(mg/kg/day)	7.3E-01	$(mg/kg/day)^{-1}$	1E-08	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	9.03	mg/kg	1.3E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2E-08	1.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
			Exp. Route Total								2E-07					0.0004
		Exposure Point Total									1E-06					0.007
	Exposure Medium Total										1E-06					0.007

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Air	SWMU 23	Inhalation	Benzo(a)anthracene	8.1E-07	mg/m^3	8.2E-08	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	9E-09	5.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(a)pyrene	1.0E-09	mg/m^3	1.0E-10	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	1E-10	6.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(b)fluoranthene	1.5E-09	mg/m^3	1.5E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-11	9.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				Benzo(k)fluoranthene	1.2E-09	mg/m^3	1.2E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	1E-11	7.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Dibenzo(a,h)anthracene	2.7E-10	mg/m^3	2.7E-11	(mg/m^3)	1.2E-03	(ug/m^3)$^{-1}$	3E-11	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Indeno(1,2,3-cd)pyrene	1.5E-09	mg/m^3	1.5E-10	(mg/m^3)	1.1E-04	(ug/m^3)$^{-1}$	2E-11	9.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	6.8E-09	mg/m^3	4.4E-10	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	2E-09	4.4E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0003
			Exp. Route Total								1E-08					0.0003
		Exposure Point Total									1E-08					0.0003
	Exposure Medium Total										1E-08					0.0003
Medium Total											1E-06					0.007
Surface Water	Surface Water	SWMU 23	Ingestion	Arsenic	2.16	ug/L	3.8E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6E-09	3.8E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Chromium	3.21	ug/L	9.0E-09	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	5E-09	5.7E-08	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.00002
				Cobalt	3.44	ug/L	6.1E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.1E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Lead	3.15	ug/L	5.6E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1E-08					0.0003
			Dermal	Arsenic	2.16	ug/L	2.3E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3E-09	2.3E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00008
				Chromium	3.21	ug/L	1.1E-08	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	2E-07	6.9E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.0009
				Cobalt	3.44	ug/L	1.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00005
				Lead	3.15	ug/L	3.4E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2E-07					0.001
		Exposure Point Total									2E-07					0.001
	Exposure Medium Total										2E-07					0.001
Medium Total											2E-07					0.001
Sediment	Sediment	SWMU 23	Ingestion	Benzo(a)pyrene	0.125	mg/kg	4.4E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	3E-09	2.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	4.7E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	3E-10	3.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	3.1E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2E-09	2.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	2.9E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	2E-10	1.9E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	1.4E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	2E-08	1.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Chromium	26.2	mg/kg	9.2E-08	(mg/kg/day)	5.0E-01	(mg/kg/day)$^{-1}$	5E-08	5.8E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Cobalt	62	mg/kg	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
			Exp. Route Total								8E-08					0.006
			Dermal	Benzo(a)pyrene	0.125	mg/kg	1.4E-10	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1E-09	8.7E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Benzo(b)fluoranthene	0.133	mg/kg	1.5E-10	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	1E-10	9.3E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Dibenzo(a,h)anthracene	0.088	mg/kg	9.6E-11	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	7E-10	6.1E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Indeno(1,2,3-cd)pyrene	0.084	mg/kg	9.2E-11	(mg/kg/day)	7.3E-01	(mg/kg/day)$^{-1}$	7E-11	5.9E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	10.8	mg/kg	1.7E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3E-09	1.7E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00006
				Chromium	26.2	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	62	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								5E-09					0.00006
		Exposure Point Total									9E-08					0.006
	Exposure Medium Total										9E-08					0.006
Medium Total											9E-08					0.006
Total Surface Soil, Surface Water, and Sediment Risks											1E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.02
Total Subsurface Soil, Surface Water, and Sediment Risks											1E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.01

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

RAGS Part D Table 9

Summary of Receptor Risks and Hazards for COPCs

LIST OF TABLES

RAGS PART D TABLE 9

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

Table No.

Reasonable Maximum Exposures

9.1.RME Construction Workers
9.2.RME Industrial Workers
9.3.RME Adolescent Trespassers
9.4.RME Child Recreational Users
9.5.RME Adult Recreational Users
9.6.RME Lifelong Recreational Users
9.7.RME Child Residents
9.8.RME Adult Residents
9.9.RME Lifelong Residents

Central Tendency Exposures

9.1.CTE Construction Workers
9.2.CTE Industrial Workers
9.3.CTE Adolescent Trespassers
9.4.CTE Child Recreational Users
9.5.CTE Adult Recreational Users
9.6.CTE Lifelong Recreational Users
9.7.CTE Child Residents
9.8.CTE Adult Residents
9.9.CTE Lifelong Residents

Cancer risks and hazard indices are reported to one significant figure in accordance with USEPA guidance,

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Crane SWMU 23	Benzo(a)anthracene	2E-09	--	1E-09	--	3E-09	NA	--	--	--	--
			Benzo(a)pyrene	3E-08	--	1E-08	--	4E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	4E-09	--	2E-09	--	6E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	5E-09	--	2E-09	--	7E-09	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-09	--	6E-10	--	2E-09	NA	--	--	--	--
			Aroclor-1254	4E-09	--	2E-09	--	6E-09	CNS	0.005	--	0.002	0.007
			Arsenic	1E-07	--	2E-08	--	1E-07	Skin, CVS	0.02	--	0.004	0.02
			Chromium	2E-07	--	- -	--	2E-07	Kidney	0.005	--	--	0.005
			Chemical Total	3E-07	--	4E-08	--	3E-07		0.03	--	0.006	0.04
		Exposure Point Total						3E-07					0.04
	Exposure Medium Total							3E-07					0.04
	Air	Crane SWMU 23	Benzo(a)anthracene	--	5E-11	--	--	5E-11	NA	--	--	--	--
			Benzo(a)pyrene	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	4E-11	--	--	4E-11	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	5E-11	--	--	5E-11	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Aroclor-1254	--	6E-10	--	--	6E-10	NA	--	--	--	--
			Arsenic	--	4E-08	--	--	4E-08	NA	--	0.04	--	0.04
			Chromium	--	2E-06	--	--	2E-06	Respiratory	--	0.005	--	0.005
			Chemical Total	--	2E-06	--	--	2E-06		- -	0.05	- -	0.05
		Exposure Point Total						2E-06					0.05
	Exposure Medium Total							2E-06					0.05
Medium Total								2E-06					0.09
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Benzo(a)anthracene	6E-08	--	3E-08	--	9E-08	NA	--	--	--	--
			Benzo(a)pyrene	2E-07	--	1E-07	--	3E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	4E-08	--	1E-08	--	5E-08	NA	--	--	--	--
			Benzo(k)fluoranthene	3E-09	--	1E-09	--	4E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	6E-08	--	3E-08	--	9E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4E-08	--	1E-08	--	5E-08	NA	--	--	--	--
			Arsenic	2E-07	--	3E-08	--	2E-07	Skin, CVS	0.03	--	0.005	0.04
			Chemical Total	6E-07	--	2E-07	--	8E-07		0.03	--	0.005	0.04
		Exposure Point Total						8E-07					0.04
	Exposure Medium Total							8E-07					0.04
	Air	Crane SWMU 23	Benzo(a)anthracene	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Benzo(k)fluoranthene	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	6E-10	--	--	6E-10	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Arsenic	--	6E-08	--	--	6E-08	NA	--	0.06	--	0.06
			Chemical Total	--	6E-08	--	--	6E-08		- -	0.06	- -	0.06
		Exposure Point Total						6E-08					0.06
	Exposure Medium Total							6E-08					0.06
Medium Total								9E-07					0.1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Crane SWMU 23	Benzo(a)anthracene	3E-08	--	2E-08	--	5E-08	NA	--	--	--	--
			Benzo(a)pyrene	3E-07	--	2E-07	--	5E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-08	--	3E-08	--	8E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	7E-08	--	4E-08	--	1E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-08	--	9E-09	--	3E-08	NA	--	--	--	--
			Aroclor-1254	6E-08	--	3E-08	--	9E-08	Whole Body	0.004	--	0.002	0.006
			Arsenic	2E-06	--	4E-07	--	2E-06	Skin, CVS	0.01	--	0.002	0.01
			Chromium	2E-06	--	- -	--	2E-06	None Specified	0.004	--	--	0.004
			Chemical Total	5E-06	--	7E-07	--	6E-06		0.02	--	0.004	0.02
		Exposure Point Total						6E-06					0.02
	Exposure Medium Total							6E-06					0.02
	Air	Crane SWMU 23	Benzo(a)anthracene	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	6E-13	--	--	6E-13	NA	--	--	--	--
			Aroclor-1254	--	5E-09	--	--	5E-09	NA	--	--	--	--
			Arsenic	--	2E-09	--	--	2E-09	NA	--	0.00007	--	0.00007
			Chromium	--	8E-08	--	--	8E-08	Respiratory	--	0.00003	--	0.00003
			Chemical Total	--	9E-08	--	--	9E-08		- -	0.0001	- -	0.0001
		Exposure Point Total						9E-08					0.0001
	Exposure Medium Total							9E-08					0.0001
Medium Total								6E-06					0.02
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Benzo(a)anthracene	8E-07	--	4E-07	--	1E-06	NA	--	--	--	--
			Benzo(a)pyrene	3E-06	--	2E-06	--	5E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-07	--	2E-07	--	7E-07	NA	--	--	--	--
			Benzo(k)fluoranthene	4E-08	--	2E-08	--	6E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	8E-07	--	4E-07	--	1E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	5E-07	--	2E-07	--	7E-07	NA	--	--	--	--
			Arsenic	3E-06	--	5E-07	--	4E-06	Skin, CVS	0.02	--	0.003	0.02
			Chemical Total	9E-06	--	4E-06	--	1E-05		0.02	--	0.003	0.02
		Exposure Point Total						1E-05					0.02
	Exposure Medium Total							1E-05					0.02
	Air	Crane SWMU 23	Benzo(a)anthracene	--	7E-09	--	--	7E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	9E-11	--	--	9E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Benzo(k)fluoranthene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-11	--	--	3E-11	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Arsenic	--	2E-09	--	--	2E-09	NA	--	0.0001	--	0.0001
			Chemical Total	--	9E-09	--	--	9E-09		- -	0.0001	- -	0.0001
		Exposure Point Total						9E-09					0.0001
	Exposure Medium Total							9E-09					0.0001
Medium Total								1E-05					0.02

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	7E-09	--	7E-09	--	1E-08	NA	--	--	--	--
			Benzo(a)pyrene	8E-08	--	7E-08	--	2E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-08	--	1E-08	--	2E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-08	--	2E-08	--	4E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4E-09	--	4E-09	--	8E-09	NA	--	--	--	--
			Aroclor-1254	4E-09	--	4E-09	--	8E-09	Whole Body	0.0008	--	0.0008	0.002
			Arsenic	1E-07	--	5E-08	--	2E-07	Skin, CVS	0.002	--	0.0008	0.003
			Chromium	5E-07	--	- -	--	5E-07	None Specified	0.0008	--	--	0.0008
			Chemical Total	7E-07	--	2E-07	--	9E-07		0.004	--	0.002	0.006
		Exposure Point Total						9E-07					0.006
	Exposure Medium Total							9E-07					0.006
	Air	SWMU 23	Benzo(a)anthracene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(a)pyrene	--	7E-13	--	--	7E-13	NA	--	--	--	--
			Benzo(b)fluoranthene	--	1E-13	--	--	1E-13	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	1E-13	--	--	1E-13	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	3E-14	--	--	3E-14	NA	--	--	--	--
			Aroclor-1254	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Arsenic	--	4E-11	--	--	4E-11	NA	--	0.000004	--	0.000004
			Chromium	--	5E-09	--	--	5E-09	Respiratory	--	0.000001	--	0.000001
			Chemical Total	--	5E-09	--	--	5E-09		- -	0.000005	- -	0.000005
		Exposure Point Total						5E-09					0.000005
	Exposure Medium Total							5E-09					0.000005
Medium Total								9E-07					0.006
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	2E-07	--	2E-07	--	4E-07	NA	--	--	--	--
			Benzo(a)pyrene	7E-07	--	7E-07	--	1E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-07	--	9E-08	--	2E-07	NA	--	--	--	--
			Benzo(k)fluoranthene	8E-09	--	8E-09	--	2E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-07	--	2E-07	--	4E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-07	--	9E-08	--	2E-07	NA	--	--	--	--
			Arsenic	2E-07	--	7E-08	--	3E-07	Skin, CVS	0.003	--	0.001	0.004
			Chemical Total	2E-06	--	1E-06	--	3E-06		0.003	--	0.001	0.004
		Exposure Point Total						3E-06					0.004
	Exposure Medium Total							3E-06					0.004
	Air	SWMU 23	Benzo(a)anthracene	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Benzo(a)pyrene	--	6E-12	--	--	6E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	8E-13	--	--	8E-13	NA	--	--	--	--
			Benzo(k)fluoranthene	--	7E-13	--	--	7E-13	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	8E-13	--	--	8E-13	NA	--	--	--	--
			Arsenic	--	5E-11	--	--	5E-11	NA	--	0.000005	--	0.000005
			Chemical Total	--	6E-10	--	--	6E-10		- -	0.000005	- -	0.000005
		Exposure Point Total						6E-10					0.000005
	Exposure Medium Total							6E-10					0.000005
Medium Total								3E-06					0.004
Surface Water	Surface Water	SWMU 23	Arsenic	6E-08	--	2E-08	--	8E-08	Skin, CVS	0.0009	--	0.0003	0.001
			Chromium	9E-08	--	3E-06	--	3E-06	None Specified	0.0001	--	0.004	0.004
			Cobalt	- -	--	- -	--	- -	Thyroid	0.001	--	0.0002	0.001
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	2E-07	--	3E-06	--	3E-06		0.002	--	0.005	0.007
		Exposure Point Total						3E-06					0.007
	Exposure Medium Total							3E-06					0.007
Medium Total								3E-06					0.007

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	3E-08	--	6E-08	--	9E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	3E-09	--	6E-09	--	9E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-08	--	4E-08	--	6E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-09	--	4E-09	--	6E-09	NA	--	--	--	--
			Arsenic	1E-07	--	8E-08	--	2E-07	Skin, CVS	0.002	--	0.001	0.003
			Chromium	4E-07	--	- -	--	4E-07	None Specified	0.0007	--	--	0.0007
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Chemical Total	6E-07	--	2E-07	--	8E-07		0.02	--	0.001	0.02
		Exposure Point Total						8E-07					0.02
	Exposure Medium Total							8E-07					0.02
Medium Total								8E-07					0.02
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				5E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.03
Receptor Total				Total Subsurface Soil, Surface Water, and Sediment Risks				7E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	4E-08	--	3E-08	--	7E-08	NA	--	--	--	--
			Benzo(a)pyrene	5E-07	--	3E-07	--	8E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-08	--	5E-08	--	1E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	9E-08	--	6E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	2E-08	--	5E-08	NA	--	--	--	--
			Aroclor-1254	2E-08	--	1E-08	--	3E-08	Whole Body	0.004	--	0.003	0.007
			Arsenic	5E-07	--	1E-07	--	6E-07	Skin, CVS	0.01	--	0.003	0.01
			Chromium	3E-06	--	- -	--	3E-06	None Specified	0.005	--	--	0.005
			Chemical Total	4E-06	--	6E-07	--	5E-06		0.02	--	0.006	0.03
		Exposure Point Total						5E-06					0.03
	Exposure Medium Total							5E-06					0.03
	Air	SWMU 23	Benzo(a)anthracene	--	4E-11	--	--	4E-11	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-12	--	--	1E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-13	--	--	3E-13	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	7E-14	--	--	7E-14	NA	--	--	--	--
			Aroclor-1254	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Arsenic	--	4E-11	--	--	4E-11	NA	--	0.000008	--	0.000008
			Chromium	--	1E-08	--	--	1E-08	Respiratory	--	0.000003	--	0.000003
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.00001	- -	0.00001
		Exposure Point Total						1E-08					0.00001
	Exposure Medium Total							1E-08					0.00001
Medium Total								5E-06					0.03
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	1E-06	--	7E-07	--	2E-06	NA	--	--	--	--
			Benzo(a)pyrene	4E-06	--	3E-06	--	7E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	6E-07	--	4E-07	--	1E-06	NA	--	--	--	--
			Benzo(k)fluoranthene	5E-08	--	3E-08	--	8E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-06	--	7E-07	--	2E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	6E-07	--	4E-07	--	1E-06	NA	--	--	--	--
			Arsenic	7E-07	--	2E-07	--	9E-07	Skin, CVS	0.02	--	0.004	0.02
			Chemical Total	8E-06	--	5E-06	--	1E-05		0.02	--	0.004	0.02
		Exposure Point Total						1E-05					0.02
	Exposure Medium Total							1E-05					0.02
	Air	SWMU 23	Benzo(a)anthracene	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Benzo(k)fluoranthene	--	1E-12	--	--	1E-12	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Arsenic	--	6E-11	--	--	6E-11	NA	--	0.00001	--	0.00001
			Chemical Total	--	1E-09	--	--	1E-09		- -	0.00001	- -	0.00001
		Exposure Point Total						1E-09					0.00001
	Exposure Medium Total							1E-09					0.00001
Medium Total								1E-05					0.02
Surface Water	Surface Water	SWMU 23	Arsenic	1E-07	--	3E-08	--	1E-07	Skin, CVS	0.003	--	0.0006	0.004
			Chromium	3E-07	--	5E-06	--	5E-06	None Specified	0.0004	--	0.008	0.008
			Cobalt	- -	--	- -	--	- -	Thyroid	0.004	--	0.0004	0.004
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	4E-07	--	5E-06	--	5E-06		0.007	--	0.009	0.02
		Exposure Point Total						5E-06					0.02
	Exposure Medium Total							5E-06					0.02
Medium Total								5E-06					0.02

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	4E-07	--	2E-07	--	6E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	4E-08	--	3E-08	--	7E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-07	--	2E-07	--	5E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	2E-08	--	5E-08	NA	--	--	--	--
			Arsenic	8E-07	--	2E-07	--	1E-06	Skin, CVS	0.02	--	0.005	0.03
			Chromium	6E-06	--	- -	--	6E-06	None Specified	0.008	--	--	0.008
			Cobalt	- -	--	- -	--	- -	Thyroid	0.2	--	--	0.2
			Chemical Total	8E-06	--	7E-07	--	9E-06		0.2	--	0.005	0.2
		Exposure Point Total						9E-06					0.2
	Exposure Medium Total							9E-06					0.2
Medium Total								9E-06					0.2
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				2E-05	Total Surface Soil, Surface Water, and Sediment HIs				0.3
				Total Subsurface Soil, Surface Water, and Sediment Risks				2E-05	Total Subsurface Soil, Surface Water, and Sediment HIs				0.2

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	5E-09	--	6E-09	--	1E-08	NA	--	--	--	--
			Benzo(a)pyrene	6E-08	--	6E-08	--	1E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	9E-09	--	9E-09	--	2E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-08	--	1E-08	--	2E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-09	--	3E-09	--	6E-09	NA	--	--	--	--
			Aroclor-1254	5E-09	--	6E-09	--	1E-08	Whole Body	0.0004	--	0.0005	0.0009
			Arsenic	2E-07	--	6E-08	--	3E-07	Skin, CVS	0.001	--	0.0005	0.002
			Chromium	4E-07	--	- -	--	4E-07	None Specified	0.0004	--	--	0.0004
			Chemical Total	7E-07	--	2E-07	--	9E-07		0.002	--	0.001	0.003
		Exposure Point Total						9E-07					0.003
	Exposure Medium Total							9E-07					0.003
	Air	SWMU 23	Benzo(a)anthracene	--	5E-11	--	--	5E-11	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	3E-13	--	--	3E-13	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	4E-13	--	--	4E-13	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	9E-14	--	--	9E-14	NA	--	--	--	--
			Aroclor-1254	--	4E-10	--	--	4E-10	NA	--	--	--	--
			Arsenic	--	1E-10	--	--	1E-10	NA	--	0.000008	--	0.000008
			Chromium	--	1E-08	--	--	1E-08	Respiratory	--	0.000003	--	0.000003
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.00001	- -	0.00001
		Exposure Point Total						1E-08					0.00001
	Exposure Medium Total							1E-08					0.00001
Medium Total								9E-07					0.003
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	1E-07	--	1E-07	--	2E-07	NA	--	--	--	--
			Benzo(a)pyrene	5E-07	--	6E-07	--	1E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-08	--	8E-08	--	2E-07	NA	--	--	--	--
			Benzo(k)fluoranthene	6E-09	--	7E-09	--	1E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-07	--	1E-07	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	7E-08	--	8E-08	--	2E-07	NA	--	--	--	--
			Arsenic	2E-07	--	9E-08	--	3E-07	Skin, CVS	0.002	--	0.0007	0.003
			Chemical Total	1E-06	--	1E-06	--	2E-06		0.002	--	0.0007	0.003
		Exposure Point Total						2E-06					0.003
	Exposure Medium Total							2E-06					0.003
	Air	SWMU 23	Benzo(a)anthracene	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Benzo(k)fluoranthene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	4E-12	--	--	4E-12	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Arsenic	--	2E-10	--	--	2E-10	NA	--	0.00001	--	0.00001
			Chemical Total	--	1E-09	--	--	1E-09		- -	0.00001	- -	0.00001
		Exposure Point Total						1E-09					0.00001
	Exposure Medium Total							1E-09					0.00001
Medium Total								2E-06					0.003
Surface Water	Surface Water	SWMU 23	Arsenic	7E-08	--	4E-08	--	1E-07	Skin, CVS	0.0005	--	0.0003	0.0008
			Chromium	7E-08	--	3E-06	--	3E-06	None Specified	0.00008	--	0.004	0.004
			Cobalt	- -	--	- -	--	- -	Thyroid	0.0008	--	0.0002	0.001
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	1E-07	--	3E-06	--	3E-06		0.001	--	0.005	0.006
		Exposure Point Total						3E-06					0.006
	Exposure Medium Total							3E-06					0.006
Medium Total								3E-06					0.006

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	5E-08	--	5E-08	--	1E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-09	--	5E-09	--	1E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-08	--	4E-08	--	7E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-09	--	3E-09	--	6E-09	NA	--	--	--	--
			Arsenic	2E-07	--	1E-07	--	3E-07	Skin, CVS	0.002	--	0.0008	0.003
			Chromium	7E-07	--	- -	--	7E-07	None Specified	0.0008	--	--	0.0008
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Chemical Total	1E-06	--	2E-07	--	1E-06		0.02	--	0.0008	0.02
		Exposure Point Total						1E-06					0.02
	Exposure Medium Total							1E-06					0.02
Medium Total								1E-06					0.02
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				5E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.03
Receptor Total				Total Subsurface Soil, Surface Water, and Sediment Risks				6E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	5E-08	--	4E-08	--	9E-08					
			Benzo(a)pyrene	6E-07	--	4E-07	--	1E-06					
			Benzo(b)fluoranthene	8E-08	--	6E-08	--	1E-07					
			Dibenzo(a,h)anthracene	1E-07	--	7E-08	--	2E-07					
			Indeno(1,2,3-cd)pyrene	3E-08	--	2E-08	--	5E-08					
			Aroclor-1254	3E-08	--	2E-08	--	5E-08					
			Arsenic	7E-07	--	2E-07	--	9E-07					
			Chromium	3E-06	--	- -	--	3E-06					
			Chemical Total	5E-06	--	8E-07	--	5E-06					
		Exposure Point Total						5E-06					
	Exposure Medium Total							5E-06					
	Air	SWMU 23	Benzo(a)anthracene	--	9E-11	--	--	9E-11					
			Benzo(a)pyrene	--	3E-12	--	--	3E-12					
			Benzo(b)fluoranthene	--	5E-13	--	--	5E-13					
			Dibenzo(a,h)anthracene	--	7E-13	--	--	7E-13					
			Indeno(1,2,3-cd)pyrene	--	2E-13	--	--	2E-13					
			Aroclor-1254	--	5E-10	--	--	5E-10					
			Arsenic	--	1E-10	--	--	1E-10					
			Chromium	--	2E-08	--	--	2E-08					
			Chemical Total	--	2E-08	--	--	2E-08					
		Exposure Point Total						2E-08					
	Exposure Medium Total							2E-08					
Medium Total								6E-06					
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	1E-06	--	8E-07	--	2E-06					
			Benzo(a)pyrene	5E-06	--	4E-06	--	9E-06					
			Benzo(b)fluoranthene	7E-07	--	5E-07	--	1E-06					
			Benzo(k)fluoranthene	6E-08	--	4E-08	--	1E-07					
			Dibenzo(a,h)anthracene	1E-06	--	8E-07	--	2E-06					
			Indeno(1,2,3-cd)pyrene	7E-07	--	5E-07	--	1E-06					
			Arsenic	9E-07	--	3E-07	--	1E-06					
			Chemical Total	9E-06	--	7E-06	--	2E-05					
		Exposure Point Total						2E-05					
	Exposure Medium Total							2E-05					
	Air	SWMU 23	Benzo(a)anthracene	--	2E-09	--	--	2E-09					
			Benzo(a)pyrene	--	3E-11	--	--	3E-11					
			Benzo(b)fluoranthene	--	4E-12	--	--	4E-12					
			Benzo(k)fluoranthene	--	3E-12	--	--	3E-12					
			Dibenzo(a,h)anthracene	--	7E-12	--	--	7E-12					
			Indeno(1,2,3-cd)pyrene	--	4E-12	--	--	4E-12					
			Arsenic	--	3E-10	--	--	3E-10					
			Chemical Total	--	2E-09	--	--	2E-09					
		Exposure Point Total						2E-09					
	Exposure Medium Total							2E-09					
Medium Total								2E-05					
Surface Water	Surface Water	SWMU 23	Arsenic	2E-07	--	7E-08	--	3E-07					
			Chromium	4E-07	--	8E-06	--	8E-06					
			Cobalt	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Chemical Total	6E-07	--	8E-06	--	9E-06					
		Exposure Point Total						9E-06					
	Exposure Medium Total							9E-06					
Medium Total								9E-06					

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	5E-07	--	3E-07	--	8E-07					
			Benzo(b)fluoranthene	5E-08	--	4E-08	--	9E-08					
			Dibenzo(a,h)anthracene	3E-07	--	2E-07	--	5E-07					
			Indeno(1,2,3-cd)pyrene	3E-08	--	2E-08	--	5E-08					
			Arsenic	1E-06	--	3E-07	--	1E-06					
			Chromium	7E-06	--	- -	--	7E-06					
			Cobalt	- -	--	- -	--	- -					
			Chemical Total	9E-06	--	9E-07	--	1E-05					
		Exposure Point Total						1E-05					
	Exposure Medium Total							1E-05					
Medium Total								1E-05					
Receptor Total			Total Surface Soil, Surface Water, and Sediment Risks					3E-05					
Receptor Total			Total Subsurface Soil, Surface Water, and Sediment Risks					4E-05					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	6E-07	--	2E-07	--	8E-07	NA	--	--	--	--
			Benzo(a)pyrene	7E-06	--	2E-06	--	9E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-06	--	3E-07	--	1E-06	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-06	--	4E-07	--	1E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-07	--	1E-07	--	4E-07	NA	--	--	--	--
			Aroclor-1254	2E-07	--	7E-08	--	3E-07	Whole Body	0.06	--	0.02	0.08
			Arsenic	6E-06	--	8E-07	--	7E-06	Skin, CVS	0.2	--	0.02	0.2
			Chromium	4E-05	--	- -	--	4E-05	None Specified	0.06	--	--	0.06
			Chemical Total	6E-05	--	4E-06	--	6E-05		0.3	--	0.04	0.3
		Exposure Point Total						6E-05					0.3
	Exposure Medium Total							6E-05					0.3
	Air	SWMU 23	Benzo(a)anthracene	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	6E-11	--	--	6E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	9E-12	--	--	9E-12	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Aroclor-1254	--	5E-09	--	--	5E-09	NA	--	--	--	--
			Arsenic	--	2E-09	--	--	2E-09	NA	--	0.0003	--	0.0003
			Chromium	--	4E-07	--	--	4E-07	Respiratory	--	0.0001	--	0.0001
			Chemical Total	--	4E-07	--	--	4E-07		- -	0.0004	- -	0.0004
		Exposure Point Total						4E-07					0.0004
	Exposure Medium Total							4E-07					0.0004
Medium Total								6E-05					0.3
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	2E-05	--	5E-06	--	3E-05	NA	--	--	--	--
			Benzo(a)pyrene	6E-05	--	2E-05	--	8E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	9E-06	--	3E-06	--	1E-05	NA	--	--	--	--
			Benzo(k)fluoranthene	7E-07	--	2E-07	--	9E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-05	--	5E-06	--	3E-05	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	9E-06	--	3E-06	--	1E-05	NA	--	--	--	--
			Arsenic	9E-06	--	1E-06	--	1E-05	Skin, CVS	0.2	--	0.03	0.2
			Chemical Total	1E-04	--	4E-05	--	1E-04		0.2	--	0.03	0.2
		Exposure Point Total						1E-04					0.2
	Exposure Medium Total							1E-04					0.2
	Air	SWMU 23	Benzo(a)anthracene	--	4E-08	--	--	4E-08	NA	--	--	--	--
			Benzo(a)pyrene	--	5E-10	--	--	5E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	7E-11	--	--	7E-11	NA	--	--	--	--
			Benzo(k)fluoranthene	--	6E-11	--	--	6E-11	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	7E-11	--	--	7E-11	NA	--	--	--	--
			Arsenic	--	2E-09	--	--	2E-09	NA	--	0.0004	--	0.0004
			Chemical Total	--	4E-08	--	--	4E-08		- -	0.0004	- -	0.0004
		Exposure Point Total						4E-08					0.0004
	Exposure Medium Total							4E-08					0.0004
Medium Total								1E-04					0.2
Surface Water	Surface Water	SWMU 23	Arsenic	1E-07	--	3E-08	--	1E-07	Skin, CVS	0.003	--	0.0006	0.004
			Chromium	3E-07	--	5E-06	--	5E-06	None Specified	0.0004	--	0.008	0.008
			Cobalt	- -	--	- -	--	- -	Thyroid	0.004	--	0.0004	0.004
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	4E-07	--	5E-06	--	5E-06		0.007	--	0.009	0.02
		Exposure Point Total						5E-06					0.02
	Exposure Medium Total							5E-06					0.02
Medium Total								5E-06					0.02

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	4E-07	--	2E-07	--	6E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	4E-08	--	3E-08	--	7E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-07	--	2E-07	--	5E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-08	--	2E-08	--	5E-08	NA	--	--	--	--
			Arsenic	8E-07	--	2E-07	--	1E-06	Skin, CVS	0.02	--	0.005	0.03
			Chromium	6E-06	--	- -	--	6E-06	None Specified	0.008	--	--	0.008
			Cobalt	- -	--	- -	--	- -	Thyroid	0.2	--	--	0.2
			Chemical Total	8E-06	--	7E-07	--	9E-06		0.2	--	0.005	0.2
		Exposure Point Total						9E-06					0.2
	Exposure Medium Total							9E-06					0.2
Medium Total								9E-06					0.2
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				7E-05	Total Surface Soil, Surface Water, and Sediment HIs				0.5
				Total Subsurface Soil, Surface Water, and Sediment Risks				1E-04	Total Subsurface Soil, Surface Water, and Sediment HIs				0.4

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	7E-08	--	4E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	8E-07	--	4E-07	--	1E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-07	--	6E-08	--	2E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-07	--	9E-08	--	3E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4E-08	--	2E-08	--	6E-08	NA	--	--	--	--
			Aroclor-1254	6E-08	--	4E-08	--	1E-07	Whole Body	0.006	--	0.003	0.009
			Arsenic	2E-06	--	4E-07	--	2E-06	Skin, CVS	0.02	--	0.003	0.02
			Chromium	5E-06	--	- -	--	5E-06	None Specified	0.006	--	--	0.006
			Chemical Total	8E-06	--	1E-06	--	9E-06		0.03	--	0.006	0.04
		Exposure Point Total						9E-06					0.04
	Exposure Medium Total							9E-06					0.04
	Air	SWMU 23	Benzo(a)anthracene	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	7E-11	--	--	7E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	4E-12	--	--	4E-12	NA	--	--	--	--
			Aroclor-1254	--	2E-08	--	--	2E-08	NA	--	--	--	--
			Arsenic	--	6E-09	--	--	6E-09	NA	--	0.0003	--	0.0003
			Chromium	--	5E-07	--	--	5E-07	Respiratory	--	0.0001	--	0.0001
			Chemical Total	--	5E-07	--	--	5E-07		- -	0.0004	- -	0.0004
		Exposure Point Total						5E-07					0.0004
	Exposure Medium Total							5E-07					0.0004
Medium Total								1E-05					0.04
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	2E-06	--	9E-07	--	3E-06	NA	--	--	--	--
			Benzo(a)pyrene	7E-06	--	4E-06	--	1E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-06	--	6E-07	--	2E-06	NA	--	--	--	--
			Benzo(k)fluoranthene	8E-08	--	4E-08	--	1E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-06	--	9E-07	--	3E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-06	--	6E-07	--	2E-06	NA	--	--	--	--
			Arsenic	3E-06	--	6E-07	--	4E-06	Skin, CVS	0.02	--	0.005	0.03
			Chemical Total	2E-05	--	8E-06	--	3E-05		0.02	--	0.005	0.03
		Exposure Point Total						3E-05					0.03
	Exposure Medium Total							3E-05					0.03
	Air	SWMU 23	Benzo(a)anthracene	--	5E-08	--	--	5E-08	NA	--	--	--	--
			Benzo(a)pyrene	--	6E-10	--	--	6E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	9E-11	--	--	9E-11	NA	--	--	--	--
			Benzo(k)fluoranthene	--	7E-11	--	--	7E-11	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	2E-10	--	--	2E-10	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	9E-11	--	--	9E-11	NA	--	--	--	--
			Arsenic	--	8E-09	--	--	8E-09	NA	--	0.0004	--	0.0004
			Chemical Total	--	6E-08	--	--	6E-08		- -	0.0004	- -	0.0004
		Exposure Point Total						6E-08					0.0004
	Exposure Medium Total							6E-08					0.0004
Medium Total								3E-05					0.03
Surface Water	Surface Water	SWMU 23	Arsenic	7E-08	--	4E-08	--	1E-07	Skin, CVS	0.0005	--	0.0003	0.0008
			Chromium	7E-08	--	3E-06	--	3E-06	None Specified	0.00008	--	0.004	0.004
			Cobalt	- -	--	- -	--	- -	Thyroid	0.0008	--	0.0002	0.001
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	1E-07	--	3E-06	--	3E-06		0.001	--	0.005	0.006
		Exposure Point Total						3E-06					0.006
	Exposure Medium Total							3E-06					0.006
Medium Total								3E-06					0.006

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	5E-08	--	5E-08	--	1E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-09	--	5E-09	--	1E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-08	--	4E-08	--	7E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-09	--	3E-09	--	6E-09	NA	--	--	--	--
			Arsenic	2E-07	--	1E-07	--	3E-07	Skin, CVS	0.002	--	0.0008	0.003
			Chromium	7E-07	--	- -	--	7E-07	None Specified	0.0008	--	--	0.0008
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Chemical Total	1E-06	--	2E-07	--	1E-06		0.02	--	0.0008	0.02
		Exposure Point Total						1E-06					0.02
	Exposure Medium Total							1E-06					0.02
Medium Total								1E-06					0.02
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				1E-05	Total Surface Soil, Surface Water, and Sediment HIs				0.07
Receptor Total				Total Subsurface Soil, Surface Water, and Sediment Risks				3E-05	Total Subsurface Soil, Surface Water, and Sediment HIs				0.06

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	7E-07	--	2E-07	--	9E-07					
			Benzo(a)pyrene	8E-06	--	2E-06	--	1E-05					
			Benzo(b)fluoranthene	1E-06	--	4E-07	--	1E-06					
			Dibenzo(a,h)anthracene	1E-06	--	5E-07	--	2E-06					
			Indeno(1,2,3-cd)pyrene	3E-07	--	1E-07	--	4E-07					
			Aroclor-1254	3E-07	--	1E-07	--	4E-07					
			Arsenic	8E-06	--	1E-06	--	9E-06					
			Chromium	5E-05	--	- -	--	5E-05					
			Chemical Total	7E-05	--	4E-06	--	7E-05					
		Exposure Point Total						7E-05					
	Exposure Medium Total							7E-05					
	Air	SWMU 23	Benzo(a)anthracene	--	4E-09	--	--	4E-09					
			Benzo(a)pyrene	--	1E-10	--	--	1E-10					
			Benzo(b)fluoranthene	--	2E-11	--	--	2E-11					
			Dibenzo(a,h)anthracene	--	3E-11	--	--	3E-11					
			Indeno(1,2,3-cd)pyrene	--	7E-12	--	--	7E-12					
			Aroclor-1254	--	3E-08	--	--	3E-08					
			Arsenic	--	8E-09	--	--	8E-09					
			Chromium	--	9E-07	--	--	9E-07					
			Chemical Total	--	9E-07	--	--	9E-07					
		Exposure Point Total						9E-07					
	Exposure Medium Total							9E-07					
Medium Total								7E-05					
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	2E-05	--	6E-06	--	3E-05					
			Benzo(a)pyrene	7E-05	--	2E-05	--	9E-05					
			Benzo(b)fluoranthene	1E-05	--	4E-06	--	1E-05					
			Benzo(k)fluoranthene	8E-07	--	2E-07	--	1E-06					
			Dibenzo(a,h)anthracene	2E-05	--	6E-06	--	3E-05					
			Indeno(1,2,3-cd)pyrene	1E-05	--	4E-06	--	1E-05					
			Arsenic	1E-05	--	2E-06	--	1E-05					
			Chemical Total	1E-04	--	4E-05	--	1E-04					
		Exposure Point Total						1E-04					
	Exposure Medium Total							1E-04					
	Air	SWMU 23	Benzo(a)anthracene	--	9E-08	--	--	9E-08					
			Benzo(a)pyrene	--	1E-09	--	--	1E-09					
			Benzo(b)fluoranthene	--	2E-10	--	--	2E-10					
			Benzo(k)fluoranthene	--	1E-10	--	--	1E-10					
			Dibenzo(a,h)anthracene	--	3E-10	--	--	3E-10					
			Indeno(1,2,3-cd)pyrene	--	2E-10	--	--	2E-10					
			Arsenic	--	1E-08	--	--	1E-08					
			Chemical Total	--	1E-07	--	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								1E-04					
Surface Water	Surface Water	SWMU 23	Arsenic	2E-07	--	7E-08	--	3E-07					
			Chromium	4E-07	--	8E-06	--	8E-06					
			Cobalt	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Chemical Total	6E-07	--	8E-06	--	9E-06					
		Exposure Point Total						9E-06					
	Exposure Medium Total							9E-06					
Medium Total								9E-06					

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	5E-07	--	3E-07	--	8E-07					
			Benzo(b)fluoranthene	5E-08	--	4E-08	--	9E-08					
			Dibenzo(a,h)anthracene	3E-07	--	2E-07	--	5E-07					
			Indeno(1,2,3-cd)pyrene	3E-08	--	2E-08	--	5E-08					
			Arsenic	1E-06	--	3E-07	--	1E-06					
			Chromium	7E-06	--	- -	--	7E-06					
			Cobalt	- -	--	- -	--	- -					
			Chemical Total	9E-06	--	9E-07	--	1E-05					
		Exposure Point Total						1E-05					
	Exposure Medium Total							1E-05					
Medium Total								1E-05					
Receptor Total			Total Surface Soil, Surface Water, and Sediment Risks					9E-05					
Receptor Total			Total Subsurface Soil, Surface Water, and Sediment Risks					1E-04					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Crane SWMU 23	Benzo(a)anthracene	6E-10	--	2E-10	--	8E-10	NA	--	--	--	--
			Benzo(a)pyrene	7E-09	--	2E-09	--	9E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-09	--	3E-10	--	1E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-09	--	4E-10	--	1E-09	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4E-10	--	9E-11	--	5E-10	NA	--	--	--	--
			Aroclor-1254	1E-09	--	3E-10	--	1E-09	CNS	0.001	--	0.0004	0.001
			Arsenic	4E-08	--	4E-09	--	4E-08	Skin, CVS	0.006	--	0.0006	0.007
			Chromium	5E-08	--	- -	--	5E-08	Kidney	0.001	--	--	0.001
			Chemical Total	1E-07	--	7E-09	--	1E-07		0.008	--	0.001	0.009
		Exposure Point Total						1E-07					0.009
	Exposure Medium Total							1E-07					0.009
	Air	Crane SWMU 23	Benzo(a)anthracene	--	3E-11	--	--	3E-11	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-11	--	--	3E-11	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	6E-12	--	--	6E-12	NA	--	--	--	--
			Aroclor-1254	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Arsenic	--	2E-08	--	--	2E-08	NA	--	0.02	--	0.02
			Chromium	--	9E-07	--	--	9E-07	Respiratory	--	0.003	--	0.003
			Chemical Total	--	9E-07	--	--	9E-07		- -	0.02	- -	0.02
		Exposure Point Total						9E-07					0.02
	Exposure Medium Total							9E-07					0.02
Medium Total								1E-06					0.03
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Benzo(a)anthracene	2E-08	--	4E-09	--	2E-08	NA	--	--	--	--
			Benzo(a)pyrene	6E-08	--	2E-08	--	8E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	9E-09	--	2E-09	--	1E-08	NA	--	--	--	--
			Benzo(k)fluoranthene	7E-10	--	2E-10	--	9E-10	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-08	--	4E-09	--	2E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	9E-09	--	2E-09	--	1E-08	NA	--	--	--	--
			Arsenic	5E-08	--	5E-09	--	6E-08	Skin, CVS	0.008	--	0.0008	0.009
			Chemical Total	2E-07	--	4E-08	--	2E-07		0.008	--	0.0008	0.009
		Exposure Point Total						2E-07					0.009
	Exposure Medium Total							2E-07					0.009
	Air	Crane SWMU 23	Benzo(a)anthracene	--	7E-10	--	--	7E-10	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-10	--	--	2E-10	NA	--	--	--	--
			Benzo(k)fluoranthene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-10	--	--	2E-10	NA	--	--	--	--
			Arsenic	--	3E-08	--	--	3E-08	NA	--	0.03	--	0.03
			Chemical Total	--	3E-08	--	--	3E-08		- -	0.03	- -	0.03
		Exposure Point Total						3E-08					0.03
	Exposure Medium Total							3E-08					0.03
Medium Total								3E-07					0.04

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Crane SWMU 23	Benzo(a)anthracene	5E-09	--	8E-10	--	6E-09	NA	--	--	--	--
			Benzo(a)pyrene	5E-08	--	9E-09	--	6E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	8E-09	--	1E-09	--	9E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-08	--	2E-09	--	1E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-09	--	5E-10	--	4E-09	NA	--	--	--	--
			Aroclor-1254	9E-09	--	2E-09	--	1E-08	Whole Body	0.002	--	0.0003	0.002
			Arsenic	3E-07	--	2E-08	--	3E-07	Skin, CVS	0.005	--	0.0003	0.005
			Chromium	4E-07	--	- -	--	4E-07	None Specified	0.002	--	--	0.002
			Chemical Total	8E-07	--	4E-08	--	8E-07		0.009	--	0.0006	0.01
		Exposure Point Total						8E-07					0.01
	Exposure Medium Total							8E-07					0.01
	Air	Crane SWMU 23	Benzo(a)anthracene	--	9E-11	--	--	9E-11	NA	--	--	--	--
			Benzo(a)pyrene	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	5E-13	--	--	5E-13	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	7E-13	--	--	7E-13	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Aroclor-1254	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Arsenic	--	6E-10	--	--	6E-10	NA	--	0.00007	--	0.00007
			Chromium	--	2E-08	--	--	2E-08	Respiratory	--	0.00002	--	0.00002
			Chemical Total	--	2E-08	--	--	2E-08		- -	0.00009	- -	0.00009
		Exposure Point Total						2E-08					0.00009
	Exposure Medium Total							2E-08					0.00009
Medium Total								9E-07					0.010
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Benzo(a)anthracene	1E-07	--	2E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	5E-07	--	8E-08	--	6E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-08	--	1E-08	--	8E-08	NA	--	--	--	--
			Benzo(k)fluoranthene	6E-09	--	9E-10	--	7E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-07	--	2E-08	--	1E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	7E-08	--	1E-08	--	8E-08	NA	--	--	--	--
			Arsenic	4E-07	--	3E-08	--	4E-07	Skin, CVS	0.007	--	0.0004	0.007
			Chemical Total	1E-06	--	2E-07	--	1E-06		0.007	--	0.0004	0.007
		Exposure Point Total						1E-06					0.007
	Exposure Medium Total							1E-06					0.007
	Air	Crane SWMU 23	Benzo(a)anthracene	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	3E-11	--	--	3E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	4E-12	--	--	4E-12	NA	--	--	--	--
			Benzo(k)fluoranthene	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	8E-12	--	--	8E-12	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	4E-12	--	--	4E-12	NA	--	--	--	--
			Arsenic	--	7E-10	--	--	7E-10	NA	--	0.00009	--	0.00009
			Chemical Total	--	3E-09	--	--	3E-09		- -	0.00009	- -	0.00009
		Exposure Point Total						3E-09					0.00009
	Exposure Medium Total							3E-09					0.00009
Medium Total								1E-06					0.007

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	2E-09	--	7E-10	--	3E-09	NA	--	--	--	--
			Benzo(a)pyrene	2E-08	--	7E-09	--	3E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	3E-09	--	1E-09	--	4E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	4E-09	--	2E-09	--	6E-09	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-09	--	4E-10	--	1E-09	NA	--	--	--	--
			Aroclor-1254	1E-09	--	4E-10	--	1E-09	Whole Body	0.0002	--	0.00008	0.0003
			Arsenic	3E-08	--	5E-09	--	4E-08	Skin, CVS	0.0005	--	0.00008	0.0006
			Chromium	1E-07	--	- -	--	1E-07	None Specified	0.0002	--	--	0.0002
			Chemical Total	2E-07	--	2E-08	--	2E-07		0.0009	--	0.0002	0.001
		Exposure Point Total						2E-07					0.001
	Exposure Medium Total							2E-07					0.001
	Air	SWMU 23	Benzo(a)anthracene	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Benzo(b)fluoranthene	--	3E-14	--	--	3E-14	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	4E-14	--	--	4E-14	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	9E-15	--	--	9E-15	NA	--	--	--	--
			Aroclor-1254	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Arsenic	--	9E-12	--	--	9E-12	NA	--	0.0000010	--	0.0000010
			Chromium	--	1E-09	--	--	1E-09	Respiratory	--	0.0000003	--	0.0000003
			Chemical Total	--	3E-09	--	--	3E-09		- -	0.000001	- -	0.000001
		Exposure Point Total						3E-09					0.000001
	Exposure Medium Total							3E-09					0.000001
Medium Total								2E-07					0.001
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	4E-08	--	2E-08	--	6E-08	NA	--	--	--	--
			Benzo(a)pyrene	2E-07	--	7E-08	--	3E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	2E-08	--	9E-09	--	3E-08	NA	--	--	--	--
			Benzo(k)fluoranthene	2E-09	--	8E-10	--	3E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	4E-08	--	2E-08	--	6E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-08	--	9E-09	--	3E-08	NA	--	--	--	--
			Arsenic	5E-08	--	7E-09	--	6E-08	Skin, CVS	0.0007	--	0.0001	0.0008
			Chemical Total	4E-07	--	1E-07	--	5E-07		0.0007	--	0.0001	0.0008
		Exposure Point Total						5E-07					0.0008
	Exposure Medium Total							5E-07					0.0008
	Air	SWMU 23	Benzo(a)anthracene	--	8E-09	--	--	8E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-12	--	--	1E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Benzo(k)fluoranthene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	4E-13	--	--	4E-13	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Arsenic	--	1E-11	--	--	1E-11	NA	--	0.000001	--	0.000001
			Chemical Total	--	8E-09	--	--	8E-09		- -	0.000001	- -	0.000001
		Exposure Point Total						8E-09					0.000001
	Exposure Medium Total							8E-09					0.000001
Medium Total								5E-07					0.0008
Surface Water	Surface Water	SWMU 23	Arsenic	1E-08	--	6E-09	--	2E-08	Skin, CVS	0.0002	--	0.00009	0.0003
			Chromium	2E-08	--	7E-07	--	7E-07	None Specified	0.00003	--	0.001	0.001
			Cobalt	- -	--	- -	--	- -	Thyroid	0.0004	--	0.00005	0.0005
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	3E-08	--	7E-07	--	7E-07		0.0006	--	0.001	0.002
		Exposure Point Total						7E-07					0.002
	Exposure Medium Total							7E-07					0.002
Medium Total								7E-07					0.002

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	8E-09	--	6E-09	--	1E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	8E-10	--	6E-10	--	1E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	5E-09	--	4E-09	--	9E-09	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	5E-10	--	4E-10	--	9E-10	NA	--	--	--	--
			Arsenic	3E-08	--	8E-09	--	4E-08	Skin, CVS	0.0004	--	0.0001	0.0005
			Chromium	1E-07	--	- -	--	1E-07	None Specified	0.0002	--	--	0.0002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.004	--	--	0.004
			Chemical Total	1E-07	--	2E-08	--	1E-07		0.005	--	0.0001	0.005
		Exposure Point Total						1E-07					0.005
	Exposure Medium Total							1E-07					0.005
Medium Total								1E-07					0.005
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				1E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.008
Receptor Total				Total Subsurface Soil, Surface Water, and Sediment Risks				1E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.008

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	4E-09	--	1E-09	--	5E-09	NA	--	--	--	--
			Benzo(a)pyrene	5E-08	--	1E-08	--	6E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	7E-09	--	2E-09	--	9E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-08	--	2E-09	--	1E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-09	--	6E-10	--	4E-09	NA	--	--	--	--
			Aroclor-1254	1E-09	--	3E-10	--	1E-09	Whole Body	0.001	--	0.0003	0.001
			Arsenic	4E-08	--	4E-09	--	4E-08	Skin, CVS	0.003	--	0.0003	0.003
			Chromium	3E-07	--	- -	--	3E-07	None Specified	0.001	--	--	0.001
			Chemical Total	4E-07	--	2E-08	--	4E-07		0.005	--	0.0006	0.006
		Exposure Point Total						4E-07					0.006
	Exposure Medium Total							4E-07					0.006
	Air	SWMU 23	Benzo(a)anthracene	--	4E-12	--	--	4E-12	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-13	--	--	1E-13	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-14	--	--	2E-14	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-14	--	--	3E-14	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	7E-15	--	--	7E-15	NA	--	--	--	--
			Aroclor-1254	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Arsenic	--	4E-12	--	--	4E-12	NA	--	0.000002	--	0.000002
			Chromium	--	1E-09	--	--	1E-09	Respiratory	--	0.0000007	--	0.0000007
			Chemical Total	--	1E-09	--	--	1E-09		- -	0.000003	- -	0.000003
		Exposure Point Total						1E-09					0.000003
	Exposure Medium Total							1E-09					0.000003
Medium Total								4E-07					0.006
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	1E-07	--	3E-08	--	1E-07	NA	--	--	--	--
			Benzo(a)pyrene	4E-07	--	1E-07	--	5E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	6E-08	--	2E-08	--	8E-08	NA	--	--	--	--
			Benzo(k)fluoranthene	5E-09	--	1E-09	--	6E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-07	--	3E-08	--	1E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	6E-08	--	2E-08	--	8E-08	NA	--	--	--	--
			Arsenic	6E-08	--	5E-09	--	7E-08	Skin, CVS	0.004	--	0.0004	0.004
			Chemical Total	8E-07	--	2E-07	--	1E-06		0.004	--	0.0004	0.004
		Exposure Point Total						1E-06					0.004
	Exposure Medium Total							1E-06					0.004
	Air	SWMU 23	Benzo(a)anthracene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-12	--	--	1E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Benzo(k)fluoranthene	--	1E-13	--	--	1E-13	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	4E-13	--	--	4E-13	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Arsenic	--	5E-12	--	--	5E-12	NA	--	0.000003	--	0.000003
			Chemical Total	--	1E-10	--	--	1E-10		- -	0.000003	- -	0.000003
		Exposure Point Total						1E-10					0.000003
	Exposure Medium Total							1E-10					0.000003
Medium Total								1E-06					0.004
Surface Water	Surface Water	SWMU 23	Arsenic	9E-09	--	2E-09	--	1E-08	Skin, CVS	0.0007	--	0.0002	0.0009
			Chromium	3E-08	--	5E-07	--	5E-07	None Specified	0.0001	--	0.002	0.002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.001	--	0.0001	0.001
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	4E-08	--	5E-07	--	5E-07		0.002	--	0.002	0.004
		Exposure Point Total						5E-07					0.004
	Exposure Medium Total							5E-07					0.004
Medium Total								5E-07					0.004

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	4E-08	--	1E-08	--	5E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	4E-09	--	1E-09	--	5E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-08	--	7E-09	--	4E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-09	--	7E-10	--	4E-09	NA	--	--	--	--
			Arsenic	7E-08	--	6E-09	--	8E-08	Skin, CVS	0.005	--	0.0005	0.006
			Chromium	6E-07	--	- -	--	6E-07	None Specified	0.002	--	--	0.002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.05	--	--	0.05
			Chemical Total	7E-07	--	2E-08	--	7E-07		0.06	--	0.0005	0.06
		Exposure Point Total						7E-07					0.06
	Exposure Medium Total							7E-07					0.06
Medium Total								7E-07					0.06
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				2E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.07
				Total Subsurface Soil, Surface Water, and Sediment Risks				2E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.07

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	4E-10	--	1E-10	--	5E-10	NA	--	--	--	--
			Benzo(a)pyrene	4E-09	--	1E-09	--	5E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	6E-10	--	2E-10	--	8E-10	NA	--	--	--	--
			Dibenzo(a,h)anthracene	8E-10	--	2E-10	--	1E-09	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-10	--	6E-11	--	3E-10	NA	--	--	--	--
			Aroclor-1254	4E-10	--	1E-10	--	5E-10	Whole Body	0.0001	--	0.00003	0.0001
			Arsenic	1E-08	--	2E-09	--	1E-08	Skin, CVS	0.0003	--	0.00004	0.0003
			Chromium	3E-08	--	- -	--	3E-08	None Specified	0.0001	--	--	0.0001
			Chemical Total	5E-08	--	4E-09	--	5E-08		0.0005	--	0.00007	0.0006
		Exposure Point Total						5E-08					0.0006
	Exposure Medium Total							5E-08					0.0006
	Air	SWMU 23	Benzo(a)anthracene	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-13	--	--	1E-13	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-14	--	--	2E-14	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-14	--	--	3E-14	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	6E-15	--	--	6E-15	NA	--	--	--	--
			Aroclor-1254	--	4E-11	--	--	4E-11	NA	--	--	--	--
			Arsenic	--	1E-11	--	--	1E-11	NA	--	0.000002	--	0.000002
			Chromium	--	8E-10	--	--	8E-10	Respiratory	--	0.0000007	--	0.0000007
			Chemical Total	--	9E-10	--	--	9E-10		- -	0.000003	- -	0.000003
		Exposure Point Total						9E-10					0.000003
	Exposure Medium Total							9E-10					0.000003
Medium Total								5E-08					0.0006
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	9E-09	--	3E-09	--	1E-08	NA	--	--	--	--
			Benzo(a)pyrene	4E-08	--	1E-08	--	5E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	5E-09	--	2E-09	--	7E-09	NA	--	--	--	--
			Benzo(k)fluoranthene	4E-10	--	1E-10	--	5E-10	NA	--	--	--	--
			Dibenzo(a,h)anthracene	9E-09	--	3E-09	--	1E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	5E-09	--	2E-09	--	7E-09	NA	--	--	--	--
			Arsenic	2E-08	--	2E-09	--	2E-08	Skin, CVS	0.0004	--	0.00005	0.0005
			Chemical Total	9E-08	--	2E-08	--	1E-07		0.0004	--	0.00005	0.0005
		Exposure Point Total						1E-07					0.0005
	Exposure Medium Total							1E-07					0.0005
	Air	SWMU 23	Benzo(a)anthracene	--	8E-11	--	--	8E-11	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-12	--	--	1E-12	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Benzo(k)fluoranthene	--	1E-13	--	--	1E-13	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-13	--	--	3E-13	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-13	--	--	2E-13	NA	--	--	--	--
			Arsenic	--	2E-11	--	--	2E-11	NA	--	0.000003	--	0.000003
			Chemical Total	--	1E-10	--	--	1E-10		- -	0.000003	- -	0.000003
		Exposure Point Total						1E-10					0.000003
	Exposure Medium Total							1E-10					0.000003
Medium Total								1E-07					0.0005
Surface Water	Surface Water	SWMU 23	Arsenic	6E-09	--	3E-09	--	9E-09	Skin, CVS	0.0001	--	0.00008	0.0002
			Chromium	5E-09	--	2E-07	--	2E-07	None Specified	0.00002	--	0.0009	0.0009
			Cobalt	- -	--	- -	--	- -	Thyroid	0.0002	--	0.00005	0.0003
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	1E-08	--	2E-07	--	2E-07		0.0003	--	0.001	0.001
		Exposure Point Total						2E-07					0.001
	Exposure Medium Total							2E-07					0.001
Medium Total								2E-07					0.001

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	4E-09	--	1E-09	--	5E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	4E-10	--	1E-10	--	5E-10	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-09	--	8E-10	--	4E-09	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-10	--	8E-11	--	3E-10	NA	--	--	--	--
			Arsenic	3E-08	--	3E-09	--	3E-08	Skin, CVS	0.0005	--	0.00007	0.0006
			Chromium	5E-08	--	- -	--	5E-08	None Specified	0.0002	--	--	0.0002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.005	--	--	0.005
			Chemical Total	9E-08	--	5E-09	--	1E-07		0.006	--	0.00007	0.006
		Exposure Point Total						1E-07					0.006
	Exposure Medium Total							1E-07					0.006
Medium Total								1E-07					0.006
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				4E-07	Total Surface Soil, Surface Water, and Sediment HIs				0.008
Receptor Total				Total Subsurface Soil, Surface Water, and Sediment Risks				4E-07	Total Subsurface Soil, Surface Water, and Sediment HIs				0.008

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	4E-09	--	1E-09	--	5E-09					
			Benzo(a)pyrene	5E-08	--	1E-08	--	6E-08					
			Benzo(b)fluoranthene	8E-09	--	2E-09	--	1E-08					
			Dibenzo(a,h)anthracene	1E-08	--	2E-09	--	1E-08					
			Indeno(1,2,3-cd)pyrene	3E-09	--	7E-10	--	4E-09					
			Aroclor-1254	1E-09	--	4E-10	--	1E-09					
			Arsenic	5E-08	--	6E-09	--	6E-08					
			Chromium	3E-07	--	- -	--	3E-07					
			Chemical Total	4E-07	--	2E-08	--	4E-07					
		Exposure Point Total						4E-07					
	Exposure Medium Total							4E-07					
	Air	SWMU 23	Benzo(a)anthracene	--	7E-12	--	--	7E-12					
			Benzo(a)pyrene	--	2E-13	--	--	2E-13					
			Benzo(b)fluoranthene	--	4E-14	--	--	4E-14					
			Dibenzo(a,h)anthracene	--	6E-14	--	--	6E-14					
			Indeno(1,2,3-cd)pyrene	--	1E-14	--	--	1E-14					
			Aroclor-1254	--	5E-11	--	--	5E-11					
			Arsenic	--	1E-11	--	--	1E-11					
			Chromium	--	2E-09	--	--	2E-09					
			Chemical Total	--	2E-09	--	--	2E-09					
		Exposure Point Total						2E-09					
	Exposure Medium Total							2E-09					
Medium Total								4E-07					
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	1E-07	--	3E-08	--	1E-07					
			Benzo(a)pyrene	4E-07	--	1E-07	--	5E-07					
			Benzo(b)fluoranthene	7E-08	--	2E-08	--	9E-08					
			Benzo(k)fluoranthene	5E-09	--	1E-09	--	6E-09					
			Dibenzo(a,h)anthracene	1E-07	--	3E-08	--	1E-07					
			Indeno(1,2,3-cd)pyrene	7E-08	--	2E-08	--	9E-08					
			Arsenic	8E-08	--	7E-09	--	9E-08					
			Chemical Total	8E-07	--	2E-07	--	1E-06					
		Exposure Point Total						1E-06					
	Exposure Medium Total							1E-06					
	Air	SWMU 23	Benzo(a)anthracene	--	2E-10	--	--	2E-10					
			Benzo(a)pyrene	--	2E-12	--	--	2E-12					
			Benzo(b)fluoranthene	--	4E-13	--	--	4E-13					
			Benzo(k)fluoranthene	--	2E-13	--	--	2E-13					
			Dibenzo(a,h)anthracene	--	7E-13	--	--	7E-13					
			Indeno(1,2,3-cd)pyrene	--	4E-13	--	--	4E-13					
			Arsenic	--	3E-11	--	--	3E-11					
			Chemical Total	--	2E-10	--	--	2E-10					
		Exposure Point Total						2E-10					
	Exposure Medium Total							2E-10					
Medium Total								1E-06					
Surface Water	Surface Water	SWMU 23	Arsenic	2E-08	--	5E-09	--	3E-08					
			Chromium	4E-08	--	7E-07	--	7E-07					
			Cobalt	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Chemical Total	6E-08	--	7E-07	--	8E-07					
		Exposure Point Total						8E-07					
	Exposure Medium Total							8E-07					
Medium Total								8E-07					

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	4E-08	--	1E-08	--	5E-08					
			Benzo(b)fluoranthene	4E-09	--	1E-09	--	5E-09					
			Dibenzo(a,h)anthracene	3E-08	--	8E-09	--	4E-08					
			Indeno(1,2,3-cd)pyrene	3E-09	--	8E-10	--	4E-09					
			Arsenic	1E-07	--	9E-09	--	1E-07					
			Chromium	7E-07	--	- -	--	7E-07					
			Cobalt	- -	--	- -	--	- -					
			Chemical Total	9E-07	--	3E-08	--	9E-07					
		Exposure Point Total						9E-07					
	Exposure Medium Total							9E-07					
Medium Total								9E-07					
Receptor Total			Total Surface Soil, Surface Water, and Sediment Risks					2E-06					
Receptor Total			Total Subsurface Soil, Surface Water, and Sediment Risks					3E-06					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	8E-08	--	9E-09	--	9E-08	NA	--	--	--	--
			Benzo(a)pyrene	9E-07	--	1E-07	--	1E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-07	--	2E-08	--	1E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-07	--	2E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	5E-08	--	6E-09	--	6E-08	NA	--	--	--	--
			Aroclor-1254	2E-08	--	3E-09	--	2E-08	Whole Body	0.02	--	0.003	0.02
			Arsenic	7E-07	--	3E-08	--	7E-07	Skin, CVS	0.06	--	0.003	0.06
			Chromium	6E-06	--	- -	--	6E-06	None Specified	0.02	--	--	0.02
			Chemical Total	8E-06	--	2E-07	--	8E-06		0.1	--	0.006	0.1
		Exposure Point Total						8E-06					0.1
	Exposure Medium Total							8E-06					0.1
	Air	SWMU 23	Benzo(a)anthracene	--	4E-10	--	--	4E-10	NA	--	--	--	--
			Benzo(a)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	8E-13	--	--	8E-13	NA	--	--	--	--
			Aroclor-1254	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Arsenic	--	4E-10	--	--	4E-10	NA	--	0.0002	--	0.0002
			Chromium	--	1E-07	--	--	1E-07	Respiratory	--	0.00007	--	0.00007
			Chemical Total	--	1E-07	--	--	1E-07		- -	0.0003	- -	0.0003
		Exposure Point Total						1E-07					0.0003
	Exposure Medium Total							1E-07					0.0003
Medium Total								8E-06					0.1
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	2E-06	--	3E-07	--	2E-06	NA	--	--	--	--
			Benzo(a)pyrene	8E-06	--	9E-07	--	9E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-06	--	1E-07	--	1E-06	NA	--	--	--	--
			Benzo(k)fluoranthene	9E-08	--	1E-08	--	1E-07	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-06	--	3E-07	--	2E-06	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-06	--	1E-07	--	1E-06	NA	--	--	--	--
			Arsenic	1E-06	--	5E-08	--	1E-06	Skin, CVS	0.08	--	0.004	0.08
			Chemical Total	2E-05	--	2E-06	--	2E-05		0.08	--	0.004	0.08
		Exposure Point Total						2E-05					0.08
	Exposure Medium Total							2E-05					0.08
	Air	SWMU 23	Benzo(a)anthracene	--	1E-08	--	--	1E-08	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(k)fluoranthene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	4E-11	--	--	4E-11	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Arsenic	--	5E-10	--	--	5E-10	NA	--	0.0003	--	0.0003
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.0003	- -	0.0003
		Exposure Point Total						1E-08					0.0003
	Exposure Medium Total							1E-08					0.0003
Medium Total								2E-05					0.08
Surface Water	Surface Water	SWMU 23	Arsenic	9E-09	--	2E-09	--	1E-08	Skin, CVS	0.0007	--	0.0002	0.0009
			Chromium	3E-08	--	5E-07	--	5E-07	None Specified	0.0001	--	0.002	0.002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.001	--	0.0001	0.001
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	4E-08	--	5E-07	--	5E-07		0.002	--	0.002	0.004
		Exposure Point Total						5E-07					0.004
	Exposure Medium Total							5E-07					0.004
Medium Total								5E-07					0.004

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	4E-08	--	1E-08	--	5E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	4E-09	--	1E-09	--	5E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	3E-08	--	7E-09	--	4E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	3E-09	--	7E-10	--	4E-09	NA	--	--	--	--
			Arsenic	7E-08	--	6E-09	--	8E-08	Skin, CVS	0.005	--	0.0005	0.006
			Chromium	6E-07	--	- -	--	6E-07	None Specified	0.002	--	--	0.002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.05	--	--	0.05
			Chemical Total	7E-07	--	2E-08	--	7E-07		0.06	--	0.0005	0.06
		Exposure Point Total						7E-07					0.06
	Exposure Medium Total							7E-07					0.06
Medium Total								7E-07					0.06
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				9E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.2
				Total Subsurface Soil, Surface Water, and Sediment Risks				2E-05	Total Subsurface Soil, Surface Water, and Sediment HIs				0.1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	6E-09	--	1E-09	--	7E-09	NA	--	--	--	--
			Benzo(a)pyrene	7E-08	--	1E-08	--	8E-08	NA	--	--	--	--
			Benzo(b)fluoranthene	1E-08	--	2E-09	--	1E-08	NA	--	--	--	--
			Dibenzo(a,h)anthracene	1E-08	--	2E-09	--	1E-08	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4E-09	--	6E-10	--	5E-09	NA	--	--	--	--
			Aroclor-1254	7E-09	--	1E-09	--	8E-09	Whole Body	0.002	--	0.0003	0.002
			Arsenic	2E-07	--	1E-08	--	2E-07	Skin, CVS	0.005	--	0.0003	0.005
			Chromium	5E-07	--	- -	--	5E-07	None Specified	0.002	--	--	0.002
			Chemical Total	8E-07	--	3E-08	--	8E-07		0.009	--	0.0006	0.010
		Exposure Point Total						8E-07					0.010
	Exposure Medium Total							8E-07					0.010
	Air	SWMU 23	Benzo(a)anthracene	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-12	--	--	2E-12	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	7E-13	--	--	7E-13	NA	--	--	--	--
			Aroclor-1254	--	4E-09	--	--	4E-09	NA	--	--	--	--
			Arsenic	--	1E-09	--	--	1E-09	NA	--	0.0002	--	0.0002
			Chromium	--	9E-08	--	--	9E-08	Respiratory	--	0.00007	--	0.00007
			Chemical Total	--	1E-07	--	--	1E-07		- -	0.0003	- -	0.0003
		Exposure Point Total						1E-07					0.0003
	Exposure Medium Total							1E-07					0.0003
Medium Total								9E-07					0.01
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	2E-07	--	3E-08	--	2E-07	NA	--	--	--	--
			Benzo(a)pyrene	6E-07	--	9E-08	--	7E-07	NA	--	--	--	--
			Benzo(b)fluoranthene	9E-08	--	1E-08	--	1E-07	NA	--	--	--	--
			Benzo(k)fluoranthene	7E-09	--	1E-09	--	8E-09	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-07	--	3E-08	--	2E-07	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	9E-08	--	1E-08	--	1E-07	NA	--	--	--	--
			Arsenic	3E-07	--	2E-08	--	3E-07	Skin, CVS	0.007	--	0.0004	0.007
			Chemical Total	1E-06	--	2E-07	--	1E-06		0.007	--	0.0004	0.007
		Exposure Point Total						1E-06					0.007
	Exposure Medium Total							1E-06					0.007
	Air	SWMU 23	Benzo(a)anthracene	--	9E-09	--	--	9E-09	NA	--	--	--	--
			Benzo(a)pyrene	--	1E-10	--	--	1E-10	NA	--	--	--	--
			Benzo(b)fluoranthene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Benzo(k)fluoranthene	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Dibenzo(a,h)anthracene	--	3E-11	--	--	3E-11	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Arsenic	--	2E-09	--	--	2E-09	NA	--	0.0003	--	0.0003
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.0003	- -	0.0003
		Exposure Point Total						1E-08					0.0003
	Exposure Medium Total							1E-08					0.0003
Medium Total								1E-06					0.008
Surface Water	Surface Water	SWMU 23	Arsenic	6E-09	--	3E-09	--	9E-09	Skin, CVS	0.0001	--	0.00008	0.0002
			Chromium	5E-09	--	2E-07	--	2E-07	None Specified	0.00002	--	0.0009	0.0009
			Cobalt	- -	--	- -	--	- -	Thyroid	0.0002	--	0.00005	0.0003
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Chemical Total	1E-08	--	2E-07	--	2E-07		0.0003	--	0.001	0.001
		Exposure Point Total						2E-07					0.001
	Exposure Medium Total							2E-07					0.001
Medium Total								2E-07					0.001

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	3E-09	--	1E-09	--	4E-09	NA	--	--	--	--
			Benzo(b)fluoranthene	3E-10	--	1E-10	--	4E-10	NA	--	--	--	--
			Dibenzo(a,h)anthracene	2E-09	--	7E-10	--	3E-09	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	2E-10	--	7E-11	--	3E-10	NA	--	--	--	--
			Arsenic	2E-08	--	3E-09	--	2E-08	Skin, CVS	0.0005	--	0.00006	0.0006
			Chromium	5E-08	--	- -	--	5E-08	None Specified	0.0002	--	--	0.0002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.005	--	--	0.005
			Chemical Total	8E-08	--	5E-09	--	9E-08		0.006	--	0.00006	0.006
		Exposure Point Total						9E-08					0.006
	Exposure Medium Total							9E-08					0.006
Medium Total								9E-08					0.006
Receptor Total				Total Surface Soil, Surface Water, and Sediment Risks				1E-06	Total Surface Soil, Surface Water, and Sediment HIs				0.02
Receptor Total				Total Subsurface Soil, Surface Water, and Sediment Risks				1E-06	Total Subsurface Soil, Surface Water, and Sediment HIs				0.02

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.9.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Benzo(a)anthracene	9E-08	--	1E-08	--	1E-07					
			Benzo(a)pyrene	1E-06	--	1E-07	--	1E-06					
			Benzo(b)fluoranthene	1E-07	--	2E-08	--	1E-07					
			Dibenzo(a,h)anthracene	2E-07	--	2E-08	--	2E-07					
			Indeno(1,2,3-cd)pyrene	5E-08	--	7E-09	--	6E-08					
			Aroclor-1254	3E-08	--	4E-09	--	3E-08					
			Arsenic	9E-07	--	4E-08	--	9E-07					
			Chromium	7E-06	--	- -	--	7E-06					
			Chemical Total	9E-06	--	2E-07	--	9E-06					
		Exposure Point Total						9E-06					
	Exposure Medium Total							9E-06					
	Air	SWMU 23	Benzo(a)anthracene	--	7E-10	--	--	7E-10					
			Benzo(a)pyrene	--	3E-11	--	--	3E-11					
			Benzo(b)fluoranthene	--	4E-12	--	--	4E-12					
			Dibenzo(a,h)anthracene	--	6E-12	--	--	6E-12					
			Indeno(1,2,3-cd)pyrene	--	2E-12	--	--	2E-12					
			Aroclor-1254	--	5E-09	--	--	5E-09					
			Arsenic	--	1E-09	--	--	1E-09					
			Chromium	--	2E-07	--	--	2E-07					
			Chemical Total	--	2E-07	--	--	2E-07					
		Exposure Point Total						2E-07					
	Exposure Medium Total							2E-07					
Medium Total								9E-06					
Subsurface Soil	Subsurface Soil	SWMU 23	Benzo(a)anthracene	2E-06	--	3E-07	--	2E-06					
			Benzo(a)pyrene	9E-06	--	1E-06	--	1E-05					
			Benzo(b)fluoranthene	1E-06	--	1E-07	--	1E-06					
			Benzo(k)fluoranthene	1E-07	--	1E-08	--	1E-07					
			Dibenzo(a,h)anthracene	2E-06	--	3E-07	--	2E-06					
			Indeno(1,2,3-cd)pyrene	1E-06	--	1E-07	--	1E-06					
			Arsenic	1E-06	--	7E-08	--	1E-06					
			Chemical Total	2E-05	--	2E-06	--	2E-05					
		Exposure Point Total						2E-05					
	Exposure Medium Total							2E-05					
	Air	SWMU 23	Benzo(a)anthracene	--	2E-08	--	--	2E-08					
			Benzo(a)pyrene	--	2E-10	--	--	2E-10					
			Benzo(b)fluoranthene	--	4E-11	--	--	4E-11					
			Benzo(k)fluoranthene	--	3E-11	--	--	3E-11					
			Dibenzo(a,h)anthracene	--	7E-11	--	--	7E-11					
			Indeno(1,2,3-cd)pyrene	--	4E-11	--	--	4E-11					
			Arsenic	--	3E-09	--	--	3E-09					
			Chemical Total	--	2E-08	--	--	2E-08					
		Exposure Point Total						2E-08					
	Exposure Medium Total							2E-08					
Medium Total								2E-05					
Surface Water	Surface Water	SWMU 23	Arsenic	2E-08	--	5E-09	--	3E-08					
			Chromium	4E-08	--	7E-07	--	7E-07					
			Cobalt	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Chemical Total	6E-08	--	7E-07	--	8E-07					
		Exposure Point Total						8E-07					
	Exposure Medium Total							8E-07					
Medium Total								8E-07					

TABLE 9.9.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 23	Benzo(a)pyrene	4E-08	--	1E-08	--	5E-08					
			Benzo(b)fluoranthene	4E-09	--	1E-09	--	5E-09					
			Dibenzo(a,h)anthracene	3E-08	--	8E-09	--	4E-08					
			Indeno(1,2,3-cd)pyrene	3E-09	--	8E-10	--	4E-09					
			Arsenic	9E-08	--	9E-09	--	1E-07					
			Chromium	7E-07	--	- -	--	7E-07					
			Cobalt	- -	--	- -	--	- -					
			Chemical Total	9E-07	--	3E-08	--	9E-07					
		Exposure Point Total						9E-07					
	Exposure Medium Total							9E-07					
Medium Total								9E-07					
Receptor Total			Total Surface Soil, Surface Water, and Sediment Risks					1E-05					
Receptor Total			Total Subsurface Soil, Surface Water, and Sediment Risks					2E-05					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

APPENDIX C.3

PROUCL OUTPUTS

Surface Soil

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	7/16/2015 7:32:44 AM
From File	ProUCL Data - Surface Soil.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

BENZO(A)ANTHRACENE

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	44
Number of Detects	27	Number of Non-Detects	22
Number of Distinct Detects	27	Number of Distinct Non-Detects	17
Minimum Detect	0.0041	Minimum Non-Detect	0.0038
Maximum Detect	0.99	Maximum Non-Detect	0.162
Variance Detects	0.0414	Percent Non-Detects	44.9%
Mean Detects	0.126	SD Detects	0.204
Median Detects	0.059	CV Detects	1.609
Skewness Detects	3.272	Kurtosis Detects	12.62
Mean of Logged Detects	-2.972	SD of Logged Detects	1.437

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.598	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.291	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.171	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0742	Standard Error of Mean	0.0233
SD	0.16	95% KM (BCA) UCL	0.114
95% KM (t) UCL	0.113	95% KM (Percentile Bootstrap) UCL	0.112
95% KM (z) UCL	0.113	95% KM Bootstrap t UCL	0.149
90% KM Chebyshev UCL	0.144	95% KM Chebyshev UCL	0.176
97.5% KM Chebyshev UCL	0.22	99% KM Chebyshev UCL	0.306

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.605	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.791	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.173	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.176	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.672	k star (bias corrected MLE)	0.622
Theta hat (MLE)	0.188	Theta star (bias corrected MLE)	0.203
nu hat (MLE)	36.28	nu star (bias corrected)	33.58
MLE Mean (bias corrected)	0.126	MLE Sd (bias corrected)	0.16

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.216	nu hat (KM)	21.17
Approximate Chi Square Value (21.17, α)	11.72	Adjusted Chi Square Value (21.17, β)	11.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.134	95% Gamma Adjusted KM-UCL (use when n<50)	0.137

BENZO(A)ANTHRACENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0041	Mean	0.0757
Maximum	0.99	Median	0.01
SD	0.161	CV	2.12
k hat (MLE)	0.575	k star (bias corrected MLE)	0.554
Theta hat (MLE)	0.132	Theta star (bias corrected MLE)	0.137
nu hat (MLE)	56.36	nu star (bias corrected)	54.24
MLE Mean (bias corrected)	0.0757	MLE Sd (bias corrected)	0.102
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (54.24, α)	38.32	Adjusted Chi Square Value (54.24, β)	37.92
95% Gamma Approximate UCL (use when n>=50)	0.107	95% Gamma Adjusted UCL (use when n<50)	0.108

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.105	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.171	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0724	Mean in Log Scale	-4.207
SD in Original Scale	0.162	SD in Log Scale	1.844
95% t UCL (assumes normality of ROS data)	0.111	95% Percentile Bootstrap UCL	0.113
95% BCA Bootstrap UCL	0.125	95% Bootstrap t UCL	0.152
95% H-UCL (Log ROS)	0.201		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.981	95% H-UCL (KM -Log)	0.146
KM SD (logged)	1.63	95% Critical H Value (KM-Log)	3.105
KM Standard Error of Mean (logged)	0.248		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.08	Mean in Log Scale	-3.879
SD in Original Scale	0.16	SD in Log Scale	1.805
95% t UCL (Assumes normality)	0.118	95% H-Stat UCL	0.252
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.114	95% GROS Adjusted Gamma UCL	0.108
95% Adjusted Gamma KM-UCL	0.137		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BENZO(A)PYRENE

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	40
Number of Detects	30	Number of Non-Detects	19
Number of Distinct Detects	28	Number of Distinct Non-Detects	12
Minimum Detect	0.0023	Minimum Non-Detect	0.00373
Maximum Detect	0.97	Maximum Non-Detect	0.162
Variance Detects	0.0411	Percent Non-Detects	38.78%
Mean Detects	0.147	SD Detects	0.203
Median Detects	0.081	CV Detects	1.382
Skewness Detects	2.728	Kurtosis Detects	8.997
Mean of Logged Detects	-2.777	SD of Logged Detects	1.487

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.687	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.244	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0945	Standard Error of Mean	0.0248
SD	0.17	95% KM (BCA) UCL	0.143
95% KM (t) UCL	0.136	95% KM (Percentile Bootstrap) UCL	0.137
95% KM (z) UCL	0.135	95% KM Bootstrap t UCL	0.163
90% KM Chebyshev UCL	0.169	95% KM Chebyshev UCL	0.203
97.5% KM Chebyshev UCL	0.25	99% KM Chebyshev UCL	0.342

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.284	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.792	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.12	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.167	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.704	k star (bias corrected MLE)	0.656
Theta hat (MLE)	0.209	Theta star (bias corrected MLE)	0.224
nu hat (MLE)	42.22	nu star (bias corrected)	39.33
MLE Mean (bias corrected)	0.147	MLE Sd (bias corrected)	0.181

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.308	nu hat (KM)	30.23
Approximate Chi Square Value (30.23, α)	18.67	Adjusted Chi Square Value (30.23, β)	18.39
95% Gamma Approximate KM-UCL (use when n>=50)	0.153	95% Gamma Adjusted KM-UCL (use when n<50)	0.155

BENZO(A)PYRENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0023	Mean	0.0959
Maximum	0.97	Median	0.025
SD	0.171	CV	1.781
k hat (MLE)	0.578	k star (bias corrected MLE)	0.557
Theta hat (MLE)	0.166	Theta star (bias corrected MLE)	0.172
nu hat (MLE)	56.68	nu star (bias corrected)	54.55
MLE Mean (bias corrected)	0.0959	MLE Sd (bias corrected)	0.129
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (54.55, α)	38.58	Adjusted Chi Square Value (54.55, β)	38.17
95% Gamma Approximate UCL (use when n>=50)	0.136	95% Gamma Adjusted UCL (use when n<50)	0.137

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.119	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0932	Mean in Log Scale	-3.764
SD in Original Scale	0.172	SD in Log Scale	1.8
95% t UCL (assumes normality of ROS data)	0.134	95% Percentile Bootstrap UCL	0.137
95% BCA Bootstrap UCL	0.147	95% Bootstrap t UCL	0.162
95% H-UCL (Log ROS)	0.279		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.841	95% H-UCL (KM -Log)	0.336
KM SD (logged)	1.897	95% Critical H Value (KM-Log)	3.468
KM Standard Error of Mean (logged)	0.289		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0996	Mean in Log Scale	-3.615
SD in Original Scale	0.17	SD in Log Scale	1.876
95% t UCL (Assumes normality)	0.14	95% H-Stat UCL	0.396

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (BCA) UCL	0.143	95% GROS Adjusted Gamma UCL	0.137
95% Adjusted Gamma KM-UCL	0.155		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BENZO(B)FLUORANTHENE

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	40
Number of Detects	35	Number of Non-Detects	14
Number of Distinct Detects	32	Number of Distinct Non-Detects	9
Minimum Detect	0.0043	Minimum Non-Detect	0.0038
Maximum Detect	1.3	Maximum Non-Detect	0.162
Variance Detects	0.083	Percent Non-Detects	28.57%
Mean Detects	0.198	SD Detects	0.288
Median Detects	0.0963	CV Detects	1.456
Skewness Detects	2.4	Kurtosis Detects	6.301
Mean of Logged Detects	-2.703	SD of Logged Detects	1.665

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.693	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.256	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.146	Standard Error of Mean	0.0369
SD	0.254	95% KM (BCA) UCL	0.21
95% KM (t) UCL	0.208	95% KM (Percentile Bootstrap) UCL	0.207
95% KM (z) UCL	0.206	95% KM Bootstrap t UCL	0.24
90% KM Chebyshev UCL	0.256	95% KM Chebyshev UCL	0.307
97.5% KM Chebyshev UCL	0.376	99% KM Chebyshev UCL	0.513

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.676	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.805	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.136	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.156	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.574	k star (bias corrected MLE)	0.544
Theta hat (MLE)	0.344	Theta star (bias corrected MLE)	0.364
nu hat (MLE)	40.21	nu star (bias corrected)	38.09
MLE Mean (bias corrected)	0.198	MLE Sd (bias corrected)	0.268

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.328	nu hat (KM)	32.13
Approximate Chi Square Value (32.13, α)	20.18	Adjusted Chi Square Value (32.13, β)	19.89
95% Gamma Approximate KM-UCL (use when n>=50)	0.232	95% Gamma Adjusted KM-UCL (use when n<50)	0.235

BENZO(B)FLUORANTHENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0043	Mean	0.146
Maximum	1.3	Median	0.0249
SD	0.256	CV	1.756
k hat (MLE)	0.502	k star (bias corrected MLE)	0.485
Theta hat (MLE)	0.291	Theta star (bias corrected MLE)	0.301
nu hat (MLE)	49.21	nu star (bias corrected)	47.53
MLE Mean (bias corrected)	0.146	MLE Sd (bias corrected)	0.21
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (47.53, α)	32.71	Adjusted Chi Square Value (47.53, β)	32.33
95% Gamma Approximate UCL (use when n>=50)	0.212	95% Gamma Adjusted UCL (use when n<50)	0.215

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.934	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.144	Mean in Log Scale	-3.503
SD in Original Scale	0.257	SD in Log Scale	1.997
95% t UCL (assumes normality of ROS data)	0.206	95% Percentile Bootstrap UCL	0.208
95% BCA Bootstrap UCL	0.22	95% Bootstrap t UCL	0.24
95% H-UCL (Log ROS)	0.626		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.363	95% H-UCL (KM -Log)	0.434
KM SD (logged)	1.816	95% Critical H Value (KM-Log)	3.355
KM Standard Error of Mean (logged)	0.271		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.15	Mean in Log Scale	-3.268
SD in Original Scale	0.255	SD in Log Scale	1.901
95% t UCL (Assumes normality)	0.211	95% H-Stat UCL	0.603
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.307	95% GROS Adjusted Gamma UCL	0.215
95% Adjusted Gamma KM-UCL	0.235		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BENZO(K)FLUORANTHENE

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	42
Number of Detects	31	Number of Non-Detects	18
Number of Distinct Detects	30	Number of Distinct Non-Detects	13
Minimum Detect	0.0024	Minimum Non-Detect	0.00373
Maximum Detect	0.63	Maximum Non-Detect	0.162
Variance Detects	0.0155	Percent Non-Detects	36.73%
Mean Detects	0.0853	SD Detects	0.124
Median Detects	0.042	CV Detects	1.457
Skewness Detects	3.129	Kurtosis Detects	12.12
Mean of Logged Detects	-3.288	SD of Logged Detects	1.394

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.648	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0584	Standard Error of Mean	0.0153
SD	0.105	95% KM (BCA) UCL	0.0895
95% KM (t) UCL	0.0841	95% KM (Percentile Bootstrap) UCL	0.0851
95% KM (z) UCL	0.0836	95% KM Bootstrap t UCL	0.1
90% KM Chebyshev UCL	0.104	95% KM Chebyshev UCL	0.125
97.5% KM Chebyshev UCL	0.154	99% KM Chebyshev UCL	0.211

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.423	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.79	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.11	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.164	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.727	k star (bias corrected MLE)	0.678
Theta hat (MLE)	0.117	Theta star (bias corrected MLE)	0.126
nu hat (MLE)	45.07	nu star (bias corrected)	42.04
MLE Mean (bias corrected)	0.0853	MLE Sd (bias corrected)	0.104

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.313	nu hat (KM)	30.65
Approximate Chi Square Value (30.65, α)	19	Adjusted Chi Square Value (30.65, β)	18.72
95% Gamma Approximate KM-UCL (use when n>=50)	0.0943	95% Gamma Adjusted KM-UCL (use when n<50)	0.0957

BENZO(K)FLUORANTHENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0024	Mean	0.0597
Maximum	0.63	Median	0.0169
SD	0.105	CV	1.753
k hat (MLE)	0.685	k star (bias corrected MLE)	0.657
Theta hat (MLE)	0.0871	Theta star (bias corrected MLE)	0.0909
nu hat (MLE)	67.13	nu star (bias corrected)	64.35
MLE Mean (bias corrected)	0.0597	MLE Sd (bias corrected)	0.0736
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (64.35, α)	46.9	Adjusted Chi Square Value (64.35, β)	46.44
95% Gamma Approximate UCL (use when n>=50)	0.0819	95% Gamma Adjusted UCL (use when n<50)	0.0827

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.109	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.057	Mean in Log Scale	-4.06
SD in Original Scale	0.105	SD in Log Scale	1.614
95% t UCL (assumes normality of ROS data)	0.0823	95% Percentile Bootstrap UCL	0.0824
95% BCA Bootstrap UCL	0.0934	95% Bootstrap t UCL	0.101
95% H-UCL (Log ROS)	0.13		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.053	95% H-UCL (KM -Log)	0.138
KM SD (logged)	1.636	95% Critical H Value (KM-Log)	3.113
KM Standard Error of Mean (logged)	0.252		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0644	Mean in Log Scale	-3.809
SD in Original Scale	0.104	SD in Log Scale	1.643
95% t UCL (Assumes normality)	0.0893	95% H-Stat UCL	0.179
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.0895	95% GROS Adjusted Gamma UCL	0.0827
95% Adjusted Gamma KM-UCL	0.0957		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

DIBENZO(A,H)ANTHRACENE

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	40
Number of Detects	13	Number of Non-Detects	36
Number of Distinct Detects	13	Number of Distinct Non-Detects	27
Minimum Detect	0.00671	Minimum Non-Detect	0.00373
Maximum Detect	0.23	Maximum Non-Detect	0.162
Variance Detects	0.00387	Percent Non-Detects	73.47%
Mean Detects	0.0605	SD Detects	0.0622
Median Detects	0.052	CV Detects	1.028
Skewness Detects	1.837	Kurtosis Detects	4.092
Mean of Logged Detects	-3.324	SD of Logged Detects	1.135

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.802	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.208	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Normal at 5% Significance Level
Detected Data appear Approximate Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0206	Standard Error of Mean	0.00616
SD	0.0403	95% KM (BCA) UCL	0.0315
95% KM (t) UCL	0.031	95% KM (Percentile Bootstrap) UCL	0.0315
95% KM (z) UCL	0.0308	95% KM Bootstrap t UCL	0.0382
90% KM Chebyshev UCL	0.0391	95% KM Chebyshev UCL	0.0475
97.5% KM Chebyshev UCL	0.0591	99% KM Chebyshev UCL	0.082

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.426	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.194	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.243	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.099	k star (bias corrected MLE)	0.897
Theta hat (MLE)	0.055	Theta star (bias corrected MLE)	0.0675
nu hat (MLE)	28.58	nu star (bias corrected)	23.32
MLE Mean (bias corrected)	0.0605	MLE Sd (bias corrected)	0.0639

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.263	nu hat (KM)	25.73
Approximate Chi Square Value (25.73, α)	15.17	Adjusted Chi Square Value (25.73, β)	14.92
95% Gamma Approximate KM-UCL (use when n>=50)	0.035	95% Gamma Adjusted KM-UCL (use when n<50)	0.0356

DIBENZO(A,H)ANTHRACENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00671	Mean	0.0238
Maximum	0.23	Median	0.01
SD	0.0384	CV	1.609
k hat (MLE)	1.126	k star (bias corrected MLE)	1.071
Theta hat (MLE)	0.0212	Theta star (bias corrected MLE)	0.0223
nu hat (MLE)	110.4	nu star (bias corrected)	104.9
MLE Mean (bias corrected)	0.0238	MLE Sd (bias corrected)	0.023
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (104.95, α)	82.31	Adjusted Chi Square Value (104.95, β)	81.7
95% Gamma Approximate UCL (use when n>=50)	0.0304	95% Gamma Adjusted UCL (use when n<50)	0.0306

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0181	Mean in Log Scale	-5.426
SD in Original Scale	0.0405	SD in Log Scale	1.515
95% t UCL (assumes normality of ROS data)	0.0278	95% Percentile Bootstrap UCL	0.0284
95% BCA Bootstrap UCL	0.0313	95% Bootstrap t UCL	0.0358
95% H-UCL (Log ROS)	0.0264		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.861	95% H-UCL (KM -Log)	0.024
KM SD (logged)	1.181	95% Critical H Value (KM-Log)	2.542
KM Standard Error of Mean (logged)	0.19		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0299	Mean in Log Scale	-4.527
SD in Original Scale	0.0429	SD in Log Scale	1.533
95% t UCL (Assumes normality)	0.0402	95% H-Stat UCL	0.0676
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.031	95% KM (Percentile Bootstrap) UCL	0.0315

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

INDENO(1,2,3-CD)PYRENE

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	42
Number of Detects	26	Number of Non-Detects	23
Number of Distinct Detects	25	Number of Distinct Non-Detects	17
Minimum Detect	0.00493	Minimum Non-Detect	0.00373
Maximum Detect	0.5	Maximum Non-Detect	0.162
Variance Detects	0.0113	Percent Non-Detects	46.94%
Mean Detects	0.0834	SD Detects	0.106
Median Detects	0.0515	CV Detects	1.273
Skewness Detects	2.825	Kurtosis Detects	9.515
Mean of Logged Detects	-3.129	SD of Logged Detects	1.229

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.678	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.23	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.174	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.05	Standard Error of Mean	0.0126
SD	0.0854	95% KM (BCA) UCL	0.0711
95% KM (t) UCL	0.0712	95% KM (Percentile Bootstrap) UCL	0.0714
95% KM (z) UCL	0.0708	95% KM Bootstrap t UCL	0.0844
90% KM Chebyshev UCL	0.0879	95% KM Chebyshev UCL	0.105
97.5% KM Chebyshev UCL	0.129	99% KM Chebyshev UCL	0.176

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.345	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.777	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.112	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.177	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.906	k star (bias corrected MLE)	0.827
Theta hat (MLE)	0.092	Theta star (bias corrected MLE)	0.101
nu hat (MLE)	47.12	nu star (bias corrected)	43.02
MLE Mean (bias corrected)	0.0834	MLE Sd (bias corrected)	0.0917

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.343	nu hat (KM)	33.61
Approximate Chi Square Value (33.61, α)	21.36	Adjusted Chi Square Value (33.61, β)	21.06
95% Gamma Approximate KM-UCL (use when n>=50)	0.0787	95% Gamma Adjusted KM-UCL (use when n<50)	0.0798

INDENO(1,2,3-CD)PYRENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00493	Mean	0.0511
Maximum	0.5	Median	0.01
SD	0.085	CV	1.662
k hat (MLE)	0.767	k star (bias corrected MLE)	0.734
Theta hat (MLE)	0.0666	Theta star (bias corrected MLE)	0.0697
nu hat (MLE)	75.18	nu star (bias corrected)	71.91
MLE Mean (bias corrected)	0.0511	MLE Sd (bias corrected)	0.0597
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (71.91, α)	53.39	Adjusted Chi Square Value (71.91, β)	52.9
95% Gamma Approximate UCL (use when n>=50)	0.0689	95% Gamma Adjusted UCL (use when n<50)	0.0695

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.174	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.048	Mean in Log Scale	-4.166
SD in Original Scale	0.086	SD in Log Scale	1.541
95% t UCL (assumes normality of ROS data)	0.0686	95% Percentile Bootstrap UCL	0.0698
95% BCA Bootstrap UCL	0.0758	95% Bootstrap t UCL	0.0868
95% H-UCL (Log ROS)	0.0988		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-4.072	95% H-UCL (KM -Log)	0.0946
KM SD (logged)	1.478	95% Critical H Value (KM-Log)	2.907
KM Standard Error of Mean (logged)	0.231		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0556	Mean in Log Scale	-3.93
SD in Original Scale	0.0851	SD in Log Scale	1.641
95% t UCL (Assumes normality)	0.0759	95% H-Stat UCL	0.158

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (BCA) UCL	0.0711	95% GROS Adjusted Gamma UCL	0.0695
95% Adjusted Gamma KM-UCL	0.0798		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

AROCLOR-1254

General Statistics			
Total Number of Observations	16	Number of Distinct Observations	16
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	6	Number of Distinct Non-Detects	10
Minimum Detect	0.00127	Minimum Non-Detect	0.00184
Maximum Detect	0.191	Maximum Non-Detect	0.0384
Variance Detects	0.00596	Percent Non-Detects	62.5%
Mean Detects	0.0334	SD Detects	0.0772
Median Detects	0.00174	CV Detects	2.314
Skewness Detects	2.449	Kurtosis Detects	5.999
Mean of Logged Detects	-5.554	SD of Logged Detects	1.93

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.503	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.487	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0135	Standard Error of Mean	0.0126
SD	0.0458	95% KM (BCA) UCL	0.0374
95% KM (t) UCL	0.0355	95% KM (Percentile Bootstrap) UCL	0.0371
95% KM (z) UCL	0.0341	95% KM Bootstrap t UCL	1.788
90% KM Chebyshev UCL	0.0512	95% KM Chebyshev UCL	0.0682
97.5% KM Chebyshev UCL	0.0919	99% KM Chebyshev UCL	0.138

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	1.448	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.764	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.477	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.356	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.317	k star (bias corrected MLE)	0.27
Theta hat (MLE)	0.105	Theta star (bias corrected MLE)	0.124
nu hat (MLE)	3.806	nu star (bias corrected)	3.237
MLE Mean (bias corrected)	0.0334	MLE Sd (bias corrected)	0.0643

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0867	nu hat (KM)	2.774
Approximate Chi Square Value (2.77, α)	0.309	Adjusted Chi Square Value (2.77, β)	0.241
95% Gamma Approximate KM-UCL (use when n>=50)	0.121	95% Gamma Adjusted KM-UCL (use when n<50)	0.156
Gamma (KM) may not be used when k hat (KM) is < 0.1			

AROCLOR-1254 (Continued)

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00127	Mean	0.0188
Maximum	0.191	Median	0.01
SD	0.0461	CV	2.456
k hat (MLE)	0.624	k star (bias corrected MLE)	0.548
Theta hat (MLE)	0.0301	Theta star (bias corrected MLE)	0.0342
nu hat (MLE)	19.95	nu star (bias corrected)	17.55
MLE Mean (bias corrected)	0.0188	MLE Sd (bias corrected)	0.0253
		Adjusted Level of Significance (β)	0.0335
Approximate Chi Square Value (17.55, α)	9.063	Adjusted Chi Square Value (17.55, β)	8.376
95% Gamma Approximate UCL (use when n>=50)	0.0363	95% Gamma Adjusted UCL (use when n<50)	0.0393

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.624	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.391	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0136	Mean in Log Scale	-6.085
SD in Original Scale	0.0473	SD in Log Scale	1.196
95% t UCL (assumes normality of ROS data)	0.0343	95% Percentile Bootstrap UCL	0.0372
95% BCA Bootstrap UCL	0.049	95% Bootstrap t UCL	3.272
95% H-UCL (Log ROS)	0.0118		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0143	Mean in Log Scale	-6.202
SD in Original Scale	0.0473	SD in Log Scale	1.424
95% t UCL (Assumes normality)	0.035	95% H-Stat UCL	0.0196

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL	0.0919

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Uncensored Full Data Sets	
User Selected Options	
Date/Time of Computation	7/16/2015 7:35:59 AM
From File	ProUCL Data - Surface Soil.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

ARSENIC

General Statistics			
Total Number of Observations	26	Number of Distinct Observations	22
		Number of Missing Observations	0
Minimum	2.3	Mean	5.329
Maximum	17.8	Median	4.405
SD	3.491	Std. Error of Mean	0.685
Coefficient of Variation	0.655	Skewness	2.032

Normal GOF Test		
Shapiro Wilk Test Statistic	0.799	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.193	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.174	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.499	95% Adjusted-CLT UCL (Chen-1995)	6.747
		95% Modified-t UCL (Johnson-1978)	6.544

Gamma GOF Test		
A-D Test Statistic	0.618	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.134	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.172	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	3.232	k star (bias corrected MLE)	2.884
Theta hat (MLE)	1.649	Theta star (bias corrected MLE)	1.848
nu hat (MLE)	168.1	nu star (bias corrected)	150
MLE Mean (bias corrected)	5.329	MLE Sd (bias corrected)	3.138
		Approximate Chi Square Value (0.05)	122.7
Adjusted Level of Significance	0.0398	Adjusted Chi Square Value	121.1

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	6.515	95% Adjusted Gamma UCL (use when n<50)	6.603

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.141	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.174	Data appear Lognormal at 5% Significance Level
Data appear Lognormal at 5% Significance Level		

ARSENIC (Continued)

Lognormal Statistics			
Minimum of Logged Data	0.833	Mean of logged Data	1.511
Maximum of Logged Data	2.879	SD of logged Data	0.562

Assuming Lognormal Distribution			
95% H-UCL	6.656	90% Chebyshev (MVUE) UCL	7.1
95% Chebyshev (MVUE) UCL	7.93	97.5% Chebyshev (MVUE) UCL	9.082
99% Chebyshev (MVUE) UCL	11.34		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs			
95% CLT UCL	6.455	95% Jackknife UCL	6.499
95% Standard Bootstrap UCL	6.443	95% Bootstrap-t UCL	7.032
95% Hall's Bootstrap UCL	7.708	95% Percentile Bootstrap UCL	6.457
95% BCA Bootstrap UCL	6.706		
90% Chebyshev(Mean, Sd) UCL	7.383	95% Chebyshev(Mean, Sd) UCL	8.313
97.5% Chebyshev(Mean, Sd) UCL	9.605	99% Chebyshev(Mean, Sd) UCL	12.14

Suggested UCL to Use	
95% Adjusted Gamma UCL	6.603

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

CHROMIUM

General Statistics			
Total Number of Observations	26	Number of Distinct Observations	21
		Number of Missing Observations	0
Minimum	4.92	Mean	12.52
Maximum	29.5	Median	10.95
SD	6.829	Std. Error of Mean	1.339
Coefficient of Variation	0.546	Skewness	1.037

Normal GOF Test		
Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.174	Data appear Normal at 5% Significance Level
Data appear Approximate Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	14.81	95% Adjusted-CLT UCL (Chen-1995)	15.01
		95% Modified-t UCL (Johnson-1978)	14.85

Gamma GOF Test		
A-D Test Statistic	0.411	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.11	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.172	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	3.782	k star (bias corrected MLE)	3.371
Theta hat (MLE)	3.31	Theta star (bias corrected MLE)	3.714
nu hat (MLE)	196.6	nu star (bias corrected)	175.3
MLE Mean (bias corrected)	12.52	MLE Sd (bias corrected)	6.818
		Approximate Chi Square Value (0.05)	145.7
Adjusted Level of Significance	0.0398	Adjusted Chi Square Value	143.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	15.06	95% Adjusted Gamma UCL (use when n<50)	15.25

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.122	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.174	Data appear Lognormal at 5% Significance Level
Data appear Lognormal at 5% Significance Level		

Lognormal Statistics			
Minimum of Logged Data	1.593	Mean of logged Data	2.389
Maximum of Logged Data	3.384	SD of logged Data	0.539

Assuming Lognormal Distribution			
95% H-UCL	15.65	90% Chebyshev (MVUE) UCL	16.7
95% Chebyshev (MVUE) UCL	18.59	97.5% Chebyshev (MVUE) UCL	21.21
99% Chebyshev (MVUE) UCL	26.36		

CHROMIUM (Continued)

Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	14.72	95% Jackknife UCL	14.81
95% Standard Bootstrap UCL	14.67	95% Bootstrap-t UCL	15.19
95% Hall's Bootstrap UCL	15.02	95% Percentile Bootstrap UCL	14.81
95% BCA Bootstrap UCL	15		
90% Chebyshev(Mean, Sd) UCL	16.54	95% Chebyshev(Mean, Sd) UCL	18.36
97.5% Chebyshev(Mean, Sd) UCL	20.88	99% Chebyshev(Mean, Sd) UCL	25.84
Suggested UCL to Use			
95% Student's-t UCL	14.81		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

COBALT

General Statistics			
Total Number of Observations	26	Number of Distinct Observations	21
		Number of Missing Observations	0
Minimum	2.5	Mean	7.764
Maximum	15.4	Median	7.74
SD	3.68	Std. Error of Mean	0.722
Coefficient of Variation	0.474	Skewness	0.143

Normal GOF Test		
Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.174	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.997	95% Adjusted-CLT UCL (Chen-1995)	8.973
		95% Modified-t UCL (Johnson-1978)	9

Gamma GOF Test		
A-D Test Statistic	1.21	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.192	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.172	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	3.722	k star (bias corrected MLE)	3.318
Theta hat (MLE)	2.086	Theta star (bias corrected MLE)	2.34
nu hat (MLE)	193.5	nu star (bias corrected)	172.5
MLE Mean (bias corrected)	7.764	MLE Sd (bias corrected)	4.262
		Approximate Chi Square Value (0.05)	143.2
Adjusted Level of Significance	0.0398	Adjusted Chi Square Value	141.4

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	9.357	95% Adjusted Gamma UCL (use when n<50)	9.474

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.845	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.229	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.174	Data Not Lognormal at 5% Significance Level
Data Not Lognormal at 5% Significance Level		

Lognormal Statistics			
Minimum of Logged Data	0.916	Mean of logged Data	1.909
Maximum of Logged Data	2.734	SD of logged Data	0.586

Assuming Lognormal Distribution			
95% H-UCL	10.17	90% Chebyshev (MVUE) UCL	10.84
95% Chebyshev (MVUE) UCL	12.15	97.5% Chebyshev (MVUE) UCL	13.97
99% Chebyshev (MVUE) UCL	17.54		

COBALT (Continued)

Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8.951	95% Jackknife UCL	8.997
95% Standard Bootstrap UCL	8.93	95% Bootstrap-t UCL	9.023
95% Hall's Bootstrap UCL	9.039	95% Percentile Bootstrap UCL	8.937
95% BCA Bootstrap UCL	8.93		
90% Chebyshev(Mean, Sd) UCL	9.929	95% Chebyshev(Mean, Sd) UCL	10.91
97.5% Chebyshev(Mean, Sd) UCL	12.27	99% Chebyshev(Mean, Sd) UCL	14.95
Suggested UCL to Use			
95% Student's-t UCL	8.997		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Subsurface Soil

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	7/16/2015 7:31:46 AM
From File	ProUCL Data - Subsurface Soil.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

BENZO(A)ANTHRACENE

General Statistics

Total Number of Observations	58	Number of Distinct Observations	44
Number of Detects	18	Number of Non-Detects	40
Number of Distinct Detects	18	Number of Distinct Non-Detects	26
Minimum Detect	0.0046	Minimum Non-Detect	0.00358
Maximum Detect	17	Maximum Non-Detect	0.162
Variance Detects	16.99	Percent Non-Detects	68.97%
Mean Detects	1.353	SD Detects	4.122
Median Detects	0.087	CV Detects	3.046
Skewness Detects	3.667	Kurtosis Detects	13.91
Mean of Logged Detects	-2.289	SD of Logged Detects	2.092

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.37	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.492	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.209	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.423	Standard Error of Mean	0.313
SD	2.317	95% KM (BCA) UCL	0.92
95% KM (t) UCL	0.947	95% KM (Percentile Bootstrap) UCL	1.004
95% KM (z) UCL	0.938	95% KM Bootstrap t UCL	15.13
90% KM Chebyshev UCL	1.363	95% KM Chebyshev UCL	1.788
97.5% KM Chebyshev UCL	2.379	99% KM Chebyshev UCL	3.538

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.497	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.856	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.387	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.222	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.271	k star (bias corrected MLE)	0.263
Theta hat (MLE)	5.001	Theta star (bias corrected MLE)	5.155
nu hat (MLE)	9.741	nu star (bias corrected)	9.45
MLE Mean (bias corrected)	1.353	MLE Sd (bias corrected)	2.641

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0334	nu hat (KM)	3.873
Approximate Chi Square Value (3.87, α)	0.672	Adjusted Chi Square Value (3.87, β)	0.641
95% Gamma Approximate KM-UCL (use when n>=50)	2.439	95% Gamma Adjusted KM-UCL (use when n<50)	2.559

Gamma (KM) may not be used when k hat (KM) is < 0.1

BENZO(A)ANTHRACENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0046	Mean	0.427
Maximum	17	Median	0.01
SD	2.337	CV	5.475
k hat (MLE)	0.236	k star (bias corrected MLE)	0.235
Theta hat (MLE)	1.807	Theta star (bias corrected MLE)	1.813
nu hat (MLE)	27.4	nu star (bias corrected)	27.31
MLE Mean (bias corrected)	0.427	MLE Sd (bias corrected)	0.88
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (27.31, α)	16.39	Adjusted Chi Square Value (27.31, β)	16.18
95% Gamma Approximate UCL (use when n>=50)	0.711	95% Gamma Adjusted UCL (use when n<50)	0.721

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.209	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.42	Mean in Log Scale	-6.344
SD in Original Scale	2.338	SD in Log Scale	3.158
95% t UCL (assumes normality of ROS data)	0.934	95% Percentile Bootstrap UCL	0.998
95% BCA Bootstrap UCL	1.479	95% Bootstrap t UCL	15.28
95% H-UCL (Log ROS)	2.855		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.521	95% H-UCL (KM -Log)	0.173
KM SD (logged)	1.914	95% Critical H Value (KM-Log)	3.69
KM Standard Error of Mean (logged)	0.265		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.429	Mean in Log Scale	-4.271
SD in Original Scale	2.336	SD in Log Scale	2.042
95% t UCL (Assumes normality)	0.941	95% H-Stat UCL	0.321
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use	
99% KM (Chebyshev) UCL	3.538

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BENZO(A)PYRENE

General Statistics			
Total Number of Observations	58	Number of Distinct Observations	48
Number of Detects	27	Number of Non-Detects	31
Number of Distinct Detects	25	Number of Distinct Non-Detects	23
Minimum Detect	0.0045	Minimum Non-Detect	0.00358
Maximum Detect	12	Maximum Non-Detect	0.162
Variance Detects	6.317	Percent Non-Detects	53.45%
Mean Detects	0.746	SD Detects	2.513
Median Detects	0.051	CV Detects	3.369
Skewness Detects	4.067	Kurtosis Detects	16.96
Mean of Logged Detects	-2.656	SD of Logged Detects	1.797

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.325	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.487	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.171	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.351	Standard Error of Mean	0.231
SD	1.723	95% KM (BCA) UCL	0.765
95% KM (t) UCL	0.736	95% KM (Percentile Bootstrap) UCL	0.763
95% KM (z) UCL	0.73	95% KM Bootstrap t UCL	7.597
90% KM Chebyshev UCL	1.042	95% KM Chebyshev UCL	1.355
97.5% KM Chebyshev UCL	1.79	99% KM Chebyshev UCL	2.644

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	4.098	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.857	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.328	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.183	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.293	k star (bias corrected MLE)	0.285
Theta hat (MLE)	2.547	Theta star (bias corrected MLE)	2.617
nu hat (MLE)	15.82	nu star (bias corrected)	15.39
MLE Mean (bias corrected)	0.746	MLE Sd (bias corrected)	1.397

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0414	nu hat (KM)	4.801
Approximate Chi Square Value (4.80, α)	1.061	Adjusted Chi Square Value (4.80, β)	1.019
95% Gamma Approximate KM-UCL (use when n>=50)	1.585	95% Gamma Adjusted KM-UCL (use when n<50)	1.652
Gamma (KM) may not be used when k hat (KM) is < 0.1			

BENZO(A)PYRENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0045	Mean	0.353
Maximum	12	Median	0.01
SD	1.737	CV	4.927
k hat (MLE)	0.265	k star (bias corrected MLE)	0.263
Theta hat (MLE)	1.331	Theta star (bias corrected MLE)	1.342
nu hat (MLE)	30.74	nu star (bias corrected)	30.48
MLE Mean (bias corrected)	0.353	MLE Sd (bias corrected)	0.688
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (30.48, α)	18.87	Adjusted Chi Square Value (30.48, β)	18.64
95% Gamma Approximate UCL (use when n>=50)	0.57	95% Gamma Adjusted UCL (use when n<50)	0.577

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.161	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.171	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Approximate Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.348	Mean in Log Scale	-4.858
SD in Original Scale	1.738	SD in Log Scale	2.481
95% t UCL (assumes normality of ROS data)	0.73	95% Percentile Bootstrap UCL	0.759
95% BCA Bootstrap UCL	1.076	95% Bootstrap t UCL	7.49
95% H-UCL (Log ROS)	0.797		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.153	95% H-UCL (KM -Log)	0.234
KM SD (logged)	1.891	95% Critical H Value (KM-Log)	3.656
KM Standard Error of Mean (logged)	0.258		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.353	Mean in Log Scale	-4.152
SD in Original Scale	1.737	SD in Log Scale	2.059
95% t UCL (Assumes normality)	0.735	95% H-Stat UCL	0.38
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use	
95% KM (Chebyshev) UCL	1.355

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BENZO(B)FLUORANTHENE

General Statistics			
Total Number of Observations	58	Number of Distinct Observations	48
Number of Detects	27	Number of Non-Detects	31
Number of Distinct Detects	26	Number of Distinct Non-Detects	23
Minimum Detect	0.004	Minimum Non-Detect	0.00358
Maximum Detect	18	Maximum Non-Detect	0.162
Variance Detects	14.12	Percent Non-Detects	53.45%
Mean Detects	1.121	SD Detects	3.757
Median Detects	0.08	CV Detects	3.351
Skewness Detects	4.087	Kurtosis Detects	17.16
Mean of Logged Detects	-2.333	SD of Logged Detects	1.944

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.327	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.475	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.171	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.525	Standard Error of Mean	0.345
SD	2.576	95% KM (BCA) UCL	1.286
95% KM (t) UCL	1.101	95% KM (Percentile Bootstrap) UCL	1.141
95% KM (z) UCL	1.092	95% KM Bootstrap t UCL	10.01
90% KM Chebyshev UCL	1.559	95% KM Chebyshev UCL	2.028
97.5% KM Chebyshev UCL	2.678	99% KM Chebyshev UCL	3.955

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	3.551	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.861	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.32	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.183	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.284	k star (bias corrected MLE)	0.277
Theta hat (MLE)	3.944	Theta star (bias corrected MLE)	4.042
nu hat (MLE)	15.35	nu star (bias corrected)	14.98
MLE Mean (bias corrected)	1.121	MLE Sd (bias corrected)	2.129

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0415	nu hat (KM)	4.812
Approximate Chi Square Value (4.81, α)	1.067	Adjusted Chi Square Value (4.81, β)	1.023
95% Gamma Approximate KM-UCL (use when n>=50)	2.368	95% Gamma Adjusted KM-UCL (use when n<50)	2.468
Gamma (KM) may not be used when k hat (KM) is < 0.1			

BENZO(B)FLUORANTHENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.004	Mean	0.527
Maximum	18	Median	0.01
SD	2.598	CV	4.928
k hat (MLE)	0.245	k star (bias corrected MLE)	0.244
Theta hat (MLE)	2.151	Theta star (bias corrected MLE)	2.162
nu hat (MLE)	28.43	nu star (bias corrected)	28.29
MLE Mean (bias corrected)	0.527	MLE Sd (bias corrected)	1.068
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (28.29, α)	17.16	Adjusted Chi Square Value (28.29, β)	16.94
95% Gamma Approximate UCL (use when n>=50)	0.87	95% Gamma Adjusted UCL (use when n<50)	0.881

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.171	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.523	Mean in Log Scale	-4.828
SD in Original Scale	2.599	SD in Log Scale	2.768
95% t UCL (assumes normality of ROS data)	1.093	95% Percentile Bootstrap UCL	1.124
95% BCA Bootstrap UCL	1.572	95% Bootstrap t UCL	9.927
95% H-UCL (Log ROS)	2.475		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.028	95% H-UCL (KM -Log)	0.457
KM SD (logged)	2.078	95% Critical H Value (KM-Log)	3.938
KM Standard Error of Mean (logged)	0.282		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.528	Mean in Log Scale	-3.923
SD in Original Scale	2.598	SD in Log Scale	2.19
95% t UCL (Assumes normality)	1.099	95% H-Stat UCL	0.723
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use	
95% KM (Chebyshev) UCL	2.028

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BENZO(K)FLUORANTHENE

General Statistics			
Total Number of Observations	58	Number of Distinct Observations	44
Number of Detects	21	Number of Non-Detects	37
Number of Distinct Detects	20	Number of Distinct Non-Detects	24
Minimum Detect	0.0025	Minimum Non-Detect	0.00358
Maximum Detect	7.2	Maximum Non-Detect	0.162
Variance Detects	2.99	Percent Non-Detects	63.79%
Mean Detects	0.597	SD Detects	1.729
Median Detects	0.046	CV Detects	2.898
Skewness Detects	3.431	Kurtosis Detects	11.76
Mean of Logged Detects	-2.858	SD of Logged Detects	2.028

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.38	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.482	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.193	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.219	Standard Error of Mean	0.142
SD	1.055	95% KM (BCA) UCL	0.479
95% KM (t) UCL	0.456	95% KM (Percentile Bootstrap) UCL	0.469
95% KM (z) UCL	0.452	95% KM Bootstrap t UCL	3.954
90% KM Chebyshev UCL	0.645	95% KM Chebyshev UCL	0.837
97.5% KM Chebyshev UCL	1.105	99% KM Chebyshev UCL	1.631

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	2.439	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.848	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.206	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.295	k star (bias corrected MLE)	0.285
Theta hat (MLE)	2.022	Theta star (bias corrected MLE)	2.096
nu hat (MLE)	12.4	nu star (bias corrected)	11.96
MLE Mean (bias corrected)	0.597	MLE Sd (bias corrected)	1.118

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0431	nu hat (KM)	4.997
Approximate Chi Square Value (5.00, α)	1.151	Adjusted Chi Square Value (5.00, β)	1.105
95% Gamma Approximate KM-UCL (use when n>=50)	0.95	95% Gamma Adjusted KM-UCL (use when n<50)	0.989
Gamma (KM) may not be used when k hat (KM) is < 0.1			

BENZO(K)FLUORANTHENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0025	Mean	0.222
Maximum	7.2	Median	0.01
SD	1.063	CV	4.779
k hat (MLE)	0.282	k star (bias corrected MLE)	0.279
Theta hat (MLE)	0.789	Theta star (bias corrected MLE)	0.798
nu hat (MLE)	32.72	nu star (bias corrected)	32.36
MLE Mean (bias corrected)	0.222	MLE Sd (bias corrected)	0.421
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (32.36, α)	20.36	Adjusted Chi Square Value (32.36, β)	20.11
95% Gamma Approximate UCL (use when n>=50)	0.354	95% Gamma Adjusted UCL (use when n<50)	0.358

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.193	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.217	Mean in Log Scale	-5.444
SD in Original Scale	1.064	SD in Log Scale	2.438
95% t UCL (assumes normality of ROS data)	0.451	95% Percentile Bootstrap UCL	0.481
95% BCA Bootstrap UCL	0.603	95% Bootstrap t UCL	3.976
95% H-UCL (Log ROS)	0.376		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.712	95% H-UCL (KM -Log)	0.135
KM SD (logged)	1.894	95% Critical H Value (KM-Log)	3.66
KM Standard Error of Mean (logged)	0.266		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.224	Mean in Log Scale	-4.317
SD in Original Scale	1.063	SD in Log Scale	1.915
95% t UCL (Assumes normality)	0.458	95% H-Stat UCL	0.213
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use	
99% KM (Chebyshev) UCL	1.631

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

DIBENZO(A,H)ANTHRACENE

General Statistics			
Total Number of Observations	58	Number of Distinct Observations	36
Number of Detects	7	Number of Non-Detects	51
Number of Distinct Detects	7	Number of Distinct Non-Detects	29
Minimum Detect	0.0077	Minimum Non-Detect	0.00358
Maximum Detect	2.6	Maximum Non-Detect	0.162
Variance Detects	1.053	Percent Non-Detects	87.93%
Mean Detects	0.623	SD Detects	1.026
Median Detects	0.08	CV Detects	1.648
Skewness Detects	1.613	Kurtosis Detects	1.518
Mean of Logged Detects	-2.199	SD of Logged Detects	2.178

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.677	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.414	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0787	Standard Error of Mean	0.0548
SD	0.387	95% KM (BCA) UCL	0.194
95% KM (t) UCL	0.17	95% KM (Percentile Bootstrap) UCL	0.171
95% KM (z) UCL	0.169	95% KM Bootstrap t UCL	1.543
90% KM Chebyshev UCL	0.243	95% KM Chebyshev UCL	0.318
97.5% KM Chebyshev UCL	0.421	99% KM Chebyshev UCL	0.624

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.657	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.77	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.357	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.332	Detected Data Not Gamma Distributed at 5% Significance Level
Detected data follow Appr. Gamma Distribution at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.384	k star (bias corrected MLE)	0.315
Theta hat (MLE)	1.622	Theta star (bias corrected MLE)	1.979
nu hat (MLE)	5.375	nu star (bias corrected)	4.405
MLE Mean (bias corrected)	0.623	MLE Sd (bias corrected)	1.11

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0414	nu hat (KM)	4.802
Approximate Chi Square Value (4.80, α)	1.062	Adjusted Chi Square Value (4.80, β)	1.019
95% Gamma Approximate KM-UCL (use when n>=50)	0.356	95% Gamma Adjusted KM-UCL (use when n<50)	0.371
Gamma (KM) may not be used when k hat (KM) is < 0.1			

DIBENZO(A,H)ANTHRACENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0077	Mean	0.0839
Maximum	2.6	Median	0.01
SD	0.389	CV	4.635
k hat (MLE)	0.364	k star (bias corrected MLE)	0.356
Theta hat (MLE)	0.231	Theta star (bias corrected MLE)	0.235
nu hat (MLE)	42.2	nu star (bias corrected)	41.35
MLE Mean (bias corrected)	0.0839	MLE Sd (bias corrected)	0.141
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (41.35, α)	27.61	Adjusted Chi Square Value (41.35, β)	27.32
95% Gamma Approximate UCL (use when n>=50)	0.126	95% Gamma Adjusted UCL (use when n<50)	0.127

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0752	Mean in Log Scale	-10.27
SD in Original Scale	0.391	SD in Log Scale	3.712
95% t UCL (assumes normality of ROS data)	0.161	95% Percentile Bootstrap UCL	0.164
95% BCA Bootstrap UCL	0.208	95% Bootstrap t UCL	1.895
95% H-UCL (Log ROS)	0.872		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-5.177	95% H-UCL (KM -Log)	0.0228
KM SD (logged)	1.328	95% Critical H Value (KM-Log)	2.909
KM Standard Error of Mean (logged)	0.193		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0864	Mean in Log Scale	-4.693
SD in Original Scale	0.389	SD in Log Scale	1.635
95% t UCL (Assumes normality)	0.172	95% H-Stat UCL	0.0713
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.17	95% GROS Approximate Gamma UCL	0.126
95% Approximate Gamma KM-UCL	0.356		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

INDENO(1,2,3-CD)PYRENE

General Statistics			
Total Number of Observations	58	Number of Distinct Observations	40
Number of Detects	15	Number of Non-Detects	43
Number of Distinct Detects	15	Number of Distinct Non-Detects	26
Minimum Detect	0.0068	Minimum Non-Detect	0.00358
Maximum Detect	8.9	Maximum Non-Detect	0.162
Variance Detects	6.289	Percent Non-Detects	74.14%
Mean Detects	0.977	SD Detects	2.508
Median Detects	0.077	CV Detects	2.567
Skewness Detects	2.84	Kurtosis Detects	7.797
Mean of Logged Detects	-2.46	SD of Logged Detects	2.088

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.445	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.493	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.256	Standard Error of Mean	0.177
SD	1.304	95% KM (BCA) UCL	0.638
95% KM (t) UCL	0.552	95% KM (Percentile Bootstrap) UCL	0.565
95% KM (z) UCL	0.548	95% KM Bootstrap t UCL	7.761
90% KM Chebyshev UCL	0.788	95% KM Chebyshev UCL	1.028
97.5% KM Chebyshev UCL	1.363	99% KM Chebyshev UCL	2.019

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	2.081	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.843	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.4	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.241	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.285	k star (bias corrected MLE)	0.273
Theta hat (MLE)	3.424	Theta star (bias corrected MLE)	3.582
nu hat (MLE)	8.56	nu star (bias corrected)	8.181
MLE Mean (bias corrected)	0.977	MLE Sd (bias corrected)	1.871

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0386	nu hat (KM)	4.477
Approximate Chi Square Value (4.48, α)	0.919	Adjusted Chi Square Value (4.48, β)	0.88
95% Gamma Approximate KM-UCL (use when n>=50)	1.248	95% Gamma Adjusted KM-UCL (use when n<50)	1.303
Gamma (KM) may not be used when k hat (KM) is < 0.1			

INDENO(1,2,3-CD)PYRENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0068	Mean	0.26
Maximum	8.9	Median	0.01
SD	1.314	CV	5.053
k hat (MLE)	0.261	k star (bias corrected MLE)	0.259
Theta hat (MLE)	0.997	Theta star (bias corrected MLE)	1.004
nu hat (MLE)	30.27	nu star (bias corrected)	30.03
MLE Mean (bias corrected)	0.26	MLE Sd (bias corrected)	0.511
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (30.03, α)	18.52	Adjusted Chi Square Value (30.03, β)	18.29
95% Gamma Approximate UCL (use when n>=50)	0.422	95% Gamma Adjusted UCL (use when n<50)	0.427

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.253	Mean in Log Scale	-7.075
SD in Original Scale	1.316	SD in Log Scale	3.196
95% t UCL (assumes normality of ROS data)	0.542	95% Percentile Bootstrap UCL	0.562
95% BCA Bootstrap UCL	0.72	95% Bootstrap t UCL	8.203
95% H-UCL (Log ROS)	1.638		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.262	Mean in Log Scale	-4.403
SD in Original Scale	1.314	SD in Log Scale	1.883
95% t UCL (Assumes normality)	0.551	95% H-Stat UCL	0.179

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

99% KM (Chebyshev) UCL	2.019

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

COBALT

General Statistics			
Total Number of Observations	17	Number of Distinct Observations	16
Number of Detects	15	Number of Non-Detects	2
Number of Distinct Detects	14	Number of Distinct Non-Detects	2
Minimum Detect	2.16	Minimum Non-Detect	2.57
Maximum Detect	11.4	Maximum Non-Detect	2.78
Variance Detects	6.294	Percent Non-Detects	11.76%
Mean Detects	4.541	SD Detects	2.509
Median Detects	4.28	CV Detects	0.552
Skewness Detects	1.604	Kurtosis Detects	2.95
Mean of Logged Detects	1.394	SD of Logged Detects	0.488

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Normal at 5% Significance Level
Detected Data appear Approximate Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	4.293	Standard Error of Mean	0.597
SD	2.377	95% KM (BCA) UCL	5.294
95% KM (t) UCL	5.335	95% KM (Percentile Bootstrap) UCL	5.286
95% KM (z) UCL	5.275	95% KM Bootstrap t UCL	5.874
90% KM Chebyshev UCL	6.084	95% KM Chebyshev UCL	6.895
97.5% KM Chebyshev UCL	8.02	99% KM Chebyshev UCL	10.23

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.502	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.162	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.222	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	4.369	k star (bias corrected MLE)	3.54
Theta hat (MLE)	1.039	Theta star (bias corrected MLE)	1.283
nu hat (MLE)	131.1	nu star (bias corrected)	106.2
MLE Mean (bias corrected)	4.541	MLE Sd (bias corrected)	2.414

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.263	nu hat (KM)	110.9
Approximate Chi Square Value (110.93, α)	87.62	Adjusted Chi Square Value (110.93, β)	85.45
95% Gamma Approximate KM-UCL (use when n>=50)	5.435	95% Gamma Adjusted KM-UCL (use when n<50)	5.573

COBALT (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	1.822	Mean	4.235
Maximum	11.4	Median	3.23
SD	2.501	CV	0.59
k hat (MLE)	3.855	k star (bias corrected MLE)	3.214
Theta hat (MLE)	1.099	Theta star (bias corrected MLE)	1.318
nu hat (MLE)	131.1	nu star (bias corrected)	109.3
MLE Mean (bias corrected)	4.235	MLE Sd (bias corrected)	2.363
		Adjusted Level of Significance (β)	0.0346
Approximate Chi Square Value (109.27, α)	86.14	Adjusted Chi Square Value (109.27, β)	83.99
95% Gamma Approximate UCL (use when n>=50)	5.373	95% Gamma Adjusted UCL (use when n<50)	5.51

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	4.284	Mean in Log Scale	1.331
SD in Original Scale	2.456	SD in Log Scale	0.49
95% t UCL (assumes normality of ROS data)	5.325	95% Percentile Bootstrap UCL	5.319
95% BCA Bootstrap UCL	5.506	95% Bootstrap t UCL	5.886
95% H-UCL (Log ROS)	5.471		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	1.335	95% H-UCL (KM -Log)	5.385
KM SD (logged)	0.473	95% Critical H Value (KM-Log)	2.008
KM Standard Error of Mean (logged)	0.119		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.164	Mean in Log Scale	1.265
SD in Original Scale	2.577	SD in Log Scale	0.586
95% t UCL (Assumes normality)	5.255	95% H-Stat UCL	5.738
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	5.335	95% KM (Percentile Bootstrap) UCL	5.286

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Uncensored Full Data Sets	
User Selected Options	
Date/Time of Computation	7/16/2015 7:31:08 AM
From File	ProUCL Data - Subsurface Soil.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

ARSENIC

General Statistics			
Total Number of Observations	17	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	1.28	Mean	7.044
Maximum	19.7	Median	6.04
SD	4.699	Std. Error of Mean	1.14
Coefficient of Variation	0.667	Skewness	1.226

Normal GOF Test		
Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.892	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.215	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	9.034	95% Adjusted-CLT UCL (Chen-1995)	9.281
		95% Modified-t UCL (Johnson-1978)	9.09

Gamma GOF Test		
A-D Test Statistic	0.164	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.106	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.211	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	2.427	k star (bias corrected MLE)	2.038
Theta hat (MLE)	2.902	Theta star (bias corrected MLE)	3.456
nu hat (MLE)	82.53	nu star (bias corrected)	69.3
MLE Mean (bias corrected)	7.044	MLE Sd (bias corrected)	4.934
		Approximate Chi Square Value (0.05)	51.13
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	49.5

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	9.546	95% Adjusted Gamma UCL (use when n<50)	9.861

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.118	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level
Data appear Lognormal at 5% Significance Level		

ARSENIC (Continued)

Lognormal Statistics			
Minimum of Logged Data	0.247	Mean of logged Data	1.732
Maximum of Logged Data	2.981	SD of logged Data	0.717

Assuming Lognormal Distribution			
95% H-UCL	10.99	90% Chebyshev (MVUE) UCL	11.15
95% Chebyshev (MVUE) UCL	12.95	97.5% Chebyshev (MVUE) UCL	15.45
99% Chebyshev (MVUE) UCL	20.36		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs			
95% CLT UCL	8.919	95% Jackknife UCL	9.034
95% Standard Bootstrap UCL	8.767	95% Bootstrap-t UCL	9.627
95% Hall's Bootstrap UCL	9.984	95% Percentile Bootstrap UCL	9.025
95% BCA Bootstrap UCL	8.994		
90% Chebyshev(Mean, Sd) UCL	10.46	95% Chebyshev(Mean, Sd) UCL	12.01
97.5% Chebyshev(Mean, Sd) UCL	14.16	99% Chebyshev(Mean, Sd) UCL	18.38

Suggested UCL to Use	
95% Student's-t UCL	9.034

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

CHROMIUM

General Statistics			
Total Number of Observations	17	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	4.92	Mean	15.41
Maximum	29.8	Median	16.2
SD	7.411	Std. Error of Mean	1.797
Coefficient of Variation	0.481	Skewness	0.151

Normal GOF Test		
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.892	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.215	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	18.55	95% Adjusted-CLT UCL (Chen-1995)	18.44
		95% Modified-t UCL (Johnson-1978)	18.56

Gamma GOF Test		
A-D Test Statistic	0.46	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.155	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.21	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	3.902	k star (bias corrected MLE)	3.253
Theta hat (MLE)	3.95	Theta star (bias corrected MLE)	4.738
nu hat (MLE)	132.7	nu star (bias corrected)	110.6
MLE Mean (bias corrected)	15.41	MLE Sd (bias corrected)	8.546
		Approximate Chi Square Value (0.05)	87.32
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	85.16

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	19.52	95% Adjusted Gamma UCL (use when n<50)	20.02

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.181	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level
Data appear Lognormal at 5% Significance Level		

Lognormal Statistics			
Minimum of Logged Data	1.593	Mean of logged Data	2.602
Maximum of Logged Data	3.395	SD of logged Data	0.566

Assuming Lognormal Distribution			
95% H-UCL	21.33	90% Chebyshev (MVUE) UCL	22.39
95% Chebyshev (MVUE) UCL	25.43	97.5% Chebyshev (MVUE) UCL	29.66
99% Chebyshev (MVUE) UCL	37.96		

CHROMIUM (Continued)

Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	18.37	95% Jackknife UCL	18.55
95% Standard Bootstrap UCL	18.27	95% Bootstrap-t UCL	18.69
95% Hall's Bootstrap UCL	18.56	95% Percentile Bootstrap UCL	18.32
95% BCA Bootstrap UCL	18.1		
90% Chebyshev(Mean, Sd) UCL	20.81	95% Chebyshev(Mean, Sd) UCL	23.25
97.5% Chebyshev(Mean, Sd) UCL	26.64	99% Chebyshev(Mean, Sd) UCL	33.3
Suggested UCL to Use			
95% Student's-t UCL	18.55		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

VANADIUM

General Statistics			
Total Number of Observations	17	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	5.8	Mean	22.41
Maximum	51.2	Median	20.4
SD	13.96	Std. Error of Mean	3.387
Coefficient of Variation	0.623	Skewness	0.475

Normal GOF Test		
Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.892	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.135	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.215	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	28.33	95% Adjusted-CLT UCL (Chen-1995)	28.4
		95% Modified-t UCL (Johnson-1978)	28.39

Gamma GOF Test		
A-D Test Statistic	0.426	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.15	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.211	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	2.382	k star (bias corrected MLE)	2.001
Theta hat (MLE)	9.408	Theta star (bias corrected MLE)	11.2
nu hat (MLE)	81	nu star (bias corrected)	68.04
MLE Mean (bias corrected)	22.41	MLE Sd (bias corrected)	15.84
		Approximate Chi Square Value (0.05)	50.05
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	48.44

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	30.47	95% Adjusted Gamma UCL (use when n<50)	31.48

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.154	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level
Data appear Lognormal at 5% Significance Level		

Lognormal Statistics			
Minimum of Logged Data	1.758	Mean of logged Data	2.885
Maximum of Logged Data	3.936	SD of logged Data	0.737

Assuming Lognormal Distribution			
95% H-UCL	35.86	90% Chebyshev (MVUE) UCL	36.2
95% Chebyshev (MVUE) UCL	42.16	97.5% Chebyshev (MVUE) UCL	50.43
99% Chebyshev (MVUE) UCL	66.68		

VANADIUM (Continued)

Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	27.98	95% Jackknife UCL	28.33
95% Standard Bootstrap UCL	27.85	95% Bootstrap-t UCL	28.8
95% Hall's Bootstrap UCL	28.26	95% Percentile Bootstrap UCL	28.14
95% BCA Bootstrap UCL	27.96		
90% Chebyshev(Mean, Sd) UCL	32.57	95% Chebyshev(Mean, Sd) UCL	37.17
97.5% Chebyshev(Mean, Sd) UCL	43.56	99% Chebyshev(Mean, Sd) UCL	56.11
Suggested UCL to Use			
95% Student's-t UCL	28.33		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Surface Water

PROUCL OUTPUT - SURFACE WATER

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	7/13/2015 12:27:47 PM
From File	ProUCL Data - Surface Water.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

ARSENIC

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	5
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable ARSENIC was not processed!

COBALT

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	5
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable COBALT was not processed!

CHROMIUM

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	3
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.56	Minimum Non-Detect	1
Maximum Detect	3.21	Maximum Non-Detect	1
Variance Detects	2.239	Percent Non-Detects	50%
Mean Detects	1.484	SD Detects	1.496
Median Detects	0.681	CV Detects	1.008
Skewness Detects	1.719	Kurtosis Detects	N/A
Mean of Logged Detects	0.0674	SD of Logged Detects	0.957

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.784	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.371	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	1.052	Standard Error of Mean	0.484
SD	0.967	95% KM (BCA) UCL	N/A
95% KM (t) UCL	2.028	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.849	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	2.506	95% KM Chebyshev UCL	3.164
97.5% KM Chebyshev UCL	4.078	99% KM Chebyshev UCL	5.873

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.676	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.885	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	10.06	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.185	nu hat (KM)	14.22
		Adjusted Level of Significance (β)	0.0122
Approximate Chi Square Value (14.22, α)	6.719	Adjusted Chi Square Value (14.22, β)	4.977
95% Gamma Approximate KM-UCL (use when n>=50)	2.226	95% Gamma Adjusted KM-UCL (use when n<50)	3.005

CHROMIUM (Continued)

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.833	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.348	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.095	Mean in Log Scale	-0.185
SD in Original Scale	1.061	SD in Log Scale	0.743
95% t UCL (assumes normality of ROS data)	1.968	95% Percentile Bootstrap UCL	1.855
95% BCA Bootstrap UCL	2.012	95% Bootstrap t UCL	5.583
95% H-UCL (Log ROS)	3.277		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-0.207	95% H-UCL (KM -Log)	2.234
KM SD (logged)	0.621	95% Critical H Value (KM-Log)	2.948
KM Standard Error of Mean (logged)	0.315		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.992	Mean in Log Scale	-0.313
SD in Original Scale	1.089	SD in Log Scale	0.735
95% t UCL (Assumes normality)	1.888	95% H-Stat UCL	2.809
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM (t) UCL	2.028	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

LEAD

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	3
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.685	Minimum Non-Detect	0.75
Maximum Detect	16.3	Maximum Non-Detect	0.75
Variance Detects	80.61	Percent Non-Detects	50%
Mean Detects	5.933	SD Detects	8.978
Median Detects	0.814	CV Detects	1.513
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	0.736	SD of Logged Detects	1.782

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.382	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	3.309	Standard Error of Mean	2.905
SD	5.81	95% KM (BCA) UCL	N/A
95% KM (t) UCL	9.163	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	8.087	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	12.02	95% KM Chebyshev UCL	15.97
97.5% KM Chebyshev UCL	21.45	99% KM Chebyshev UCL	32.21

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.592	k star (bias corrected MLE)	N/A
Theta hat (MLE)	10.01	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	3.555	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.324	nu hat (KM)	3.893
		Adjusted Level of Significance (β)	0.0122
Approximate Chi Square Value (3.89, α)	0.68	Adjusted Chi Square Value (3.89, β)	0.328
95% Gamma Approximate KM-UCL (use when n>=50)	18.95	95% Gamma Adjusted KM-UCL (use when n<50)	39.31

LEAD (Continued)

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.791	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.368	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	3.235	Mean in Log Scale	-0.0319
SD in Original Scale	6.406	SD in Log Scale	1.485
95% t UCL (assumes normality of ROS data)	8.505	95% Percentile Bootstrap UCL	8.399
95% BCA Bootstrap UCL	11.04	95% Bootstrap t UCL	100.9
95% H-UCL (Log ROS)	140		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	0.179	95% H-UCL (KM -Log)	28.01
KM SD (logged)	1.17	95% Critical H Value (KM-Log)	4.719
KM Standard Error of Mean (logged)	0.585		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.154	Mean in Log Scale	-0.123
SD in Original Scale	6.443	SD in Log Scale	1.468
95% t UCL (Assumes normality)	8.454	95% H-Stat UCL	114.2
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	9.163	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Sediment

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	7/13/2015 12:26:08 PM
From File	ProUCL Data - Sediment.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

BENZO(A)PYRENE

General Statistics

Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	2
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.00604	Minimum Non-Detect	0.0187
Maximum Detect	0.255	Maximum Non-Detect	0.0216
Variance Detects	0.0109	Percent Non-Detects	28.57%
Mean Detects	0.0747	SD Detects	0.104
Median Detects	0.0303	CV Detects	1.396
Skewness Detects	1.895	Kurtosis Detects	3.624
Mean of Logged Detects	-3.461	SD of Logged Detects	1.534

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.753	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.305	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0555	Standard Error of Mean	0.0357
SD	0.0845	95% KM (BCA) UCL	0.117
95% KM (t) UCL	0.125	95% KM (Percentile Bootstrap) UCL	0.114
95% KM (z) UCL	0.114	95% KM Bootstrap t UCL	0.396
90% KM Chebyshev UCL	0.163	95% KM Chebyshev UCL	0.211
97.5% KM Chebyshev UCL	0.279	99% KM Chebyshev UCL	0.411

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.308	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.701	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.212	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.368	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.697	k star (bias corrected MLE)	0.412
Theta hat (MLE)	0.107	Theta star (bias corrected MLE)	0.181
nu hat (MLE)	6.971	nu star (bias corrected)	4.122
MLE Mean (bias corrected)	0.0747	MLE Sd (bias corrected)	0.116

BENZO(A)PYRENE (Continued)

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.431	nu hat (KM)	6.04
Approximate Chi Square Value (6.04, α)	1.66	Adjusted Chi Square Value (6.04, β)	1.062
95% Gamma Approximate KM-UCL (use when n>=50)	0.202	95% Gamma Adjusted KM-UCL (use when n<50)	0.316

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00604	Mean	0.0562
Maximum	0.255	Median	0.01
SD	0.0908	CV	1.615
k hat (MLE)	0.668	k star (bias corrected MLE)	0.477
Theta hat (MLE)	0.0841	Theta star (bias corrected MLE)	0.118
nu hat (MLE)	9.359	nu star (bias corrected)	6.681
MLE Mean (bias corrected)	0.0562	MLE Sd (bias corrected)	0.0814
		Adjusted Level of Significance (β)	0.0158
Approximate Chi Square Value (6.68, α)	1.997	Adjusted Chi Square Value (6.68, β)	1.318
95% Gamma Approximate UCL (use when n>=50)	0.188	95% Gamma Adjusted UCL (use when n<50)	0.285

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0555	Mean in Log Scale	-3.878
SD in Original Scale	0.0913	SD in Log Scale	1.44
95% t UCL (assumes normality of ROS data)	0.123	95% Percentile Bootstrap UCL	0.117
95% BCA Bootstrap UCL	0.149	95% Bootstrap t UCL	0.522
95% H-UCL (Log ROS)	1.106		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.877	95% H-UCL (KM -Log)	0.654
KM SD (logged)	1.337	95% Critical H Value (KM-Log)	4.687
KM Standard Error of Mean (logged)	0.568		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0563	Mean in Log Scale	-3.787
SD in Original Scale	0.0908	SD in Log Scale	1.371
95% t UCL (Assumes normality)	0.123	95% H-Stat UCL	0.848
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.125	95% KM (Percentile Bootstrap) UCL	0.114

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BENZO(B)FLUORANTHENE

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	1
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.00583	Minimum Non-Detect	0.0187
Maximum Detect	0.254	Maximum Non-Detect	0.0187
Variance Detects	0.00935	Percent Non-Detects	14.29%
Mean Detects	0.0741	SD Detects	0.0967
Median Detects	0.0313	CV Detects	1.304
Skewness Detects	1.694	Kurtosis Detects	2.543
Mean of Logged Detects	-3.412	SD of Logged Detects	1.466

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.778	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.305	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0646	Standard Error of Mean	0.0352
SD	0.085	95% KM (BCA) UCL	0.115
95% KM (t) UCL	0.133	95% KM (Percentile Bootstrap) UCL	0.12
95% KM (z) UCL	0.122	95% KM Bootstrap t UCL	0.395
90% KM Chebyshev UCL	0.17	95% KM Chebyshev UCL	0.218
97.5% KM Chebyshev UCL	0.284	99% KM Chebyshev UCL	0.415

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.293	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.722	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.198	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.344	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.741	k star (bias corrected MLE)	0.481
Theta hat (MLE)	0.1	Theta star (bias corrected MLE)	0.154
nu hat (MLE)	8.886	nu star (bias corrected)	5.776
MLE Mean (bias corrected)	0.0741	MLE Sd (bias corrected)	0.107

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.577	nu hat (KM)	8.074
Approximate Chi Square Value (8.07, α)	2.778	Adjusted Chi Square Value (8.07, β)	1.931
95% Gamma Approximate KM-UCL (use when n>=50)	0.188	95% Gamma Adjusted KM-UCL (use when n<50)	0.27

BENZO(B)FLUORANTHENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00583	Mean	0.065
Maximum	0.254	Median	0.0226
SD	0.0915	CV	1.409
k hat (MLE)	0.711	k star (bias corrected MLE)	0.501
Theta hat (MLE)	0.0914	Theta star (bias corrected MLE)	0.13
nu hat (MLE)	9.952	nu star (bias corrected)	7.02
MLE Mean (bias corrected)	0.065	MLE Sd (bias corrected)	0.0918
		Adjusted Level of Significance (β)	0.0158
Approximate Chi Square Value (7.02, α)	2.182	Adjusted Chi Square Value (7.02, β)	1.46
95% Gamma Approximate UCL (use when n>=50)	0.209	95% Gamma Adjusted UCL (use when n<50)	0.312

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0645	Mean in Log Scale	-3.639
SD in Original Scale	0.0919	SD in Log Scale	1.467
95% t UCL (assumes normality of ROS data)	0.132	95% Percentile Bootstrap UCL	0.123
95% BCA Bootstrap UCL	0.14	95% Bootstrap t UCL	0.407
95% H-UCL (Log ROS)	1.616		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.633	95% H-UCL (KM -Log)	0.905
KM SD (logged)	1.354	95% Critical H Value (KM-Log)	4.736
KM Standard Error of Mean (logged)	0.562		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0649	Mean in Log Scale	-3.592
SD in Original Scale	0.0916	SD in Log Scale	1.42
95% t UCL (Assumes normality)	0.132	95% H-Stat UCL	1.323

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.133	95% KM (Percentile Bootstrap) UCL	0.12

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

DIBENZO(A,H)ANTHRACENE

General Statistics

Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	1	Number of Non-Detects	6
Number of Distinct Detects	1	Number of Distinct Non-Detects	6

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable DIBENZO(A,H)ANTHRACENE was not processed!

INDENO(1,2,3-CD)PYRENE

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	2
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.00492	Minimum Non-Detect	0.0187
Maximum Detect	0.164	Maximum Non-Detect	0.0216
Variance Detects	0.00444	Percent Non-Detects	28.57%
Mean Detects	0.0527	SD Detects	0.0666
Median Detects	0.0257	CV Detects	1.266
Skewness Detects	1.614	Kurtosis Detects	2.424
Mean of Logged Detects	-3.758	SD of Logged Detects	1.537

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.807	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0391	Standard Error of Mean	0.0231
SD	0.0548	95% KM (BCA) UCL	0.0761
95% KM (t) UCL	0.084	95% KM (Percentile Bootstrap) UCL	0.0761
95% KM (z) UCL	0.0771	95% KM Bootstrap t UCL	0.199
90% KM Chebyshev UCL	0.108	95% KM Chebyshev UCL	0.14
97.5% KM Chebyshev UCL	0.184	99% KM Chebyshev UCL	0.269

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.321	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.699	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.245	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.367	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.737	k star (bias corrected MLE)	0.428
Theta hat (MLE)	0.0714	Theta star (bias corrected MLE)	0.123
nu hat (MLE)	7.372	nu star (bias corrected)	4.282
MLE Mean (bias corrected)	0.0527	MLE Sd (bias corrected)	0.0805

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.509	nu hat (KM)	7.123
Approximate Chi Square Value (7.12, α)	2.238	Adjusted Chi Square Value (7.12, β)	1.504
95% Gamma Approximate KM-UCL (use when n>=50)	0.124	95% Gamma Adjusted KM-UCL (use when n<50)	0.185

INDENO(1,2,3-CD)PYRENE (Continued)

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00492	Mean	0.0405
Maximum	0.164	Median	0.01
SD	0.0583	CV	1.44
k hat (MLE)	0.755	k star (bias corrected MLE)	0.526
Theta hat (MLE)	0.0536	Theta star (bias corrected MLE)	0.0769
nu hat (MLE)	10.56	nu star (bias corrected)	7.37
MLE Mean (bias corrected)	0.0405	MLE Sd (bias corrected)	0.0558
		Adjusted Level of Significance (β)	0.0158
Approximate Chi Square Value (7.37, α)	2.376	Adjusted Chi Square Value (7.37, β)	1.612
95% Gamma Approximate UCL (use when n>=50)	0.126	95% Gamma Adjusted UCL (use when n<50)	0.185

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0392	Mean in Log Scale	-4.173
SD in Original Scale	0.0591	SD in Log Scale	1.442
95% t UCL (assumes normality of ROS data)	0.0826	95% Percentile Bootstrap UCL	0.0763
95% BCA Bootstrap UCL	0.0899	95% Bootstrap t UCL	0.276
95% H-UCL (Log ROS)	0.828		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.193	95% H-UCL (KM -Log)	0.51
KM SD (logged)	1.351	95% Critical H Value (KM-Log)	4.728
KM Standard Error of Mean (logged)	0.571		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0405	Mean in Log Scale	-3.999
SD in Original Scale	0.0582	SD in Log Scale	1.321
95% t UCL (Assumes normality)	0.0833	95% H-Stat UCL	0.537
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.084	95% KM (Percentile Bootstrap) UCL	0.0761

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Uncensored Full Data Sets	
User Selected Options	
Date/Time of Computation	7/13/2015 12:26:59 PM
From File	ProUCL Data - Sediment.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

ARSENIC

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	4.59	Mean	8.599
Maximum	12.3	Median	8.22
SD	2.997	Std. Error of Mean	1.133
Coefficient of Variation	0.349	Skewness	0.102

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test		
Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10.8	95% Adjusted-CLT UCL (Chen-1995)	10.51
		95% Modified-t UCL (Johnson-1978)	10.81

Gamma GOF Test		
A-D Test Statistic	0.24	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.176	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.312	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	9.066	k star (bias corrected MLE)	5.276
Theta hat (MLE)	0.948	Theta star (bias corrected MLE)	1.63
nu hat (MLE)	126.9	nu star (bias corrected)	73.86
MLE Mean (bias corrected)	8.599	MLE Sd (bias corrected)	3.744
		Approximate Chi Square Value (0.05)	55.07
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	50.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	11.53	95% Adjusted Gamma UCL (use when n<50)	12.65

ARSENIC (Continued)

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.524	Mean of logged Data	2.095
Maximum of Logged Data	2.51	SD of logged Data	0.37
Assuming Lognormal Distribution			
95% H-UCL	12.28	90% Chebyshev (MVUE) UCL	12.24
95% Chebyshev (MVUE) UCL	13.88	97.5% Chebyshev (MVUE) UCL	16.16
99% Chebyshev (MVUE) UCL	20.64		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	10.46	95% Jackknife UCL	10.8
95% Standard Bootstrap UCL	10.33	95% Bootstrap-t UCL	10.79
95% Hall's Bootstrap UCL	10.62	95% Percentile Bootstrap UCL	10.36
95% BCA Bootstrap UCL	10.25		
90% Chebyshev(Mean, Sd) UCL	12	95% Chebyshev(Mean, Sd) UCL	13.54
97.5% Chebyshev(Mean, Sd) UCL	15.67	99% Chebyshev(Mean, Sd) UCL	19.87
Suggested UCL to Use			
95% Student's-t UCL	10.8		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

CHROMIUM

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	9.63	Mean	20
Maximum	35.2	Median	20.5
SD	8.45	Std. Error of Mean	3.194
Coefficient of Variation	0.422	Skewness	0.797

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test		
Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	26.21	95% Adjusted-CLT UCL (Chen-1995)	26.29
		95% Modified-t UCL (Johnson-1978)	26.37

Gamma GOF Test		
A-D Test Statistic	0.179	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.148	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	6.658	k star (bias corrected MLE)	3.9
Theta hat (MLE)	3.005	Theta star (bias corrected MLE)	5.13
nu hat (MLE)	93.21	nu star (bias corrected)	54.6
MLE Mean (bias corrected)	20	MLE Sd (bias corrected)	10.13
		Approximate Chi Square Value (0.05)	38.62
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	34.6

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	28.28	95% Adjusted Gamma UCL (use when n<50)	31.56

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.165	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics			
Minimum of Logged Data	2.265	Mean of logged Data	2.919
Maximum of Logged Data	3.561	SD of logged Data	0.428

CHROMIUM (Continued)

Assuming Lognormal Distribution			
95% H-UCL	30.47	90% Chebyshev (MVUE) UCL	29.78
95% Chebyshev (MVUE) UCL	34.2	97.5% Chebyshev (MVUE) UCL	40.34
99% Chebyshev (MVUE) UCL	52.39		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs			
95% CLT UCL	25.26	95% Jackknife UCL	26.21
95% Standard Bootstrap UCL	24.88	95% Bootstrap-t UCL	27.8
95% Hall's Bootstrap UCL	28.3	95% Percentile Bootstrap UCL	24.95
95% BCA Bootstrap UCL	25.66		
90% Chebyshev(Mean, Sd) UCL	29.59	95% Chebyshev(Mean, Sd) UCL	33.93
97.5% Chebyshev(Mean, Sd) UCL	39.95	99% Chebyshev(Mean, Sd) UCL	51.78

Suggested UCL to Use	
95% Student's-t UCL	26.21

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

COBALT

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	4.65	Mean	22.09
Maximum	62	Median	12.2
SD	24.37	Std. Error of Mean	9.211
Coefficient of Variation	1.103	Skewness	1.208

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test		
Shapiro Wilk Test Statistic	0.732	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.364	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	39.99	95% Adjusted-CLT UCL (Chen-1995)	41.73
		95% Modified-t UCL (Johnson-1978)	40.69

Gamma GOF Test		
A-D Test Statistic	0.702	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.292	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.319	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	1.094	k star (bias corrected MLE)	0.721
Theta hat (MLE)	20.18	Theta star (bias corrected MLE)	30.65
nu hat (MLE)	15.32	nu star (bias corrected)	10.09
MLE Mean (bias corrected)	22.09	MLE Sd (bias corrected)	26.02
		Approximate Chi Square Value (0.05)	3.997
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	2.927

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	55.75	95% Adjusted Gamma UCL (use when n<50)	76.13

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.843	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.226	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics			
Minimum of Logged Data	1.537	Mean of logged Data	2.573
Maximum of Logged Data	4.127	SD of logged Data	1.083

COBALT (Continued)

Assuming Lognormal Distribution			
95% H-UCL	134.3	90% Chebyshev (MVUE) UCL	46.99
95% Chebyshev (MVUE) UCL	58.73	97.5% Chebyshev (MVUE) UCL	75.03
99% Chebyshev (MVUE) UCL	107		

Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	37.24	95% Jackknife UCL	39.99
95% Standard Bootstrap UCL	36.16	95% Bootstrap-t UCL	112
95% Hall's Bootstrap UCL	155.6	95% Percentile Bootstrap UCL	36.98
95% BCA Bootstrap UCL	38.41		
90% Chebyshev(Mean, Sd) UCL	49.72	95% Chebyshev(Mean, Sd) UCL	62.24
97.5% Chebyshev(Mean, Sd) UCL	79.61	99% Chebyshev(Mean, Sd) UCL	113.7
Suggested UCL to Use			
95% Adjusted Gamma UCL	76.13		

Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C.4

DERIVATION OF ADOLESCENT TRESPASSER SKIN SURFACE AREA

DERIVATION OF EXPOSED SKIN SURFACE AREA FOR ADOLESCENT RECREATIONAL USER/TRESPASSER

This appendix explains how the total exposed skin surface area was derived for the adolescent recreational user/trespasser. For adolescent recreational users/trespassers it was assumed that face, forearms, hands, and lower legs would be available for exposure. Body part specific data representing the mean value for male and female children were obtained from Table 7-2 in USEPA s Exposure Factors Handbook: 2011 Edition and was calculated as follows:

Age (Years)	Fraction of Total Body Surface Area by Body Part (m^2)					
	Head	Arms	Forearms(1)	Hands	Legs	Lower Legs(2)
6 to 11	0.066	0.151	0.071	0.051	0.311	0.121
11 to 16	0.073	0.227	0.107	0.072	0.483	0.188
Average (6 < 16)	0.070	0.189	0.089	0.062	0.397	0.155

1 – Ratio of adult male forearm-to-arm ratio applied to arm data (0.47).

2 – Ratio of adult male lower legs-to-leg ratio applied to leg data (0.39).

The total fraction of skin surface exposed is 0.070 m^2 + 0.089 m^2 + 0.062 m^2 + 0.155 m^2 = 0.375 m^2 or 3,750 cm^2.

APPENDIX C.5

SAMPLE CALCULATIONS

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL INDUSTRIAL WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface soil.

EQUATION:

$$IEX = \frac{CS \times IR \times RBA \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
IR	=	incidental ingestion rate (mg/day)
RBA	=	relative bioavailability
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1E-06 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	6.6	mg/kg	Chemical: Arsenic
IR	=	100	mg/day	
RBA	=	0.6		
EF	=	250	days/year	
ED	=	25	years	
FI	=	1		
CF	=	1E-06	kg/mg	
BW	=	80	kg	
ATc	=	25,550	days	
ATnc	=	9125	days	
CSFo	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL INDUSTRIAL WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{6.6 \text{ mg/kg} \times 100 \text{ mg/day} \times 0.6 \times 250 \text{ days/year} \times 25 \text{ years} \times 1 \times 1E\text{-}06 \text{ kg/mg}}{80 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 1.21E-06 mg/kg/day

ILCR = 1.21E-06 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 1.8E-06

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{6.6 \text{ mg/kg} \times 100 \text{ mg/day} \times 0.6 \times 250 \text{ days/year} \times 25 \text{ years} \times 1 \times 1E\text{-}06 \text{ kg/mg}}{80 \text{ kg} \times 9125 \text{ days}}$$

IEXnc = 3.39E-06 mg/kg/day

HQ = 3.39E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 1.1E-02

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL INDUSTRIAL WORKERS		
BASED ON: USEPA, JULY 2004		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

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 (1E-06 kg/mg)
SA	=	skin surface available for contact (cm2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDd (mg/kg/day)

ASSUMPTIONS:

Cs	=	6.6	mg/kg	Chemical: Arsenic
CF	=	1E-06	kg/mg	
SA	=	3,527	cm^2/day	
AF	=	0.12	mg/cm^2	
ABS	=	0.03		
EF	=	250	days/year	
ED	=	25	years	
BW	=	80	kg	
ATc	=	25,550	days	
ATnc	=	9125	days	
CSFd	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDd	=	3.0E-04	(mg/kg/day)	

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL INDUSTRIAL WORKERS		
BASED ON: USEPA, JULY 2004		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{6.6 \text{ mg/kg} \times 1E\text{-}06 \text{ kg/mg} \times 3527 \text{ cm2/day} \times 0.12 \text{ mg/cm2} \times 0.03 \times 250 \text{ days/year} \times 25 \text{ years}}{80 \text{ kg} \times 25550 \text{ days}}$$

DEXc = 2.56E-07 mg/kg/day

ILCR = 2.56E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 3.8E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{6.6 \text{ mg/kg} \times 1E\text{-}06 \text{ kg/mg} \times 3527 \text{ cm2/day} \times 0.12 \text{ mg/cm2} \times 0.03 \times 250 \text{ days/year} \times 25 \text{ years}}{80 \text{ kg} \times 9125 \text{ days}}$$

DEXnc = 7.17E-07 mg/kg/day

HQ = 7.17E-07 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 2.4E-03

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS INDUSTRIAL WORKERS		
BASED ON: USEPA, JANUARY 2009		
BY: R. JUPIN	**CHECKED BY:** L. Cifani	**DATE:** 7/13/2015

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from inhalation of surface soil.

EQUATION:

$$EC = \frac{Ca \times ET \times EF \times ED}{AT \times 24 \text{ hours/day}}$$

Where:

EC	=	exposure concentration (mg/m3)
Ca	=	exposure point concentration in air (mg/m3)
	=	Cs x 1/PEF
Cs	=	exposure point concentration in soil (mg/kg)
PEF	=	particulate emission factor (m3/kg)
ET	=	exposure time (hrs/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (hours)
IUR	=	inhalation unit risk ($(ug/m3)^{-1}$)
RfC	=	inhalation reference concentration (mg/m3)

RISKS:

ILCR (Carcinogens) = Exposure Concentration (mg/m3) x IURi (ug/m3)-1 x 1000 ug/mg
HQ (Noncarcinogens) = Exposure Concentration (mg/m3) / RFCi (mg/m3)

ASSUMPTIONS:

Cs	=	6.6	mg/kg	Chemical: Arsenic
PEF	=	1.32E+09	m3/kg	
Ca	=	5.02E-09	mg/m3	
ET	=	8	hours/day	
EF	=	250	days/year	
ED	=	25	years	
ATc	=	25,550	days	
ATnc	=	9,125	days	
IUR	=	4.3E-03	$(ug/m3)^{-1}$	
RfC	=	1.5E-05	(mg/m3)	

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS INDUSTRIAL WORKERS		
BASED ON: USEPA, JANUARY 2009		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{5.02E\text{-}09\ mg/m3 \times 8\ hours/day \times 250\ days/year \times 25\ years}{25550\ days \times 24\ hours/day}$$

IEXc = 4.09E-10 mg/m3

ILCR = 4.09E-10 mg/m3 x 4.30E-03 (ug/m3)-1 x 1000 ug/mg = Incremental Lifetime Cancer Risk

ILCR = 1.8E-09

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{5.02E\text{-}09\ mg/m3 \times 8\ hours/day \times 250\ days/year \times 25\ years}{9125\ days \times 24\ hours/day}$$

IEXnc = 1.15E-09 mg/m3

HQ = 1.15E-09 mg/m3 / 1.50E-05 (mg/m3) = Hazard Quotient

HQ **7.6E-05**

CLIENT: NSA CRANE, CRANE, INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF PARTICULATE EMISSION FACTOR FOR CONSTRUCTION WORKERS		
BASED ON: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA, December 2002)		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

Equation 5-5
Derivation of the Particulate Emission Factor
Construction Scenario - Construction Worker

$$PEF_{sc} = Q/C_{sr} \times \frac{1}{F_D} \times \left[\frac{T \times A_R}{556 \times (W/3)^{0.4} \times \frac{(365d/yr - p)}{365d/yr} \times \Sigma VKT} \right]$$

Parameter/Definition (units)	Default
PEF_{sc}/subchronic road particulate emission factor (m^3/kg)	site-specific
Q/C_{sr}/ inverse of the ratio of the 1-h geometric mean air concentration to the emission flux along a straight road segment bisecting a square site (g/m^2-s per kg/m^3)	23.02[a] (Equation 5-6)
F_D/dispersion correction factor (unitless)	0.185 (Appendix E)
T/total time over which construction occurs (s)	site-specific
A_R/surface area of contaminated road segment (m^2) L_R/length of road segment (ft) W_R/width of road segment (ft)	274.213 ($A_R = L_R \times W_R \times 0.092903 m^2/ft^2$)
W/mean vehicle weight (tons)	site-specific
p/number of days with at least 0.01 inches of precipitation (days/year)	site-specific (Exhibit 5-2)
ΣVKT/sum of fleet vehicle kilometers traveled during the exposure duration (km)	site-specific

[a] Assumes a 0.5 acre site

Q/C	23.02	(g/m^2-s per kg/m^3)	
Fd	0.185	dispersion correction factor (unitless)	
T	4.32E+06	sec	3600 sec/hr x 8hr/day x 150 days/yr
A_R	274.213	m^2	
W	8	tons	
p	125	day/year	
VKT	202.5	km	30 vehicles x 0.045 km/day x 150 days

PEF = 1.34E+06 m^3/kg

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER ADULT RECREATIONAL USERS		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:** L. Cafani	**DATE:** 7/13/2015

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	=	2.16	ug/L	Chemical: Arsenic
CRsw	=	0.01	L/hr	
CF	=	1.0E-03	mg/ug	
ET	=	4	hours	
EF	=	52	days/year	
ED	=	20	years	
BW	=	80	kg	
ATc	=	25550	days	
ATnc	=	7300	days	
CSFo	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER ADULT RECREATIONAL USERS		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{2.16\ ug/L \times 1.0E\text{-}03\ mg/ug \times 0.01\ L/hr \times 4\ hours \times 52\ days/year \times 20\ years}{80\ kg \times 25550\ days}$$

IEXc = 4.40E-08 mg/kg/day

ICLR = 4.40E-08 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR **6.6E-08**

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{2.16\ ug/L \times 1.0E\text{-}03\ mg/ug \times 0.01\ L/hr \times 4\ hours \times 52\ days/year \times 20\ years}{80\ kg \times 7300\ days}$$

IEXnc = 1.54E-07 mg/kg/day

$$HQ = \frac{1.54E\text{-}07\ mg/kg/day}{3.00E\text{-}04\ (mg/kg/day)} = \text{Hazard Quotient}$$

HQ = 5.1E-04

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER ADULT RECREATIONAL USERS		
BASED ON: USEPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	**CHECKED BY:** L. Cifani	**DATE:** 7/13/2015

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 dose 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)
CSFd	=	dermal carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDd	=	dermal 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: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER ADULT RECREATIONAL USERS		
BASED ON: USEPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	**CHECKED BY:** L. Cifani	**DATE:** 7/13/2015

Where:

Kp	=	permeability coefficient from water (cm/hr)
Csw	=	concentration of chemical in surface water (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
t*	=	time it takes to reach steady-state (hr/event)
τ	=	lag time (hr/event)
B	=	Bunge Model Constant (dimensionless)

EXAMPLE CALCULATION OF DAevent

ASSUMPTIONS:

Csw	=	0.00216	mg/L	Chemical: Arsenic
Kp	=	1.00E-03	cm/hr	
tevent	=	4	hr/event	

DA_{event} = 0.001 cm/hr x 0.00216 mg/L x 0.001 L/cm3 x 4 hr/event

DA_{event} 8.64E-09 mg/cm2-event

RISK CALCULATIONS

ASSUMPTIONS:

A	=	6,032	cm^2
EV	=	1	event/day
ED	=	20	years
EF	=	52	days/year
BW	=	80	kg
ATc	=	25,550	days
ATnc	=	7,300	days
CSFd	=	1.5E+00	(mg/kg/day)$^{-1}$
RfDd	=	3.0E-04	(mg/kg/day)

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER ADULT RECREATIONAL USERS		
BASED ON: USEPA, DECEMBER 1989, JULY 2004		
BY: R. JUPIN	**CHECKED BY:** L. Cifani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$DADc = \frac{8.64E\text{-}09 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 20 \text{ years} \times 52 \text{ days/year} \times 6032 \text{ cm2}}{80 \text{ kg} \times 25550 \text{ days}}$$

DADc = 2.65E-08 mg/kg/day

DADc = 2.65E-08 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 4.0E-08

EXAMPLE NONCARCINOGENIC CALCULATION

$$DADnc = \frac{8.64E\text{-}09 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 20 \text{ years} \times 52 \text{ days/year} \times 6032 \text{ cm2}}{80 \text{ kg} \times 7300 \text{ days}}$$

DADnc = 9.28E-08 mg/kg/day

HQ = 9.28E-08 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 3.1E-04

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT ADULT RECREATIONAL USERS		
BASED ON: USEPA, DECEMBER 1989		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** 7/13/2015

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of sediment.

EQUATION:

$$IEX = \frac{CS \times IR \times RBA \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in sediment (mg/kg)
IR	=	incidental ingestion rate (mg/day)
RBA	=	relative bioavailibility
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	=	10.8	mg/kg	Chemical: Arsenic
IR	=	100	mg/day	
RBA	=	0.6		
EF	=	52	days/year	
ED	=	20	years	
FI	=	0.5		
CF	=	1.0E-06	kg/mg	
BW	=	80	kg	
ATc	=	25,550	days	
ATnc	=	7,300	days	
CSFo	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT ADULT RECREATIONAL USERS		
BASED ON: USEPA, DECEMBER 1989		
BY: R. JUPIN	**CHECKED BY:** L. Cuffman	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{10.8 \text{ mg/kg} \times 100 \text{ mg/day} \times 0.6 \times 52 \text{ days/year} \times 20 \text{ years} \times 0.5 \times 1.0\text{E-06 kg/mg}}{80 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 1.65E-07 mg/kg/day

ILCR = 1.65E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 2.5E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{10.8 \text{ mg/kg} \times 100 \text{ mg/day} \times 0.6 \times 52 \text{ days/year} \times 20 \text{ years} \times 0.5 \times 1.0\text{E-06 kg/mg}}{80 \text{ kg} \times 7300 \text{ days}}$$

IEXnc = 5.77E-07 mg/kg/day

HQ = 5.77E-07 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 1.9E-03

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT ADULT RECREATIONAL USERS		
BASED ON: USEPA, JULY 2004		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** 7/13/2015

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	=	10.8	mg/kg	Chemical: Arsenic
CF	=	1.0E-06	kg/mg	
SA	=	6,032	cm^2/day	
AF	=	0.07	mg/cm^2	
ABS	=	0.03		
EF	=	52	days/year	
ED	=	20	years	
BW	=	80	kg	
ATc	=	25,550	days	
ATnc	=	7,300	days	
CSFd	=	1.5E+00	(mg/kg/day)$^{-1}$	
RfDd	=	3.0E-04	(mg/kg/day)	

CLIENT: NSA CRANE, CRANE INDIANA		JOB NUMBER: 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT ADULT RECREATIONAL USERS		
BASED ON: USEPA, JULY 2004		
BY: R. JUPIN	CHECKED BY:	DATE: 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{10.8 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 6032 \text{ cm2/day} \times 0.07 \text{ mg/cm2} \times 0.03 \times 52 \text{ days/year} \times 20 \text{ years}}{80 \text{ kg} \times 25550 \text{ days}}$$

DEXc = 6.96E-08 mg/kg/day

ILCR = 6.96E-08 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 1.0E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{10.8 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 6032 \text{ cm2/day} \times 0.07 \text{ mg/cm2} \times 0.03 \times 52 \text{ days/year} \times 20 \text{ years}}{80 \text{ kg} \times 7300 \text{ days}}$$

DEXnc = 2.44E-07 mg/kg/day

HQ = 2.44E-07 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 8.1E-04

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FOR MUTAGENIC CHEMICALS - HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Ciafani	**DATE:** 7/13/2015

PURPOSE: To estimate intake and cancer risks for mutagenic chemicals from incidental ingestion of surface soil.

EQUATION:

$$IEX = \frac{CS \times IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

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)
ADAF	=	age-dependent adjustment factor
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1

ASSUMPTIONS:

Cs	=	0.155	mg/kg	Chemical: Benzo(a)pyrene
IR	=	200	mg/day	
EF	=	350	days/year	
ED_1	=	2	years	
ED_2	=	4	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	15	kg	
AT	=	25,550	days	
CSFo	=	7.3E+00	$(mg/kg/day)^{-1}$	
$ADAF_1$	=	10		
$ADAF_2$	=	3		

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FOR MUTAGENIC CHEMICALS - HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEX_1 = \frac{0.155 \text{ mg/kg} \times 200 \text{ mg/day} \times 350 \text{ days/year} \times 2 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{15 \text{ kg} \times 25550 \text{ days}} \times 10$$

IEX_1 = 5.66E-07 mg/kg/day

$$IEX_2 = \frac{0.155 \text{ mg/kg} \times 200 \text{ mg/day} \times 350 \text{ days/year} \times 4 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{15 \text{ kg} \times 25550 \text{ days}} \times 3$$

IEX_2 = 3.40E-07 mg/kg/day

ILCR = (5.66E-07 mg/kg/day + 3.40E-07 mg/kg/day) x 7.30E+00 (mg/kg/day)-1

ILCR = 6.6E-06

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FOR MUTAGENIC CHEMICALS HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, JULY 2004, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

PURPOSE: To estimate intake and cancer risks for mutagenic chemicals from dermal contact with of surface soil.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT} \times ADAF$$

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)
ADAF	=	age-dependent adjustment factor
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1

ASSUMPTIONS:

Cs	=	0.155	mg/kg	Chemical: Benzo(a)pyrene
CF	=	1.0E-06	kg/mg	
SA	=	2,373	cm^2/day	
AF	=	0.2	mg/cm^2	
ABS	=	0.13		
EF	=	350	days/year	
ED_1	=	2	years	
ED_2	=	4	years	
BW	=	15	kg	
AT	=	25,550	days	
CSFd	=	7.3E+00	$(mg/kg/day)^{-1}$	
$ADAF_1$	=	10		
$ADAF_2$	=	3		

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FOR MUTAGENIC CHEMICALS HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, JULY 2004, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Chiffani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{0.155 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 2373 \text{ cm2/day} \times 0.2 \text{ mg/cm2} \times 0.13 \times 350 \text{ days/year} \times 2 \text{ years}}{15 \text{ kg} \times 25550 \text{ days}} \times 10$$

DEXc = 1.75E-07 mg/kg/day

$$DEXc = \frac{0.155 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 2373 \text{ cm2/day} \times 0.2 \text{ mg/cm2} \times 0.13 \times 350 \text{ days/year} \times 4 \text{ years}}{15 \text{ kg} \times 25550 \text{ days}} \times 3$$

DEXc = 1.05E-07 mg/kg/day

ILCR = (1.75E-07 mg/kg/day + 1.05E-07 mg/kg/day) x 7.30E+00 (mg/kg/day)-1

ILCR = 2.0E-06

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS FOR MUTAGENIC CHEMICALS - HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Crafani	**DATE:** 7/13/2015

PURPOSE: To estimate intake, carcinogenic risks for mutagenic chemicals from inhalation of of surface soil.

EQUATION:

$$EC = \frac{Ca \times ET \times EF \times ED}{AT \times 24\ hours/day} \times ADAF$$

Where:

EC	=	estimated exposure concentration (mg/m3)
Ca	=	exposure point concentration in air (mg/m3)
	=	Cs x 1/PEF
Cs	=	exposure point concentration in soil (mg/kg)
PEF	=	particulate emission factor (m3/kg)
ET	=	exposure time (hrs/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
AT	=	averaging time (hours)
ADAF	=	age-dependent adjustment factor
IUR	=	inhalation unit risk($(ug/mg)^{-1}$)

RISKS:

ILCR = Exposure concentration (mg/m3) x IURi (ug/m3)-1 x 1000 ug/mg

ASSUMPTIONS:

Cs	=	0.155	mg/kg	Chemical: Benzo(a)pyrene
PEF	=	1.32E+09	m3/kg	
Ca	=	1.18E-10	mg/m3	
ET	=	24	hr/day	
EF	=	350	days/year	
ED_1	=	2	years	
ED_2	=	4	years	
ATc	=	25,550	days	
IUR	=	1.1E-03	$(ug/m3)^{-1}$	
$ADAF_1$	=	10		
$ADAF_2$	=	3		

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS FOR MUTAGENIC CHEMICALS - HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Cufani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$EC = \frac{1.18E\text{-}10 \text{ mg/m3} \times 24 \text{ hr/day} \times 350 \text{ days/year} \times 2 \text{ years}}{25550 \text{ days} \times 24 \text{ hours/day}} \times 10$$

EC = 3.23E-11 mg/m3

$$EC = \frac{1.18E\text{-}10 \text{ mg/m3} \times 24 \text{ hr/day} \times 350 \text{ days/year} \times 4 \text{ years}}{25550 \text{ days} \times 24 \text{ hours/day}} \times 3$$

EC = 1.94E-11 mg/m3

ILCR = (3.23E-11 mg/m3 + 1.94E-11 mg/m3) x 1.10E-03 (ug/m3)-1 x 1000 ug/mg

ILCR = 5.7E-11

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FOR MUTAGENIC CHEMICALS - HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Ciafani	**DATE:** 7/13/2015

PURPOSE: To estimate intake and cancer risks for mutagenic chemicals from incidental ingestion of surface soil.

EQUATION:

$$IEX = \frac{CS \times IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

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)
ADAF	=	age-dependent adjustment factor
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1

ASSUMPTIONS:

Cs	=	0.155	mg/kg	Chemical: Benzo(a)pyrene
IR	=	100	mg/day	
EF	=	350	days/year	
ED_1	=	10	years	
ED_2	=	10	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	80	kg	
AT	=	25,550	days	
CSFo	=	7.3E+00	$(mg/kg/day)^{-1}$	
$ADAF_1$	=	3		
$ADAF_2$	=	1		

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FOR MUTAGENIC CHEMICALS - HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Ciafani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEX_1 = \frac{0.155 \text{ mg/kg} \times 100 \text{ mg/day} \times 350 \text{ days/year} \times 10 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{80 \text{ kg} \times 25550 \text{ days}} \times 3$$

IEX_1 = 7.96E-08 mg/kg/day

$$IEX_2 = \frac{0.155 \text{ mg/kg} \times 100 \text{ mg/day} \times 350 \text{ days/year} \times 10 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{80 \text{ kg} \times 25550 \text{ days}} \times 1$$

IEX_2 = 2.65E-08 mg/kg/day

ILCR = (7.96E-08 mg/kg/day + 2.65E-08 mg/kg/day) x 7.30E+00 (mg/kg/day)-1

ILCR = 7.8E-07

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FOR MUTAGENIC CHEMICALS HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, JULY 2004, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Ciafoni	**DATE:** 7/13/2015

PURPOSE: To estimate intake and cancer risks for mutagenic chemicals from dermal contact with of surface soil.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT} \times ADAF$$

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)
ADAF	=	age-dependent adjustment factor
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1

ASSUMPTIONS:

Cs	=	0.155	mg/kg	Chemical: Benzo(a)pyrene
CF	=	1.0E-06	kg/mg	
SA	=	6,032	cm^2/day	
AF	=	0.07	mg/cm^2	
ABS	=	0.13		
EF	=	350	days/year	
ED_1	=	10	years	
ED_2	=	10	years	
BW	=	80	kg	
AT	=	25,550	days	
CSFd	=	7.3E+00	$(mg/kg/day)^{-1}$	
$ADAF_1$	=	3		
$ADAF_2$	=	1		

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FOR MUTAGENIC CHEMICALS HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, JULY 2004, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:** L. Ciofani	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{0.155 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 6032 \text{ cm2/day} \times 0.07 \text{ mg/cm2} \times 0.13 \times 350 \text{ days/year} \times 10 \text{ years}}{80 \text{ kg} \times 25550 \text{ days}} \times 3$$

DEXc = 4.37E-08 mg/kg/day

$$DEXc = \frac{0.155 \text{ mg/kg} \times 1.0E\text{-}06 \text{ kg/mg} \times 6032 \text{ cm2/day} \times 0.07 \text{ mg/cm2} \times 0.13 \times 350 \text{ days/year} \times 10 \text{ years}}{80 \text{ kg} \times 25550 \text{ days}} \times 1$$

DEXc = 1.46E-08 mg/kg/day

ILCR = (4.37E-08 mg/kg/day + 1.46E-08 mg/kg/day) x 7.30E+00 (mg/kg/day)-1

ILCR = 4.3E-07

CALCULATION WORKSHEET

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS FOR MUTAGENIC CHEMICALS - HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** 7/13/2015

PURPOSE: To estimate intake, carcinogenic risks for mutagenic chemicals from inhalation of of surface soil.

EQUATION:

$$EC = \frac{Ca \times ET \times EF \times ED}{AT \times 24\ hours/day} \times ADAF$$

Where:

EC	=	estimated exposure intake (mg/kg/day)
Ca	=	exposure point concentration in air (mg/m3)
	=	Cs x 1/PEF
Cs	=	exposure point concentration in soil (mg/kg)
PEF	=	particulate emission factor (m3/kg)
ET	=	exposure time (hrs/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (hours)
ADAF	=	age-dependent adjustment factor
IURi	=	inhalation unit risk($(ug/mg)^{-1}$)

RISKS:

ILCR = Exposure concentration (mg/m3) x IUR (ug/m3)-1 x 1000 ug/mg

ASSUMPTIONS:

Cs	=	0.155	mg/kg	Chemical: Benzo(a)pyrene
PEF	=	1.32E+09	m3/kg	
Ca	=	1.18E-10	mg/m3	
ET	=	24	hr/day	
EF	=	350	days/year	
ED_1	=	10	years	
ED_2	=	10	years	
ATc	=	25,550	days	
IUR	=	1.1E-03	$(ug/m3)^{-1}$	
$ADAF_1$	=	3		
$ADAF_2$	=	1		

CLIENT: NSA CRANE, CRANE INDIANA		**JOB NUMBER:** 112G02122
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS FOR MUTAGENIC CHEMICALS - HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** 7/13/2015

EXAMPLE CARCINOGENIC CALCULATION

$$EC = \frac{1.18E\text{-}10\ mg/m3 \times 24\ hr/day \times 350\ days/year \times 10\ years}{25550\ days \times 24\ hours/day} \times 3$$

EC = 4.84E-11 mg/m3

$$EC = \frac{1.18E\text{-}10\ mg/m3 \times 24\ hr/day \times 350\ days/year \times 10\ years}{25550\ days \times 24\ hours/day} \times 1$$

EC = 1.61E-11 mg/m3

ILCR = (4.84E-11 mg/m3 + 1.61E-11 mg/m3) x 1.10E-03 (ug/m3)-1 x 1000 ug/mg

ILCR = 7.1E-11

APPENDIX C.6

RAGS PART D TABLES FOR CHEMICALS PRESENT AT NATURALLY OCCURRING LEVELS

RAGS Part D Table 3

Medium-Specific Exposure Point Concentration Summary

LIST OF TABLES
RAGS PART D TABLE 3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Table No.

3.1.RME	Surface Soil
3.2.RME	Subsurface Soil

TABLE 3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current
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 23	Cobalt	mg/kg	7.76	9.0 (N)	15.4 J	9.0	mg/kg	95% Student's-t UCL	ProUCL 5.0.00

N = Normal

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: 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 23	Chromium	mg/kg	15.4	18.6 (N)	29.8	18.6	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Cobalt	mg/kg	4.16	5.34 (AN)	11.4	5.34	mg/kg	95% KM (t) UCL	ProUCL 5.0.00
	Vanadium	mg/kg	22.4	28.3 (N)	51.2	28.3	mg/kg	95% Student's-t UCL	ProUCL 5.0.00

AN = Approximate normal
N = Normal

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

RAGS Part D Table 7

Calculation of Cancer Risks and Non-Cancer Hazards

LIST OF TABLES

RAGS PART D TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Table No.

Reasonable Maximum Exposures

7.1.RME	Construction Workers
7.2.RME	Industrial Workers
7.3.RME	Adolescent Trespassers
7.4.RME	Child Recreational Users
7.5.RME	Adult Recreational Users
7.6.RME	Child Residents
7.7.RME	Adult Residents

Central Tendency Exposures

7.1.CTE	Construction Workers
7.2.CTE	Industrial Workers
7.3.CTE	Adolescent Trespassers
7.4.CTE	Child Recreational Users
7.5.CTE	Adult Recreational Users
7.6.CTE	Child Residents
7.7.CTE	Adult Residents

Cancer risks and hazard indices are reported to one significant figures on the Table 7s to assist in reproducing the results.

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Crane SWMU 23	Ingestion	Cobalt	9	mg/kg	2.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								- -					0.005
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.005
	Exposure Medium Total										- -					0.005
	Air	Crane SWMU 23	Inhalation	Cobalt	6.7E-06	mg/m^3	1.3E-08	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-07	9.2E-07	(mg/m^3)	2.0E-05	(mg/m^3)	0.05
			Exp. Route Total								1E-07					0.05
		Exposure Point Total									1E-07					0.05
	Exposure Medium Total										1E-07					0.05
Medium Total											1E-07					0.06
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Ingestion	Chromium	18.6	mg/kg	4.5E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	2E-07	3.2E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.006
				Cobalt	5.34	mg/kg	1.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.1E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.003
				Vanadium	28.3	mg/kg	6.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.8E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.005
			Exp. Route Total								2E-07					0.01
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									2E-07					0.01
	Exposure Medium Total										2E-07					0.01
	Air	Crane SWMU 23	Inhalation	Chromium	1.4E-05	mg/m^3	2.7E-08	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	2E-06	1.9E-06	(mg/m^3)	3.0E-04	(mg/m^3)	0.006
				Cobalt	4.0E-06	mg/m^3	7.8E-09	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	7E-08	5.5E-07	(mg/m^3)	2.0E-05	(mg/m^3)	0.03
				Vanadium	2.1E-05	mg/m^3	4.1E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.9E-06	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2E-06					0.04
		Exposure Point Total									2E-06					0.04
	Exposure Medium Total										2E-06					0.04
Medium Total											2E-06					0.05

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Crane SWMU 23	Ingestion	Cobalt	9	mg/kg	2.8E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
			Exp. Route Total								- -					0.03
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.03
	Exposure Medium Total										- -					0.03
	Air	Crane SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	5.5E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	5E-09	1.6E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0003
			Exp. Route Total								5E-09					0.0003
		Exposure Point Total									5E-09					0.0003
	Exposure Medium Total										5E-09					0.0003
Medium Total											5E-09					0.03
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Ingestion	Chromium	18.6	mg/kg	5.7E-06	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	3E-06	1.6E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.005
				Cobalt	5.34	mg/kg	1.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Vanadium	28.3	mg/kg	8.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								3E-06					0.03
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									3E-06					0.03
	Exposure Medium Total										3E-06					0.03
	Air	Crane SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	1.1E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	9E-08	3.2E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00003
				Cobalt	4.1E-09	mg/m^3	3.3E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	3E-09	9.3E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.0002
				Vanadium	2.1E-08	mg/m^3	1.7E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00005
			Exp. Route Total								9E-08					0.0003
		Exposure Point Total									9E-08					0.0003
	Exposure Medium Total										9E-08					0.0003
Medium Total											3E-06					0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	2.0E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
			Exp. Route Total								- -					0.005
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.005
	Exposure Medium Total										- -					0.005
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	1.2E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-10	8.1E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.00001
			Exp. Route Total								1E-10					0.00001
		Exposure Point Total									1E-10					0.00001
	Exposure Medium Total										1E-10					0.00001
Medium Total											1E-10					0.005
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	1.3E-06	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	7E-07	2.9E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0010
				Cobalt	5.34	mg/kg	1.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Vanadium	28.3	mg/kg	6.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.5E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0009
			Exp. Route Total								7E-07					0.005
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									7E-07					0.005
	Exposure Medium Total										7E-07					0.005
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	7.1E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	6E-09	1.7E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000002
				Cobalt	4.1E-09	mg/m^3	7.0E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	6E-11	4.9E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.000008
				Vanadium	2.1E-08	mg/m^3	3.6E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
			Exp. Route Total								6E-09					0.00001
		Exposure Point Total									6E-09					0.00001
	Exposure Medium Total										6E-09					0.00001
Medium Total											7E-07					0.005

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	7.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
			Exp. Route Total								- -					0.03
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.03
	Exposure Medium Total										- -					0.03
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	1.4E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-10	1.6E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00003
			Exp. Route Total								1E-10					0.00003
		Exposure Point Total									1E-10					0.00003
	Exposure Medium Total										1E-10					0.00003
Medium Total											1E-10					0.03
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	8.1E-06	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	4E-06	1.8E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.006
				Cobalt	5.34	mg/kg	4.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Vanadium	28.3	mg/kg	2.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.005
			Exp. Route Total								4E-06					0.03
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									4E-06					0.03
	Exposure Medium Total										4E-06					0.03
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	1.5E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-08	3.3E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
				Cobalt	4.1E-09	mg/m^3	8.4E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	8E-11	9.7E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.00002
				Vanadium	2.1E-08	mg/m^3	4.3E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.0E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000005
			Exp. Route Total								1E-08					0.00003
		Exposure Point Total									1E-08					0.00003
	Exposure Medium Total										1E-08					0.00003
Medium Total											4E-06					0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	2.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
			Exp. Route Total								- -					0.003
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.003
	Exposure Medium Total										- -					0.003
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	4.6E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	4E-10	1.6E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00003
			Exp. Route Total								4E-10					0.00003
		Exposure Point Total									4E-10					0.00003
	Exposure Medium Total										4E-10					0.00003
Medium Total											4E-10					0.003
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	9.4E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	5E-07	1.7E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0006
				Cobalt	5.34	mg/kg	1.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Vanadium	28.3	mg/kg	7.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.5E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0005
			Exp. Route Total								5E-07					0.003
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									5E-07					0.003
	Exposure Medium Total										5E-07					0.003
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	1.9E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	2E-08	3.3E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
				Cobalt	4.1E-09	mg/m^3	2.8E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	3E-10	9.7E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.00002
				Vanadium	2.1E-08	mg/m^3	1.4E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.0E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000005
			Exp. Route Total								2E-08					0.00003
		Exposure Point Total									2E-08					0.00003
	Exposure Medium Total										2E-08					0.00003
Medium Total											5E-07					0.003

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	9.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.4
			Exp. Route Total								- -					0.4
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.4
	Exposure Medium Total										- -					0.4
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	5.6E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	5E-09	6.5E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.001
			Exp. Route Total								5E-09					0.001
		Exposure Point Total									5E-09					0.001
	Exposure Medium Total										5E-09					0.001
Medium Total											5E-09					0.4
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	1.1E-04	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	6E-05	2.4E-04	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.08
				Cobalt	5.34	mg/kg	5.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.8E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Vanadium	28.3	mg/kg	3.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.07
			Exp. Route Total								6E-05					0.4
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									6E-05					0.4
	Exposure Medium Total										6E-05					0.4
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	6.1E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	5E-07	1.3E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
				Cobalt	4.1E-09	mg/m^3	3.4E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	3E-09	3.9E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0007
				Vanadium	2.1E-08	mg/m^3	1.7E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0002
			Exp. Route Total								5E-07					0.001
		Exposure Point Total									5E-07					0.001
	Exposure Medium Total										5E-07					0.001
Medium Total											6E-05					0.4

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	3.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
			Exp. Route Total								- -					0.04
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.04
	Exposure Medium Total										- -					0.04
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	1.9E-09	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2E-08	6.5E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.001
			Exp. Route Total								2E-08					0.001
		Exposure Point Total									2E-08					0.001
	Exposure Medium Total										2E-08					0.001
Medium Total											2E-08					0.04
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	1.3E-05	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	7E-06	2.2E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.007
				Cobalt	5.34	mg/kg	1.8E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Vanadium	28.3	mg/kg	9.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.007
			Exp. Route Total								7E-06					0.03
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									7E-06					0.03
	Exposure Medium Total										7E-06					0.03
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	7.7E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	6E-07	1.3E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
				Cobalt	4.1E-09	mg/m^3	1.1E-09	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-08	3.9E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0007
				Vanadium	2.1E-08	mg/m^3	5.8E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0002
			Exp. Route Total								6E-07					0.0010
		Exposure Point Total									6E-07					0.0010
	Exposure Medium Total										6E-07					0.0010
Medium Total											8E-06					0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				Hazard Quotient
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Crane SWMU 23	Ingestion	Cobalt	9	mg/kg	5.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								- -					0.001
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.001
	Exposure Medium Total										- -					0.001
	Air	Crane SWMU 23	Inhalation	Cobalt	6.7E-06	mg/m^3	6.6E-09	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	6E-08	4.6E-07	(mg/m^3)	2.0E-05	(mg/m^3)	0.02
			Exp. Route Total								6E-08					0.02
		Exposure Point Total									6E-08					0.02
	Exposure Medium Total										6E-08					0.02
Medium Total											6E-08					0.02
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Ingestion	Chromium	18.6	mg/kg	1.1E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	6E-08	7.9E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.002
				Cobalt	5.34	mg/kg	3.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0008
				Vanadium	28.3	mg/kg	1.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.001
			Exp. Route Total								6E-08					0.004
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									6E-08					0.004
	Exposure Medium Total										6E-08					0.004
	Air	Crane SWMU 23	Inhalation	Chromium	1.4E-05	mg/m^3	1.4E-08	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-06	9.6E-07	(mg/m^3)	3.0E-04	(mg/m^3)	0.003
				Cobalt	4.0E-06	mg/m^3	3.9E-09	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	4E-08	2.7E-07	(mg/m^3)	2.0E-05	(mg/m^3)	0.01
				Vanadium	2.1E-05	mg/m^3	2.1E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-06	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1E-06					0.01
		Exposure Point Total									1E-06					0.01
	Exposure Medium Total										1E-06					0.01
Medium Total											1E-06					0.01

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Crane SWMU 23	Ingestion	Cobalt	9	mg/kg	4.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
			Exp. Route Total								- -					0.01
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.01
	Exposure Medium Total										- -					0.01
	Air	Crane SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	1.7E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2E-09	1.4E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0002
			Exp. Route Total								2E-09					0.0002
		Exposure Point Total									2E-09					0.0002
	Exposure Medium Total										2E-09					0.0002
Medium Total											2E-09					0.01
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Ingestion	Chromium	18.6	mg/kg	9.0E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	5E-07	7.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Cobalt	5.34	mg/kg	2.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Vanadium	28.3	mg/kg	1.4E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.002
			Exp. Route Total								5E-07					0.01
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									5E-07					0.01
	Exposure Medium Total										5E-07					0.01
	Air	Crane SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	3.6E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	3E-08	2.8E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00003
				Cobalt	4.1E-09	mg/m^3	1.1E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-09	8.2E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.0001
				Vanadium	2.1E-08	mg/m^3	5.4E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.2E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00004
			Exp. Route Total								3E-08					0.0002
		Exposure Point Total									3E-08					0.0002
	Exposure Medium Total										3E-08					0.0002
Medium Total											5E-07					0.01

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	5.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
			Exp. Route Total								- -					0.001
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.001
	Exposure Medium Total										- -					0.001
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	2.9E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	3E-11	2.0E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.000003
			Exp. Route Total								3E-11					0.000003
		Exposure Point Total									3E-11					0.000003
	Exposure Medium Total										3E-11					0.000003
Medium Total											3E-11					0.001
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	3.2E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	2E-07	7.4E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0002
				Cobalt	5.34	mg/kg	3.0E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
				Vanadium	28.3	mg/kg	1.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0002
			Exp. Route Total								2E-07					0.001
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									2E-07					0.001
	Exposure Medium Total										2E-07					0.001
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	1.8E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	2E-09	4.2E-11	(mg/m^3)	1.0E-04	(mg/m^3)	4.2E-7
				Cobalt	4.1E-09	mg/m^3	1.7E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2E-11	1.2E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.000002
				Vanadium	2.1E-08	mg/m^3	8.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.2E-11	(mg/m^3)	1.0E-04	(mg/m^3)	6.2E-7
			Exp. Route Total								2E-09					0.000003
		Exposure Point Total									2E-09					0.000003
	Exposure Medium Total										2E-09					0.000003
Medium Total											2E-07					0.001

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	6.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
			Exp. Route Total								- -					0.007
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.007
	Exposure Medium Total										- -					0.007
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	1.2E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-11	4.0E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.000007
			Exp. Route Total								1E-11					0.000007
		Exposure Point Total									1E-11					0.000007
	Exposure Medium Total										1E-11					0.000007
Medium Total											1E-11					0.007
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	8.2E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	4E-07	4.4E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.001
				Cobalt	5.34	mg/kg	3.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Vanadium	28.3	mg/kg	1.9E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.7E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								4E-07					0.006
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									4E-07					0.006
	Exposure Medium Total										4E-07					0.006
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	1.5E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-09	8.3E-11	(mg/m^3)	1.0E-04	(mg/m^3)	8.3E-7
				Cobalt	4.1E-09	mg/m^3	7.0E-13	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	6E-12	2.4E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.000004
				Vanadium	2.1E-08	mg/m^3	3.6E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000001
			Exp. Route Total								1E-09					0.000006
		Exposure Point Total									1E-09					0.000006
	Exposure Medium Total										1E-09					0.000006
Medium Total											4E-07					0.006

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	2.0E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
			Exp. Route Total								- -					0.0007
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.0007
	Exposure Medium Total										- -					0.0007
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	4.0E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	4E-11	4.0E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.000007
			Exp. Route Total								4E-11					0.000007
		Exposure Point Total									4E-11					0.000007
	Exposure Medium Total										4E-11					0.000007
Medium Total											4E-11					0.0007
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	6.5E-08	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	3E-08	4.1E-07	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0001
				Cobalt	5.34	mg/kg	1.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Vanadium	28.3	mg/kg	6.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.3E-07	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0001
			Exp. Route Total								3E-08					0.0006
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									3E-08					0.0006
	Exposure Medium Total										3E-08					0.0006
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	1.3E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-09	8.3E-11	(mg/m^3)	1.0E-04	(mg/m^3)	8.3E-7
				Cobalt	4.1E-09	mg/m^3	2.4E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2E-11	2.4E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.000004
				Vanadium	2.1E-08	mg/m^3	1.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000001
			Exp. Route Total								1E-09					0.000006
		Exposure Point Total									1E-09					0.000006
	Exposure Medium Total										1E-09					0.000006
Medium Total											3E-08					0.0006

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.1
			Exp. Route Total								- -					0.1
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.1
	Exposure Medium Total										- -					0.1
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	1.2E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-09	4.4E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0007
			Exp. Route Total								1E-09					0.0007
		Exposure Point Total									1E-09					0.0007
	Exposure Medium Total										1E-09					0.0007
Medium Total											1E-09					0.1
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	1.5E-05	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	8E-06	7.9E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.03
				Cobalt	5.34	mg/kg	6.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.08
				Vanadium	28.3	mg/kg	3.5E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.02
			Exp. Route Total								8E-06					0.1
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									8E-06					0.1
	Exposure Medium Total										8E-06					0.1
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	1.7E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-07	9.0E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00009
				Cobalt	4.1E-09	mg/m^3	7.5E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	7E-10	2.6E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0004
				Vanadium	2.1E-08	mg/m^3	3.8E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
			Exp. Route Total								1E-07					0.0006
		Exposure Point Total									1E-07					0.0006
	Exposure Medium Total										1E-07					0.0006
Medium Total											8E-06					0.1

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 23	Ingestion	Cobalt	9	mg/kg	3.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
			Exp. Route Total								- -					0.01
			Dermal	Cobalt	9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					0.01
	Exposure Medium Total										- -					0.01
	Air	SWMU 23	Inhalation	Cobalt	6.8E-09	mg/m^3	4.4E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	4E-09	4.4E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0007
			Exp. Route Total								4E-09					0.0007
		Exposure Point Total									4E-09					0.0007
	Exposure Medium Total										4E-09					0.0007
Medium Total											4E-09					0.01
Subsurface Soil	Subsurface Soil	SWMU 23	Ingestion	Chromium	18.6	mg/kg	1.2E-06	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	6E-07	7.5E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.003
				Cobalt	5.34	mg/kg	2.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Vanadium	28.3	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.002
			Exp. Route Total								6E-07					0.01
			Dermal	Chromium	18.6	mg/kg	0.0E+00	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.5E-05	(mg/kg/day)	--
				Cobalt	5.34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Vanadium	28.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									6E-07					0.01
	Exposure Medium Total										6E-07					0.01
	Air	SWMU 23	Inhalation	Chromium	1.4E-08	mg/m^3	1.4E-09	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	1E-07	9.0E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00009
				Cobalt	4.1E-09	mg/m^3	2.6E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2E-09	2.6E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0004
				Vanadium	2.1E-08	mg/m^3	1.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
			Exp. Route Total								1E-07					0.0006
		Exposure Point Total									1E-07					0.0006
	Exposure Medium Total										1E-07					0.0006
Medium Total											7E-07					0.01

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

RAGS Part D Table 9

Summary of Receptor Risks and Hazards for COPCs

LIST OF TABLES

RAGS PART D TABLE 9

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

Table No.

Reasonable Maximum Exposures

9.1.RME Construction Workers
9.2.RME Industrial Workers
9.3.RME Adolescent Trespassers
9.4.RME Child Recreational Users
9.5.RME Adult Recreational Users
9.6.RME Lifelong Recreational Users
9.7.RME Child Residents
9.8.RME Adult Residents
9.9.RME Lifelong Residents

Central Tendency Exposures

9.1.CTE Construction Workers
9.2.CTE Industrial Workers
9.3.CTE Adolescent Trespassers
9.4.CTE Child Recreational Users
9.5.CTE Adult Recreational Users
9.6.CTE Lifelong Recreational Users
9.7.CTE Child Residents
9.8.CTE Adult Residents
9.9.CTE Lifelong Residents

Cancer risks and hazard indices are reported to one significant figure in accordance with USEPA guidance,

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Crane SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.005	--	--	0.005
			Chemical Total	- -	--	- -	--	- -		0.005	--	--	0.005
		Exposure Point Total						- -					0.005
	Exposure Medium Total							- -					0.005
	Air	Crane SWMU 23	Cobalt	--	1E-07	--	--	1E-07	Respiratory	--	0.05	--	0.05
			Chemical Total	--	1E-07	--	--	1E-07		- -	0.05	- -	0.05
		Exposure Point Total						1E-07					0.05
	Exposure Medium Total							1E-07					0.05
Medium Total								1E-07					0.06
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Chromium	2E-07	--	- -	--	2E-07	Kidney	0.006	--	--	0.006
			Cobalt	- -	--	- -	--	- -	Thyroid	0.003	--	--	0.003
			Vanadium	- -	--	- -	--	- -	Kidney	0.005	--	--	0.005
			Chemical Total	2E-07	--	- -	--	2E-07		0.01	--	--	0.01
		Exposure Point Total						2E-07					0.01
	Exposure Medium Total							2E-07					0.01
	Air	Crane SWMU 23	Chromium	--	2E-06	--	--	2E-06	Respiratory	--	0.006	--	0.006
			Cobalt	--	7E-08	--	--	7E-08	Respiratory	--	0.03	--	0.03
			Vanadium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	2E-06	--	--	2E-06		- -	0.04	- -	0.04
		Exposure Point Total						2E-06					0.04
	Exposure Medium Total							2E-06					0.04
Medium Total								2E-06					0.05

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Crane SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.03	--	--	0.03
			Chemical Total	- -	--	- -	--	- -		0.03	--	--	0.03
		Exposure Point Total						- -					0.03
	Exposure Medium Total							- -					0.03
	Air	Crane SWMU 23	Cobalt	--	5E-09	--	--	5E-09	Respiratory	--	0.0003	--	0.0003
			Chemical Total	--	5E-09	--	--	5E-09		- -	0.0003	- -	0.0003
		Exposure Point Total						5E-09					0.0003
	Exposure Medium Total							5E-09					0.0003
Medium Total								5E-09					0.03
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Chromium	3E-06	--	- -	--	3E-06	None Specified	0.005	--	--	0.005
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Vanadium	- -	--	- -	--	- -	Kidney	0.005	--	--	0.005
			Chemical Total	3E-06	--	- -	--	3E-06		0.03	--	--	0.03
		Exposure Point Total						3E-06					0.03
	Exposure Medium Total							3E-06					0.03
	Air	Crane SWMU 23	Chromium	--	9E-08	--	--	9E-08	Respiratory	--	0.00003	--	0.00003
			Cobalt	--	3E-09	--	--	3E-09	Respiratory	--	0.0002	--	0.0002
			Vanadium	--	- -	--	--	- -	NA	--	0.00005	--	0.00005
			Chemical Total	--	9E-08	--	--	9E-08		- -	0.0003	- -	0.0003
		Exposure Point Total						9E-08					0.0003
	Exposure Medium Total							9E-08					0.0003
Medium Total								3E-06					0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.005	--	--	0.005
			Chemical Total	- -	--	- -	--	- -		0.005	--	--	0.005
		Exposure Point Total						- -					0.005
	Exposure Medium Total							- -					0.005
	Air	SWMU 23	Cobalt	--	1E-10	--	--	1E-10	Respiratory	--	0.00001	--	0.00001
			Chemical Total	--	1E-10	--	--	1E-10		- -	0.00001	- -	0.00001
		Exposure Point Total						1E-10					0.00001
	Exposure Medium Total							1E-10					0.00001
Medium Total								1E-10					0.005
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	7E-07	--	- -	--	7E-07	None Specified	0.0010	--	--	0.0010
			Cobalt	- -	--	- -	--	- -	Thyroid	0.003	--	--	0.003
			Vanadium	- -	--	- -	--	- -	Kidney	0.0009	--	--	0.0009
			Chemical Total	7E-07	--	- -	--	7E-07		0.005	--	--	0.005
		Exposure Point Total						7E-07					0.005
	Exposure Medium Total							7E-07					0.005
	Air	SWMU 23	Chromium	--	6E-09	--	--	6E-09	Respiratory	--	0.000002	--	0.000002
			Cobalt	--	6E-11	--	--	6E-11	Respiratory	--	0.000008	--	0.000008
			Vanadium	--	- -	--	--	- -	NA	--	0.000003	--	0.000003
			Chemical Total	--	6E-09	--	--	6E-09		- -	0.00001	- -	0.00001
		Exposure Point Total						6E-09					0.00001
	Exposure Medium Total							6E-09					0.00001
Medium Total								7E-07					0.005

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.03	--	--	0.03
			Chemical Total	- -	--	- -	--	- -		0.03	--	--	0.03
		Exposure Point Total						- -					0.03
	Exposure Medium Total							- -					0.03
	Air	SWMU 23	Cobalt	--	1E-10	--	--	1E-10	Respiratory	--	0.00003	--	0.00003
			Chemical Total	--	1E-10	--	--	1E-10		- -	0.00003	- -	0.00003
		Exposure Point Total						1E-10					0.00003
	Exposure Medium Total							1E-10					0.00003
Medium Total								1E-10					0.03
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	4E-06	--	- -	--	4E-06	None Specified	0.006	--	--	0.006
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Vanadium	- -	--	- -	--	- -	Kidney	0.005	--	--	0.005
			Chemical Total	4E-06	--	- -	--	4E-06		0.03	--	--	0.03
		Exposure Point Total						4E-06					0.03
	Exposure Medium Total							4E-06					0.03
	Air	SWMU 23	Chromium	--	1E-08	--	--	1E-08	Respiratory	--	0.000003	--	0.000003
			Cobalt	--	8E-11	--	--	8E-11	Respiratory	--	0.00002	--	0.00002
			Vanadium	--	- -	--	--	- -	NA	--	0.000005	--	0.000005
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.00003	- -	0.00003
		Exposure Point Total						1E-08					0.00003
	Exposure Medium Total							1E-08					0.00003
Medium Total								4E-06					0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.003	--	--	0.003
			Chemical Total	- -	--	- -	--	- -		0.003	--	--	0.003
		Exposure Point Total						- -					0.003
	Exposure Medium Total							- -					0.003
	Air	SWMU 23	Cobalt	--	4E-10	--	--	4E-10	Respiratory	--	0.00003	--	0.00003
			Chemical Total	--	4E-10	--	--	4E-10		- -	0.00003	- -	0.00003
		Exposure Point Total						4E-10					0.00003
	Exposure Medium Total							4E-10					0.00003
Medium Total								4E-10					0.003
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	5E-07	--	- -	--	5E-07	None Specified	0.0006	--	--	0.0006
			Cobalt	- -	--	- -	--	- -	Thyroid	0.002	--	--	0.002
			Vanadium	- -	--	- -	--	- -	Kidney	0.0005	--	--	0.0005
			Chemical Total	5E-07	--	- -	--	5E-07		0.003	--	--	0.003
		Exposure Point Total						5E-07					0.003
	Exposure Medium Total							5E-07					0.003
	Air	SWMU 23	Chromium	--	2E-08	--	--	2E-08	Respiratory	--	0.000003	--	0.000003
			Cobalt	--	3E-10	--	--	3E-10	Respiratory	--	0.00002	--	0.00002
			Vanadium	--	- -	--	--	- -	NA	--	0.000005	--	0.000005
			Chemical Total	--	2E-08	--	--	2E-08		- -	0.00003	- -	0.00003
		Exposure Point Total						2E-08					0.00003
	Exposure Medium Total							2E-08					0.00003
Medium Total								5E-07					0.003

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -					
			Chemical Total	- -	--	- -	--	- -					
		Exposure Point Total						- -					
	Exposure Medium Total							- -					
	Air	SWMU 23	Cobalt	--	5E-10	--	--	5E-10					
			Chemical Total	--	5E-10	--	--	5E-10					
		Exposure Point Total						5E-10					
	Exposure Medium Total							5E-10					
Medium Total								5E-10					
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	5E-06	--	- -	--	5E-06					
			Cobalt	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	5E-06	--	- -	--	5E-06					
		Exposure Point Total						5E-06					
	Exposure Medium Total							5E-06					
	Air	SWMU 23	Chromium	--	3E-08	--	--	3E-08					
			Cobalt	--	4E-10	--	--	4E-10					
			Vanadium	--	- -	--	--	- -					
			Chemical Total	--	3E-08	--	--	3E-08					
		Exposure Point Total						3E-08					
	Exposure Medium Total							3E-08					
Medium Total								5E-06					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.4	--	--	0.4
			Chemical Total	- -	--	- -	--	- -		0.4	--	--	0.4
		Exposure Point Total						- -					0.4
	Exposure Medium Total							- -					0.4
	Air	SWMU 23	Cobalt	--	5E-09	--	--	5E-09	Respiratory	--	0.001	--	0.001
			Chemical Total	--	5E-09	--	--	5E-09		- -	0.001	- -	0.001
		Exposure Point Total						5E-09					0.001
	Exposure Medium Total							5E-09					0.001
Medium Total								5E-09					0.4
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	6E-05	--	- -	--	6E-05	None Specified	0.08	--	--	0.08
			Cobalt	- -	--	- -	--	- -	Thyroid	0.2	--	--	0.2
			Vanadium	- -	--	- -	--	- -	Kidney	0.07	--	--	0.07
			Chemical Total	6E-05	--	- -	--	6E-05		0.4	--	--	0.4
		Exposure Point Total						6E-05					0.4
	Exposure Medium Total							6E-05					0.4
	Air	SWMU 23	Chromium	--	5E-07	--	--	5E-07	Respiratory	--	0.0001	--	0.0001
			Cobalt	--	3E-09	--	--	3E-09	Respiratory	--	0.0007	--	0.0007
			Vanadium	--	- -	--	--	- -	NA	--	0.0002	--	0.0002
			Chemical Total	--	5E-07	--	--	5E-07		- -	0.001	- -	0.001
		Exposure Point Total						5E-07					0.001
	Exposure Medium Total							5E-07					0.001
Medium Total								6E-05					0.4

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.04	--	--	0.04
			Chemical Total	- -	--	- -	--	- -		0.04	--	--	0.04
		Exposure Point Total						- -					0.04
	Exposure Medium Total							- -					0.04
	Air	SWMU 23	Cobalt	--	2E-08	--	--	2E-08	Respiratory	--	0.001	--	0.001
			Chemical Total	--	2E-08	--	--	2E-08		- -	0.001	- -	0.001
		Exposure Point Total						2E-08					0.001
	Exposure Medium Total							2E-08					0.001
Medium Total								2E-08					0.04
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	7E-06	--	- -	--	7E-06	None Specified	0.007	--	--	0.007
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Vanadium	- -	--	- -	--	- -	Kidney	0.007	--	--	0.007
			Chemical Total	7E-06	--	- -	--	7E-06		0.03	--	--	0.03
		Exposure Point Total						7E-06					0.03
	Exposure Medium Total							7E-06					0.03
	Air	SWMU 23	Chromium	--	6E-07	--	--	6E-07	Respiratory	--	0.0001	--	0.0001
			Cobalt	--	1E-08	--	--	1E-08	Respiratory	--	0.0007	--	0.0007
			Vanadium	--	- -	--	--	- -	NA	--	0.0002	--	0.0002
			Chemical Total	--	6E-07	--	--	6E-07		- -	0.001	- -	0.001
		Exposure Point Total						6E-07					0.001
	Exposure Medium Total							6E-07					0.001
Medium Total								8E-06					0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -					
			Chemical Total	- -	--	- -	--	- -					
		Exposure Point Total						- -					
	Exposure Medium Total							- -					
	Air	SWMU 23	Cobalt	--	3E-08	--	--	3E-08					
			Chemical Total	--	3E-08	--	--	3E-08					
		Exposure Point Total						3E-08					
	Exposure Medium Total							3E-08					
Medium Total								3E-08					
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	7E-05	--	- -	--	7E-05					
			Cobalt	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	7E-05	--	- -	--	7E-05					
		Exposure Point Total						7E-05					
	Exposure Medium Total							7E-05					
	Air	SWMU 23	Chromium	--	1E-06	--	--	1E-06					
			Cobalt	--	1E-08	--	--	1E-08					
			Vanadium	--	- -	--	--	- -					
			Chemical Total	--	1E-06	--	--	1E-06					
		Exposure Point Total						1E-06					
	Exposure Medium Total							1E-06					
Medium Total								7E-05					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Crane SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.001	--	--	0.001
			Chemical Total	- -	--	- -	--	- -		0.001	--	--	0.001
		Exposure Point Total						- -					0.001
	Exposure Medium Total							- -					0.001
	Air	Crane SWMU 23	Cobalt	--	6E-08	--	--	6E-08	Respiratory	--	0.02	--	0.02
			Chemical Total	--	6E-08	--	--	6E-08		- -	0.02	- -	0.02
		Exposure Point Total						6E-08					0.02
	Exposure Medium Total							6E-08					0.02
Medium Total								6E-08					0.02
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Chromium	6E-08	--	- -	--	6E-08	Kidney	0.002	--	--	0.002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.0008	--	--	0.0008
			Vanadium	- -	--	- -	--	- -	Kidney	0.001	--	--	0.001
			Chemical Total	6E-08	--	- -	--	6E-08		0.004	--	--	0.004
		Exposure Point Total						6E-08					0.004
	Exposure Medium Total							6E-08					0.004
	Air	Crane SWMU 23	Chromium	--	1E-06	--	--	1E-06	Respiratory	--	0.003	--	0.003
			Cobalt	--	4E-08	--	--	4E-08	Respiratory	--	0.01	--	0.01
			Vanadium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	1E-06	--	--	1E-06		- -	0.01	- -	0.01
		Exposure Point Total						1E-06					0.01
	Exposure Medium Total							1E-06					0.01
Medium Total								1E-06					0.01

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Crane SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.01	--	--	0.01
			Chemical Total	- -	--	- -	--	- -		0.01	--	--	0.01
		Exposure Point Total						- -					0.01
	Exposure Medium Total							- -					0.01
	Air	Crane SWMU 23	Cobalt	--	2E-09	--	--	2E-09	Respiratory	--	0.0002	--	0.0002
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.0002	- -	0.0002
		Exposure Point Total						2E-09					0.0002
	Exposure Medium Total							2E-09					0.0002
Medium Total								2E-09					0.01
Subsurface Soil	Subsurface Soil	Crane SWMU 23	Chromium	5E-07	--	- -	--	5E-07	None Specified	0.002	--	--	0.002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Vanadium	- -	--	- -	--	- -	Kidney	0.002	--	--	0.002
			Chemical Total	5E-07	--	- -	--	5E-07		0.01	--	--	0.01
		Exposure Point Total						5E-07					0.01
	Exposure Medium Total							5E-07					0.01
	Air	Crane SWMU 23	Chromium	--	3E-08	--	--	3E-08	Respiratory	--	0.00003	--	0.00003
			Cobalt	--	1E-09	--	--	1E-09	Respiratory	--	0.0001	--	0.0001
			Vanadium	--	- -	--	--	- -	NA	--	0.00004	--	0.00004
			Chemical Total	--	3E-08	--	--	3E-08		- -	0.0002	- -	0.0002
		Exposure Point Total						3E-08					0.0002
	Exposure Medium Total							3E-08					0.0002
Medium Total								5E-07					0.01

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.001	--	--	0.001
			Chemical Total	- -	--	- -	--	- -		0.001	--	--	0.001
		Exposure Point Total						- -					0.001
	Exposure Medium Total							- -					0.001
	Air	SWMU 23	Cobalt	--	3E-11	--	--	3E-11	Respiratory	--	0.000003	--	0.000003
			Chemical Total	--	3E-11	--	--	3E-11		- -	0.000003	- -	0.000003
		Exposure Point Total						3E-11					0.000003
	Exposure Medium Total							3E-11					0.000003
Medium Total								3E-11					0.001
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	2E-07	--	- -	--	2E-07	None Specified	0.0002	--	--	0.0002
			Cobalt	- -	--	- -	--	- -	Thyroid	0.0007	--	--	0.0007
			Vanadium	- -	--	- -	--	- -	Kidney	0.0002	--	--	0.0002
			Chemical Total	2E-07	--	- -	--	2E-07		0.001	--	--	0.001
		Exposure Point Total						2E-07					0.001
	Exposure Medium Total							2E-07					0.001
	Air	SWMU 23	Chromium	--	2E-09	--	--	2E-09	Respiratory	--	0.0000004	--	0.0000004
			Cobalt	--	2E-11	--	--	2E-11	Respiratory	--	0.000002	--	0.000002
			Vanadium	--	- -	--	--	- -	NA	--	0.0000006	--	0.0000006
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.000003	- -	0.000003
		Exposure Point Total						2E-09					0.000003
	Exposure Medium Total							2E-09					0.000003
Medium Total								2E-07					0.001

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Chemical Total	- -	--	- -	--	- -		0.007	--	--	0.007
		Exposure Point Total						- -					0.007
	Exposure Medium Total							- -					0.007
	Air	SWMU 23	Cobalt	--	1E-11	--	--	1E-11	Respiratory	--	0.000007	--	0.000007
			Chemical Total	--	1E-11	--	--	1E-11		- -	0.000007	- -	0.000007
		Exposure Point Total						1E-11					0.000007
	Exposure Medium Total							1E-11					0.000007
Medium Total								1E-11					0.007
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	4E-07	--	- -	--	4E-07	None Specified	0.001	--	--	0.001
			Cobalt	- -	--	- -	--	- -	Thyroid	0.004	--	--	0.004
			Vanadium	- -	--	- -	--	- -	Kidney	0.001	--	--	0.001
			Chemical Total	4E-07	--	- -	--	4E-07		0.006	--	--	0.006
		Exposure Point Total						4E-07					0.006
	Exposure Medium Total							4E-07					0.006
	Air	SWMU 23	Chromium	--	1E-09	--	--	1E-09	Respiratory	--	0.0000008	--	0.0000008
			Cobalt	--	6E-12	--	--	6E-12	Respiratory	--	0.000004	--	0.000004
			Vanadium	--	- -	--	--	- -	NA	--	0.000001	--	0.000001
			Chemical Total	--	1E-09	--	--	1E-09		- -	0.000006	- -	0.000006
		Exposure Point Total						1E-09					0.000006
	Exposure Medium Total							1E-09					0.000006
Medium Total								4E-07					0.006

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.0007	--	--	0.0007
			Chemical Total	- -	--	- -	--	- -		0.0007	--	--	0.0007
		Exposure Point Total						- -					0.0007
	Exposure Medium Total							- -					0.0007
	Air	SWMU 23	Cobalt	--	4E-11	--	--	4E-11	Respiratory	--	0.000007	--	0.000007
			Chemical Total	--	4E-11	--	--	4E-11		- -	0.000007	- -	0.000007
		Exposure Point Total						4E-11					0.000007
	Exposure Medium Total							4E-11					0.000007
Medium Total								4E-11					0.0007
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	3E-08	--	- -	--	3E-08	None Specified	0.0001	--	--	0.0001
			Cobalt	- -	--	- -	--	- -	Thyroid	0.0004	--	--	0.0004
			Vanadium	- -	--	- -	--	- -	Kidney	0.0001	--	--	0.0001
			Chemical Total	3E-08	--	- -	--	3E-08		0.0006	--	--	0.0006
		Exposure Point Total						3E-08					0.0006
	Exposure Medium Total							3E-08					0.0006
	Air	SWMU 23	Chromium	--	1E-09	--	--	1E-09	Respiratory	--	0.0000008	--	0.0000008
			Cobalt	--	2E-11	--	--	2E-11	Respiratory	--	0.000004	--	0.000004
			Vanadium	--	- -	--	--	- -	NA	--	0.000001	--	0.000001
			Chemical Total	--	1E-09	--	--	1E-09		- -	0.000006	- -	0.000006
		Exposure Point Total						1E-09					0.000006
	Exposure Medium Total							1E-09					0.000006
Medium Total								3E-08					0.0006

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -					
			Chemical Total	- -	--	- -	--	- -					
		Exposure Point Total						- -					
	Exposure Medium Total							- -					
	Air	SWMU 23	Cobalt	--	5E-11	--	--	5E-11					
			Chemical Total	--	5E-11	--	--	5E-11					
		Exposure Point Total						5E-11					
	Exposure Medium Total							5E-11					
Medium Total								5E-11					
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	4E-07	--	- -	--	4E-07					
			Cobalt	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	4E-07	--	- -	--	4E-07					
		Exposure Point Total						4E-07					
	Exposure Medium Total							4E-07					
	Air	SWMU 23	Chromium	--	2E-09	--	--	2E-09					
			Cobalt	--	3E-11	--	--	3E-11					
			Vanadium	--	- -	--	--	- -					
			Chemical Total	--	2E-09	--	--	2E-09					
		Exposure Point Total						2E-09					
	Exposure Medium Total							2E-09					
Medium Total								4E-07					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.1	--	--	0.1
			Chemical Total	- -	--	- -	--	- -		0.1	--	--	0.1
		Exposure Point Total						- -					0.1
	Exposure Medium Total							- -					0.1
	Air	SWMU 23	Cobalt	--	1E-09	--	--	1E-09	Respiratory	--	0.0007	--	0.0007
			Chemical Total	--	1E-09	--	--	1E-09		- -	0.0007	- -	0.0007
		Exposure Point Total						1E-09					0.0007
	Exposure Medium Total							1E-09					0.0007
Medium Total								1E-09					0.1
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	8E-06	--	- -	--	8E-06	None Specified	0.03	--	--	0.03
			Cobalt	- -	--	- -	--	- -	Thyroid	0.08	--	--	0.08
			Vanadium	- -	--	- -	--	- -	Kidney	0.02	--	--	0.02
			Chemical Total	8E-06	--	- -	--	8E-06		0.1	--	--	0.1
		Exposure Point Total						8E-06					0.1
	Exposure Medium Total							8E-06					0.1
	Air	SWMU 23	Chromium	--	1E-07	--	--	1E-07	Respiratory	--	0.00009	--	0.00009
			Cobalt	--	7E-10	--	--	7E-10	Respiratory	--	0.0004	--	0.0004
			Vanadium	--	- -	--	--	- -	NA	--	0.0001	--	0.0001
			Chemical Total	--	1E-07	--	--	1E-07		- -	0.0006	- -	0.0006
		Exposure Point Total						1E-07					0.0006
	Exposure Medium Total							1E-07					0.0006
Medium Total								8E-06					0.1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -	Thyroid	0.01	--	--	0.01
			Chemical Total	- -	--	- -	--	- -		0.01	--	--	0.01
		Exposure Point Total						- -					0.01
	Exposure Medium Total							- -					0.01
	Air	SWMU 23	Cobalt	--	4E-09	--	--	4E-09	Respiratory	--	0.0007	--	0.0007
			Chemical Total	--	4E-09	--	--	4E-09		- -	0.0007	- -	0.0007
		Exposure Point Total						4E-09					0.0007
	Exposure Medium Total							4E-09					0.0007
Medium Total								4E-09					0.01
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	6E-07	--	- -	--	6E-07	None Specified	0.003	--	--	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Vanadium	- -	--	- -	--	- -	Kidney	0.002	--	--	0.002
			Chemical Total	6E-07	--	- -	--	6E-07		0.01	--	--	0.01
		Exposure Point Total						6E-07					0.01
	Exposure Medium Total							6E-07					0.01
	Air	SWMU 23	Chromium	--	1E-07	--	--	1E-07	Respiratory	--	0.00009	--	0.00009
			Cobalt	--	2E-09	--	--	2E-09	Respiratory	--	0.0004	--	0.0004
			Vanadium	--	- -	--	--	- -	NA	--	0.0001	--	0.0001
			Chemical Total	--	1E-07	--	--	1E-07		- -	0.0006	- -	0.0006
		Exposure Point Total						1E-07					0.0006
	Exposure Medium Total							1E-07					0.0006
Medium Total								7E-07					0.01

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.9.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
NSA CRANE, CRANE, INDIANA

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 23	Cobalt	- -	--	- -	--	- -					
			Chemical Total	- -	--	- -	--	- -					
		Exposure Point Total						- -					
	Exposure Medium Total							- -					
	Air	SWMU 23	Cobalt	--	5E-09	--	--	5E-09					
			Chemical Total	--	5E-09	--	--	5E-09					
		Exposure Point Total						5E-09					
	Exposure Medium Total							5E-09					
Medium Total								5E-09					
Subsurface Soil	Subsurface Soil	SWMU 23	Chromium	9E-06	--	- -	--	9E-06					
			Cobalt	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	9E-06	--	- -	--	9E-06					
		Exposure Point Total						9E-06					
	Exposure Medium Total							9E-06					
	Air	SWMU 23	Chromium	--	2E-07	--	--	2E-07					
			Cobalt	--	3E-09	--	--	3E-09					
			Vanadium	--	- -	--	--	- -					
			Chemical Total	--	2E-07	--	--	2E-07					
		Exposure Point Total						2E-07					
	Exposure Medium Total							2E-07					
Medium Total								9E-06					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

APPENDIX C.7

THIESSEN POLYGON EVALUATION

THIESSEN POLYGON EVALUATION

Thiessen polygons were used to extrapolate soil data from individual sampling points across the entire area of SWMU 23. Polygons were drawn to enclose representative amounts of space around sample points by establishing polygon boundaries that are midway between all of the surrounding adjacent sampling points. By this method, no polygons overlap, and there are no gaps between polygons. Because polygon boundaries are halfway between sample points, the distance between adjacent sampling points affects the size of the polygon such that polygons enclosing adjacent points that are closer together are smaller than polygons enclosing adjacent points that are further apart, and all locations within a polygon are closer to the sample location within that polygon than to the sampling location in any adjacent polygon. Based on this calculation method, the soil results at the central location in each polygon are considered representative of the entire area of the polygon. The perimeter of each evaluation area was established by a physical constraint (e.g., building) or a line between the outermost sampling points. Figures 1 through 5 present the Thiessen polygons for the 2-4 feet, 4-6 feet, 6-8 feet, 8-10 feet, and 10-12 feet sampling intervals, respectively.

A weighted average for each sampling location was calculated by multiplying the area of the polygon for each sampling location by the benzo(a)pyrene equivalent concentration for that sampling point. The weighted average for each sampling area was then determined by summing the weighted averages at each sampling location. Table 1 summarizes the results of the evaluation for each sampling interval. Tables 2 through 6 presents the results for each sampling interval.

Table 1

Sampling Interval (feet)	Area ($feet^2$)	Weighted Average Concentration (mg/kg)
2 – 4	89,294	0.291
4 – 6	78,199	0.634
6 – 8	34,551	0.015
8 – 10	21,102	0.031
10 – 12	943	0.011
	Site Weighted Average =	0.196

TABLE 2
2-4 FOOT INTERVAL

LOCATION	SAMPLE ID	SAMPLE TYPE	TOP DEPTH	BOTTOM DEPTH	RESULT	QUALIFIER	AREA (SQ FT)	WEIGHTED CONCENTRATION
23SB002	23SB002-0204	NORMAL	2	4	0.08876		591.53	0.0006
23SB028	23SB028-0204	NORMAL	2	4	0.00418	U	6581.44	0.0003
23SB072	23SB072-0204	NORMAL	2	4	0.05983		1849.74	0.001
23SB074	23SB074-0204	NORMAL	2	4	0.042564		2686.86	0.001
23SB085	23SB085-0204	REMOVED (backfilled)	2	4	0.162	U	6085.54	0.011
23SB068	23SB068-0204	NORMAL	2	4	9.3647		2049.54	0.215
23SB091	23SB091-0204	NORMAL	2	4	0.30106		1352.83	0.005
23SB064	23SB064-0204	NORMAL	2	4	0.17868		757.79	0.002
23SB063	23SB063-0204	NORMAL	2	4	0.15956		2475.33	0.004
23SB066	23SB066-0204	NORMAL	2	4	0.063931		647.06	0.0005
23SB001	23SB001-0204	NORMAL	2	4	0.054504		8579.97	0.005
23SB067	23SB067-0204	NORMAL	2	4	0.017692		3429.5	0.0007
23SB069	23SB069-0204	NORMAL	2	4	0.0038	U	816.78	0.00003
23SB030	23SB030-0204	NORMAL	2	3	0.00379	U	2672.96	0.0001
23SB090	23SB090-0204	NORMAL	2	4	0.55097		1328.05	0.008
23SB003	23SB003-0204	NORMAL	2	4	0.51836		517.85	0.003
23SB071	23SB071-0204	NORMAL	2	4	0.14847		474.03	0.0008
23SB073	23SB073-0204	NORMAL	2	4	0.074384		3685.4	0.003
23SB059	23SB059-0204	NORMAL	2	4	0.014439		3456.03	0.0006
23SB029	23SB029-0204	NORMAL	2	4	0.00395	U	6772.37	0.0003
23SB048	23SB048-0204	NORMAL	2	4	0.4959		4238.77	0.024
23SB075	23SB075-0204	NORMAL	2	4	0.17964		2007.76	0.004
23SB032	23SB032-0204	NORMAL	2	3	0.0039	U	6860.92	0.0003
23SB027	23SB027-0204	NORMAL	2	4	0.00384	U	7016.02	0.0003
23SB092	23SB092-0204	NORMAL	2	4	0.004841		6913.69	0.0004
23SB070	23SB070-0204	NORMAL	2	4	0.0039	U	5446.26	0.0002
						Total Area	89,294	
						Weighted Average	0.291	

TABLE 3
4-6 FOOT INTERVAL

LOCATION	SAMPLE ID	SAMPLE TYPE	TOP DEPTH	BOTTOM DEPTH	RESULT	QUALIFIER	AREA (SQ FT)	WEIGHTED CONCENTRATION
23SB069	23SB069-0406	NORMAL	4	6	0.004871		813.8	0.00005
23SB025	23SB025-0406	NORMAL	4	6	0.0182	U	5151.53	0.001
23SB072	23SB072-0406	NORMAL	4	6	0.0041	U	4949.22	0.0003
23SB048	23SB048-0406	NORMAL	4	6	0.107893		3426.74	0.005
23SB085	23SB085-0406	REMOVED (backfilled)	4	6	0.162	U	8203.22	0.017
23SB068	23SB068-0406	NORMAL	4	6	19.078		2405.17	0.587
23SB063	23SB063-0406	NORMAL	4	6	0.053731		1678.22	0.001
23SB064	23SB064-0406	NORMAL	4	6	0.047565		1084.33	0.0007
23SB001	23SB001-0406	NORMAL	4	6	0.038	U	5166.14	0.003
23SB091	23SB091-0406	NORMAL	4	6	0.037	U	2385.3	0.001
23SB066	23SB066-0406	NORMAL	4	6	0.010577		2154.34	0.0003
23SB002	23SB002-0406	NORMAL	4	6	0.008157		591.53	0.00006
23SB070	23SB070-0406	NORMAL	4	6	0.0049	U	3601.57	0.0002
23SB073	23SB073-0406	NORMAL	4	6	0.077884		4621.65	0.005
23SB090	23SB090-0406	NORMAL	4	6	0.043968		1646.79	0.0009
23SB071	23SB071-0406	NORMAL	4	6	0.039	U	474.03	0.0002
23SB003	23SB003-0406	NORMAL	4	6	0.004	U	1335.32	0.00007
23SB004	23SB004-0406	NORMAL	4	6	0.112401		5604.55	0.008
23SB075	23SB075-0406	NORMAL	4	6	0.047913		5330.04	0.003
23SB074	23SB074-0406	NORMAL	4	6	0.039	U	856.08	0.0004
23SB092	23SB092-0406	NORMAL	4	6	0.004	U	5619.55	0.0003
23SB026	23SB026-0406	NORMAL	4	6	0.00393	U	5339.9	0.0003
23SB024	23SB024-0406	NORMAL	4	6	0.00369	U	5760.01	0.0003
						Total Area	78,199	

Weighted Average 0.634 mg/kg

TABLE 4
6-8 FOOT INTERVAL

LOCATION	SAMPLE ID	SAMPLE TYPE	TOP DEPTH	BOTTOM DEPTH	RESULT	QUALIFIER	AREA (SQ FT)	WEIGHTED CONCENTRATION
23SB024	23SB024-0608	NORMAL	6	8	0.00358	U	8072.85	0.0008
23SB026	23SB026-0608	NORMAL	6	8	0.00374	U	4363.08	0.0005
23SB006	23SB006-0608	NORMAL	6	8	0.005516		11394.01	0.002
23SB025	23SB025-0608	NORMAL	6	8	0.0369	U	10721.29	0.011
						Total Area	34,551	

Weighted Average 0.015 mg/kg

TABLE 5
8-10 FOOT INTERVAL

LOCATION	SAMPLE ID	SAMPLE TYPE	TOP DEPTH	BOTTOM DEPTH	RESULT	QUALIFIER	AREA (SQ FT)	WEIGHTED CONCENTRATION
23SB005	23SB005-0810	NORMAL	8	10	0.00365	U	4105.84	0.0007
23SB004	23SB004-0810	NORMAL	8	10	0.00369	U	10057.41	0.002
23SB003	23SB003-0810	NORMAL	8	10	0.085278		6938.31	0.028
						Total Area	21,102	

Weighted Average 0.0305 mg/kg

TABLE 6
10-12 FOOT INTERVAL

LOCATION	SAMPLE ID	SAMPLE TYPE	TOP DEPTH	BOTTOM DEPTH	RESULT	QUALIFIER	AREA (SQ FT)	WEIGHTED CONCENTRATION
23SB002	23SB002-1012	NORMAL	10	12	0.00383	U	471.33	0.002
23SB001	23SB001-1012	NORMAL	10	12	0.0185	U	471.33	0.009
						Total Area	942.66	

Weighted Average 0.011 mg/kg

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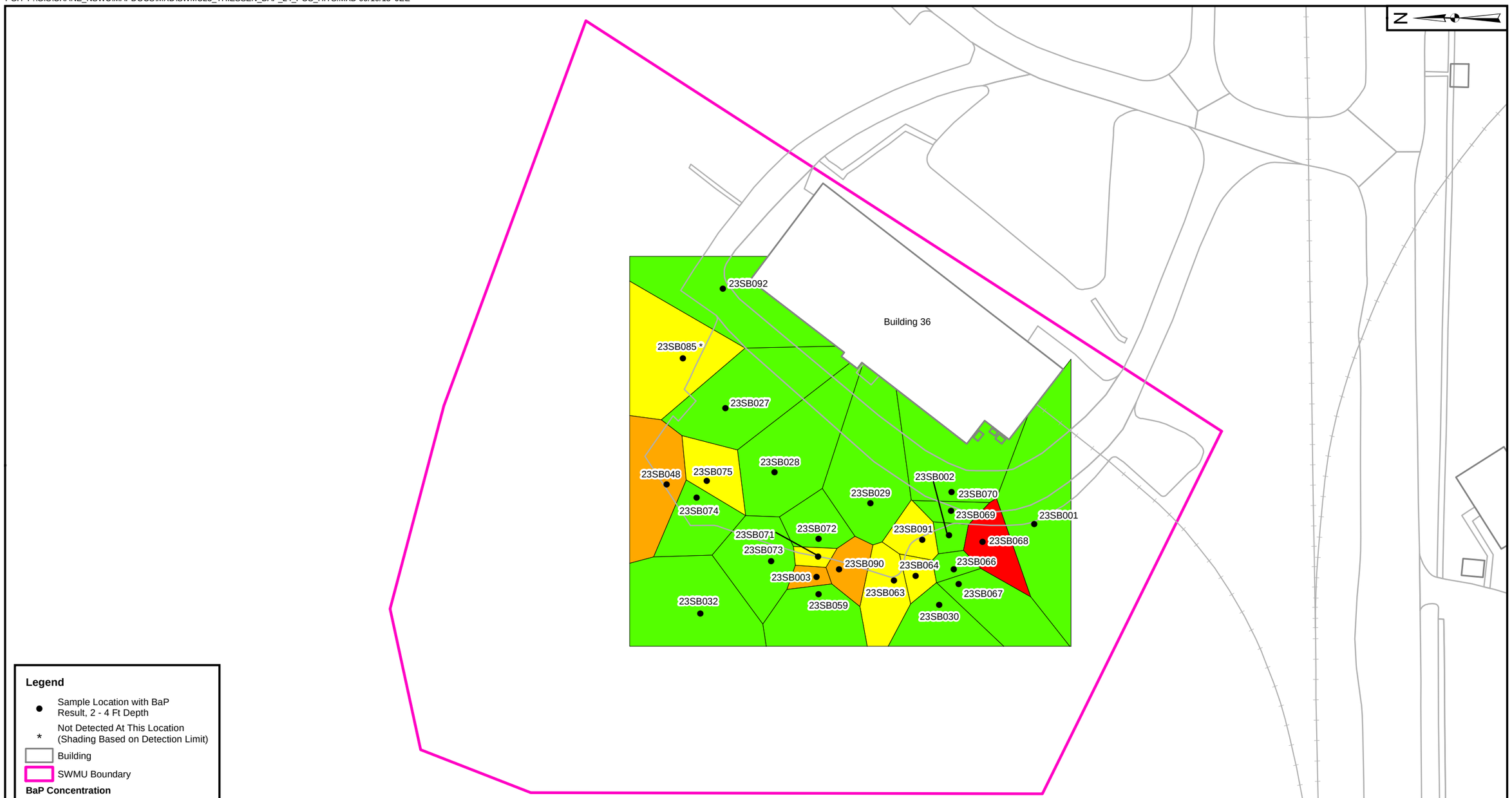

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	09/09/15		2122	F274
CHECKED BY	DATE	BENZO(A)PYRENE THIESSEN POLYGONS, 2-4 FEET	APPROVED BY	DATE
B. JUPIN	09/10/15	SWMU 23 - BATTERY SHOP BUILDING 36	—	—
REVISED BY	DATE	NSA CRANE	APPROVED BY	DATE
—	—	CRANE, INDIANA	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1	0

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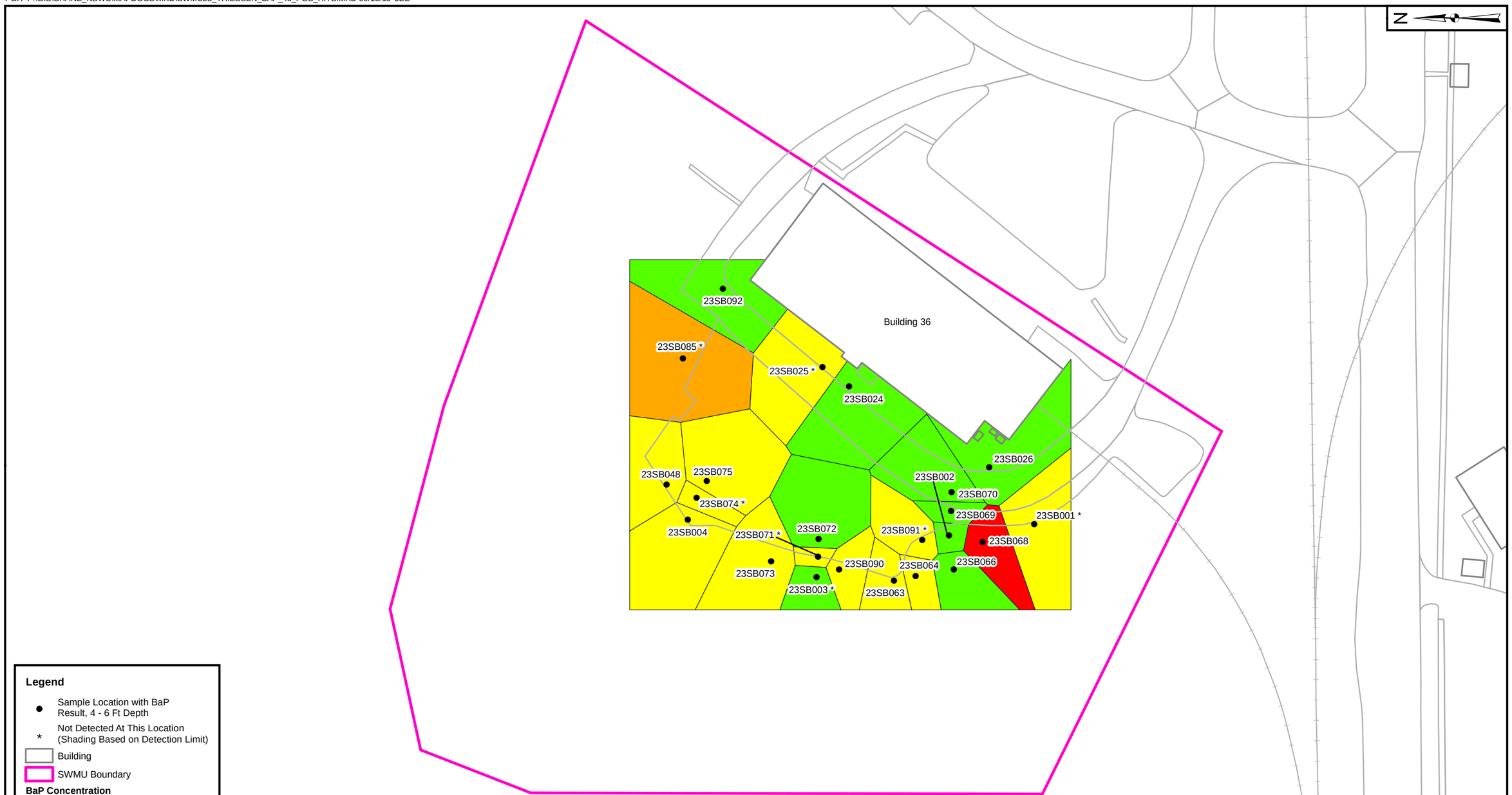

Legend

- ● Sample Location with BaP Result, 4 - 6 Ft Depth
- * Not Detected At This Location (Shading Based on Detection Limit)
- Building
- SWMU Boundary

BaP Concentration

- > 1.5 mg/kg
- 0.15 mg/kg to 1.5 mg/kg
- 0.015 mg/kg to 0.15 mg/kg
- < 0.015 m/kg

80 0 80 Feet

DRAWN BY J. ENGLISH	DATE 09/09/15	TETRA TECH	CONTRACT NUMBER 2122 / CTO NUMBER F274
CHECKED BY B. JUPIN	DATE 09/10/15	BENZO(A)PYRENE THIESSEN POLYGONS, 4-6 FEET SWMU 23 - BATTERY SHOP BUILDING 36 NSA CRANE CRANE, INDIANA	APPROVED BY — / DATE —
REVISED BY —	DATE —		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 2 / REV 0

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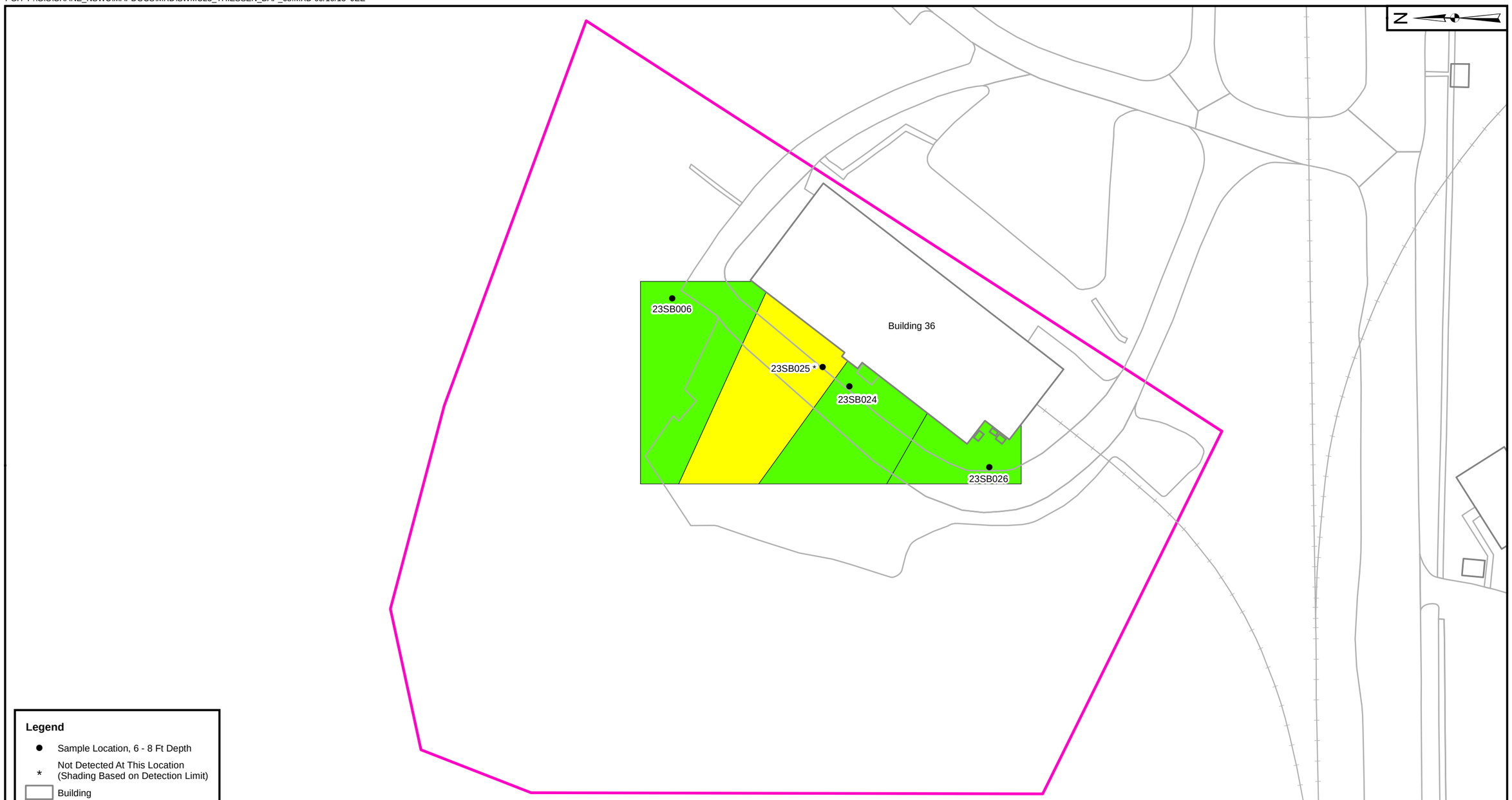


Legend

- ● Sample Location, 6 - 8 Ft Depth
- * Not Detected At This Location (Shading Based on Detection Limit)
- Building
- SWMU Boundary

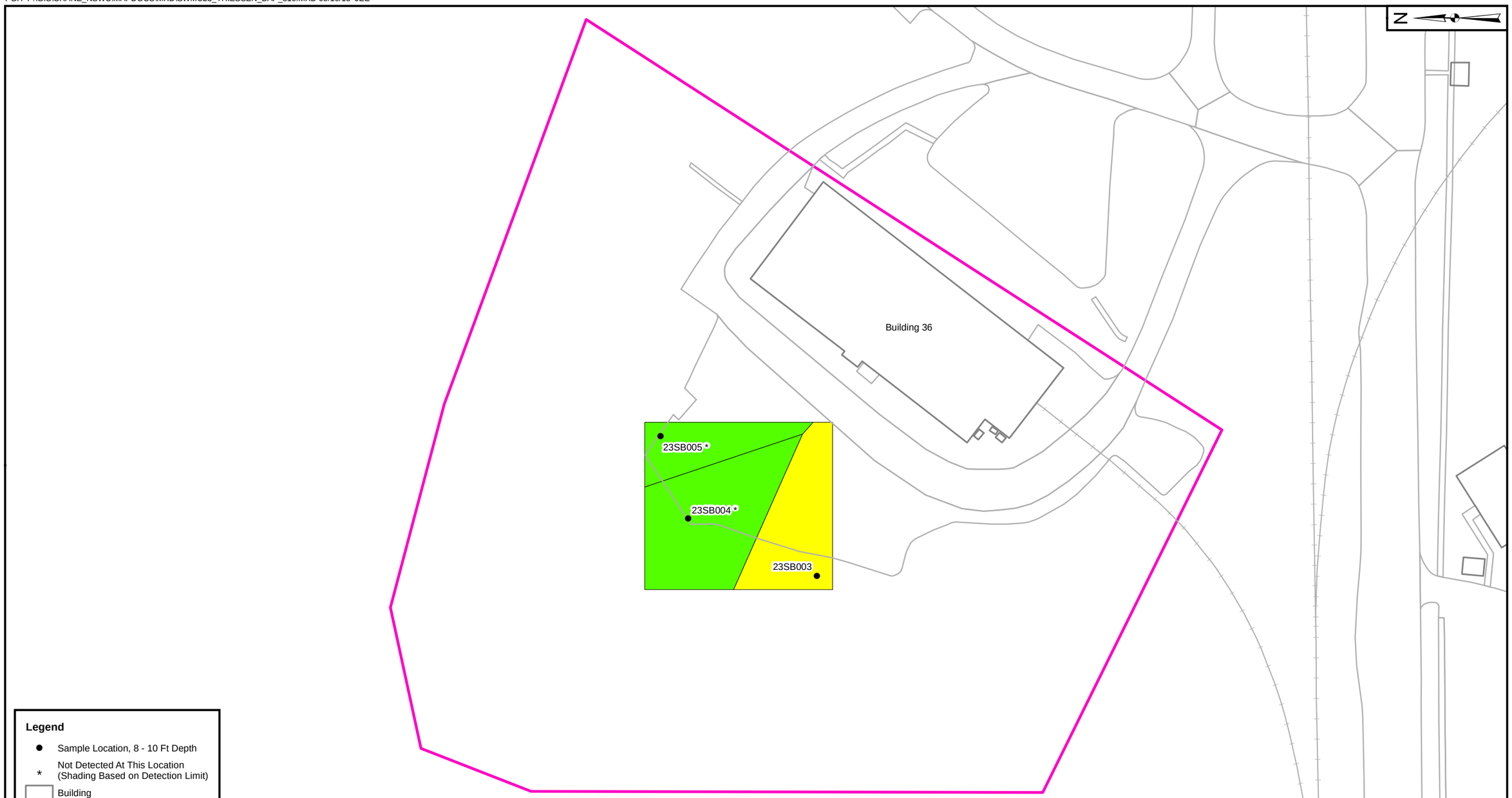
BaP Concentration

- 0.015 mg/kg to 0.15 mg/kg
- < 0.015 m/kg

80 0 80 Feet

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	09/03/15		2122	F274
CHECKED BY	DATE	BENZO(A)PYRENE THIESSEN POLYGONS, 6-8 FEET	APPROVED BY	DATE
B. JUPIN	09/10/15	SWMU 23 - BATTERY SHOP BUILDING 36	—	—
REVISED BY	DATE	NSA CRANE	APPROVED BY	DATE
—	—	CRANE, INDIANA	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 3	0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_THIESSEN_BAP_810.MXD 09/10/15 JEE



Legend

- ● Sample Location, 8 - 10 Ft Depth
- * Not Detected At This Location (Shading Based on Detection Limit)
- Building
- SWMU Boundary

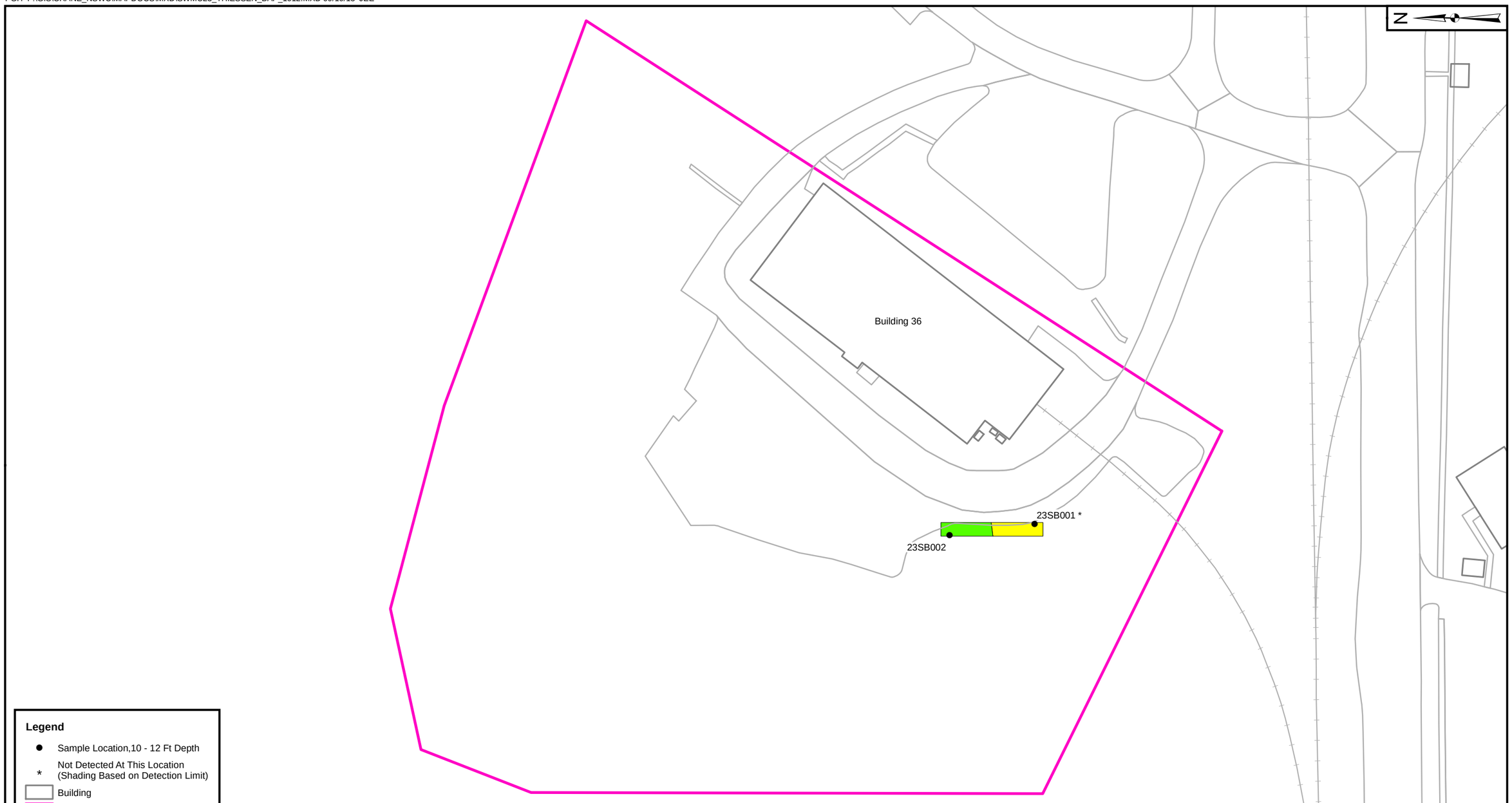
BaP Concentration

- 0.015 mg/kg to 0.15 mg/kg
- < 0.015 m/kg

80 0 80 Feet

DRAWN BY J. ENGLISH	DATE 09/03/15	TETRA TECH	CONTRACT NUMBER 2122 / CTO NUMBER F274
CHECKED BY B. JUPIN	DATE 09/10/15	BENZO(A)PYRENE THIESSEN POLYGONS, 8-10 FEET SWMU 23 - BATTERY SHOP BUILDING 36 NSA CRANE CRANE, INDIANA	APPROVED BY — / DATE —
REVISED BY —	DATE —		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 4 / REV 0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU23_THIESSEN_BAP_1012.MXD 09/10/15 JEE



Legend

- ● Sample Location,10 - 12 Ft Depth
- * Not Detected At This Location (Shading Based on Detection Limit)
- Building
- SWMU Boundary

BaP Concentration

- 0.015 mg/kg to 0.15 mg/kg
- < 0.015 m/kg

80 0 80 Feet

DRAWN BY J. ENGLISH	DATE 09/03/15	TETRA TECH	CONTRACT NUMBER 2122 / CTO NUMBER F274
CHECKED BY B. JUPIN	DATE 09/10/15	BENZO(A)PYRENE THIESSEN POLYGONS, 10-12 FEET SWMU 23 - BATTERY SHOP BUILDING 36 NSA CRANE CRANE, INDIANA	APPROVED BY — DATE —
REVISED BY —	DATE —		APPROVED BY — DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 5 / REV 0

APPENDIX D

SUPPORTING INFORMATION FOR THE ECOLOGICAL RISK ASSESSMENT

D.1 Chemical Class Descriptions

D.2 Receptor Profiles and Exposure Factors Calculation

D.3 Bioaccumulation Factors

D.4 Toxicity Reference Values

D.5 Food-Chain Modeling

APPENDIX D.1

CHEMICAL CLASS DESCRIPTIONS

This appendix presents a discussion of the different chemical classes detected at the site, including toxicity information, potential food chain and trophic transfer, and bioaccumulation potential.

Volatile Organic Compounds

VOCs are usually very mobile in the environment because they are poorly adsorbed to soil and sediment particles. Also, because they are very volatile, they typically are only detected in surface water, surface soil, and sediment at low concentrations.

Most VOCs have very little potential to bioaccumulate in plants, invertebrates, or other ecological receptors; therefore, biomagnification through the food chain does not appear to be significant. VOCs are not typically only toxic to ecological receptors at relatively high concentrations and indicated by the relatively high screening levels for these chemicals.

Semivolatile Organic Compounds

The most common semivolatile organic compounds include polynuclear aromatic hydocarbons (PAHs) and phthalates. PAHs are a diverse group of compounds consisting of two or more substituted and unsubstituted polynuclear aromatic rings formed by the incomplete combustion of carbonaceous materials. PAHs are ubiquitous in the modern environment and are common constituents of coal tar, soot, vehicle exhaust, cigarette smoke, certain petroleum products, road tar, mineral oils, creosote, and many cooked foods. PAHs also are released to the environment through natural sources such as volcanoes and forest fires.

PAHs are transferred from surface water by volatilization and sorption to settling particles. The compounds are transformed in surface water by photooxidation, chemical oxidation, and microbial metabolism (ATSDR, 1989a). In soil and sediments, microbial metabolism is the major process for degradation of PAHs (ATSDR, 1989a). Although PAHs accumulate in terrestrial and aquatic plants, many organisms are able to metabolize and eliminate these compounds. Vertebrates can readily metabolize PAHs, but lower forms (insects and worms) cannot metabolize PAHs as quickly. However, food chain uptake does not appear to be a major exposure source to PAHs for aquatic animals (ATSDR, 1989a).

PAHs vary substantially in their toxicity to aquatic organisms. In general, toxicity increases as molecular weight increases, with the exception of some high molecular weight PAHs that have low acute toxicity.

Most species of aquatic organisms rapidly accumulate PAHs that occur at low concentrations in the ambient medium. However, uptake of PAHs is highly species-specific, it is higher in algae, mollusks, and other species that are incapable of metabolizing PAHs (Eisler, 1987). The ability of fish to metabolize PAHs may explain why benzo(a)pyrene is frequently not detected or is found at only very low levels in fish from environments heavily contaminated with PAHs (ATSDR, 1989a).

Phthalates are semivolatile organic compounds that are used in production of plastics (ATSDR, 1993). Most phthalates are expected to sorb to soil or sediment particles after their release because of their high Log K_{OC} values (Howard, 1989). Some phthalates may bioconcentrate in aquatic organisms [Spectrum Laboratories, 1999; Howard, 1989; ATSDR, 1989a].

PCBs

The term polychlorinated biphenyls (PCBs) commonly refers to a variety of mixtures of individual biphenyl isomers, each consisting of two joined benzene rings and up to 10 chlorine atoms. Mixtures of these isomers are known by their commercial designation of Aroclor. This trade name is followed by a four-digit number; the first two numbers indicate the type of isomer mixture and the last two numbers indicate the approximate weight percent of chlorine in the mixture (USEPA, 1985).

PCBs released into water adsorb to sediments and other organic matter. Typically, PCB concentrations are greater in the sediment and suspended material than in the water column. Substantial quantities of PCBs in aquatic sediments can act as an environmental reservoir from which PCBs may be released slowly over a long period of time (ATSDR, 1989b). For PCBs that exist in the dissolved state in water, volatilization becomes the primary fate process (USEPA, 1985).

Degradation of PCBs in the environment is dependent upon the degree of chlorination. Generally, the more chlorinated the PCB molecule, the more persistent it will be in the environment. Factors that determine biodegradability include the amount of chlorination, concentration, type of microbial population, available nutrients, and the temperature (ATSDR, 1989b).

Because PCBs are highly lipophilic, they can bioaccumulate in the lipid portions of animals. Bioconcentration factors in the thousands have been reported for various aquatic species (Eisler, 1986a). PCBs can also accumulate in upper trophic level animals such as piscivorous birds and mammals that feed on contaminated prey items (Eisler, 1986a).

Adverse effects of PCBs on terrestrial wildlife include increased mortality, reproductive effects, and behavioral effects (USEPA, 1985). As a group, birds are more resistant to acutely toxic effects of PCBs than mammals (Eisler, 1986a). Among sensitive avian species, PCBs disrupt the normal pattern of growth, reproduction, metabolism, and behavior (Eisler, 1986a). Of the mammals, the mink is the most sensitive wildlife species tested for which data are available (Eisler, 1986a). Impacts to mink include anorexia, weight loss, lethargy, reproductive effects, and death (Eisler, 1986a).

Metals

Many metals occur naturally at various concentrations in the surface water and sediment primarily to chemical weathering of rocks and fallout from volcanoes. Most metals are toxic to aquatic (i.e., fish, invertebrates) and terrestrial (i.e., plants, invertebrates, vertebrates) ecological receptors above certain concentrations, with some metals being more toxic at lower concentrations than others. Also, different chemical forms of the metals may be more toxic than others. For example, hexavalent chromium is typically more toxic than trivalent chromium, and methylmercury is more toxic than inorganic mercury. In addition, the toxicity of several metals (cadmium, chromium, copper, lead, nickel, silver, and zinc) to aquatic receptors in freshwater systems decreases with increasing water hardness.

References:

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APPENDIX D.2

RECEPTOR PROFILES AND EXPOSURE FACTORS CALCULATION

The following sections present the receptor profiles for the representative herbivorous and invertivorous, receptors chosen for food chain modeling at SWMU 23. The majority of the information for the profiles was obtained from the Wildlife Exposure Factors Handbook (USEPA, 1993). The data for the incidental soil ingestion rates were obtained from the USEPA Ecological Soil Screening Guidance, Attachment 4-1 (USEPA, 2007).

The food and water ingestion rates are listed in g/g (of body weight)-day on a wet weight basis but were converted to dry weight for the ERA using the exposure factors presented below. The home ranges are presented in hectares in USEPA (1993) but were converted to acres by multiplying the number of hectares by 2.471. Also note that the estimated percent of soil in the diets are listed in dry weight.

Short-Tailed Shrew (*Blarina brevicauda*)

Shrews inhabit a wide variety of habitats and are common in areas with abundant vegetative cover. They need cool, moist habitats because of their high metabolic and water-loss rates. The short-tailed shrew is primarily carnivorous, eating insects and other invertebrates such as earthworms, slugs, and snails.

The adult body weight for the short-tailed shrew in various habitats ranged from 0.015 to 0.01921 kg with an average of 0.0169 kg. The listed food ingestion rates for shrews are between 0.43 and 0.96 g/g-day (wet-weight). The water ingestion rate was listed as 0.223 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in Table 2 of this Appendix. The food ingestion rate was then multiplied by 0.16 in the food chain model, which is the percent solids of worms (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (3% for conservative food chain model and 0.9% for the average food chain model) from USEPA (2007). 3% is the 90th percentile value and 0.9% is the 50th percentile value from USEPA (2007). The only available home range for the shrew (0. 9699 acres) was calculated using data from a tamarack bog in Manitoba (only value available).

American Woodcock (*Scolopax minor*)

Woodcocks inhabit both woodlands and abandoned fields, particularly those with rich and moderately to poorly drained loamy soils, which tend to support abundant earthworm populations. They feed primarily on invertebrates found in moist upland soils by probing the soil with their long prehensile-tipped bill. Earthworms are their preferred diet, but seeds and other plant matter may also be consumed.

The adult body weight for the woodcock ranges from 0.166 to 0.213 kg with an average of 0.190 kg. The listed food ingestion rates for the woodcock are between 0.73 and 1.0 g/g-day (wet-weight). The water ingestion rate is listed as 0.1 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in Table 2 of this Appendix. The food ingestion rate was then multiplied by 0.16 in the food chain model, which is the percent solids of worms (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 16.4% for conservative food chain model and 6.4% for the average food chain model) from USEPA (2007). 16.4% is the 90th percentile value and 6.4% is the 50th percentile value from USEPA (2007).

The range of home range sizes for the woodcock is 7.66 to 182 acres with an average home range of 61 acres.

Meadow Vole (*Microtus pennsylvanicus*)

Meadow voles inhabit grassy fields, marshes, and bogs; however, they prefer fields with more grass, more cover, and fewer woody plants. They typically consume green succulent vegetation, sedges, seeds, roots, bark, fungi, insects, and animal matter. However, green succulent vegetation makes up the majority of their diet.

The adult body weight for the vole ranges from 0.0329 to 0.0391 kg with an average of 0.0366 kg. The only listed food ingestion rates for voles range from 0.30 to 0.35 g/g-day (wet-weight), with an average of 0.325 g/g-day. The water ingestion rates are 0.14 (estimated) and 0.21 g/g-day, with an average of 0.175 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in Table 2 of this Appendix. The food ingestion rate was then multiplied by 0.15 in the food chain model, which is the percent solids of plant foliage (USEPA, 2007), to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 3.2% for conservative food chain model and 1.2% for the average food chain model) from USEPA (2007). 3.2% is the 90th percentile value and 1.2% is the 50th percentile value from USEPA (2007).

The range of home range sizes for the meadow vole is 0.0297 to 1.06 acres with an average home range of 0.16 acres.

Northern Bobwhite Quail (*Colinus virginianus*)

Quails inhabit grasslands, idle fields, pastures, and large clumps of grasses. Bobwhite quails forage in areas with open vegetation, some bare ground, and light litter. Seeds from weeds, woody plants, and grasses comprise the ma ority of an adult s diet, although green vegetation has been found to dominate the diet of this species in winter in the southern areas of the United States.

The adult body weight for the bobwhite quail ranges from 0.162 to 0.186 kg with an average of 0.177 kg. The listed food ingestion rates for quails range from 0.067 to 0.093 g/g-day (wet-weight), with an average of 0.082 g/g-day. The water ingestion rate is estimated as 0.10 and 0.11 g/g-day, and measured as 0.10 to 0.13 g/g-day, for an average water ingestion rate of 0.11 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in Table 2 of this Appendix. The food ingestion rates were already dry-weight values. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 13.9% for conservative food chain model and 6.1% for the average food chain model) from USEPA (2007). 13.9% is the 90th percentile value and 6.1% is the 50th percentile value for the mourning dove from USEPA (2007).

The home range for the quail ranges from 16 to 41 acres with an average home range of 29 acres.

References:

Sample, B.E., M.S. Aplin, R.A. Efroymson, G.W., Suter II, and C.J.E. Welsh. 1997. Methods and Tools for Estimation of the Exposure of Terrestrial Wildlife to Contaminants. Oak Ridge National Laboratory. October. ORNL/TM-13391.

USEPA (U.S. Environmental Protection Agency), 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency. Office of Research and Development. Washington, D.C. December 1993. EPA/600/R-93/187a.

USEPA, 2007. Guidance for Developing Ecological Soil Screening Level, Attachment 4-1, Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs. Office of Solid Waste and Emergency and Response. OSWER Directive 9285.7-55. April.

TABLE 1

EXPOSURE PARAMETERS FOR THE TERRESTRIAL WILDLIFE MODEL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

	Conservative Inputs		Average Inputs		
Species/Exposure Inputs	**Values**	**Units**	**Values**	**Units**	**Source**
Meadow Vole					
Body Weight = BW	3.290E-02	kg	3.663E-02	kg	USEPA, 1993
Food Ingestion Rate = If	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	6.144E-05	kg/day	2.142E-05	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		1.640E-01	acres	USEPA, 1993
Short-Tailed Shrew					
Body Weight = BW	1.525E-02	kg	1.687E-02	kg	USEPA, 1993
Food Ingestion Rate = If	2.592E-03	kg/day	1.648E-03	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	4.300E-03	L/day	3.800E-03	L/day	USEPA, 1993
Soil Ingestion Rate - Is	7.776E-05	kg/day	1.483E-05	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		9.700E-01	acres	USEPA, 1993
American Woodcock					
Body Weight = BW	1.660E-01	kg	1.895E-01	kg	USEPA, 1993
Food Ingestion Rate = If	3.032E-02	kg/day	2.526E-02	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	2.130E-02	L/day	1.900E-02	L/day	USEPA, 1993
Soil Ingestion Rate - Is	4.972E-03	kg/day	1.617E-03	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		6.133E+01	acres	USEPA, 1993
Bobwhite Quail					
Body Weight = BW	1.620E-01	kg	1.770E-01	kg	USEPA, 1993
Food Ingestion Rate = If	1.640E-02	kg/day	1.440E-02	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	2.310E-02	L/day	1.840E-02	L/day	USEPA, 1993
Soil Ingestion Rate - Is	2.280E-03	kg/day	8.784E-04	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		2.860E+01	acres	USEPA, 1993

The exposure factors were derived as presented in Appendix G Table 2.

The soil ingestion rates were calculated by multiplying the food ingestion rates by the following incidental soil ingestion rates:

Receptor	**Conservative**	**Average**	**Source**
Bobwhite quail	13.9%	6.1%	1, 2
Meadow Vole	3.2%	1.2%	1
American woodcock	16.4%	6.4%	1
Short-tailed Shrew	3%	0.9%	1

1 - USEPA (U.S. Environmental Protection Agency), 2007. Guidance for Developing Ecological Soil Screening Level, Attachment 4-1, Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs. Office of Solid Waste and Emergency and Response. OSWER Directive 9285.7-55. April.
2 - Based on the mourning dove.

TABLE 2

CALCULATION OF EXPOSURE PARAMETERS FOR SURROGATE WILDLIFE RECEPTORS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Exposure Parameters	Meadow Vole		Short-Tailed Shrew		American Woodcock	Bobwhite Quail	
Body Weights (g)	32.9		17.61	16.87	168	180	181
	39.1		17.33	15.58	209	168	183
	35.5		19.21	15.7	166	162	179
	39		17.4	15.25	212	175	175
					169	178	183.2
					213	179	185.5
						180	173
						162.8	180.4
Minimum	***32.9***		***15.25***		***166***	***162***	
Maximum	***39.1***		***19.21***		***213***	***186***	
Average	***36.6***		***16.87***		***190***	***177***	
Food Ingestion Rate (g/g-day) (1)	0.3		0.49	0.77	1.0	0.067	0.079
	0.35		0.62	0.55	0.77	0.072	0.093
			0.43	0.96	0.73	0.09	0.089
			0.52	0.54			
Minimum	***0.3***		***0.43***		***0.73***	***0.067***	
Maximum	***0.35***		***0.96***		***1.0***	***0.093***	
Average	***0.325***		***0.61***		***0.8***	***0.082***	
Food Ingestion Rate (kg/day)							
Conservative	***1.28E-02***		***1.62E-02***		***1.90E-01***	***1.64E-02***	
Average	***1.19E-02***		***1.03E-02***		***1.58E-01***	***1.44E-02***	
Conversion from wet weight to dry weight	***0.15 (2)***		***0.16 (3)***		***0.16 (3)***	***None (4)***	
Water Ingestion Rate (g/g-day) (1)	0.14	0.21	0.223		0.1	0.115	0.1
					0.1	0.106	0.131
						0.093	0.101
						0.086	0.102
						0.11	0.1
Minimum	***0.14***		***0.223***		***0.1***	***0.086***	
Maximum	***0.21***		***0.223***		***0.1***	***0.131***	
Average	***0.175***		***0.223***		***0.1***	***0.104***	
Water Ingestion Rate (L/day)							
Conservative	***7.69E-03***		***4.28E-03***		***2.13E-02***	***2.31E-02***	
Average	***6.41E-03***		***3.76E-03***		***1.90E-02***	***1.84E-02***	
Home Range (Ha)	0.43	0.1	0.3925		4.5	7.6	
	0.02	0.04			32.4	16.7	
	0.01	0.03			3.1	6.4	
	0.01	0.01			73.6	15.6	
	0.04	0.06			10.5		
	0.02	0.03					
	0.05	0.08					
	0.06	0.06					
Minimum (acres)	***0.0297***		***0.97***		***7.7***	***16***	
Maximum (acres)	***1.06***		***0.97***		***182***	***41***	
Average (acres)	***0.16***		***0.97***		***61***	***29***	

Notes:
Source of data is USEPA (1993). If values from several studies are available, they are given. The minimum, maximum, and average values are derived from these studies.

Footnotes:
(1) - Ingestion Rates (kg/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

(2) - Percent solids in vegetation
(3) - Percent solids in earthworms
(4) - Food items on dry weight basis

APPENDIX D.3

BIOACCUMULATION FACTORS

TABLE 3

TERRESTRIAL FOOD CHAIN MODEL - BIOACCUMULATION FACTORS
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Plant Bioaccumulation Factors			Earthworm Bioaccumulation Factors		
	Conservative	Average		Conservative	Average	
Inorganics						
CHROMIUM	0.041		(1)	0.306		(1)
COPPER	EXP(0.394*LN(C)+0.668)		(1)	0.515		(1)
LEAD	EXP(0.561*LN(C)-1.328)		(1)	EXP(0.807*LN(C)-0.218)		(1)
MERCURY	5	0.652	(2)	EXP(0.3369*LN(C)+0.0781)		(3)
VANADIUM	0.00485		(1)	0.042		(1)
ZINC	EXP(0.554*LN(C)+1.575)		(1)	EXP(0.328*LN(C)+4.449)		(1)
Polycyclic Aromatic Hydrocarbons						
ACENAPHTHENE	EXP(-0.8556*LN(C)-5.562)		(1)	1.47		(1)
ACENAPHTHYLENE	EXP(0.791*LN(C)-1.144)		(1)	22.9		(1)
ANTHRACENE	EXP(0.7784*LN(C)-0.9887)		(1)	2.42		(1)
BENZO(A)ANTHRACENE	EXP(0.5944*LN(C)-2.7078)		(1)	1.59		(1)
BENZO(A)PYRENE	EXP(0.975*LN(C)-2.0615)		(1)	1.33		(1)
BENZO(B)FLUORANTHENE	0.31		(1)	2.6		(1)
BENZO(G,H,I)PERYLENE	EXP(1.1829*LN(C)-0.9313)		(1)	2.94		(1)
BENZO(K)FLUORANTHENE	EXP(0.8595*LN(C)-2.1579)		(1)	2.6		(1)
CHRYSENE	EXP(0.5944*LN(C)-2.7078)		(1)	2.29		(1)
DIBENZO(A,H)ANTHRACENE	0.13		(1)	2.31		(1)
FLUORANTHENE	0.5		(1)	3.04		(1)
FLUORENE	EXP(-0.8556*LN(C)-5.562)		(1)	9.57		(1)
INDENO(1,2,3-CD)PYRENE	0.11		(1)	2.86		(1)
PHENANTHRENE	EXP(0.6203*LN(C)-0.1665)		(1)	1.72		(1)
PYRENE	0.72		(1)	1.75		(1)
Polychlorinated Biphenyls						
AROCLOR-1254	0.0044		(2)	15.9	6.67	(3)
AROCLOR-1260	0.00062		(2)	15.9	6.67	(3)

Footnotes:
1 - USEPA (2007). Several tissue concentrations calculated using regression equations (where C is the soil concentration) from USEPA (2007), Attachment 4-1, Tables 4a (for inorganics), 4b (for organics).
2 - ORNL (September, 1998) for all chemicals; conservative value is 90th percentile; average value is median value.
3 - Sample et al., (February, 1998) conservative value is 90th percentile; average value is median value.

Sources:
ORNL (Oak Ridge National Laboratory). 1998. Empirical Model for the Uptake of Inorganic Chemicals from Soil by Plants. BJC/OR-133. September.
Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G.W., Suter II, and T.L. Ashwood. 1998. Development and Validation of Bioaccumulation Models for Earthworms. Oak Ridge National Laboratory. February. ES/ER/TM-220.
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APPENDIX D.4

TOXICITY REFERENCE VALUES

TABLE 4

TOXICITY REFERENCE VALUES
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

PARAMETER	Mammal		Bird	
	NOAEL	LOAEL	NOAEL	LOAEL
Inorganics				
Chromium	2.40	24	2.66	14.48
Copper	5.6	180	4.05	35.53
Lead	4.7	30.2	1.63	9.70
Mercury	0.032	0.16	0.0064	0.064
Vanadium	4.16	7.67	0.34	1.89
Zinc	75.4	894	66.1	128
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	65.6	356	2	20
Acenaphthylene	65.6	356	2	20
Anthracene	65.6	356	2	20
Benzo(a)anthracene	0.615	38.4	2	20
Benzo(a)pyrene	0.615	38.4	2	20
Benzo(b)fluoranthene	0.615	38.4	2	20
Benzo(g,h,i)perylene	0.615	38.4	2	20
Benzo(k)fluoranthene	0.615	38.4	2	20
Chrysene	0.615	38.4	2	20
Dibenzo(a,h)anthracene	0.615	38.4	2	20
Fluoranthene	65.6	356	2	20
Fluorene	65.6	356	2	20
Indeno(1,2,3-cd)pyrene	0.615	38.4	2	20
Phenanthrene	65.6	356	2	20
Pyrene	0.615	38.4	2	20
Polychlorinated Biphenyls				
Aroclor-1254	0.068	0.68	0.18	1.8
Aroclor-1260	0.068	0.68	0.18	1.8

The sources of these NOAELS and LOAELS are presented in the table titled "Sources and Endpoints for NOAELS and LOAELS for Terrestrial Wildlife" in this appendix.

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. If only a LOAEL was available, the value was divided by 10 to estimate the NOAEL.

NV - No value available.

TABLE 5

SOURCES AND ENDPOINTS FOR NOAELS AND LOAELS FOR TERRESTRIAL WILDLIFE
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Parameters	Concentration (mg/kg-day)	Endpoint	Effect	Chronic/ Subchronic	Species	Primary Reference	Source of Reference
PAHs							
7,12-Dimethylbenz(a)anthracene	20	LOAEL	systemic	chronic	nestling/starlings	Trust et al., 1994	
7,12-Dimethylbenz(a)anthracene	2	NOAEL	systemic	chronic	nestling/starlings	Trust et al., 1994	
High Molecular Weight PAHs	38.4	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
High Molecular Weight PAHs	0.615	NOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Low Molecular Weight PAHs	356	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Low Molecular Weight PAHs	65.6	NOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
PCBs							
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							
Cadmium	1.47	NOAEL	reproduction & growth	chronic	birds	USEPA, 2005	
Cadmium	0.77	NOAEL	reproduction & growth	chronic	rat	USEPA, 2005	
Chromium(III)	14.48	LOAEL	reproduction & growth	chronic	birds	USEPA, 2008	
Chromium(III)	2.66	NOAEL	reproduction & growth	chronic	birds	USEPA, 2008	
Chromium(III)	2.4	NOAEL	reproduction & growth	chronic	mammals	USEPA, 2008	
Copper	35.53	LOAEL	reproduction & growth	chronic	birds	USEPA, 2007	
Copper	180	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Copper	4.05	NOAEL	reproduction & growth	chronic	chicken	USEPA, 2007	
Copper	5.6	NOAEL	reproduction & growth	chronic	pig	USEPA, 2007	
Lead	9.7	LOAEL	reproduction & growth	chronic	birds	Spec Pro, Inc and Exponent, Inc., 2009(1)	
Lead	30.2	LOAEL	reproduction & growth	chronic	mammals	Spec Pro, Inc and Exponent, Inc., 2009(1)	
Lead	1.63	NOAEL	reproduction & growth	chronic	chicken	USEPA, 2005	
Lead	4.7	NOAEL	reproduction & growth	chronic	rat	USEPA, 2005	
Mercury	0.064	LOAEL	reproductive	chronic	mallard duck	Heinz, 1979	Sample et.al., 1996
Mercury	0.16	LOAEL	reproductive	chronic	rat	Verschuuren et al., 1976	Sample et.al., 1996
Mercury	0.032	NOAEL	reproductive	chronic	rat	Verschuuren et al., 1976	Sample et.al., 1996
Vanadium	1.89	LOAEL	reproduction & growth	chronic	birds	USEPA, 2005	
Vanadium	7.67	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2005	
Vanadium	0.344	NOAEL	reproduction & growth	chronic	chicken	USEPA, 2005	
Vanadium	4.16	NOAEL	reproduction & growth	chronic	mouse	USEPA, 2005	
Zinc	895	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Zinc	128	LOAEL	reproduction & growth	chronic	birds	Spec Pro, Inc and Exponent, Inc., 2009(1)	
Zinc	75.4	NOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Zinc	66.1	NOAEL	reproduction & growth	chronic	birds	USEPA, 2007	

Notes:

NOAEL = No Observed Adverse Effects Level

LOAEL = Lowest Observed Adverse Effects Level

The NOAELS and LOAELS for the following PAHs are based on the Low Molecular Weight PAH values: acenapthylene, acenaphthene, anthracene, fluoranthene, fluorene, phenanthrene.

The NOAELS and LOAELS for the following PAHs are based on the High Molecular Weight PAH values: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene, and pyrene.

The NOAELS and LOAELS for the PAHs for birds were based on 7,12-dimethylbenz(a)anthracene.

The LOAELs used for antimony, cadmium, chromium, copper, vanadium, and zinc were calculated as the geometric mean of growth and reproduction data from the Ecological Soil Screening Levels (USEPA, 2005, 2007, 2008). Only LOAELs bounded with NOAELs were used in the calculation.

The LOAELs for Aroclor-1254 were used as surrogate for Aroclor-1260.

References for the NOAELS and LOAELs are presented in this Attachment and Titled "TRV Source and Endpoint References".

1 - Modified based on correspondence with UESPA Region 5.

TRV SOURCE AND ENPOINT REFERENCES

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APPENDIX D.5

FOOD-CHAIN MODELING

TABLE 6

CHEMICAL CONCENTRATIONS IN SURFACE SOIL AND TISSUE
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Surface Soil Concentrations (mg/kg)				Surface Water Concentrations (mg/L)				Earthworm Bioaccumulation Factors		Earthworm Concentrations (mg/kg)		Plant Bioaccumulation Factors		Plant Concentrations (mg/kg)	
	Maximum Detection	Average of All Results	Average of Positive Results	Average [1]	Maximum Detection	Average of All Results	Average of Positive Results	Average[1]	Conservative	Average	Maximum Detection	Average	Conservative	Average	Maximum Detection	Average
Inorganics																
CHROMIUM	2.95E+01	1.25E+01	1.25E+01	1.25E+01	3.21E-03	9.92E-04	1.48E-03	9.92E-04	3.06E-01	3.06E-01	9.03E+00	3.83E+00	4.10E-02	4.10E-02	1.21E+00	5.13E-01
COPPER	3.98E+01	1.08E+01	1.08E+01	1.08E+01	1.07E-02	2.84E-03	3.77E-03	2.84E-03	5.15E-01	5.15E-01	2.05E+01	5.57E+00	Regression equation from Eco SSL		8.33E+00	4.98E+00
LEAD	3.45E+02	3.75E+01	3.75E+01	3.75E+01	1.63E-02	3.15E-03	5.93E-03	3.15E-03	Regression equation from Eco SSL		8.98E+01	1.50E+01	Regression equation from Eco SSL		7.03E+00	2.02E+00
MERCURY	6.92E-01	9.08E-02	8.61E-02	9.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Regression - Sample et al., (1998)		9.55E-01	4.82E-01	5.00E+00	6.52E-01	3.46E+00	5.92E-02
VANADIUM	3.83E+01	1.61E+01	1.61E+01	1.61E+01	7.29E-03	2.26E-03	7.29E-03	2.26E-03	4.20E-02	4.20E-02	1.61E+00	6.76E-01	4.85E-03	4.85E-03	1.86E-01	7.81E-02
ZINC	1.27E+02	3.93E+01	3.93E+01	3.93E+01	6.26E-02	1.47E-02	1.47E-02	1.47E-02	Regression equation from Eco SSL		4.19E+02	2.85E+02	Regression equation from Eco SSL		7.07E+01	3.69E+01
Polycyclic Aromatic Hydrocarbons																
ACENAPHTHENE	1.50E-01	2.11E-02	1.16E-01	2.11E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	1.47E+00	2.21E-01	3.10E-02	Regression equation from Eco SSL		1.95E-02	1.04E-01
ACENAPHTHYLENE	7.70E-03	1.73E-02	5.37E-03	5.37E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E+01	2.29E+01	1.76E-01	1.23E-01	Regression equation from Eco SSL		6.78E-03	5.10E-03
ANTHRACENE	3.70E-01	3.02E-02	1.26E-01	3.02E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E+00	2.42E+00	8.95E-01	7.31E-02	Regression equation from Eco SSL		1.72E-01	2.44E-02
BENZO(A)ANTHRACENE	9.90E-01	8.00E-02	1.26E-01	8.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+00	1.59E+00	1.57E+00	1.27E-01	Regression equation from Eco SSL		6.63E-02	1.49E-02
BENZO(A)PYRENE	9.70E-01	9.96E-02	1.47E-01	9.96E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E+00	1.33E+00	1.29E+00	1.32E-01	Regression equation from Eco SSL		1.24E-01	1.34E-02
BENZO(B)FLUORANTHENE	1.30E+00	1.50E-01	1.98E-01	1.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E+00	2.60E+00	3.38E+00	3.91E-01	3.10E-01	3.10E-01	4.03E-01	4.66E-02
BENZO(G,H,I)PERYLENE	7.10E-01	8.64E-02	1.38E-01	8.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E+00	2.94E+00	2.09E+00	2.54E-01	Regression equation from Eco SSL		2.63E-01	2.18E-02
BENZO(K)FLUORANTHENE	6.30E-01	6.44E-02	8.53E-02	6.44E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E+00	2.60E+00	1.64E+00	1.67E-01	Regression equation from Eco SSL		7.77E-02	1.09E-02
CHRYSENE	1.00E+00	1.03E-01	1.52E-01	1.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E+00	2.29E+00	2.29E+00	2.35E-01	Regression equation from Eco SSL		6.67E-02	1.73E-02
DIBENZO(A,H)ANTHRACENE	2.30E-01	2.99E-02	6.05E-02	2.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E+00	2.31E+00	5.31E-01	6.90E-02	1.30E-01	1.30E-01	2.99E-02	3.88E-03
FLUORANTHENE	1.90E+00	1.39E-01	1.93E-01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.04E+00	3.04E+00	5.78E+00	4.23E-01	5.00E-01	5.00E-01	9.50E-01	6.96E-02
FLUORENE	1.70E-01	2.18E-02	1.35E-01	2.18E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.57E+00	9.57E+00	1.63E+00	2.09E-01	Regression equation from Eco SSL		1.75E-02	1.01E-01
INDENO(1,2,3-CD)PYRENE	5.00E-01	5.56E-02	8.34E-02	5.56E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.86E+00	2.86E+00	1.43E+00	1.59E-01	1.10E-01	1.10E-01	5.50E-02	6.11E-03
PHENANTHRENE	1.40E+00	8.13E-02	1.87E-01	8.13E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E+00	1.72E+00	2.41E+00	1.40E-01	Regression equation from Eco SSL		1.04E+00	1.79E-01
PYRENE	2.00E+00	1.40E-01	2.12E-01	1.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E+00	1.75E+00	3.50E+00	2.45E-01	7.20E-01	7.20E-01	1.44E+00	1.01E-01
Polychlorinated Biphenyls																
AROCLOR-1254	1.91E-01	1.43E-02	3.34E-02	1.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+01	6.67E+00	3.04E+00	9.53E-02	4.44E-03	4.44E-03	8.48E-04	6.35E-05
AROCLOR-1260	1.86E-01	2.70E-02	4.26E-02	2.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+01	6.67E+00	2.96E+00	1.80E-01	6.15E-04	6.15E-04	1.14E-04	1.66E-05

1 - Average concentration is the mean concentration of all samples, using 1/2 the detection limit for non-detects, unless the value is greater than the maximum concentration. In that case, the average concentration is the mean of the positive detections.

TABLE 7

MEADOW VOLE - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Max Soil Conc. (mg/kg)	Max SW Conc. (mg/L)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Surface Water	Veget.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	LOAEL
Inorganics											
CHROMIUM	2.95E+01	3.21E-03	1.21E+00	5.51E-02	7.51E-04	7.06E-02	1.26E-01	2.40E+00	2.40E+01	5.3E-02	5.3E-03
COPPER	3.98E+01	1.07E-02	8.33E+00	7.43E-02	2.50E-03	4.86E-01	5.63E-01	5.60E+00	1.80E+02	1.0E-01	3.1E-03
LEAD	3.45E+02	1.63E-02	7.03E+00	6.44E-01	3.81E-03	4.10E-01	1.06E+00	4.70E+00	3.02E+01	2.3E-01	3.5E-02
MERCURY	6.92E-01	0.00E+00	3.46E+00	1.29E-03	0.00E+00	2.02E-01	2.03E-01	3.20E-02	1.60E-01	6.4E+00	1.3E+00
VANADIUM	3.83E+01	7.29E-03	1.86E-01	7.15E-02	1.71E-03	1.08E-02	8.41E-02	4.16E+00	7.67E+00	2.0E-02	1.1E-02
ZINC	1.27E+02	6.26E-02	7.07E+01	2.37E-01	1.47E-02	4.13E+00	4.38E+00	7.54E+01	8.94E+02	5.8E-02	4.9E-03
Polycyclic Aromatic Hydrocarbons											
ACENAPHTHENE	1.50E-01	0.00E+00	1.95E-02	2.80E-04	0.00E+00	1.14E-03	1.42E-03	6.56E+01	3.56E+02	2.2E-05	4.0E-06
ACENAPHTHYLENE	7.70E-03	0.00E+00	6.78E-03	1.44E-05	0.00E+00	3.96E-04	4.10E-04	6.56E+01	3.56E+02	6.3E-06	1.2E-06
ANTHRACENE	3.70E-01	0.00E+00	1.72E-01	6.91E-04	0.00E+00	1.00E-02	1.07E-02	6.56E+01	3.56E+02	1.6E-04	3.0E-05
BENZO(A)ANTHRACENE	9.90E-01	0.00E+00	6.63E-02	1.85E-03	0.00E+00	3.87E-03	5.72E-03	6.15E-01	3.84E+01	9.3E-03	1.5E-04
BENZO(A)PYRENE	9.70E-01	0.00E+00	1.24E-01	1.81E-03	0.00E+00	7.21E-03	9.02E-03	6.15E-01	3.84E+01	1.5E-02	2.3E-04
BENZO(B)FLUORANTHENE	1.30E+00	0.00E+00	4.03E-01	2.43E-03	0.00E+00	2.35E-02	2.59E-02	6.15E-01	3.84E+01	4.2E-02	6.8E-04
BENZO(G,H,I)PERYLENE	7.10E-01	0.00E+00	2.63E-01	1.33E-03	0.00E+00	1.53E-02	1.67E-02	6.15E-01	3.84E+01	2.7E-02	4.3E-04
BENZO(K)FLUORANTHENE	6.30E-01	0.00E+00	7.77E-02	1.18E-03	0.00E+00	4.53E-03	5.71E-03	6.15E-01	3.84E+01	9.3E-03	1.5E-04
CHRYSENE	1.00E+00	0.00E+00	6.67E-02	1.87E-03	0.00E+00	3.89E-03	5.76E-03	6.15E-01	3.84E+01	9.4E-03	1.5E-04
DIBENZO(A,H)ANTHRACENE	2.30E-01	0.00E+00	2.99E-02	4.30E-04	0.00E+00	1.74E-03	2.17E-03	6.15E-01	3.84E+01	3.5E-03	5.7E-05
FLUORANTHENE	1.90E+00	0.00E+00	9.50E-01	3.55E-03	0.00E+00	5.54E-02	5.90E-02	6.56E+01	3.56E+02	9.0E-04	1.7E-04
FLUORENE	1.70E-01	0.00E+00	1.75E-02	3.17E-04	0.00E+00	1.02E-03	1.34E-03	6.56E+01	3.56E+02	2.0E-05	3.8E-06
INDENO(1,2,3-CD)PYRENE	5.00E-01	0.00E+00	5.50E-02	9.34E-04	0.00E+00	3.21E-03	4.14E-03	6.15E-01	3.84E+01	6.7E-03	1.1E-04
PHENANTHRENE	1.40E+00	0.00E+00	1.04E+00	2.61E-03	0.00E+00	6.09E-02	6.35E-02	6.56E+01	3.56E+02	9.7E-04	1.8E-04
PYRENE	2.00E+00	0.00E+00	1.44E+00	3.73E-03	0.00E+00	8.40E-02	8.78E-02	6.15E-01	3.84E+01	1.4E-01	2.3E-03
Polychlorinated Biphenyls											
AROCLOR-1254	1.91E-01	0.00E+00	8.48E-04	3.57E-04	0.00E+00	4.95E-05	4.06E-04	6.80E-02	6.80E-01	6.0E-03	6.0E-04
AROCLOR-1260	1.86E-01	0.00E+00	1.14E-04	3.47E-04	0.00E+00	6.68E-06	3.54E-04	6.80E-02	6.80E-01	5.2E-03	5.2E-04

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	3.29E-02	kg
Food Ingestion Rate = (If)	1.92E-03	kg/day
Water Ingestion Rate = (Iw)	7.70E-03	L/day
Soil Ingestion Rate = (Is)	6.14E-05	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Cs = Contaminant concentration in soil
Cv = Contaminant concentration in vegetation
Cw = Contaminant concentration in water
Total Dose = Dose (soil) + Dose (vegetation) + Dose (water)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
SW = Surface water
NOAEL = No Observed Adverse Effects Concentration

TABLE 8

MEADOW VOLE - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Average Soil Conc. (mg/kg)	Avg SW Conc. (mg/L)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Surface Water	Veget.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	LOAEL
Inorganics											
CHROMIUM	1.25E+01	9.92E-04	5.13E-01	7.32E-03	1.73E-04	2.50E-02	3.25E-02	2.40E+00	2.40E+01	1.4E-02	1.4E-03
COPPER	1.08E+01	2.84E-03	4.98E+00	6.32E-03	4.97E-04	2.43E-01	2.50E-01	5.60E+00	1.80E+02	4.5E-02	1.4E-03
LEAD	3.75E+01	3.15E-03	2.02E+00	2.19E-02	5.51E-04	9.86E-02	1.21E-01	4.70E+00	3.02E+01	2.6E-02	4.0E-03
MERCURY	9.08E-02	0.00E+00	5.92E-02	5.31E-05	0.00E+00	2.89E-03	2.94E-03	3.20E-02	1.60E-01	9.2E-02	1.8E-02
VANADIUM	1.61E+01	2.26E-03	7.81E-02	9.41E-03	3.94E-04	3.81E-03	1.36E-02	4.16E+00	7.67E+00	3.3E-03	1.8E-03
ZINC	3.93E+01	1.47E-02	3.69E+01	2.30E-02	2.57E-03	1.80E+00	1.83E+00	7.54E+01	8.94E+02	2.4E-02	2.0E-03
Polycyclic Aromatic Hydrocarbons											
ACENAPHTHENE	2.11E-02	0.00E+00	1.04E-01	1.23E-05	0.00E+00	5.09E-03	5.10E-03	6.56E+01	3.56E+02	7.8E-05	1.4E-05
ACENAPHTHYLENE	5.37E-03	0.00E+00	5.10E-03	3.14E-06	0.00E+00	2.49E-04	2.52E-04	6.56E+01	3.56E+02	3.8E-06	7.1E-07
ANTHRACENE	3.02E-02	0.00E+00	2.44E-02	1.77E-05	0.00E+00	1.19E-03	1.21E-03	6.56E+01	3.56E+02	1.8E-05	3.4E-06
BENZO(A)ANTHRACENE	8.00E-02	0.00E+00	1.49E-02	4.68E-05	0.00E+00	7.24E-04	7.71E-04	6.15E-01	3.84E+01	1.3E-03	2.0E-05
BENZO(A)PYRENE	9.96E-02	0.00E+00	1.34E-02	5.83E-05	0.00E+00	6.54E-04	7.13E-04	6.15E-01	3.84E+01	1.2E-03	1.9E-05
BENZO(B)FLUORANTHENE	1.50E-01	0.00E+00	4.66E-02	8.79E-05	0.00E+00	2.27E-03	2.36E-03	6.15E-01	3.84E+01	3.8E-03	6.1E-05
BENZO(G,H,I)PERYLENE	8.64E-02	0.00E+00	2.18E-02	5.05E-05	0.00E+00	1.06E-03	1.11E-03	6.15E-01	3.84E+01	1.8E-03	2.9E-05
BENZO(K)FLUORANTHENE	6.44E-02	0.00E+00	1.09E-02	3.76E-05	0.00E+00	5.33E-04	5.71E-04	6.15E-01	3.84E+01	9.3E-04	1.5E-05
CHRYSENE	1.03E-01	0.00E+00	1.73E-02	6.01E-05	0.00E+00	8.41E-04	9.01E-04	6.15E-01	3.84E+01	1.5E-03	2.3E-05
DIBENZO(A,H)ANTHRACENE	2.99E-02	0.00E+00	3.88E-03	1.75E-05	0.00E+00	1.89E-04	2.07E-04	6.15E-01	3.84E+01	3.4E-04	5.4E-06
FLUORANTHENE	1.39E-01	0.00E+00	6.96E-02	8.14E-05	0.00E+00	3.39E-03	3.47E-03	6.56E+01	3.56E+02	5.3E-05	9.8E-06
FLUORENE	2.18E-02	0.00E+00	1.01E-01	1.28E-05	0.00E+00	4.94E-03	4.95E-03	6.56E+01	3.56E+02	7.5E-05	1.4E-05
INDENO(1,2,3-CD)PYRENE	5.56E-02	0.00E+00	6.11E-03	3.25E-05	0.00E+00	2.98E-04	3.30E-04	6.15E-01	3.84E+01	5.4E-04	8.6E-06
PHENANTHRENE	8.13E-02	0.00E+00	1.79E-01	4.76E-05	0.00E+00	8.70E-03	8.75E-03	6.56E+01	3.56E+02	1.3E-04	2.5E-05
PYRENE	1.40E-01	0.00E+00	1.01E-01	8.20E-05	0.00E+00	4.92E-03	5.00E-03	6.15E-01	3.84E+01	8.1E-03	1.3E-04
Polychlorinated Biphenyls											
AROCLOR-1254	1.43E-02	0.00E+00	6.35E-05	8.36E-06	0.00E+00	3.09E-06	1.15E-05	6.80E-02	6.80E-01	1.7E-04	1.7E-05
AROCLOR-1260	2.70E-02	0.00E+00	1.66E-05	1.58E-05	0.00E+00	8.08E-07	1.66E-05	6.80E-02	6.80E-01	2.4E-04	2.4E-05

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	3.66E-02	kg
Food Ingestion Rate = (If)	1.79E-03	kg/day
Water Ingestion Rate = (Iw)	6.40E-03	L/day
Soil Ingestion Rate = (Is)	2.14E-05	kg/day
Home Range = (HR)	1.64E-01	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Cs = Contaminant concentration in soil
Cv = Contaminant concentration in vegetation
Cw = Contaminant concentration in water
Total Dose = Dose (soil) + Dose (vegetation) + Dose (water)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
SW = Surface water
NOAEL = No Observed Adverse Effects Concentration

TABLE 9

BOBWHITE QUAIL - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Max Soil Conc. (mg/kg)	Max SW Conc. (mg/L)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Surface Water	Veget.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	LOAEL
Inorganics											
CHROMIUM	2.95E+01	3.21E-03	1.21E+00	4.15E-01	4.58E-04	1.22E-01	5.38E-01	2.66E+00	1.45E+01	2.0E-01	3.7E-02
COPPER	3.98E+01	1.07E-02	8.33E+00	5.60E-01	1.53E-03	8.43E-01	1.40E+00	4.05E+00	3.55E+01	3.5E-01	4.0E-02
LEAD	3.45E+02	1.63E-02	7.03E+00	4.85E+00	2.32E-03	7.12E-01	5.57E+00	1.63E+00	9.70E+00	3.4E+00	5.7E-01
MERCURY	6.92E-01	0.00E+00	3.46E+00	9.74E-03	0.00E+00	3.50E-01	3.60E-01	6.40E-03	6.40E-02	5.6E+01	5.6E+00
VANADIUM	3.83E+01	7.29E-03	1.86E-01	5.39E-01	1.04E-03	1.88E-02	5.59E-01	3.44E-01	1.89E+00	1.6E+00	3.0E-01
ZINC	1.27E+02	6.26E-02	7.07E+01	1.79E+00	8.93E-03	7.16E+00	8.95E+00	6.61E+01	1.28E+02	1.4E-01	7.0E-02
Polycyclic Aromatic Hydrocarbons											
ACENAPHTHENE	1.50E-01	0.00E+00	1.95E-02	2.11E-03	0.00E+00	1.97E-03	4.08E-03	2.00E+00	2.00E+01	2.0E-03	2.0E-04
ACENAPHTHYLENE	7.70E-03	0.00E+00	6.78E-03	1.08E-04	0.00E+00	6.87E-04	7.95E-04	2.00E+00	2.00E+01	4.0E-04	4.0E-05
ANTHRACENE	3.70E-01	0.00E+00	1.72E-01	5.21E-03	0.00E+00	1.74E-02	2.26E-02	2.00E+00	2.00E+01	1.1E-02	1.1E-03
BENZO(A)ANTHRACENE	9.90E-01	0.00E+00	6.63E-02	1.39E-02	0.00E+00	6.71E-03	2.06E-02	2.00E+00	2.00E+01	1.0E-02	1.0E-03
BENZO(A)PYRENE	9.70E-01	0.00E+00	1.24E-01	1.36E-02	0.00E+00	1.25E-02	2.62E-02	2.00E+00	2.00E+01	1.3E-02	1.3E-03
BENZO(B)FLUORANTHENE	1.30E+00	0.00E+00	4.03E-01	1.83E-02	0.00E+00	4.08E-02	5.91E-02	2.00E+00	2.00E+01	3.0E-02	3.0E-03
BENZO(G,H,I)PERYLENE	7.10E-01	0.00E+00	2.63E-01	9.99E-03	0.00E+00	2.66E-02	3.66E-02	2.00E+00	2.00E+01	1.8E-02	1.8E-03
BENZO(K)FLUORANTHENE	6.30E-01	0.00E+00	7.77E-02	8.87E-03	0.00E+00	7.86E-03	1.67E-02	2.00E+00	2.00E+01	8.4E-03	8.4E-04
CHRYSENE	1.00E+00	0.00E+00	6.67E-02	1.41E-02	0.00E+00	6.75E-03	2.08E-02	2.00E+00	2.00E+01	1.0E-02	1.0E-03
DIBENZO(A,H)ANTHRACENE	2.30E-01	0.00E+00	2.99E-02	3.24E-03	0.00E+00	3.03E-03	6.26E-03	2.00E+00	2.00E+01	3.1E-03	3.1E-04
FLUORANTHENE	1.90E+00	0.00E+00	9.50E-01	2.67E-02	0.00E+00	9.62E-02	1.23E-01	2.00E+00	2.00E+01	6.1E-02	6.1E-03
FLUORENE	1.70E-01	0.00E+00	1.75E-02	2.39E-03	0.00E+00	1.77E-03	4.16E-03	2.00E+00	2.00E+01	2.1E-03	2.1E-04
INDENO(1,2,3-CD)PYRENE	5.00E-01	0.00E+00	5.50E-02	7.04E-03	0.00E+00	5.57E-03	1.26E-02	2.00E+00	2.00E+01	6.3E-03	6.3E-04
PHENANTHRENE	1.40E+00	0.00E+00	1.04E+00	1.97E-02	0.00E+00	1.06E-01	1.25E-01	2.00E+00	2.00E+01	6.3E-02	6.3E-03
PYRENE	2.00E+00	0.00E+00	1.44E+00	2.81E-02	0.00E+00	1.46E-01	1.74E-01	2.00E+00	2.00E+01	8.7E-02	8.7E-03
Polychlorinated Biphenyls											
AROCLOR-1254	1.91E-01	0.00E+00	8.48E-04	2.69E-03	0.00E+00	8.59E-05	2.77E-03	1.80E-01	1.80E+00	1.5E-02	1.5E-03
AROCLOR-1260	1.86E-01	0.00E+00	1.14E-04	2.62E-03	0.00E+00	1.16E-05	2.63E-03	1.80E-01	1.80E+00	1.5E-02	1.5E-03

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.62E-01	kg
Food Ingestion Rate = (If)	1.64E-02	kg/day
Water Ingestion Rate = (Iw)	2.31E-02	L/day
Soil Ingestion Rate = (Is)	2.28E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Cs = Contaminant concentration in soil
Cv = Contaminant concentration in vegetation
Cw = Contaminant concentration in water
Total Dose = Dose (soil) + Dose (vegetation) + Dose (water)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
SW = Surface water
NV = No Value

TABLE 10

BOBWHITE QUAIL - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Average Soil Conc. (mg/kg)	Avg SW Conc. (mg/L)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Surface Water	Veget.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	LOAEL
Inorganics											
CHROMIUM	1.25E+01	9.92E-04	5.13E-01	6.21E-02	1.03E-04	4.18E-02	1.04E-01	2.66E+00	1.45E+01	3.9E-02	7.2E-03
COPPER	1.08E+01	2.84E-03	4.98E+00	5.37E-02	2.96E-04	4.05E-01	4.59E-01	4.05E+00	3.55E+01	1.1E-01	1.3E-02
LEAD	3.75E+01	3.15E-03	2.02E+00	1.86E-01	3.28E-04	1.65E-01	3.51E-01	1.63E+00	9.70E+00	2.2E-01	3.6E-02
MERCURY	9.08E-02	0.00E+00	5.92E-02	4.51E-04	0.00E+00	4.82E-03	5.27E-03	6.40E-03	6.40E-02	8.2E-01	8.2E-02
VANADIUM	1.61E+01	2.26E-03	7.81E-02	7.99E-02	2.35E-04	6.35E-03	8.65E-02	3.44E-01	1.89E+00	2.5E-01	4.6E-02
ZINC	3.93E+01	1.47E-02	3.69E+01	1.95E-01	1.53E-03	3.01E+00	3.20E+00	6.61E+01	1.28E+02	4.8E-02	2.5E-02
Polycyclic Aromatic Hydrocarbons											
ACENAPHTHENE	2.11E-02	0.00E+00	1.04E-01	1.05E-04	0.00E+00	8.50E-03	8.60E-03	2.00E+00	2.00E+01	4.3E-03	4.3E-04
ACENAPHTHYLENE	5.37E-03	0.00E+00	5.10E-03	2.67E-05	0.00E+00	4.15E-04	4.42E-04	2.00E+00	2.00E+01	2.2E-04	2.2E-05
ANTHRACENE	3.02E-02	0.00E+00	2.44E-02	1.50E-04	0.00E+00	1.99E-03	2.14E-03	2.00E+00	2.00E+01	1.1E-03	1.1E-04
BENZO(A)ANTHRACENE	8.00E-02	0.00E+00	1.49E-02	3.97E-04	0.00E+00	1.21E-03	1.61E-03	2.00E+00	2.00E+01	8.0E-04	8.0E-05
BENZO(A)PYRENE	9.96E-02	0.00E+00	1.34E-02	4.94E-04	0.00E+00	1.09E-03	1.59E-03	2.00E+00	2.00E+01	7.9E-04	7.9E-05
BENZO(B)FLUORANTHENE	1.50E-01	0.00E+00	4.66E-02	7.46E-04	0.00E+00	3.79E-03	4.53E-03	2.00E+00	2.00E+01	2.3E-03	2.3E-04
BENZO(G,H,I)PERYLENE	8.64E-02	0.00E+00	2.18E-02	4.29E-04	0.00E+00	1.77E-03	2.20E-03	2.00E+00	2.00E+01	1.1E-03	1.1E-04
BENZO(K)FLUORANTHENE	6.44E-02	0.00E+00	1.09E-02	3.19E-04	0.00E+00	8.90E-04	1.21E-03	2.00E+00	2.00E+01	6.0E-04	6.0E-05
CHRYSENE	1.03E-01	0.00E+00	1.73E-02	5.10E-04	0.00E+00	1.40E-03	1.91E-03	2.00E+00	2.00E+01	9.6E-04	9.6E-05
DIBENZO(A,H)ANTHRACENE	2.99E-02	0.00E+00	3.88E-03	1.48E-04	0.00E+00	3.16E-04	4.64E-04	2.00E+00	2.00E+01	2.3E-04	2.3E-05
FLUORANTHENE	1.39E-01	0.00E+00	6.96E-02	6.90E-04	0.00E+00	5.66E-03	6.35E-03	2.00E+00	2.00E+01	3.2E-03	3.2E-04
FLUORENE	2.18E-02	0.00E+00	1.01E-01	1.08E-04	0.00E+00	8.25E-03	8.35E-03	2.00E+00	2.00E+01	4.2E-03	4.2E-04
INDENO(1,2,3-CD)PYRENE	5.56E-02	0.00E+00	6.11E-03	2.76E-04	0.00E+00	4.97E-04	7.73E-04	2.00E+00	2.00E+01	3.9E-04	3.9E-05
PHENANTHRENE	8.13E-02	0.00E+00	1.79E-01	4.04E-04	0.00E+00	1.45E-02	1.49E-02	2.00E+00	2.00E+01	7.5E-03	7.5E-04
PYRENE	1.40E-01	0.00E+00	1.01E-01	6.96E-04	0.00E+00	8.22E-03	8.91E-03	2.00E+00	2.00E+01	4.5E-03	4.5E-04
Polychlorinated Biphenyls											
AROCLOR-1254	1.43E-02	0.00E+00	6.35E-05	7.09E-05	0.00E+00	5.16E-06	7.61E-05	1.80E-01	1.80E+00	4.2E-04	4.2E-05
AROCLOR-1260	2.70E-02	0.00E+00	1.66E-05	1.34E-04	0.00E+00	1.35E-06	1.35E-04	1.80E-01	1.80E+00	7.5E-04	7.5E-05

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.77E-01	kg
Food Ingestion Rate = (If)	1.44E-02	kg/day
Water Ingestion Rate = (Iw)	1.84E-02	L/day
Soil Ingestion Rate = (Is)	8.78E-04	kg/day
Home Range = (HR)	2.86E+01	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Cs = Contaminant concentration in soil
Cv = Contaminant concentration in vegetation
Cw = Contaminant concentration in water
Total Dose = Dose (soil) + Dose (vegetation) + Dose (water)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
SW = Surface water
NV = No Value

TABLE 11

SHORT-TAILED SHREW - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Max Soil Conc. (mg/kg)	Max SW Conc. (mg/L)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Surface Water	Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	LOAEL
Inorganics											
CHROMIUM	2.95E+01	3.21E-03	9.03E+00	1.50E-01	9.01E-04	1.53E+00	1.69E+00	2.40E+00	2.40E+01	7.0E-01	7.0E-02
COPPER	3.98E+01	1.07E-02	2.05E+01	2.03E-01	3.00E-03	3.48E+00	3.69E+00	5.60E+00	1.80E+02	6.6E-01	2.0E-02
LEAD	3.45E+02	1.63E-02	8.98E+01	1.76E+00	4.57E-03	1.53E+01	1.70E+01	4.70E+00	3.02E+01	3.6E+00	5.6E-01
MERCURY	6.92E-01	0.00E+00	9.55E-01	3.53E-03	0.00E+00	1.62E-01	1.66E-01	3.20E-02	1.60E-01	5.2E+00	1.0E+00
VANADIUM	3.83E+01	7.29E-03	1.61E+00	1.95E-01	2.05E-03	2.73E-01	4.71E-01	4.16E+00	7.67E+00	1.1E-01	6.1E-02
ZINC	1.27E+02	6.26E-02	4.19E+02	6.48E-01	1.76E-02	7.12E+01	7.19E+01	7.54E+01	8.94E+02	9.5E-01	8.0E-02
Polycyclic Aromatic Hydrocarbons											
ACENAPHTHENE	1.50E-01	0.00E+00	2.21E-01	7.65E-04	0.00E+00	3.75E-02	3.82E-02	6.56E+01	3.56E+02	5.8E-04	1.1E-04
ACENAPHTHYLENE	7.70E-03	0.00E+00	1.76E-01	3.93E-05	0.00E+00	3.00E-02	3.00E-02	6.56E+01	3.56E+02	4.6E-04	8.4E-05
ANTHRACENE	3.70E-01	0.00E+00	8.95E-01	1.89E-03	0.00E+00	1.52E-01	1.54E-01	6.56E+01	3.56E+02	2.3E-03	4.3E-04
BENZO(A)ANTHRACENE	9.90E-01	0.00E+00	1.57E+00	5.05E-03	0.00E+00	2.68E-01	2.73E-01	6.15E-01	3.84E+01	4.4E-01	7.1E-03
BENZO(A)PYRENE	9.70E-01	0.00E+00	1.29E+00	4.95E-03	0.00E+00	2.19E-01	2.24E-01	6.15E-01	3.84E+01	3.6E-01	5.8E-03
BENZO(B)FLUORANTHENE	1.30E+00	0.00E+00	3.38E+00	6.63E-03	0.00E+00	5.74E-01	5.81E-01	6.15E-01	3.84E+01	9.4E-01	1.5E-02
BENZO(G,H,I)PERYLENE	7.10E-01	0.00E+00	2.09E+00	3.62E-03	0.00E+00	3.55E-01	3.58E-01	6.15E-01	3.84E+01	5.8E-01	9.3E-03
BENZO(K)FLUORANTHENE	6.30E-01	0.00E+00	1.64E+00	3.21E-03	0.00E+00	2.78E-01	2.82E-01	6.15E-01	3.84E+01	4.6E-01	7.3E-03
CHRYSENE	1.00E+00	0.00E+00	2.29E+00	5.10E-03	0.00E+00	3.89E-01	3.94E-01	6.15E-01	3.84E+01	6.4E-01	1.0E-02
DIBENZO(A,H)ANTHRACENE	2.30E-01	0.00E+00	5.31E-01	1.17E-03	0.00E+00	9.03E-02	9.15E-02	6.15E-01	3.84E+01	1.5E-01	2.4E-03
FLUORANTHENE	1.90E+00	0.00E+00	5.78E+00	9.69E-03	0.00E+00	9.82E-01	9.91E-01	6.56E+01	3.56E+02	1.5E-02	2.8E-03
FLUORENE	1.70E-01	0.00E+00	1.63E+00	8.67E-04	0.00E+00	2.77E-01	2.77E-01	6.56E+01	3.56E+02	4.2E-03	7.8E-04
INDENO(1,2,3-CD)PYRENE	5.00E-01	0.00E+00	1.43E+00	2.55E-03	0.00E+00	2.43E-01	2.46E-01	6.15E-01	3.84E+01	4.0E-01	6.4E-03
PHENANTHRENE	1.40E+00	0.00E+00	2.41E+00	7.14E-03	0.00E+00	4.09E-01	4.16E-01	6.56E+01	3.56E+02	6.3E-03	1.2E-03
PYRENE	2.00E+00	0.00E+00	3.50E+00	1.02E-02	0.00E+00	5.95E-01	6.05E-01	6.15E-01	3.84E+01	9.8E-01	1.6E-02
Polychlorinated Biphenyls											
AROCLOR-1254	1.91E-01	0.00E+00	3.04E+00	9.74E-04	0.00E+00	5.16E-01	5.17E-01	6.80E-02	6.80E-01	7.6E+00	7.6E-01
AROCLOR-1260	1.86E-01	0.00E+00	2.96E+00	9.48E-04	0.00E+00	5.03E-01	5.04E-01	6.80E-02	6.80E-01	7.4E+00	7.4E-01

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.53E-02	kg
Food Ingestion Rate = (If)	2.59E-03	kg/day
Water Ingestion Rate = (Iw)	4.28E-03	L/day
Soil Ingestion Rate = (Is)	7.78E-05	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Cs = Contaminant concentration in soil
Ci = Contaminant concentration in invertebrate
Cw = Contaminant concentration in water
Total Dose = Dose (soil) + Dose (invertebrate) + Dose (water)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
SW = Surface water
NOAEL = No Observed Adverse Effects Concentration

TABLE 12

SHORT-TAILED SHREW - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Average Soil Conc. (mg/kg)	Avg SW Conc. (mg/L)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Surface Water	Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	LOAEL
Inorganics											
CHROMIUM	1.25E+01	9.92E-04	3.83E+00	1.10E-02	2.21E-04	3.74E-01	3.85E-01	2.40E+00	2.40E+01	1.6E-01	1.6E-02
COPPER	1.08E+01	2.84E-03	5.57E+00	9.51E-03	6.34E-04	5.44E-01	5.54E-01	5.60E+00	1.80E+02	9.9E-02	3.1E-03
LEAD	3.75E+01	3.15E-03	1.50E+01	3.30E-02	7.03E-04	1.46E+00	1.50E+00	4.70E+00	3.02E+01	3.2E-01	5.0E-02
MERCURY	9.08E-02	0.00E+00	4.82E-01	7.99E-05	0.00E+00	4.71E-02	4.72E-02	3.20E-02	1.60E-01	1.5E+00	2.9E-01
VANADIUM	1.61E+01	2.26E-03	6.76E-01	1.42E-02	5.03E-04	6.61E-02	8.07E-02	4.16E+00	7.67E+00	1.9E-02	1.1E-02
ZINC	3.93E+01	1.47E-02	2.85E+02	3.46E-02	3.28E-03	2.79E+01	2.79E+01	7.54E+01	8.94E+02	3.7E-01	3.1E-02
Polycyclic Aromatic Hydrocarbons											
ACENAPHTHENE	2.11E-02	0.00E+00	3.10E-02	1.85E-05	0.00E+00	3.02E-03	3.04E-03	6.56E+01	3.56E+02	4.6E-05	8.5E-06
ACENAPHTHYLENE	5.37E-03	0.00E+00	1.23E-01	4.72E-06	0.00E+00	1.20E-02	1.20E-02	6.56E+01	3.56E+02	1.8E-04	3.4E-05
ANTHRACENE	3.02E-02	0.00E+00	7.31E-02	2.66E-05	0.00E+00	7.14E-03	7.17E-03	6.56E+01	3.56E+02	1.1E-04	2.0E-05
BENZO(A)ANTHRACENE	8.00E-02	0.00E+00	1.27E-01	7.03E-05	0.00E+00	1.24E-02	1.25E-02	6.15E-01	3.84E+01	2.0E-02	3.3E-04
BENZO(A)PYRENE	9.96E-02	0.00E+00	1.32E-01	8.76E-05	0.00E+00	1.29E-02	1.30E-02	6.15E-01	3.84E+01	2.1E-02	3.4E-04
BENZO(B)FLUORANTHENE	1.50E-01	0.00E+00	3.91E-01	1.32E-04	0.00E+00	3.82E-02	3.83E-02	6.15E-01	3.84E+01	6.2E-02	1.0E-03
BENZO(G,H,I)PERYLENE	8.64E-02	0.00E+00	2.54E-01	7.60E-05	0.00E+00	2.48E-02	2.49E-02	6.15E-01	3.84E+01	4.0E-02	6.5E-04
BENZO(K)FLUORANTHENE	6.44E-02	0.00E+00	1.67E-01	5.66E-05	0.00E+00	1.63E-02	1.64E-02	6.15E-01	3.84E+01	2.7E-02	4.3E-04
CHRYSENE	1.03E-01	0.00E+00	2.35E-01	9.04E-05	0.00E+00	2.30E-02	2.31E-02	6.15E-01	3.84E+01	3.8E-02	6.0E-04
DIBENZO(A,H)ANTHRACENE	2.99E-02	0.00E+00	6.90E-02	2.63E-05	0.00E+00	6.74E-03	6.77E-03	6.15E-01	3.84E+01	1.1E-02	1.8E-04
FLUORANTHENE	1.39E-01	0.00E+00	4.23E-01	1.22E-04	0.00E+00	4.13E-02	4.14E-02	6.56E+01	3.56E+02	6.3E-04	1.2E-04
FLUORENE	2.18E-02	0.00E+00	2.09E-01	1.92E-05	0.00E+00	2.04E-02	2.04E-02	6.56E+01	3.56E+02	3.1E-04	5.7E-05
INDENO(1,2,3-CD)PYRENE	5.56E-02	0.00E+00	1.59E-01	4.88E-05	0.00E+00	1.55E-02	1.56E-02	6.15E-01	3.84E+01	2.5E-02	4.1E-04
PHENANTHRENE	8.13E-02	0.00E+00	1.40E-01	7.15E-05	0.00E+00	1.37E-02	1.37E-02	6.56E+01	3.56E+02	2.1E-04	3.9E-05
PYRENE	1.40E-01	0.00E+00	2.45E-01	1.23E-04	0.00E+00	2.40E-02	2.41E-02	6.15E-01	3.84E+01	3.9E-02	6.3E-04
Polychlorinated Biphenyls											
AROCLOR-1254	1.43E-02	0.00E+00	9.53E-02	1.26E-05	0.00E+00	9.31E-03	9.32E-03	6.80E-02	6.80E-01	1.4E-01	1.4E-02
AROCLOR-1260	2.70E-02	0.00E+00	1.80E-01	2.37E-05	0.00E+00	1.76E-02	1.76E-02	6.80E-02	6.80E-01	2.6E-01	2.6E-02

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.69E-02	kg
Food Ingestion Rate = (If)	1.65E-03	kg/day
Water Ingestion Rate = (Iw)	3.76E-03	L/day
Soil Ingestion Rate = (Is)	1.48E-05	kg/day
Home Range = (HR)	9.70E-01	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Cs = Contaminant concentration in soil
Ci = Contaminant concentration in invertebrate
Cw = Contaminant concentration in water
Total Dose = Dose (soil) + Dose (invertebrate) + Dose (water)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
SW = Surface water
NOAEL = No Observed Adverse Effects Concentration

TABLE 13

AMERICAN WOODCOCK - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Max Soil Conc. (mg/kg)	Max SW Conc. (mg/L)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Surface Water	Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	LOAEL
Inorganics											
CHROMIUM	2.95E+01	3.21E-03	9.03E+00	8.84E-01	4.12E-04	1.65E+00	2.53E+00	2.66E+00	1.45E+01	9.5E-01	1.7E-01
COPPER	3.98E+01	1.07E-02	2.05E+01	1.19E+00	1.37E-03	3.74E+00	4.94E+00	4.05E+00	3.55E+01	1.2E+00	1.4E-01
LEAD	3.45E+02	1.63E-02	8.98E+01	1.03E+01	2.09E-03	1.64E+01	2.67E+01	1.63E+00	9.70E+00	1.6E+01	2.8E+00
MERCURY	6.92E-01	0.00E+00	9.55E-01	2.07E-02	0.00E+00	1.74E-01	1.95E-01	6.40E-03	6.40E-02	3.0E+01	3.0E+00
VANADIUM	3.83E+01	7.29E-03	1.61E+00	1.15E+00	9.35E-04	2.94E-01	1.44E+00	3.44E-01	1.89E+00	4.2E+00	7.6E-01
ZINC	1.27E+02	6.26E-02	4.19E+02	3.80E+00	8.03E-03	7.65E+01	8.03E+01	6.61E+01	1.28E+02	1.2E+00	6.3E-01
Polycyclic Aromatic Hydrocarbons											
ACENAPHTHENE	1.50E-01	0.00E+00	2.21E-01	4.49E-03	0.00E+00	4.03E-02	4.48E-02	2.00E+00	2.00E+01	2.2E-02	2.2E-03
ACENAPHTHYLENE	7.70E-03	0.00E+00	1.76E-01	2.31E-04	0.00E+00	3.22E-02	3.24E-02	2.00E+00	2.00E+01	1.6E-02	1.6E-03
ANTHRACENE	3.70E-01	0.00E+00	8.95E-01	1.11E-02	0.00E+00	1.64E-01	1.75E-01	2.00E+00	2.00E+01	8.7E-02	8.7E-03
BENZO(A)ANTHRACENE	9.90E-01	0.00E+00	1.57E+00	2.97E-02	0.00E+00	2.88E-01	3.17E-01	2.00E+00	2.00E+01	1.6E-01	1.6E-02
BENZO(A)PYRENE	9.70E-01	0.00E+00	1.29E+00	2.91E-02	0.00E+00	2.36E-01	2.65E-01	2.00E+00	2.00E+01	1.3E-01	1.3E-02
BENZO(B)FLUORANTHENE	1.30E+00	0.00E+00	3.38E+00	3.89E-02	0.00E+00	6.17E-01	6.56E-01	2.00E+00	2.00E+01	3.3E-01	3.3E-02
BENZO(G,H,I)PERYLENE	7.10E-01	0.00E+00	2.09E+00	2.13E-02	0.00E+00	3.81E-01	4.03E-01	2.00E+00	2.00E+01	2.0E-01	2.0E-02
BENZO(K)FLUORANTHENE	6.30E-01	0.00E+00	1.64E+00	1.89E-02	0.00E+00	2.99E-01	3.18E-01	2.00E+00	2.00E+01	1.6E-01	1.6E-02
CHRYSENE	1.00E+00	0.00E+00	2.29E+00	3.00E-02	0.00E+00	4.18E-01	4.48E-01	2.00E+00	2.00E+01	2.2E-01	2.2E-02
DIBENZO(A,H)ANTHRACENE	2.30E-01	0.00E+00	5.31E-01	6.89E-03	0.00E+00	9.70E-02	1.04E-01	2.00E+00	2.00E+01	5.2E-02	5.2E-03
FLUORANTHENE	1.90E+00	0.00E+00	5.78E+00	5.69E-02	0.00E+00	1.05E+00	1.11E+00	2.00E+00	2.00E+01	5.6E-01	5.6E-02
FLUORENE	1.70E-01	0.00E+00	1.63E+00	5.09E-03	0.00E+00	2.97E-01	3.02E-01	2.00E+00	2.00E+01	1.5E-01	1.5E-02
INDENO(1,2,3-CD)PYRENE	5.00E-01	0.00E+00	1.43E+00	1.50E-02	0.00E+00	2.61E-01	2.76E-01	2.00E+00	2.00E+01	1.4E-01	1.4E-02
PHENANTHRENE	1.40E+00	0.00E+00	2.41E+00	4.19E-02	0.00E+00	4.40E-01	4.82E-01	2.00E+00	2.00E+01	2.4E-01	2.4E-02
PYRENE	2.00E+00	0.00E+00	3.50E+00	5.99E-02	0.00E+00	6.39E-01	6.99E-01	2.00E+00	2.00E+01	3.5E-01	3.5E-02
Polychlorinated Biphenyls											
AROCLOR-1254	1.91E-01	0.00E+00	3.04E+00	5.72E-03	0.00E+00	5.55E-01	5.61E-01	1.80E-01	1.80E+00	3.1E+00	3.1E-01
AROCLOR-1260	1.86E-01	0.00E+00	2.96E+00	5.57E-03	0.00E+00	5.40E-01	5.46E-01	1.80E-01	1.80E+00	3.0E+00	3.0E-01

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.66E-01	kg
Food Ingestion Rate = (If)	3.03E-02	kg/day
Water Ingestion Rate = (Iw)	2.13E-02	L/day
Soil Ingestion Rate = (Is)	4.97E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Cs = Contaminant concentration in soil
Ci = Contaminant concentration in invertebrate
Cw = Contaminant concentration in water
Total Dose = Dose (soil) + Dose (invertebrate) + Dose (water)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
SW = Surface water
NV = No Value

TABLE 14

AMERICAN WOODCOCK - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SWMU 23 - BATTERY SHOP
NSA CRANE, CRANE, INDIANA

Chemical	Average Soil Conc. (mg/kg)	Avg SW Conc. (mg/L)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Surface Water	Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	LOAEL
Inorganics											
CHROMIUM	1.25E+01	9.92E-04	3.83E+00	1.07E-01	9.94E-05	5.11E-01	6.18E-01	2.66E+00	1.45E+01	2.3E-01	4.3E-02
COPPER	1.08E+01	2.84E-03	5.57E+00	9.23E-02	2.85E-04	7.42E-01	8.35E-01	4.05E+00	3.55E+01	2.1E-01	2.3E-02
LEAD	3.75E+01	3.15E-03	1.50E+01	3.20E-01	3.16E-04	2.00E+00	2.32E+00	1.63E+00	9.70E+00	1.4E+00	2.4E-01
MERCURY	9.08E-02	0.00E+00	4.82E-01	7.75E-04	0.00E+00	6.42E-02	6.50E-02	6.40E-03	6.40E-02	1.0E+01	1.0E+00
VANADIUM	1.61E+01	2.26E-03	6.76E-01	1.37E-01	2.26E-04	9.02E-02	2.28E-01	3.44E-01	1.89E+00	6.6E-01	1.2E-01
ZINC	3.93E+01	1.47E-02	2.85E+02	3.36E-01	1.48E-03	3.80E+01	3.84E+01	6.61E+01	1.28E+02	5.8E-01	3.0E-01
Polycyclic Aromatic Hydrocarbons											
ACENAPHTHENE	2.11E-02	0.00E+00	3.10E-02	1.80E-04	0.00E+00	4.13E-03	4.31E-03	2.00E+00	2.00E+01	2.2E-03	2.2E-04
ACENAPHTHYLENE	5.37E-03	0.00E+00	1.23E-01	4.58E-05	0.00E+00	1.64E-02	1.65E-02	2.00E+00	2.00E+01	8.2E-03	8.2E-04
ANTHRACENE	3.02E-02	0.00E+00	7.31E-02	2.58E-04	0.00E+00	9.74E-03	1.00E-02	2.00E+00	2.00E+01	5.0E-03	5.0E-04
BENZO(A)ANTHRACENE	8.00E-02	0.00E+00	1.27E-01	6.82E-04	0.00E+00	1.70E-02	1.76E-02	2.00E+00	2.00E+01	8.8E-03	8.8E-04
BENZO(A)PYRENE	9.96E-02	0.00E+00	1.32E-01	8.50E-04	0.00E+00	1.77E-02	1.85E-02	2.00E+00	2.00E+01	9.3E-03	9.3E-04
BENZO(B)FLUORANTHENE	1.50E-01	0.00E+00	3.91E-01	1.28E-03	0.00E+00	5.21E-02	5.34E-02	2.00E+00	2.00E+01	2.7E-02	2.7E-03
BENZO(G,H,I)PERYLENE	8.64E-02	0.00E+00	2.54E-01	7.37E-04	0.00E+00	3.39E-02	3.46E-02	2.00E+00	2.00E+01	1.7E-02	1.7E-03
BENZO(K)FLUORANTHENE	6.44E-02	0.00E+00	1.67E-01	5.49E-04	0.00E+00	2.23E-02	2.29E-02	2.00E+00	2.00E+01	1.1E-02	1.1E-03
CHRYSENE	1.03E-01	0.00E+00	2.35E-01	8.77E-04	0.00E+00	3.14E-02	3.23E-02	2.00E+00	2.00E+01	1.6E-02	1.6E-03
DIBENZO(A,H)ANTHRACENE	2.99E-02	0.00E+00	6.90E-02	2.55E-04	0.00E+00	9.20E-03	9.45E-03	2.00E+00	2.00E+01	4.7E-03	4.7E-04
FLUORANTHENE	1.39E-01	0.00E+00	4.23E-01	1.19E-03	0.00E+00	5.64E-02	5.76E-02	2.00E+00	2.00E+01	2.9E-02	2.9E-03
FLUORENE	2.18E-02	0.00E+00	2.09E-01	1.86E-04	0.00E+00	2.78E-02	2.80E-02	2.00E+00	2.00E+01	1.4E-02	1.4E-03
INDENO(1,2,3-CD)PYRENE	5.56E-02	0.00E+00	1.59E-01	4.74E-04	0.00E+00	2.12E-02	2.17E-02	2.00E+00	2.00E+01	1.1E-02	1.1E-03
PHENANTHRENE	8.13E-02	0.00E+00	1.40E-01	6.94E-04	0.00E+00	1.86E-02	1.93E-02	2.00E+00	2.00E+01	9.7E-03	9.7E-04
PYRENE	1.40E-01	0.00E+00	2.45E-01	1.20E-03	0.00E+00	3.27E-02	3.39E-02	2.00E+00	2.00E+01	1.7E-02	1.7E-03
Polychlorinated Biphenyls											
AROCLOR-1254	1.43E-02	0.00E+00	9.53E-02	1.22E-04	0.00E+00	1.27E-02	1.28E-02	1.80E-01	1.80E+00	7.1E-02	7.1E-03
AROCLOR-1260	2.70E-02	0.00E+00	1.80E-01	2.30E-04	0.00E+00	2.40E-02	2.42E-02	1.80E-01	1.80E+00	1.3E-01	1.3E-02

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.90E-01	kg
Food Ingestion Rate = (If)	2.53E-02	kg/day
Water Ingestion Rate = (Iw)	1.90E-02	L/day
Soil Ingestion Rate = (Is)	1.62E-03	kg/day
Home Range = (HR)	6.13E+01	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Cs = Contaminant concentration in soil
Ci = Contaminant concentration in invertebrate
Cw = Contaminant concentration in water
Total Dose = Dose (soil) + Dose (invertebrate) + Dose (water)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
SW = Surface water
NV = No Value